UNIVERSIDAD DE CÓRDOBA

Programa de Doctorado en

Ciencias Sociales y Jurídica

ESTUDIO SOBRE LAS PERCEPCIONES DEL ALUMNADO GRIEGO, DE LA ETAPA DE SECUNDARIA EN LA ASIGNATURA DE MATEMÁTICAS, REFERENTES A ALGUNOS ASPECTOS DE LA COMPETENCIA DE APRENDER A APRENDER, DESDE UNA PERSPECTIVA DE LA PSICOLÓGICA ESCOLAR EN EDUCACIÓN

STUDY ON THE PERCEPTIONS OF GREEK STUDENTS, OF THE SECONDARY EDUCATION, ON THE COURSE OF MATHEMATICS, REFERRING TO SOME ASPECTS OF THEIR COMPETENCE OF LEARNING TO LEARN, FROM THE PERSPECTIVE OF SCHOOL PSYCHOLOGY IN EDUCATION

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TITULO: *Study on the perceptions of Greek students, of the secondary education, on the course of mathematics, referring to some aspects of their competence of learning to learn, from the perspective of school psychology in education*

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UNIVERSIDAD DE CÓRDOBA

DOCTORAL PROGRAM IN SOCIAL AND LEGAL SCIENCES

Estudio sobre las percepciones del alumnado griego, de la etapa de secundaria en la asignatura de matemáticas, referentes a algunos aspectos de la competencia de aprender a aprender, desde una perspectiva de la psicológica escolar en educación

Study on the perceptions of Greek students, of the secondary education, on the course of mathematics, referring to some aspects of their competence of learning to learn, from the perspective of school psychology in education

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DOCTORAL THESIS

Georgios Tsampouris

DIRECTORAS
Prof. Sampedro Requena, Begoña Esther

Prof. Spencer-Rodgers, Julie

Cordoba, Junio de 2022

TÍTULO DE LA TESIS: ESTUDIO SOBRE LAS PERCEPCIONES DEL ALUMNADO GRIEGO, DE LA ETAPA DE SECUNDARIA EN LA ASIGNATURA DE MATEMÁTICAS, REFERENTES A ALGUNOS ASPECTOS DE LA COMPETENCIA DE APRENDER A APRENDER, DESDE UNA PERSPECTIVA DE LA PSICOLÓGICA ESCOLAR EN EDUCACIÓN.

DOCTORANDO/A: Georgios Tsampouris

INFORME RAZONADO DEL/DE LOS DIRECTOR/ES DE LA TESIS

(se hará mención a la evolución y desarrollo de la tesis, así como a trabajos y publicaciones derivados de la misma).

En líneas generales, el trabajo efectuado por el doctorando, a nuestro juicio, cumple con todos los criterios y requisitos para ser presentado y sometido a valoración.
La realización de la tesis ha requerido de cinco años, necesitando solicitar dos prórrogas y un tiempo de baja, los cuales han sido ineludibles por diversos factores, entre ellos se puede destacar las consecuencias derivadas de la pandemia sanitaria internacional (COVID-19); las tensiones laborales del doctorando, dado que es docente y parte de equipos de educación especial en su país, lo cual debido a los acontecimientos esgrimidos anteriormente a presionado los sistemas educativos de todos los lugares; y, la espera de la decisión de la editorial de la revista en la que se envió una publicación de la misma. Sin embargo, estos hechos acontecidos, y dado que al tratarse de una tesis basada en educación especial, más concretamente en la metacognición y la manera de enfrentarse al aprendizaje, no han producido detrimento la validez y transferencia de conocimiento en estos temas la temporalidad empleada.
De manera más concreta, respecto al desarrollo de la tesis, comentar que la dificultad mayor con la que se ha encontrado el doctorando, ha sido por un lado la necesidad de solicitar permisos a las instituciones ministeriales griegas para acceder a los datos, puesto que el estudio se dirige a adolescentes y, por otro, ha sido revisar y concretar la cantidad de bibliografía internacional que obra de la temática de la metacognición y las habilidades cognitivas, en especial cuando nos referimos a adolescentes diagnosticados con alguna de las tipologías de TDAH y, algunos con otros problemas asociados, en la materia de matemáticas, lo cual confiere una temática de abordaje en los sistemas educativos internacionales con el fin de mejorar las dificultades de estos estudiantes.
La fundamentación teórica realiza un recorrido desde los requerimientos cognitivos que supone las dificultades de aprendizaje de las matemáticas en cualquier individuo, pasando por factores cognitivos y emocionales que puede suponer la misma, hasta arribar en los problemas con los que se encuentra los estudiantes con TDAH y las adaptaciones curriculares que a este respecto se realizan en Grecia.
La metodología y el proceso de diseño, considera los preceptos y reglas de la investigación en el campo educativo, siguiendo el rigor científico obligado para las investigaciones de carácter cuantitativo, en cada uno de los elementos de este apartado. De manera más detallada, ha sido necesario un grado de objetividad y de protección de datos muy exigente, debido a que la investigación se dirige a

estudiantes adolescentes con TDAH, en su mayoría menores, por lo que se han empleado varios instrumentos ya validados que aporten datos sobre las percepciones que manifiestan estos, sin interferir en demasía en su rutinas escolares, para alcanzar los objetivos propuestos de investigación.
En referencia a los resultados han sido cuantiosos, correspondiendo a la diversidad de instrumentos utilizados para la recopilación de los datos y, poder responder de manera coherente y fiable a los interrogantes planteados con la investigación.
Finalmente, indicar que durante la realización de la tesis, se han enviado dos artículos a dos revistas científicas, el primero de ellos con título Metacognitive Strategies Related with Logical–Mathematical Thinking for Adolescents with ADHD, en Mathematics, JCR de 1º cuartil, cuyo DOI es https://doi.org/10.3390/math10111810. Y, otra aportación con título The relationship of metacognitive abilities of students with ADHD with their mathematical competence with the use of ICT's, en la Revista EDMETIC, con un ICDS de 7.5 en MIAR, que se encuentra aceptado y pendiente de su próxima publicación.

Por todo ello, se autoriza la presentación de la tesis doctoral.

Córdoba, 22 de junio de 2022

Firma del/de los director/es

SAMPEDRO REQUENA BEGOÑA ESTHER - 30949012M

Fdo.: Begoña Esther Sampedro Requena

Fdo.: Julie Spencer-Rodgers

DEDICATED

To my beloved people

ΑΦΙΕΡΩΜΕΝΟ

Στους αγαπημένους δικούς μου ανθρώπους

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This doctoral thesis is the completion of a great personal effort over the years as well as the contribution of many different people who generously offered their spiritual or moral help!

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Η παρούσα διδακτορική διατριβή αποτελεί την ολοκλήρωση μίας μεγάλης προσωπικής προσπάθειας χρόνων όπως επίσης και της συμβολής πολλών διαφορετικών ανθρώπων που απλόχερα προσέφεραν την πνευματική ή ηθική βοήθειά τους!

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Σας ευχαριστώ πολύ όλους!

RESUMEN ABREVIADO EN ESPAÑOL

ESTUDIO SOBRE LAS PERCEPCIONES DEL ALUMNADO GRIEGO, DE LA ETAPA DE SECUNDARIA EN LA ASIGNATURA DE MATEMÁTICAS, REFERENTES A ALGUNOS ASPECTOS DE LA COMPETENCIA DE APRENDER A APRENDER, DESDE UNA PERSPECTIVA DE LA PSICOLÓGICA ESCOLAR EN EDUCACIÓN.

1. Marco teórico

La metacognición se refiere al conocimiento que tiene la persona sobre los procesos de su pensamiento. En el estudio actual, la metacognición se define como el conocimiento del conocimiento, es decir, la conciencia de la conciencia o la ignorancia y se refiere al seguimiento y control del conocimiento.

El tránsito del nivel cognitivo al metacognitivo se produce a través del conocimiento del individuo sobre sus conocimientos básicos. A nivel cognitivo, las representaciones mentales se producen como resultado de los conocimientos básicos del individuo y se realizan determinadas acciones, que se caracterizan como cognitivas, como el razonamiento, el juicio y la evaluación. En el nivel metacognitivo, el individuo observa su nivel cognitivo para construir el nivel metacognitivo, es decir, los resultados del conocimiento metacognitivo surgen del conocimiento del conocimiento básico (saber lo que sé) (Fleming & Dolan, 2012).

Las habilidades metacognitivas más básicas son (a) la conciencia, (b) la reflexión y (c) la autorregulación. La conciencia se refiere al conocimiento de información, relacionada con el individuo o su entorno cognitivo (software, compañeros de clase, asociados, entrenador, etc.), y surge como resultado de la interacción del individuo con su entorno (Medina et al., 2017).

Los investigadores clasifican el conocimiento matemático a través del estudio sistemático de las habilidades y conocimientos individuales que los alumnos deben conquistar para ser considerados exitosos en el dominio cognitivo de las matemáticas. La mayoría de las clasificaciones a menudo distinguen la importancia y el papel de los elementos estructurales básicos, que en la terminología de Orton (1992) son: 1) retención y recuperación de datos, 2) el uso de algoritmos, 3) conceptos de aprendizaje, 4) resolución de problemas.

Las matemáticas como materia cognitiva se caracterizan por algunas peculiaridades que, si se tienen en cuenta en la enseñanza, pueden convertirse en causas de bajo rendimiento o fracaso escolar (Tshabalala & Ncube, 2016). Algunas de las peculiaridades más importantes son: 1) la naturaleza jerárquica de las matemáticas, 2) el código matemático de comunicación, 3) las formas de representación del conocimiento matemático. A continuación, se analiza y examina la naturaleza de estas peculiaridades y su posible relación con las dificultades en la evolución del conocimiento matemático de los niños. El TDAH, según Kakouros&Maniadaki, es un trastorno del desarrollo de origen orgánico -según la mayoría de los datos de investigación- que tiene un impacto negativo en muchas áreas del funcionamiento del niño y provoca dificultades graves y persistentes tanto en el propio niño como en su familia y el entorno social más amplio. Las personas con TDAH se diferencian de la media de personas del mismo nivel de desarrollo en su capacidad de concentración, control de sus impulsos y en algunos casos restringen su movilidad. Les cuesta responder a situaciones en las que otras personas lo hacen con mucha facilidad. Estas dificultades se manifiestan en diferentes contextos y pueden tener, a largo plazo, serias implicaciones para el rendimiento académico, el éxito profesional y el desarrollo socioemocional (Merrell et al., 2017). Los principales síntomas del TDAH son (a) Déficit de atención (en adelante DA), (b) Rapidez, (c) Hiperactividad.

Como se ha dicho anteriormente, queda claro que la metodología didáctica propuesta para alumnos con dificultades de aprendizaje no es diferente de la metodología propuesta para el aprendizaje matemático en todos los niños. Las dificultades en matemáticas surgen de su forma abstracta, la necesidad de generalizaciones, la peculiaridad de su lenguaje, las diferencias en las nociones entre la forma en que se usan en matemáticas y en la vida cotidiana, el uso de formas simbólicas y representacionales, y estas dificultades se diferencian por concepto y área temática. Más que diagnosticar problemas y discutir formas especiales de enfrentarlos, es interesante identificar las dificultades específicas en un eje matemático temático y sugerir métodos y actividades que pueden ayudar a superarlas.

2. Metodología

La competencia matemática implica, en diversos grados, la capacidad y la voluntad de utilizar modos matemáticos de pensamiento (pensamiento lógico y espacial) y representaciones (tipos, modelos, construcciones, gráficos y tablas). El objetivo general que se persigue con esta investigación es conocer la percepción que tienen los estudiantes de la asignatura de matemáticas de secundaria en instituciones de Grecia sobre algunos aspectos psicológicos, como la motivación hacia los deberes, el autoconcepto, la autoestima y las relaciones con los compañeros.

Más concretamente, se pueden definir los siguientes objetivos específicos:

- Determinar si existe relación entre el rendimiento académico de los estudiantes de matemáticas de la etapa secundaria (12 -15 años) en instituciones de Grecia y algunos aspectos como la motivación hacia la tarea, el autoconcepto, la autoestima, la relación con los compañeros
- Averiguar si existe una relación entre el rendimiento académico de los estudiantes de la asignatura de matemáticas en la etapa secundaria (12 -15 años) en instituciones griegas y la resolución de problemas matemáticos.

El instrumento que se empleo para la recopilación de los datos, fueron dos cuestionarios, uno de ellos denominado "Uso de estrategias" Gonida & Leontari (2012), el mismo establece tres factores o subescalala subescala que mide la ausencia de estrategias (α=.81), la subescala de estrategias de alto nivel (α=.78) y, la subescala de estrategias de bajo nivel (α=.71). Asimismo, se utilizo un instrumento de preguntas sobre el proceso cognitivo (Huertas et al., 2014), con un valor de fiabilidad notable (α=.87).

La muestra de la investigación consta de estudiantes de 12 a 15 años que asisten a unidades de escuela secundaria en Heraklion, Creta, tanto en integración como en el aula general. Los estudiantes que participaron en el estudio fueron diagnosticados con TDAH diagnosticado anteriormente (Trastorno por Déficit de Atención con Hiperactividad). La muestra fue seleccionada tanto en el área urbana como no urbana. Sería de vital importancia informar que una cantidad importante de niños con TDAH fueron seleccionados de esta prefectura específica de 17 escuelas en total. En una muestra no probabilística, como en el presente estudio, no hay forma de calcular la probabilidad que tiene cada individuo de ser incluido en la muestra. Así, la selección de la muestra se realizó de forma aleatoria a través de la característica común de los alumnos con TDAH. La situación anterior explica el hecho de que todas las muestras de no probabilidad se basan en el juicio personal del investigador en lugar de alguna forma de procedimiento mecánico para la selección de los miembros de la muestra. En un muestreo estratificado como este, primero ocurre una división de la "población" en grupos mutuamente excluidos y luego la selección de una muestra aleatoria simple de cada grupo. Después de dividir la muestra en grupos, entre las escuelas del área urbana y no urbana, la selección de los integrantes se realizó solo por conveniencia (muestreo aleatorio simple), en el que la investigación se centró en las personas más accesibles para participar en la investigacion.

Las estrategias de analisis son de carácter cuantitativo, basadas en procedimientos descriptivos e inferenciales, estos últimos basados en su mayoría en comparativas de medias (T-Student y Anova).

3. Conclusiones – Discusión

El tránsito del nivel cognitivo al metacognitivo se produce a través del conocimiento del individuo sobre sus conocimientos básicos. A nivel cognitivo, las representaciones mentales se producen como resultado de los conocimientos básicos del individuo y se realizan determinadas acciones, que se caracterizan como cognitivas, como el razonamiento, el juicio y la evaluación. En el nivel metacognitivo, el individuo observa su nivel cognitivo para construir el nivel metacognitivo, es decir, los resultados del conocimiento metacognitivo surgen del conocimiento del conocimiento básico (saber lo que sé) (Shea, 2020).

3.1 Dimensión 1: Falta de uso de preguntas de estrategia

La relación predictiva negativa de las autocreencias con la manifestación de conductas de evitación, ha sido estudiada por otros investigadores que afirman que los estudiantes mantienen una autoimagen positiva, teniendo confianza en su capacidad para tener éxito en una materia como Matemáticas, es menos probable que muestren conductas disfuncionales como autodegradación académica y evitar buscar ayuda (Bobo et al., 2013; Schwinger, 2013; Steinmayr et al., 2019). Los estudiantes que informan que no usan estrategias cognitivas y cognitivas debido a su conciencia cognitiva limitada tienen más probabilidades de evitar buscar ayuda del maestro, pero es más probable que lo hagan por otras razones, como obtener una respuesta preparada o en circunstancias inapropiadas y no como un estrategia de autorregulación (Chatzikyriakou, 2014).

Esta pregunta describe a los niños a quienes se les preguntó si les resulta difícil organizar el tiempo de su estudio de manera efectiva (falta de organización del proceso de aprendizaje), tiene un significado más fuerte para los niños de 2° grado de secundaria y de 3° grado más que para los niños de 1° grado, quienes respondieron que no les resulta difícil administrar el tiempo para estudiar. Un estudio similar indica que las habilidades ejecutivas pueden conducir a mayores niveles de autodirección necesarios a medida que los niños crecen e incluso más tarde en la universidad y las carreras (Darling-Hammond et al., 2020). Por el contrario, Zenner et al. (2014) no encuentran ninguna validación clara que exista, ya que el uso de estrategias de atención plena para monitorear y redirigir la atención ofrece beneficios para el aprendizaje en diferentes edades y, como resultado, en diferentes grupos de clase.

Otro resultado estadísticamente importante lo da la pregunta en la que se preguntó a los niños si omiten los puntos difíciles, cuando estudian Matemáticas (falta de conexión con los conocimientos y experiencias previas y falta de grado de persistencia). Los niños que viven fuera de la ciudad de Heraklion parecen tener la costumbre de omitir los puntos difíciles, más que los niños que viven en la ciudad. De la misma forma, resultados de la investigación de Taghieh et al. (2019) muestra que existen diferencias significativas entre niños de zonas urbanas y no urbanas con respecto a sus estrategias metacognitivas y cognitivas.

A los niños les cuesta estudiar de una manera que les ayude a aprender bien lo que necesitan saber, cuando tienen un examen de matemáticas (falta de organización del proceso de aprendizaje), tiene un significado más fuerte para los niños con un título de último año bajo o mediocre en Matemáticas. Los niños con buena o excelente licenciatura en Matemáticas el último año parecen no tener este tipo de dificultad. En la investigación de Young y Fry (2008) se estudiaron las calificaciones parciales y acumuladas de los estudiantes en alguno de los cursos que estaban cursando. Se encontró que existe una alta correlación entre el instrumento metacognitivo utilizado y la nota acumulada y además con la nota final.

3.2 Dimensión 2: Estrategia de profundidad y preguntas de autorregulación

En cuanto al segundo factor a investigar, estudios previos han demostrado que las estrategias básicas de aprendizaje autorregulado que se asocian con resultados de aprendizaje positivos son las estrategias cognitivas y metacognitivas (Hayat et al., 2020), que además parece que cuando los estudiantes comprenden que el profesor y sus padres están enfatizando el proceso esencial de aprendizaje, mostrándoles las estrategias adecuadas para aprender a resolver un problema por sí mismos, entonces estos estudiantes evitan conscientemente el uso de conductas de evitación, que los distraerá de alcanzar sus metas académicas (Metcalfe, 2017).

En esta subescala los estudiantes que fueron participantes en esta investigación mostró una media más alta en la pregunta sobre que tienen que resolver un ejercicio, primero tratan de aclarar lo que pide este ejercicio, mientras que los estudiantes mostraron la media más baja en que no suelen dibujar diseños o diagramas a través de los cuales se vinculan los puntos principales.

Más particularmente, podemos discernir datos específicos estadísticamente significativos, cuando se preguntó a los niños si aprenden algo tratando primero de entender su significado (uso de estrategias adaptativas), teniendo un significado más significativo para las chicas que para los chicos. De la misma forma, las chicas expresan un mayor puntaje cuando se preguntó si para resolver un ejercicio o comprender un texto, intentan tener en cuenta alguna información más antigua que pueda estar relacionada con ellos, porque eso les ayuda (recuperación de información previa). Además, se preguntó a los estudiantes si cada vez que contestan una pregunta en una prueba, la vuelven a leer, para asegurarse de que dieron la respuesta a la pregunta planteada (autocontrol y autorregulación), siendo nuevamente a favor de las mujeres, al igual que cuando se preguntó a los niños si intentan explicar las ideas principales con sus propias palabras cuando estudian (participación voluntaria en el aprendizaje con participación activa y utilización de los conocimientos adquiridos también en otros casos). Investigaciones similares indican que incluso los estudiantes de dominio numérico obtuvieron resultados más altos, no hubo ninguna diferencia significativa entre el género (Alci&Karatas, 2011).

Los niños que viven en un área urbana (ciudad de Heraklion) parecen tener este hábito de explicar las ideas principales de lo que aprenden con sus propias palabras, más que aquellos que viven en un área no urbana (fuera de la ciudad). Un resultado estadísticamente importante se deriva de la pregunta, en la que se preguntó a los niños si se les ayuda, cuando tienen que dar solución a un ejercicio o comprender un texto, tratando de recordar alguna información más antigua que pueda estar relacionada con ellos (recuperación de informacion previa), siendolos que viven en un área urbana (ciudad de Heraklion) más a favor que los niños que viven en un área no urbana (fuera de la ciudad). Asimismo, en la premisa de que los niños dibujan diseños o diagramas a los que vinculan los puntos principales, cuando estudian Matemáticas (participación activa en el aprendizaje y cultivo de la identidad personal en el aprendizaje). Esto corrobora otra investigación entre estudiantes que viven tanto en áreas urbanas como no urbanas con respecto a sus estrategias de aprendizaje, tanto cognitivas como metacognitivas por igual (Taghieh et al., 2019).

Esta rutina de recordar información relativa representa mejor a los niños con bajo o mediocre grado de último año en Matemáticas. Los niños con excelente último año en Matemáticas parecen no tener este tipo de rutina al momento de resolver un ejercicio o tratar de comprender un texto. Además, niños que realizan varios ejercicios de deberes, similares a los que realizan en clase (participación activa en el aprendizaje). Estudios similares afirman que este tipo de instrumentos metacognitivos muestran los mismos resultados en el promedio de calificaciones y pueden convertirse en una herramienta poderosa para que los pedagogos sepan qué estudiantes parecen necesitar instrucción directa en metacognición, y más especialmente en cursos grandes (Young &Fry, 2008).

Esta pregunta tiene un significado más fuerte para los niños con DA y Déficit de atención e hiperactividad (en adelante DAH), más que para los niños con Déficit de atención e impulsividad (en adelante DAI) y Déficit de atención e hiperactividad e impulsividad (en adelante DAHI). Además, un resultado estadísticamente significativo da la pregunta en la que los alumnos con DA y DAI que tienen que resolver un ejercicio, lo primero que intentan hacer es entender qué requiere de ellos dicho ejercicio. En contraposición a lo anterior, los niños con DAH y DAHI muestran una menor importancia a esta. De manera similar, una investigación de Sibley et al. (2019) muestra el afecto en niños con TDAH y sus características motivacionales y dirigidas a objetivos del aprendizaje autorregulado. Las estrategias metacognitivas reparadoras, como el establecimiento de objetivos y los motivos de implementación, pueden integrarse en estudiantes con TDAH a través de intervenciones en clase (Sibley et al., 2019).

3.3 Dimensión 3: Preguntas de estrategia de superficie

La literatura sobre el uso de estrategias superficiales establece que se espera que los adolescentes que usan estrategias eviten comportamientos disfuncionales (Petersen, 2014; Darling-Hammond, 2020). Parece, por lo tanto, que los estudiantes que carecen de habilidades de aprendizaje de autorregulación, como el uso intencional de estrategias cognitivas y metacognitivas, en última instancia tienen más probabilidades de exhibir comportamientos académicos autodestructivos, así como la cantidad de uso que se ve afectado. Estrategias de aprendizaje funcional a partir de metas de logro, individuales y contextuales, llevando a los estudiantes a utilizar conscientemente estrategias desadaptativas que actúan como medio de autodefensa (Metcalfe, 2017).

En esta subescala la muestra de 110 participantes de este estudio mostró una media más alta en la pregunta en la que la mayoría trata de aprender de memoria todo lo que cree que se les pedirá para el examen, mientras que la misma muestra de adolescentes mostró la media más baja en la situación mientras estudian Matemáticas, intentan identificar las ideas principales y aprenderlas de memoria.

Niños que intentan aprender de memoria la mayor cantidad de información posible, cuando estudian (no buscan adquirir el significado de aprender). Esta pregunta tiene un significado más fuerte para los niños con problemas del habla/trastorno evolutivo lingüístico/falta de conocimiento del idioma griego y para los niños sin otro trastorno aparte del TDAH más que para los niños con dificultades emocionales. Este tipo de estudiantes requieren una intervención basada en la escuela que integre estrategias metacognitivas reparadoras como los motivos de implementación y el establecimiento de metas (Sibley et al., 2019).

Además, se preguntó a los niños si intentan aprender todo de memoria cuando tienen un examen. Esta pregunta tiene un significado más fuerte para los niños de 1° de Secundaria y de 3° más que para los de 2°, quienes respondieron que no se aprenden todo de memoria para estar preparados en un examen. De manera similar, la investigación de Darling-Hammond et al. (2020) demostraron que las habilidades ejecutivas pueden conducir a mayores niveles de autodirección necesarios a medida que los niños crecen.

3.4 Dimensión 4: Preguntas sobre procesos cognitivos

Los resultados de aprendizaje positivos se asocian con estrategias básicas de aprendizaje autorregulado, que son estrategias cognitivas y metacognitivas (Uppal&Kumar, 2021). Este hecho también se evidencia por el deseo de los estudiantes de enfatizar por parte del docente y los padres en el análisis detallado de cómo deben resolver un ejercicio de Matemáticas, más que del rendimiento académico final (Yeh et al., 2019).

En esta subescala la muestra de los estudiantes que forman parte de esta investigación mostró una media más alta en intentar pedir ayuda cuando no comprende algo, mientras que la misma muestra de adolescentes mostró la media más baja en la pregunta que ilustra la situación mientras los niños hacerse preguntas sobre la lección antes de empezar a estudiar. Como resultado, la motivación para el logro, la adquisición de habilidades, las creencias e incluso la orientación hacia la meta de desempeño se vuelven parte de la orientación hacia la meta de aprendizaje (Schunk, 2020).

Se preguntó a los estudiantes si seguían preguntándose si podrían alcanzar sus objetivos (autocuestionamiento, autocontrol), teniendo un significado más fuerte para las niñas que para los niños. Asimismo, las chicas muestran dar más importancia a detenerse y releer cuando no entiende (autocontrol, autorregulación), que los chicos. De la misma forma, ellas son más favorables a completar un trabajo, y preguntarse si habían aprendido tanto como podían (control de conciencia), que ellos. En contraste con los resultados anteriores, la investigación de Alci & Karatas (2011) indicó que aunque los estudiantes numéricos obtuvieron mejores resultados al aplicar las herramientas metacognitivas, las diferencias no fueron significativas según el género. Además, se preguntó a los niños si se hacían preguntas a sí mismos sobre la lección, antes de comenzar a estudiar (participación voluntaria en el aprendizaje con participación activa y utilización de los conocimientos adquiridos), esta es más favorable para los niños de 1° de Secundaria y de 3° más que para los de 2°, quienes respondieron que no tienen este hábito cuando estudian. Por otro lado, los niños de 1° de Secundaria y de 3° parecen pensar más en numerosas formas de resolver un problema (uso de estrategias adaptativas de identidad personal en el aprendizaje), que los niños de 2°, quienes respondieron que no tienen este tipo de hábito, lo mismo ocurre con la pregunta en la que los niños de 1º de Secundaria y 3º hacen un resumen de lo aprendido, cuando terminan de estudiar (participación activa en el aprendizaje y chequeo de conciencia), a diferencia de los alumnos de 2º. A este respecto, la investigación de Zenner et al., (2014) indica que no se puede encontrar una validación clara ya que el uso de estrategias de atención plena para monitorear y redirigir la atención ofrece beneficios para el aprendizaje de diferentes edades.

Por otro lado, Los niños que viven en un área urbana (ciudad de Heraklion) parecen tener este hábito de reexaminar periódicamente lo que estudian(autocuestionamiento, autocontrol y autorregulación), más que aquellos que viven en un área no urbana (fuera de la ciudad). Asimismo, los adolescentes que viven en un área urbana (ciudad de Heraklion) son más favorables a detenerse y recapacitar, cuando la nueva información los está confundiendo (autocontrol y autorregulación)que los niños que viven en un área no urbana (fuera de la ciudad). La investigación de Taghieh et al., (2019), señala que los estudiantes de áreas urbanas y no urbanas presentan diferencias significativas en sus estrategias cognitivas y metacognitivas.

Un resultado estadísticamente significativo da la pregunta en la que los estudiantes respondieron que cambian sus estrategias cuando no pueden resolver un problema matemático (autorregulación). Pensar en cambiar estrategias representa mejor a los niños con un buen último año de grado en Matemáticas. Los estudiantes con grado bajo, mediocre o excelente en el último año de Matemáticas no tienen este tipo de rutina cuando no son capaces de resolver un problema de matemáticas. La aplicación del mismo instrumento metacognitivo en el pasado en diferentes grupos de estudiantes mostró los mismos resultados ya que la correlación entre la herramienta y el promedio de calificaciones fue alta (Young & Fry, 2008).

Además, los niños con DA y DAH son más favorables a utilizar la estructura y organización del texto para comprender mejor (participación activa en el aprendizaje y cultivo de la identidad personal), que los que presentan DAI y DAHI. Asimismo,los niños con DA y DAI, se detienen y vuelven a leer cuando están confundidos (participación activa en el aprendizaje y cultivo de la identidad personal), en contraposición a lo anterior, los niños con DAH y DAHI muestran que le dan menos importancia. La investigación de Sibley et al. (2019) muestra el afecto de los niños con TDAH y sus características de aprendizaje dirigidas a objetivos y motivacionales. Esta investigación indica que las diferencias de grupo son menos estables durante este período de desarrollo.

3.5 La relación entre lasdimensiones

a. Importancia en la Dimensión 2 “Estrategia de profundidad y preguntas de autorregulación”

La principal conclusión de este punto de la investigación es que a través de la regresión lineal se dibuja una fuerte relación entre la Dimensión 2 “Preguntas de estrategia de profundidad y autorregulación” y la Dimensión 3 “Preguntas de estrategia de superficie” y la Dimensión 4 “Preguntas de proceso cognitivo”. Por otro lado, la Dimensión 1 parece tener un papel reversible y disuasorio para la Dimensión 2. Debido a estos hechos, es obvio que las preguntas de Estrategia de Profundidad y Autorregulación y Uso de Estrategia de Bajo Nivel tienen un gran vínculo y podrían usarse como un parte integrante de las conclusiones. Otros estudios, demuestran que la motivación de logro, la adquisición de habilidades, las creencias e incluso la orientación a la meta de desempeño como parte de la orientación a la meta de aprendizaje constituyen un mecanismo con numerosos efectos (Schunk, 2020).

b. Importancia en la Dimensión 4 “Preguntas del Proceso Cognitivo”

La principal conclusión de este punto de la investigación es que a través de la regresión lineal se dibuja una fuerte relación entre la Dimensión 4 “Preguntas del proceso cognitivo” y la Dimensión 2 “Preguntas de profundidad, estrategia y autorregulación”. Además, la Dimensión 1 "Falta de uso de la estrategia" y la Dimensión 3 "Preguntas de estrategia superficial" tienen una relación positiva con la Dimensión 4. Debido a estos hechos, es obvio que las preguntas de Proceso cognitivo y Estrategia profunda y autorregulación tienen una gran vinculación. De acuerdo con estos resultados, tanto las preguntas que examinan el uso de estrategias de profundidad, como las preguntas que examinan el uso de estrategias de superficie, así como las preguntas del Proceso Cognitivo constituyen un factor, el del uso de estrategias, mientras que las preguntas relativas a la ausencia de cualquier tipo de estrategias constituyen un segundo factor.

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INDICES

Study on the perceptions of Greek students, of the secondary education, on the course of mathematics, referring to some aspects of their competence of learning to learn, from the perspective of school psychology in education

1. INTRODUCTION

The organization and operation of the education and training system is the largest enterprise in each country. Perhaps the most important of mankind's achievements in recent years is the particular emphasis given by states on the development of youth education and education.

Previously, one intuitively sought to answer the questions posed by pedagogical reality. He cited and cited the opinions of 'prominent' pedagogues and pedagogical 'authentic', without referring to facts. He did not investigate whether the personal opinions of the 'original' were based or based on facts, and whether these events were observed and studied under the strict rules of scientific methodology and ethics. The first pedagogues seem to have believed they were endowed with a sort of insight that made them omnipotent and infallible. This fact, coupled with the low level of education of society, slowed acceptance of the scientific method in the study of pedagogical problems, events and situations.

Today Pedagogy has come out of dogmatism and empiricism. Pedagogical dogmatism is superseded by pedagogical experimentation and research. The scientific spirit has entered into the study and addressing of school and educational problems and situations. Scientific methodology, based on reason and the right reason, seeks to replace pedagogical opinions with evidence and knowledge, theories with facts and generalizations with precise and specific elements.

The Founder of Scientific Pedagogy, A. Binet, writes: "In Pedagogy everything has been said, nothing has been proven." Nowadays, Pedagogy attempts exactly this, to test and control what has been said and said about education and education (Nicolas et al., 2014). In order to answer the various questions posed by the daily reality of education and education, it collects facts, makes comparisons and correlates among them, considers them from various sides in order to discover their causes and their effects. But in order to reveal their causal or functional relationships, Pedagogy measures, evaluates and interprets the facts.

Study on the perceptions of Greek students, of the secondary education, on the course of mathematics, referring to some aspects of their competence of learning to learn, from the perspective of school psychology in education

Pedagogical experimentation and scientific research in general are now considered to be powerful, legitimate and useful means to solve pedagogical problems. It is necessary, however, that the principles, methods, techniques, and generally the research process have been sufficiently assimilated in order to keep the education of the pupils a dominant target of the research.

Pedagogical research and generally all studies aimed at improving educational reality should be the subject of collaboration between teachers, administrative staff, specialists and all those involved in education and education. The education and training of teachers in scientific pedagogical research helps to conduct valid pedagogical research and to establish the necessary communication between producers and consumers of psycho-pedagogical knowledge.

The psychological concepts measured by psychometry usually relate to common characteristics of individuals (e.g. knowledge, attitudes, personality) that experience has shown us to have a practical significance in understanding and predicting the behavior of individuals. It is logical that psychometry has many applications in education as well. Over the years, many ways of psychometric assessment of various characteristics have been attempted.

More specifically, in recent years, specialized research by sector of education has led to the study of the learning difficulties of pupils in mathematics. The significantly greater difficulty of the majority of peers or the inability of some pupils to meet the requirements of certain school curricula, despite the absence of any apparent causative factor and the demonstration of sufficient competencies in other school and non-sectoral disciplines, is one of the difficult but also more interesting problems faced by modern pedagogy. After several decades of dealing with difficulties in the field of reading and writing, the attention of researchers has been systematically turning to the difficulties encountered in the area of mathematics. Among the factors contributing to this shift, several factors are important. Firstly, the fact that in many areas of human activity there is widespread use of the symbolic system of mathematics. Therefore, any difficulties in understanding and using mathematical concepts and skills are now a major obstacle to the socialization of the individual (English-Clarke et al., 2012). In addition, the documentation of the fact that mathematical competence retains its autonomy despite its undeniable relationships with many other cognitive domains and most of the processes that make up the human learning mechanism. This means that studying the difficulties in learning mathematics is an autonomous research field and not the complement of research efforts in reading and writing (Green, 2014). Study papers showing that, while many pupils with low grade language skills have a particular need and specially designed mathematics teaching, they are not properly supported due to shortcomings in relevant scientific knowledge (Li et al., 2019).

Although the need for a thorough examination of the difficulties encountered in learning mathematics is generalized, however, the steps taken in this direction are not sufficient. As is widely acknowledged, if there is a common ground among scholars of learning difficulties in mathematics, this is that research is still in its early stages (Li et al., 2019).

The writing of this paper aims to provide a comprehensive picture of modern knowledge about the factors on which the development of mathematical knowledge and skills depends, as well as the conditions under which these factors can turn into obstacles to mathematical progress. In addition, it aims to critically examine the possibilities of evaluating the learning difficulties in mathematics and to provide clear information on the most appropriate selection procedures for teaching objectives and the preparation of relevant programs. Finally, it will offer techniques and strategies to support children with learning difficulties in mathematics and methods of dealing with specific mistakes.

This research focuses on children who show energy and motor activity to an unreasonable extent over other children of the same age, as they find it hard to keep their attention and interest in school activity, they are very often misleading and lead adults in over-simplified explanations that offend them and stigmatize them. Often, in the classroom, easy classifications that result from ignorance many times, such as naughty children, careless or indifferent, are often heard in the classroom. The limited or erroneous expectations of important adults for these students are a brake on their psychosocial development and happiness, since their self-esteem is affected. Many times, their unadjusted behavior causes the anger of important adults from a mistaken impression that they do not respect them or are inadequate and do not manage to master the difficult behavior. Results from experiential groups have shown that when teachers' feelings are expressed then they can manage to find the solutions.

The reasons that have led us to choose a work on psycho-pedagogical treatment of ADHD in the classroom are that these people are receiving a great deal of attention from health systems, justice and education, and other social services. They have higher injuries rates and are a high-risk group for anti-social behavior. The degree of frustration among parents and teachers is high, and parents' disagreements about the nature and handling of the child's difficulties and behavior are common (Merrell et al., 2017)

2. THEORITICAL FRAMEWORK

2.1 Cognitive requirements and difficulties in learning mathematics

The mathematical knowledge is categorized by the researchers through the systematic study of the individual skills and knowledge that pupils are required to conquer in order to be considered successful in the cognitive domain of mathematics. Most classifications often distinguish the importance and role of basic structural elements, which in A. Orton (1992) terminology are: 1) data retention and recall, 2) the use of algorithms, 3) learning concepts, 4) problem solving.

2.1.1 Data Retention and Recall

Mathematical knowledge requires memory to be retained and data recovered (numeric data, terms, symbol formulas). Types of memory, such as working-short, long-term, sequence memory, are involved in this process, aiming at the automated use of the above data (Orton, A., 1992). Automating the recall of arithmetic data is considered to be of key importance in performing complex tasks, such as multipath numbers and problem solving. If a student does not have the data, but needs to be tired of calculating each partial sum, difference, product or quotient, he pays a significant part of his attention and short-term memory, he is tired and cannot meet all the requirements of a complex (Re et al., 2016). Students who, while aware of the role of the 'prisoner' in an addition, forget to use it, busy finding partial sums, are a representative example.

The association of long-term retention and automated use of data with continuous practice and repetition contradicts newer views that accept long-term retention presupposes comprehension as opposed to non-learning (Camina, E. & Guell, F., 2017). The teaching of mathematical data aims both at cultivating the ability of creative use in school lessons (problem solving, physics, chemistry) and within the practical needs of everyday life. It goes without saying, of course, to these goals in time, the formal satisfaction of the requirements of the curriculum. The generalized use of mathematical skills requires the understanding of the meaning of the various data. Therefore, it is argued that memorization should be postponed until the creation of sufficient conceptual foundation (Orton, A., 1992). In addition, each new learning must be integrated into an organized network of interrelated knowledge in order to assimilate it better (Parisi et al., 2019). Numerical data, symbols, terms and formulas must be clear not only as to what they are claiming, but also how they relate to each other, why they work and when they are used, so that the child is not idle when it cannot immediately recall required data from memory (Hernandez & Chapa, 2010). The knowledge of the child must form a conceptual structure rather than being individual pieces of information (Committee on the Science of Children Birth to Age 8, 2015). A representative example would be the term 'minus' which, in order to have the necessary functionality within the mathematical vocabulary of a child, must have a coherent knowledge and unity with the corresponding symbol, with the words' minus',' , 'out' and the types and situations through which it is used.

There is a perception that in the early stages of the student's contact with mathematics it is logical and unavoidable to transmit some elements with mechanical recognition and the "stimulus-reaction" pattern of classical dependent learning. The prevailing view among scientists is that weight in teaching should be given to understanding the meaning of the data used and then to memorize their symbolic expression (Hernandez & Chapa, 2010).

2.1.2. Use of Algorithms

Algorithm is a set of rules, precisely defined, showing how to obtain defined output information based on given input information after a finite number of operations (Simanowski, 2018). The specified steps taken to execute operations with integer, fractional or decimal numbers are common examples of algorithms. Algorithms are an essential part of mathematical knowledge. Memory is important in the ability to use algorithms, since algorithms consist of many and stringent steps, especially at a more complex level than in the case of numerical data (Hernandez & Chapa, 2010).

Often students use algorithms and find results of actions without actually understanding the meaning of the process that follows. This has the effect of causing students to mistakes when they have to deal with situations with common elements, although they are not exactly the same. For example, students who mechanically perform two-digit numbers with a prisoner, when they are called to do three-digit numbers, may attempt to transfer all prisoners to the hundreds of columns by not correctly knowing the importance of the site's value and generalizing the ' we add to the left column '. Everyday life mainly supports the meaning of algorithms. The inability of some children to grasp the importance of some elements of the algorithms is mainly due to the ignorance of this meaning. For example, the need for divisions to be the remainder always smaller than the divisor are the 'no-logical rules', which, according to R. Skemp (1976), constitute 'instrumental understanding', which is contrasted by the knowledge of what I do and why I do, which is characterized as 'relational understanding'. The same researcher continues that correlative comprehension: 1) is more adaptable to new situations; 2) is easier to remember; 3) can more easily be a learning motivation; and 4) provides the basis for further conceptual development. Otherwise, memory is burdened by instrumental understanding when there is no point in the recall. Performing multiplication with a prisoner is a representative example of such a case where students first add the prisoner to dozens and then multiply with the units by moving the actions they make to add to a different context of multiplication. Students with inherent memory weaknesses maximize the difficulties described above.

The fact that correlative understanding offers a wealth of advantages cannot be omitted from the value of instrumental understanding. As R. Skemp (1976) notes, instrumental understanding offers direct positive reinforcement and a sense of success to students by ensuring correct - though not understandable - answers to the teacher's questions. It also offers spiritual power savings through standardized responses to familiar problems. In addition, A. Orton (1992) reports that there is evidence to support the view that instrumental understanding can facilitate correlation if used correctly. Certainly the use of instrumental understanding as a unique approach to mathematical knowledge should be avoided. Algorithms are quite dependent on the child's visual and spatial abilities in their application process by performing numerical operations, although they are a specific sequence of actions. The correct perception of the structure and the editorial part of the numbers (series of digits - positive value), the beginning of execution of the act from the right point (column, number), and especially the placement of the digits in the correct columns in the finding of some results; the transfer of higher order digits ("held") presuppose the seamless operation of spatial perception (National mapping division, 1990). It is worth noting that it is possible for a student to conquer the order of the algorithmic steps verbally, but not to be able to carry out the actions in the order in which they are worded (Bellettini et al., 2014).

2.1.3. Learning Concepts

It is known that concepts describe some regularity or relationship within a set of data and are represented by a signal or symbol. The set, number or addition could be an example of mathematical concepts. Through these, the user is given the opportunity to adapt to new situations already conquered concepts, which are the main element of the symbolic power of mathematics. At the same time, these concepts often imply a lot of difficulties in the lesson, since their inability to understand is behind poor performance (Hernandez & Chapa, 2010).

In the context of preventing difficulties, the question arises as to how to learn the concepts. Relevant research concludes that a concept cannot be conveyed as a ready-made knowledge by someone who holds it to someone who ignores it (Orton, A., 1992). Conceptual development requires that the student develops relationships between various old or new information units (Darling-Hammond, 2018). This construction is of a personal nature and depends on the student's previous knowledge, experience and attitude towards the subject. As a result, the pupil is at the center of the learning process, having as active a role as possible. An example could be the case of a student who has doubts whether the deduction of the balance is always less than the deductible and whether he or she should accept a series of verbal explanations in the event of an error. This particular student would have to apply a series of deductions, which will be executed with a variety of material, so as to observe the relationship between the deduction and the remainder, ultimately leading to a relative conclusion. Therefore, the teacher should, in such a case, help, encourage and guide the student in order to synthesize the qualities and characteristics of the concepts. In educational reality, where students with different backgrounds interact with each other, it would be appropriate to use a variety of teaching methods to approach the individual needs of each student. The exclusive use of a particular teaching tool or method actually contributes to the creation of associations rather than concepts, drastically limiting the possibilities of generalizing knowledge and transferring learning (Alosaimi, 2016). There are cases of children who perform the four acts exclusively using specific material, because the numbers only make sense through this material. In conclusion, the teaching of concepts requires the use of various methods, such as teacher's analysis of concepts, discussion of concepts between teacher and pupils, representation of concepts through specific materials, or discovery of concepts through problem solving. The fact that some students approach reality in different ways requires the use of many methods and stimuli. There are students able to handle verbal descriptions of a concept with ease and lead to practical applications while others perform first that they are taught and then pass on their verbal speech.

The use of successful positive and negative examples also plays an important role. Positive examples should be chosen in such a way that only the properties that form the concept have the same meaning, while the negative examples should be clearly distinguishable from the positive ones (Romppel et al., 2013). For the concept of addition, for example, positive examples are cases of union, accumulation, elongation, synthesis, etc., while negative examples are cases of abstraction, detachment, cut-off, consumption etc. (Simanowski, 2018). Particularly in the case of complex projects and multifaceted concepts, words and skills, the selection of positive examples needs special attention.

Mathematical concepts are related to their chain linking. Thus, the student has the need to control the extent to which he has conquered the "preconceived" concepts, before learning a new, higher order concept (Skemp, R., 1976). A representative example is the conquest of the honorary value, a prerequisite for the understanding of the "detained" in multiplication. The lack of understanding of this algorithm makes it a mechanistic application of a sequence of actions.

2.1.4. Problem Solving

In mathematics, problem solving is the process of finding those who request a statement or proposal that describes quantitative relationships between different elements. In order to find those who are asked, the data in the proposal (problem) and other elements and suggestions, whose truth and power we already know, are used (Re et al., 2016).

The stages of solving a problem are: 1) the translation, the transformation of the elements of a problem into a mental representation, 2) the integration, the combination of individual representations into a comprehensive, comprehensive mental picture of the problem, 3) the design, ie the inventing and controlling of a solution plan, 4) the execution, the conversion of the plan into specific numerical operations and the finding of the result. The first three stages described above are of a qualitative nature, while the fourth quantum is intended to present the solution in numerical form (Maehr, 2001).

In order to represent and solve such problems, different kinds of knowledge are necessary: 1) linguistic knowledge, knowledge of the structure of the Greek language and the meaning of words, 2) factual knowledge, knowledge of the environment, 3) knowledge of models 4) Strategic knowledge, knowledge of how to develop a plan to solve and present an appropriate answer, 5) Algorithmic knowledge, knowledge of how to execute the tasks (Maehr, 2001). In the case of deficiencies of the above knowledge, various mistakes arise such as: 1) mismatch between the mental model of the problem that the student constructs and the situation described in the problem, 2) mismatch between the mental model and its quantitative expression (Volkamer & Renaud, 2013). Kirbulut & Beeth (2013) argue that the inability to construct the appropriate representation of the problem is the main cause of children's wrong answers to verbal numerical problems due to misconceptions, conceptual inadequacy and inadequate knowledge of processes. According to Santrock (2016), it is proposed to classify the verbal problems according to the type of the described situation into 4 categories. More specifically, they can be distinguished in 1) problems of change, 2) combination problems, 3) problems of comparison, 4) simulation problems.

According to Re (2016), important aspects of successful problem solving with regard to younger children are: 1) the ability to execute operations, 2) the level of acquisition of the mathematical vocabulary, and 3) the degree of burden of short-term memory by the terms and extent of the problem. One way to reduce the burden is to improve the reading speed, as the number of constrained words decreases (Re et al., 2016). Using appropriate strategies and procedures depicts the individual's ability and also plays an important role in order to drive speedy and secure the execution as well as the organization of the resolution plan given.

Lately, researches of the student's skill to select the appropriate problem-solving strategy have essentially driven to an indicator of whether the individual "knows how to learn", i.e. his metacognitive competence (Agaliotis, 2009). Characteristically, Diaz (2015) reports that poor development of metacognitive capacity occurs in children who are unable to find what they will do without having previously been guided by the plan to solve a problem.

In addition, according to modern pedagogical psychology, the self-esteem of the individual in terms of his particular cognitive activity is an important contribution. This alleged ability, avail- able, is a catalyst for the persistence of the individual in designing and implementing the problem solution (Romppel et al., 2013). A person's negative view of his / her abilities has a negative impact on the solution of mathematical problems to a maximum extent with respect to any other structural element (Senko & Dawson, 2017).

2.1.5. Native features of mathematics as a source of learning difficulties

Mathematics as a cognitive subject is characterized by some peculiarities which, if taken into account in teaching, can evolve into causes of poor school performance or failure (Tshabalala & Ncube, 2016). Some of the most important peculiarities are: 1) the hierarchical nature of mathematics, 2) the mathematical code of communication, 3) the ways of representation of mathematical knowledge. The nature of these peculiarities and their possible relationship with the difficulties in the evolution of mathematical knowledge of children are then analyzed and examined.

2.1.5.1. The hierarchical nature of mathematics

Mathematical concepts and skills are structured in a strict hierarchical way and resolutely rely on their predecessors (Linnebo, 2013). Any incomplete coverage of curriculum sections may lead to a collapse of the mathematical structure and failure in learning. Mathematics inherently requires particular consideration and assessment of learning difficulties, as the student moves to the next chapter of the subject, he must have acquired the prerequisite knowledge (Scherer et al., 2016).

2.1.5.2. The mathematical code of communication

In mathematics the code through which ideas and situations are expressed is a source of difficulty. The words and symbols used for mathematical communication have a very special way. Mathematical terms and symbols refer to all existing entities, actions and situations, and at the same time to none at all. This situation leads to necessity in teaching specific use of the language. Additionally, the representation of mathematical concepts requires special attention and accuracy (Agaliotis, 2009).

A common view of researchers such as Darling-Hammond (2019), which suggests that children develop mathematical skills embedded in a comprehensible system of needs and activities. The same goes on to say that, nevertheless, children entering the organized education system are forced to link their pre-existing ideas and skills to the official code of communication of mathematics, trying to restore a cognitive balance in this transition.

2.1.5.3. The ways of representation of mathematical knowledge

According to Santrock (2016), Cognitive Psychology, among other things, leads to the conclusion that a person learns when he has the ability to construct knowledge on his own. Agaliotis (2009) adds that the active construction of knowledge is achieved through the representation of reality. As Metsamuuronen & Rasanen (2018) refer that Bruner separated the representation into 1) practical, 2) figurative, and 3) symbolic. The transactional representation is mainly kinesthetic and tactile. The figurative representation is based on the use of concise images and graphs. Finally, the symbolic representation is characterized by abstract symbolic systems and simultaneous thinking on possible real events. It is true that the three kinds of representations have a direct connection between them and the absence of conquest of one directly has an impact on the rest. The Lingefjärd & Ghosh (2016), argue that especially in the teaching of mathematics, used the mathematical symbolic system to learning with understanding can lead to the representation of reality and the child is able to understand the concepts representations through concrete materials, symbols and images.

2.2 Educational Neuroscience

The “brain-based learning” arised the last 20 years by teachers who are interested to make inferences through research in neuroscience on classroom routines. Bruner gave a name to this movement as the “bridge too far” as the professionals-pedagogues did not appear sufficient comprehence of the subject as a result to make indefensible jumbs (Price, 2000). Even if there was an interesting movement from scientists to communicate knowledge to professionals-pedagogues, there was a lack of teaching experience, and more particularly to K-12. Skepticism and competitiveness overshadowed this specific field, as there was a significant current of confrontation between many specialists of educational psychology, cognitive psychology, education, neurology, and neuroscience about giving recommendation tips to pedagogues. There was a part of them who did not believe at all in such a bridge across the fields (Howard-Jones, 2014). Cross-conversations emerged through disciplines, as the movement became more popular. Scientists' presentations and publications to teachers gave to educators the appropriate knowledge more deeply, credibly, even the persistence of the neuromyths. At the moment, three decades after Bruner's "bridge too far", between neuroscience and education is being made a credible bridge, through educational programs which are offering much in Educational Neuroscience. It would be important to mention the recruit, qualificantiona and training inconsistence of these programs. So School systems as Universities do not give recognition on this field of expertise and do looking for input and getting information in either neuroscience or K-16 education from such a unqualified (the movement in the United States that brings together the various levels of education for younger students). The professional presenters of "Brain" are not experienced in neuroscience but still offer keynotes and professional development as the Neuromyths exist (Howard-Jones, 2014). Educational Neuroscientist needed a more understandable definition, deep knowledge of of curriculum scientific interventions, and even more instances from neuroscience that drive to educational rectification which could improve the bridge between neuroscience and education. On the same time that scientists have the belief of having the translating research qualifications to converse with teachers, teachers appear to be able to make implications in the class. In the same way the battle of the most qualified professionals continues with educational psychologists beliefs. However, the primary issue of what to do remains. Undoubtedly, research and practice are the essential ingredients for education to be reformed. The question that arises concerns the way of reducing the achievement gap between neuroscience and interventions. When Educational Neuroscience is considered as an authentic field, it faces firstly the enthusiasm of the beginning, the overgeneralizations and afterwards by training the improvement in both ways, as so research as practice enhance. A Nature Neuroscience journal (The science of education reform, 2006) argues that the practice of psychology is more like medicine than teaching is. For instance, psychologists could recommend the viable technique of 'reframing' by imagining teaching as an art and a science simultaneously and the diverse ability of well-educated teachers of taking the information and using it wisely.

2.2.1 Defining and Training the Educational Neuroscientist

It would be essential an experienced 'hybrid' specialist, in neuroscience and education as well (Howard-Jones, 2014). Scientists usually find it difficult to talk to teachers. A usual way to present scientific information drives many educators to use that presentation style, by making the comprehencing mistake as Paul Howard-Jones calls it, the teachers' perspectives and needs or the "cultural conditions and concepts of education" (Howard-Jones, 2014). In addition, scientists have not taught unmotivated or struggling learners. As a result they are not able to jump into practice if they are not experienced in such a field (Howard-Jones, 2014). "Translational efforts should be guided by determining what problems teachers currently face in the classroom, and should be evaluated based in part on their experience of what works" (The science of education reform, 2006). An additional useful information is that pedagogues are nou used to study the scientific body of literature but on the other hand they are getting informed by a presenter with sometimes weak or incomplete knowledge of the field. As a result, it is impossible to give an answer or even comprehend the literature of science and its limitations in thinking, critiquing or in neurobiological research design. Even teachers, as analyzed above, are not integrated informed, they do have the ability to be, so in understanding as in practice. Consequently, the main need in this system of different professionals is a person educated across regulations (Howard-Jones, 2014). The main issue is the way people are trained to 'translate'. The basic role of the educational neuroscientist is transform in the most useful and credible way the research into practice. The development of a training program would be the most serviceable way to train somebody from education or from science. For instance, some institutions begin their training with the scientists who are getting learned some theory of education. A useful recruitment could involve both teachers and scientists in a cross-training program. The first step could be a student teaching practicum fro the scientists, not in a specialized laboratory school associated with for instance university, but in real conditions of poverty where learners struggle, by giving the guidance of the program to the teacher. The next step could be a specialized neuroscience program where experienced classroom teachers would conduct research in a neuroscience lab and the presence of a scientist in this situation. Such a program would require a practicum, literature from both domains. Discussions in groups between scientists and educators who would share perspectives and styles of thinking and speaking would be ideal. The graduates afterwards would have so credentials as the valuable experience in both fields so of education as of neuroscience. In such a program someone can see research through the eyes of a teacher and teaching through the eyes of a researcher as well. These dual perspectives provide valuable awareness into scientific and educational research design and implementation of new intuitivenesses to reform education (Howard-Jones, 2014). In a small pilot study, where perceptions and educators had the opportunity to develop the formulation of questions in the research of dyslexia, they looked at subtypes and found some interesting indifferences between anatomical measurements (Peterson et al., 2013). Lately, an emerging research in the classroom shows that reading subtypes could guide to specific individualized strategies. Therefore, we can recognize the value of having input through researching learning, from science and education simultaneously.

2.2.2 Informing Professional Development and Classroom Strategies

Is Educational Neuroscience able to give directions to classroom practices? There is no direct relationship as critics contend (Zadina, 2012). Awarenesses that neuroscience can bring, has as a primary condition interventions and studies required for the whole school society. The overall understanding of best practices and our previous classroom practices is that we use education and theory of psychology and research and previous experience. The research of child development and psychology of education require deep comprehence of neuroscience research. Educators should attend professional development work-shops in order to stay updated of motivation, physiology, emotions and brain findings of science. The information above has the ability to inform the comprehence of students and the possibility to create an effective lesson. The use of specific terminology for brain and skills of presentation, as well as the knowledge of scientific literature, are characteristics that are missing from a person who recruits. Therefore, credentialing programs needed in the field of education in order to understand the brain as a complex. The jump from research to professional development can be made by well trained presenters. A continuous educating culture is something makes teachers to feel validated and supported, through modifications of a new understanding level. Neuroscience of education can promote new strategies and the neuroscientists with teaching background might think of classroom strategies in an alternative but basic way.

For instance, an important step in the developmental scale is for somebody to count his fingers, as neuroscience research indicates (Berteletti & Booth, 2015), and the above shows that the brain has the mental ability to use finger representation when the child learns maths. Noël (2005) investigated and found that the ability of telling which fingers touched has a straight connection with the children's and adults' mathematical ability. Kaufmann et al. (2008) that the use of fingers should not be discouraged during learning maths so as the intervention for children and adults who face difficulties in mathematics is usually based on this kind of knowledge. It is not always the same to use an intervention in the same way because students do not learn obviously in the same way, so neuroscience offers a new alternative for learners who are getting struggled. Moreover the above, an educator is prevented to tell to a child not use its fingers for counting because of being too old for this habit. On the other hand, a well educated teacher with knowledge of neuroimaging, who comprehents the stages of development and the learning differences, has a positive impact on their practices and the outcomes for children (Howard-Jones, 2014). Literature indicates the fact of processes underlying thinking and thinking as an invisible factor of classroom pedagogues. Such kinds of understandings help educators to explore interventions more targeted. In the past, teachers would do much repetition and practice for a child that hadn't the ability of arithmetics with the hope of succeed through it. On the other hand studies have shown recently that mental processes can control this kind of tasks. For instance, working memory problems appear as a math or reading understanding problem. An investigation about the role of working memory in mathematical performance shows the students' quick absence of information in their memories in order not to be able to end a math problem (Diamond, 2011). This problem of working memory capacity could be improved through training more than just giving students mathematical problems to solve and fail because of deficit not relevant to math concepts. Jaeggi's lab (Jaeggi et al., 2011) discovered that "fluid intelligence can be improved by rehearsing a working memory task."

Functional magnetic resonance imaging (fMRI) shows more demand on working memory especially for students who initially learn (Bennett et al., 2013). Educators who comprehend cognitive load theory have the ability to teach alternatively, by giving more time limits in the process and creating lessons in a way that can give directions to the effects of working memory limitations as well as cognitive loads. A second underlying process of attention is related with the working memory. The ability to control attention predicts the working memory capacity as Peng et al. (2018) reports. This fact shows the importance of attention training in the improvement of control attention. Classroom strategies appear a great value in the improvement of attention. According to Helen Neville's lab (Peng et al., 2018) a children attention training daily and IQ measures improves significantly attention. Socioeconomic status (SES) and achievement has a positive correlation according to education research (Liu et al., 2019). Neville's (2013) findings after applying attention training show that, low SES students appeared in achievement just like the high SES students. Sturm et al. (2006) findings about attention training make more general the improvement on tests related to intelligence. Improvement in class can be achieved through attention training behavior by making students to become better in conflict resolution (Sturm et al. 2006). Mindfulness meditation (Kerr et al., 2011) improves attention mechanisms and might become a beneficial strategy in classroom. Children often feel anxious or stress-related to specific issues. Such issues make educators to be careful of the way of learning. Post Traumatic Stress Disorder (PTSD) is related in populations which exist in classrooms and suffer from natural disaster, violence, poverty, migration/immigration, and sexual, domestic, or child abuse (Kim et al., 2013; Liu et al., 2020). It would be vital for school populations who suffer from trauma to comprehend the results of school curriculum (Peterson, 2013). Additionaly, educators challenge math and reading anxiety in the class. Cisler & Koster (2010) advice that anxiety is related with students' ability to attend by mechanisms highly disrupting. PTSD is effected by mindfulness (Kim et al., 2013; Liu et al., 2020) and could belong to the non-pharmacological interventions for children with trauma. Theory and practices revealed from neuroscience are sometimes being cancelled from conversations related to education. Neuroscience research is not supporting learning styles theory that has tken class time and misdirects students' efforts (Furey, 2020). Brain regions and revealed multiple pathways which are getting involved in learning is getting up on the surface of complexity of the interactions through neuroimaging studies (Peterson, 2013). Neuroscience research discloses the importance of vision in learning, while learning styles theory shows the importance between learning visually, auditorily or kinesthetically (Rees et al., 2016). Therefore, a suggestion and a positive guidance for educators is to make lessons more visual and remind them that students use brain resources and increase cognitive load, as a result images must have a specific meaning.

Neuroscience research has revealed other factors influencing state math anxiety's (hereinafter, MA) impact on performance. Patterns related to brain activation of individuals with high MA were studied by Yang et al. (2017). Students who begin with a mathematics task performed better, do appear more activation in a network of the inferior fronto-parietal region of the brain. Research has linked this neural region to reappraisal, which is a form of emotion regulation that involves transforming the emotional impact of a situation by changing how the situation is perceived (Grupe et al., 2018). The activation of the brain patterns of individuals with high performance with MA showed that they reappraise their anxiety when expecting the mathematics task, thereby the negative influence of anxiety on performance is reduced or eliminated at all (Yang et al., 2017). Investigations about neuroscience find that successful reappraisal of negative emotions indicate a balance of amygdala-prefrontal circuitry which is opposed to that seen in conjunction with anxiety (Hoshi et al., 2011).The findings above, provide an explanation for regulating teaching emotion strategies to students with MA to make them be able to reappraise their anxiety (Yang et al., 2017).

Anxiety, is shown by cognitive psychology and neuroscience studies that has a direct or on-task effect on performance with specific mechanisms that admit MA to do this effect. MA influence performance in two ways as Yang et al. (2017) argue. First of all, situations noticed as threatening, draws on parts of the brain that are implicated in problem-solving draw down the interpretation of the physiological reactions. As a result, these abilities above do not allow to complete the tasks of mathematics and achievement ails. In addition, anxiety has negative impact on the working memory (Moran, 2016), which is crucial to solve a problem. This connecting anxiety is linked with a model of on-line MA suggested by Yang et al. (2017). This model argues that a part of MA interruption of the function of the cognition is related to invasive thoughts during the process of the working memory. Many investigations agree with Ashcraft and Kirk's model of the affection of MA on working memory (Yang et al., 2017). The relationship between state MA and performance is complicated more than Ashcraft and Kirk's model proposes. The degree of the task's irrelevant thinking interfering with students' performance is affected by their msthematical competence (Getahun et al., 2016). MA's impact on performance can also be influenced by working memory capacity as well. Children with higher than the mediocre memory capacity can have greater impact of their anxiety on performance (Sperling et al., 2004; Yang et al., 2017). In contrast, Scherer's et al. (2016) findings show better performance for the adults with high MA and working memory compared with those with lower working memory capacity.

The science of Neuro-Education is a nascent discipline that seeks to blend the collective fields of neuroscience, psychology, cognitive science, and education to create a better understanding of how we learn and the way this information can be used to create more effective teaching methods, curricula, and educational policy. Though still in its infancy as are search discipline, this initiative is already opening critical new dialogs between teachers, administrators, parents, and brain scientists.

Learning, as well as teaching, are intricately intertwined with brain function. researchers in both education and neuroscience, yet for many years, have worked far apart in silos—often within sight of each other across a university campus, but worlds away in forming hypotheses about how people learn, investigating those learning processes, and finally, translating findings into practice. Thankfully, that is changing. Nowadays, new opportunities exist for informing the practice of teaching and learning within the broad discipline of neuroscience. This is good news, because more than ever, we need to figure out how to teach our children how to learn.

2.2.3 How can Neuroscience help?

Research is not only about well- defined problems, but also for big societal issues. It is not news that neuroscience and related fields have done an extraordinary job of creating vast amounts of knowledge. Every day, useful information, data, and perspectives on important learning topics are being generated by new research, exploration, and inquiry. Much of this knowledge is shared through academic circles, although for the most part it has used outside of disciplines to inform larger issues and not been widely shared. The fact is that the ‘‘translational’’ potential of this work is often not discovered, explored, or further evaluated. The field of neuroscience is ripe for expanding its translational reach. ‘‘Neuro-Education’’ is still a relatively new and developing area. Recently, a presidential initiative was created, a Neuroscience Research in Education Summit (Society for Neuroscience, 2009). Such a fact gave rise to a working group that has formed into a Neuro-Education Leadership Coalition that is working together to further the development and strategic integration of this nascent area. It seeks to blend the collective fields of neuroscience, psychology, cognitive science, and education to create more effective teaching methods and curricula and, ultimately, to inform and transform educational policy.

Nevertheless still its infancy as are search discipline, this initiative is already opening critical new dialogs through the development of a common language between its primary partners, teachers, parents, and brain researchers. The more each discipline approaches its work with common terminology, new traditions, and learning outcomes in mind, the faster and stronger a new community and field will be formed, while this will take time and is a complex task.

It is not news that neuroscience and related fields have done an extraordinary job of creating vast amounts of knowledge. Everyday more and more useful information, data, and perspectives on important learning topics are being generated by new research, exploration, and inquiry. While much of this knowledge is shared through academic circles, for the most part it has not been widely shared and used outside of disciplines to inform larger issues. In addition, we have to consider the fact that the ‘‘translational’’ potential of this work is often not discovered, explored, or further evaluated. The field of neuroscience is ripe for expanding its translational reach. ‘‘Neuro-Education’’ is still a relatively new and developing area. The more each discipline approaches its work with common terminology, new traditions, and learning outcomes in mind, the faster and stronger a new community and field will be formed.

2.2.3.1 Cognitive neuroscience studies influence educational research

Cognitive neuroscience can influence (mathematics) educational research through the study of the neural basis of arithmetic learning. This kind of research is helping to isolate and dissociate specific sub-processes that are part of school-relevant arithmetical projects. The neural correlates of basic number processing and arithmetic learning have been reviewed recently by Sommerauer et al. (2020). The integration of these findings with cognitive and educational theories may yield a better and deeper understanding of children’s learning routine. The basic challenge of this endeavor is in combining the specificity of neuroscientific findings with a wide variety of educationally relevant variables taking place in any learning case.

It would be important to note that most of the available neuroimaging studies have been carried out with adult participants. The application of existing findings to children’s learning of mathematics needs to be exercised with caution. Indeed, the majority of these adult studies do not take into account how learning changes across development and how learning is influenced by different instructional conditions (Sommerauer et al., 2020). Interestingly, as witnessed at the ASC, the number of developmental, most importantly longitudinal, neuroimaging studies is growing

(Wang et al., 2021), and the field of developmental cognitive neuroscience is emerging (Diamond, 2011). However, neuroimaging studies that also consider relations between brain activity and instructional features are scarce (Wang et al., 2021), and this represents an important, challenging avenue for future research.

Some examples of the way in which cognitive neuroscience might influence research on mathematics education are quoted below. These involve (a) understanding a typical development, (b) paving the way for behavioral experiments, (c) representing a level of description that cannot be elucidated by behavioral methods alone.

2.2.3.2 A typical development

Understanding of the origins of a typical mathematical development and dyscalculia is the aim of cognitive neuroscience (Kaufmann et al., 2008).This area of research is probably one of the examples of where cognitive neuroscience, perhaps for the first time, meteducational research, and which continues to be an active area of interdisciplinary research (Kaufmann et al., 2008). Cognitive neuroscience research on dyscalculia (a specific learning disorder in the domain of arithmetic in the presence of otherwise normal cognitive functioning) suggests a detectable neural correlate. For instance, studies in children with dyscalculia have shown structural (Rotzer et al., 2009) and functional abnormalities (Kaufmann et al., 2008) in those areas of the brain that are dedicated to the processing of numerical magnitudes. Cognitive neuroscience research thus suggests that children’s difficulties with basic arithmetic may have their origins in an abnormal development of the brain circuitry that supports numerical magnitude processing.

This knowledge leads us in the next research step by elaborating by longitudinal investigations of the direction of the association between abnormal functioning of brain circuitry and specific mathematical skills at the behavioral level. The fact above allows us to determine whether abnormal brain activation predicts subsequent mathematical skills or whether it is a consequence of those poor mathematical skills as well. This knowledge may guide appropriate educational intervention. For instance, remediation tools may then be focused on children’s acquiring of representations of numerical magnitudes, in particular on the mappings between number symbols and the quantities they represent. Recent evidence suggests that these types of interventions improve children's numerical understanding, not only in children with dyscalculia (Butterworth, 2019) but also in children from low income backgrounds (Fuhs & McNeil, 2013).

Another potential of cognitive neuroscience in relation to a typical development deals with the issue of early identification of at-risk children (Diamond, 2011). If these children can be identified before or at the very beginning of formal mathematics instruction, it might be possible to minimize or even eliminate their difficulties with mathematics by remediating the foundations upon which higher level-skills are built, such as numerical magnitude processing (Fuhs & McNeil, 2013). An analogous approach has been successfully applied in the farm or developed field of dyslexia, where longitudinal studies have demonstrated that brain measures, i.e. event-related potentials, collected in infants and young children (i.e. in the absence of symptoms) predict future language and reading development (Ozernov-Palchik & Gaab, 2016). Similar research in the domain of mathematics might be published in the coming years.

In relation with this, studies in the field of numerical skills have been investigating disorders of a known genetic origin that have a high prevalence of numerical impairments, such as Deletion Syndrome (Kirbulut & Beeth, 2013). Such disorders are easily detectable at an early age, long before children start with formal schooling procedure. The study of infants and toddlers with such a genetic disorder who are at risk for numerical impairments will enable us to understand the early stages of how mathematical development goes awry over developmental time and how compensatory mechanisms emerge, which might be exploited in new teaching and remediation methods.

2.2.3.3 Cognitive neuroscience research paves the way for behavioral experiments

Study on the perceptions of Greek students, of the secondary education, on the course of mathematics, referring to some aspects of their competence of learning to learn, from the perspective of school psychology in education

Imagine explaining to a high school teacher what executive function is and how it might influence judgment as they create meaningful lessons in ethics. Imagine being able to use what we know about the rules of learning to design a classroom that actually made kids smarter. It would be useful to imagine as well, using our knowledge about brain function to help prevent, reverse, or stop damage to the brain through neglect, abuse, or even malnutrition with at-risk children. Or imagine a school day that incorporated our understanding of the biological factors of stress and sleep on children's ability to learn and remember. We could continue to imagine a million things that are all possible when fueled by evidence–based rigorous neuroscience

Research that can be translated to practical application and tested for their efficacy through the creation of research schools, in formal learning testing, and other measures. Such a game-changers for education and learning are within our reach. Advances in techniques, relentless inquiry, and innovative practitioners, curious about how the mind and brain work, are creating significant findings and new knowledge about the brain, from memory and learning to executive function, emotions, autism, literacy, language motor skills, and more. And we know that educators, parents, and child service providers are reading everything they can get their hands on about this work. Why? Because the problems and issues our children face today are like no other generation before them. And those of us enlisted in the nurturing and developmental support of our most precious national resource, our children, need information, ideas, conversation, and useable knowledge.

Data related to cognitive neuroscience provide an important source of evidence on mathematical and related abilities, which provides a ground for setting up behavioral researches. Numerous neuroimaging studies have shown that the intraparietal sulcus, which is involved in the processing of numerical magnitudes in children (Kaufmann et al., 2008) and adults, appears to be consistently active during arithmetical tasks (Dastjerdi et al., 2013). Several researchers were inspired to examine the role of numerical magnitude processing in not only a typical but also typical mathematical development. For instance, it has been shown that measures of numerical magnitude processing, such as tasks that require the comparison of magnitudes or that involve the placement of a number on a number line, predict individual differences in mathematics development (Kirbulut & Beeth, 2013). Fuhs & McNeil (2013) demonstrated interestingly that this ability to represent numerical magnitudes, in the context of a number line estimation task, predicts children's learning of answers to novel addition problems as well as the errors they make on these problems.

Furthermore, recently, DeSmedt, Taylor, Archibald, and Ansari (inpress) tried to investigate the precise locus of the frequently observed association between reading and arithmetic and in addition their associated disorders. Data from cognitive neuroimaging studies indicate that reading (Zatorre et al., 2012) and arithmetic (Dastjerdi et al., 2013) show a neural overlap in the left temporoparietal cortex. In reading, this area appears to be particularly active during phonological decoding or mapping graph Emerson to phonemes. In arithmetic, this area is particularly related to arithmetic fact retrieval, a process that is assumed to rely on phonological codes. Thus, reading and arithmetic rely on the processing of the phonological code of language and, hence, the quality of phonological representations. This led to hypothesize a specific association between phonological awareness, a measure of the quality of phonological representations, and arithmetic fact retrieval. In a behavioral study in fourth and fifth graders, phonological awareness was uniquely correlated with arithmetic fact retrieval. DeSmedt et al. concluded that the quality of children's phonological representations mediates individual differences in arithmetic fact retrieval, suggesting that more distinct phonological representations of arithmetic facts are easier to retrieve. All these findings might have implications for future educational research, especially because research of reading and mathematics has been developing in relative isolation of each other.

Mary Brabeck, Dean of New York University's Steinhardt School of Culture, Education, and Human Development, believes that, in this growing new field, a parity relationship between educators and researchers is integral to make gains in educational outcomes (Brabeck, 2008). Educators must pull research findings out of the lab and put them to use in the classroom, and researchers need to distill their results for teachers' purposes. It is important, effective changes in teaching practices to be communicated back to scientists. Consistent and quantitative feedback, both for what works and what doesn't, is crucial for improvement, Brabeck believes. In her efforts to promote ''translational research'' from the lab to the classroom, Brabeck likens this gap to that between health researchers and physicians. She says that in education, like medicine, vital knowledge too often remains with researchers and is in accessible to people who are in positions to help our children — that is, teachers and parents (Brabeck, 2008).

2.2.3.4 A unique source of evidence

Data on brain activity obtained with cognitive neuroscience techniques might generate findings that could not be anticipated by behavioral data alone. In other words, neuroimaging provides a level of measurement and analysis that cannot be accessed by behavioral studies alone, allowing educational researchers to add another level of explanation to their exploration of questions related to instruction and learning.

For instance, examined the nature of intuitive interference in geometry. Researchers investigated brain activation while participants had to compare the perimeters of two geometrical shapes under two conditions: one that was in line with intuitive reasoning and one in which the correct answer was counter intuitive. The results revealed that the correct answers to counter intuitive items were accompanied by activations in those areas of brain that are important for inhibitory control, such as the prefrontal cortices (Brookman-Byrne et al., 2018). Stavy and Babai (2010) concluded that this highlights the importance of control mechanisms in overcoming intuitive interferences.

Another example is provided by Kaufmann et al. (2008), where in their study, children and adults did not differ in performing a number comparison task at the behavioral level. At the neural level, however, there were differences in brain activation. Children but not adults activated those areas of the brain, which are involved in grasping and finger movements (i.e., the right supramarginal gyrus and post central gyrus), suggesting that children might have relied on finger representations to compare numerical magnitudes. Neuroimaging studies might thus reveal issues related to strategy use, such as compensatory strategies. Such strategies may not be observable at the behavioral level, but can be hypothesized against the background of brain-imaging findings. In turn, the latter findings might generate new hypotheses for follow up behavioral and neuroimaging studies, thereby creating a productive cycle of interdisciplinary, empirical research.

Neuroimaging methods may also help to specify the stage of cognitive performance in which a certain cognitive process takes place. A series of behavioral studies by Hannula and colleagues (Hannula et al., 2020) observed individual differences in children's Spontaneous Focusing On Numerosity (SFON), i.e. focusing attention on the aspect of the exact number of items or incidents and utilizing numerical information in one's action. Behavioral Spontaneous Focusing On Numerosity (SFON) studies could not exhaustively answer the question whether these individual differences are due to the differences in the processing stage of perception and encoding of the stimuli. Recently, electroencephalography EEG-methods were used to further explore this issue (Hannula et al., 2020). These findings showed that the oscillatory EEG activity during encoding of photos of natural scenes of 12-year-old children was different in photos from which children recalled exact numbers when compared to photos with nore called numbers. Thus, these EEG data revealed that the individual differences in SFON are particularly related to differences in encoding stimuli. This more detailed understanding of SFON aids us to investigate which kind of stimuli trigger focusing on numerosity more easily.

2.2.3.5 An International Concern

The U.S. Secretary of Education, Arne Duncan, called the state of education in America a national public health crisis. American children are not excelling. Test grades show it. In such a situation, innovation and creative thinking are not being taught, practiced, or nurtured in children's lives. Industry and business are concerned that we are not producing engineers, mathematicians, scientists, and physicists. Something must be done to prepare our children for a 21st century future, and here we propose that Neuro-Education may provide one critical element toward a solution. And this is not simply a national problem: it is global. Comparable challenges in education exist around the world, and exciting programs have been developed in a number of countries to address this critical issue. The International Mind, Brain, and Education Society has fostered a growing number of global initiatives that have brought together many interested countries. In addition, since 1999, the Organization for Economic Co-operation and Development has had a Neuroscience and Education program that brokered a variety of productive collaborations. In the United Kingdom, Cambridge University has founded an educational neuroscience program, and under the guidance of Hirokazu Tanaka, Japan is currently building a strong Mind, Brain, and Education research program. Likewise, in Shanghai, East Normal University has recently founded a neuro-education effort. Finally, a European organization on learning research (EARLI) held its first meeting in Zurich in 2010, focusing on learning and the brain. Thus, a global initiative is on the march, which promises extraordinary opportunities for international collaboration.

International test-score comparisons, in tract able achievement gaps, and static U.S. graduation rates clearly indicate that now is the time to act. To maintain (and expand) any technologically advanced society, cultivating generations of science, technology, engineering, and math disciples is required. American students, as well as worldwide, clearly require a new approach to spark or reenergize their sense of curiosity, passion, and competition. Neuro-Education may help prevent counterproductive actions in tough times. Dwindling school budgets have led to anemic arts programs, which have reduced children’s access to dance, music, theater, creative writing, and the visual arts (Re et al., 2016). These programs are far from superfluous; current research supports the view that they are conduits for problem-solving, motivation, collaboration, and innovative thinking. Michael Posner describes, in his seminal book, studies revealing that attention-focusing art forms significantly improve listening skills and concentration (Re et al., 2016). Neuro-Education initiatives can help frame issues and make the case for far-sighted education policies that make evidence -based sense for children’s development. The bottom line is everyone wins. As psychologists, cognitive scientists, neuroscientists, educators and parents continue to overcome challenges, children must remain the clear motivation for action and should form the basis for a compelling drive to sustain and grow this movement. For each young mind served by Neuro-Education knowledge, all societies have the opportunity to regain lost ground—and build the potential for better academic achievements and opportunities for both young people and society at large. Moreover, if successful, it also highlights that science can collaborate best with society when we bring to the table what we do know—our scientific expertise—and a dose of humility about what we don't know—in this case, what works best in a classroom, at home, and in the community. In the end, Neuro-Education provides a paradigm for how science can inform broader social policies by being inclusive and collaborative with other established disciplines. And when the collaboration bears fruit, we will have children who can learn better, which in turn yields a society better equipped for the future.

Stress, particularly chronic stress, undermines learning by impairing students' ability to concentrate. Students functioning in a more relaxed environment, who feel less overwhelmed, have better brain function (Sarahian et al., 2014). An important study by Conor Liston, Bruce McEwen, and B.J.Casey (Liston et al., 2009) compared how highly stressed and relatively non stressed medical students performed on tasks that required that they shift their attention from one visual stimulus to another. Their results showed that the extremely stressed students scored lower on tests and had reduced processing in certain brain regions, implying that chronic stress disrupts the brain's ability to shift attention, a function certainly necessary for classroom learning.

2.2.4 A new generation: a new discipline

Laboratories and research groups are being established, and graduate students are completing doctoral training programs in this emerging discipline, despite the relative infancy of educational neuroscience. Therefore, we are for the first time, at a point where a new generation of researchers view themselves as educational neuroscientists. This is a unique position because the field of educational neuroscience has – until recently – been inhabited by cognitive (neuro) scientists with an interest in education or education professionals with an interest in neuroscience. It is our suggestion that a new, uniquely trained group of researchers has the power to tackle important questions generated in the classroom, and to overcome the fallacy that neuroscientific findings are only useful within the laboratory. Unlike other commentaries, we propose shifting the focus from cross talking and interdisciplinary training to approaching educational neuroscience as a discrete discipline with uniquely trained professionals. Considering issues highlighted above concerning difficulties in translation and communication; if researchers are trained as educational neuroscientists, translation should not be a problem. Rather, the utility of neuroscience within the school context would become these academics' primary focus. Difficulties in communication should also be lessened if future generations are trained to speak the new language of educational neuroscience. Finally, our reconceptualization of this field would help to address the 'grand challenges' of neureducation recently identified (Butterworth et al., 2011).

2.3 Mathematics Anxiety

The mathematics anxiety (MA) is an issue with wide range of studies because of its numerous negative results on mathematical learning and it consists of disquiet awareness and worrying thinking of mathematics or mathematical excercises aggregating (Young et al., 2012). MA is characterized by both physiological (e.g. increased heart rate) and cognitive symptoms (e.g. negative thoughts) and is often considered one of the biggest obstacles to learning in the mathematics classroom as individuals with big mathematics anxiety indicate to have more activated their neural regions linked with the disclosure and occurance of pain (Yang et al., 2017). With a great interest, we can observe this specific pattern of brain activation only in apprehension with the mathematical tasks. The approach of the fact that achievement emotion is related to the anxiety agrees with the unachievable outcome of control due to the expectant emotion of MA (Núñez-Peña et al., 2013). The purpose of this article is to integrate research from multiple disciplines to illustrate the characteristics and effects of MA. We argue that using this integrated perspective allows for a better understanding of the experience of MA and potential intervention approaches.

Feeling anxious about mathematics has been linked to avoidant behavior, poor performance and test anxiety (Carey et al., 2016). An Australian study indicated the highest relationship of anxiety for mathematics of primary students, more than this of literacy (Punaro & Reeve, 2012). When a student feels struggled with mathematics

MA appears (Yang et al., 2017). When anxiety is high, this fact is related to the mathematics low achievement (Carey et al., 2016); even more when anxiety is associated with severe numerical processing deficits (Butterworth, 2019). It is worth to mention that a poor ability can't be a coverage by MA. There are students who feel anxious with mathematics but they don't appear under-achievement and those who don't have anxiety with mathematics but at the same time they are not good at it.

Contemporary literature is illustrated through various different forms concerning to MA. MA seems to have a betrayer mood (Buckley, 2016), whereas other scientists give the option of MA being extracted straight forward through mathematical tasks (Carey et al., 2016). Um et al. (2012) argued that the way MA related to way of learning is considered to have several betrayer forms. To be more specific, as in Australian Journal of Education is mentioned, mathematics performance is affected in a negative way with MA, in a way that these individuals choose careers , courses or opportunities with have totally no relationship with mathematics.

The three fields of education, neuroscience and psychology give intergrated perspectives about a deepest comprehension of MA in specific trait forms, such as the way the fields mentioned above can contribute to find out the origins of MA, the affection on avoidant behavior and much more essential the reduction of its negative effects.

2.3.1 Insights from cognitive psychology and neuroscience research

It is already known that performance in mathematics can be disrupted by MA (Carey et al., 2016; Scherer et al., 2016). Generally anxiety has a specific explanation from a psychological view, which is connected to biological factors and a corporal preparation to react to the threat (Cisler & Koster, 2010). As a results, when a student has MA, he realizes mathematics as a threat.

Neuroscience research have a forward connection with the of the fight-or-flight response and attentional anxiety beliefs. Particulartly, these beliefs of attention through threat can be activated after stimuli and it has a connection with the way the brain is activated by a particular model. A great number of studies in the field of neuroimaging indicate the beliefs between the brain information of threat and the hyperactivity in the amygdala (a part of the brain thought to be involved in processing negative emotions) and reduced activation of the prefrontal cortex (a part of the brain involved in emotion regulation) (Hoshi et al., 2011). The findings of Young, Wu, and Menon (2016), for instance are related to the activation in the amygdala and deactivation in parts of the prefrontal cortex has a direct relation with the emotional regulation (the ventromedial prefrontal cortex) were greater among seven-to nine-year-old children with high MA than among children with low MA. An interesting finding of Young and colleagues (2012) shows the high connection between the amygdala and the ventromedial prefrontal cortex in individuals with high MA. Additionally, the findings of Young and colleagues' (2012) indicate the restriction of the capacity of people with MA to adopt anxiety control strategies.

The research of neuroscience research has taken into the surface numerous factors that influence the performance of MA. Yang et al. (2017) discovered a brain network of the inferior fronto-parietal region which is activated more when an individuals has not already started a task in mathematics. Moreover, a finding is associating the change of a situation perceived with the transformation of the effect of a situation (Grupe et al., 2018). Yang et al. (2017) indicate that high performanced children with MA reduce their anxiety when performing maths but increase their anxiety when anticipating about it. The same team of researchers suggest reduction of anxiety by providing an excuse in order to regulate emotions (Yang et al., 2017).

Through neuroscience and cognitive psychology research Yang et al. (2017) found the bial affection of MA in performance by a direct on-task effect. The first is that threat situations are brought out by physiological feedback (increased heart rate and respiratory rate). The second is that the working memory can be affected by anxiety, which is significantly important to solve a problem (Moran, 2016, Carey et al., 2016).

The level of affection is related to the mathematical competence and the degree of interference with the task thoughts (Getahun et al., 2016). The degree of MA's affection on performance impacts the working memory capacity. High MA and the extended capacity of working memory is positively related to a better performance (Scherer et al., 2016).

The mathematical development has several results on students' MA. Numerous studies concerning with the research of cognitive psychology and neuroscience about the affection of MA in performance we illustrated. Most of the studies about AM include evidence of trait MA (Buckley et al., 2016). This specific study with a rare methodology in published research, provided specific hypothetical questions about getting involved mathematics and anxiety. The participants should answer several ratings of anxiety when having a lesson on mathematics (Núñez-Peña et al., 2013), while the findings argue that trait MA measurement impacts MA. In the future research should investigate deeper the affection of performance on MA and its on-task reactions.

2.3.2 Insights from cognitive, social and clinical psychology, and education research

The definition between state MA and trait MA differs in a high level. The state MA is defined as the point a student receives an information in mathematics in contrast with trait MA which is defined as the general negative perception on the subject of mathematics and drives to a complete avoidance of this topic and this career. These complete differences in defining and structure of cognition has impact on the attentional beliefs. The basic impact of decreasing the capacity of threat for mathematics could be regulated by activating the attentional beliefs on state MA (Hoshi et al., 2011), which beliefs translate stimuli (Dudeney et al., 2015). In addition, clinical anxiety as well as phobia are related with a false perception of life and world assumptions (Koyuncu et al., 2014). Barrett et al. (2007) suggested that emotion designs are 'complex emotion-cognition-action systems' (p.265). In order to regulate emotions, such designs, mentioned above, it is essential to be consisted of specific factors of culture and experience acquired (Barrett et al., 2007). These cultural expectations are usually related to the negative impression of the society about the subject of mathematics (Maloney et al., 2013). The primary reasoning of trait MA might be based on the negative beliefs of the subject in general.

An holistic reasoning of the negative beliefs related to trait MA is based on the research connected with the field of social psychologhy and the field of education. These fields study the MA from a different point of view and find correlation with environment, disposition as well as general situations. The general situations contain experience, whereas environment contains parental or teacher or wider social influence. Disposition contains the personality. For example, MA is connected with perfectionism, which is a generalization and the excess of conscientiousness (Stoeber et al., 2009). Firstly, it is essential to target on the role of environmental factors in the growth of trait MA and connected with negative characteristics and beliefs concerning mathematics. An initial consideration between gender and mathematics would be essential to be discussed from the perspective of environment and disposition as well.

The research between gender and mathematics constitutes a famous topic (Leder & Forgasz, 2018). With a first view of this topic we can recognize the 'male advantage' in the subject of mathematics (Um et al., 2012). Deeper researches determine the socialization as the main factor of indifferences between gender and mathematics (Bellettini et al., 2014). A theory that correlates the achievement and the social factors constitutes the expectancy-value model of achievement of Eccle (Guo et al., 2017). These social factors that affect achievement consist of competence beliefs, emotions and students' values, like MA is. The fear of stereotype connects the gender and the mathematics on the topic of MA. Stereotypes are beginning when fear starts as well (Kessels, 2015). Mathematical meanings included in negative stereotypes make the subject of mathematics a non feminine task (Young et al., 2012). Good, Rattan, and Dweck (2012) findings on this topic point out a low sense of belonging in the subject of mathematics, when these students were female with higher MA. Moreover, those female students with lower sense of belonging in the subject of mathematics were those who thought that females do not have the appropriate capapility in this subject. The western idea of culture that the concept of mathematics can 'undermine achievement in the face of difficulty' (p.701) (Good and colleagues, 2012), which idea develops MA.

There are studies that believe in the in-direct connection between MA, gender and mathematics, some of them find higher level of MA (Yang et al., 2017), where at the same time other studies do not find any gender difference (Reilly et al., 2019). Another study indicates that high level of MA is related with female students, while high level of trait anxiety is related with male students with MA (Bieg et al., 2015). Ran et al., (2021) argue with observations between gender differences for MA only, where anxiety is getting significantly higher for female students in relation with the male. Lastly, observations of the Programme of International Student Assessment (PISA) (Buckley et al., 2016) indicated that female adolescents in Australia have higher level of MA than males. On the other hand, several studies by Goetz et al. indicate higher levels of trait MA for females whereas at the same time indicate same levels of state MA for both genders (Bieg et al., 2015). On behalf of trait MA a study can show a faster enrolment of female students than this of the male (Stoeber et al., 2009).

An additional significant environmental factor in the MA is between the parental and teacher influence and the beliefs for mathematics. Especially mothers show to have a significant influence on children’s opinion for mathematics, their career selections in the future, even more their stereotype fear (Vukovic et al., 2013). Another research shows the levels of MA of teachers. Those with higher levels of MA appear to have lower confidence for teaching mathematics, they do it without entering in deep meanings and by using non-effective methods (Beilock et al., 2010). The most troubling results of teachers come from the study of primary or elementary school teachers. A deeper investigation is needed to study the characteristics of behavior and psychology of teachers and their relationship with MA. Yang et al. (2017) indicate high levels of MA in preservice primary pedagogues, whereas in another study is indicated female primary teachers with high anxiety admitted to have students with lower achievement and negative gender stereotypes for mathematics as well (Yang et al., 2017). Worldwide, MA consistutes a problem for preservice primary school teachers in relation with research about mathematics education (Pincheira & Alsina, 2021). Threat to fail, exam anxiety, negative experiences in the past could be the ‘‘right answers and right methods instead of on developing ways of reasoning about mathematics’’ (Pincheira & Alsina, 2021), facts that create MA. Numerous of the findings above create the need for interventions with the aim to decrease the levels of MA of preservice teachers (Moran, 2016).

2.4 Neurology of Mathematics

The neurological background of mathematical knowledge is undoubtedly one of the factors that greatly influence mathematical performance. In recent years, there has been a growing scientific interest in the role played by the various parts of the brain when engaging a person with mathematics (Karlsson et al., 2015). Researchers who have dealt with this issue believe that if they are able to identify topologically and functionally, the brain activity associated with the processing of mathematical concepts and skills will then be able to propose specific methods in the direction of improving the applied support programs for the children who fail in this particular area.

Scientists who were at the beginning of the century with the exploration of the brainstorming of mathematics learning, believed in the existence of a central or major mathematical brain center (Rinaldi & Girelli, 2016). Instead, Wang et al. (2015), relying on his observations on the variety of mathematical errors, supported the opposite idea of serving a person's mathematical needs from an entire brain network. Scientists who supported Wang's ideas presented data that led to the conclusion that mathematical activity is not only served by both brain hemispheres but also by their various regions (Wang et al., 2015). It should be noted that the role of the two hemispheres is not identical and equivalent in the processing of the various mathematical concepts and activities. On the contrary, it appears from the existing evidence that each hemisphere is specialized in some form of mathematical activity. This idea arises from the fact that the differentiation of the two hemispheres in terms of mathematical thinking is due to the different way in which each hemisphere processes the information in general (Karlsson et al., 2015).

More analytically, it is argued that the left hemisphere processes the information in sequence, one at a time, and at the abstract level of the words. In addition, this particular hemisphere works from the parties to the whole. The left hemisphere is the center of language communication, it describes and memorizes the visual material with spoken and written symbols and gives importance to the details. Finally, it specializes in the processing of stimuli directed at a single sensory pathway (visual, acoustic, etc.) and usually handles known and already learned activities (routines). In the context of mathematics, the left hemisphere is primarily responsible for numbering, for the identification of symbols, numbers and operations, for the sequencing of a series of numerical data (such as multiplication tables), for the application of the algorithms of operations, for logical analysis and, in general, for activities that are structured in part and hierarchically. Possible lesions and dysfunctions of the left hemisphere may result, among other things, in disturbances in the execution of operations, difficulties in restraining and recalling basic numerical data, as well as problems in understanding the concept of number.

The right hemisphere, on the other hand, processes the information in parallel, ie many elements at the same time, writes information in the form of pictures or shapes, communicates through actions and figurative representations, memorizes facts and works from the whole point of view. Also, this hemisphere is specialized in stimulating pulses that simultaneously address many senses and handles information that is new and complex. In the context of mathematics, the right hemisphere has very limited arithmetic capabilities (up to five elements), but it excels in assessing space, comparing complex geometric shapes, interpreting graphs and other documentary material, restraining the practical application of concepts, and the rough assessment of the accuracy of the results of the operations and, above all, of the problems. Any injuries or dysfunctions of the right hemisphere may result, among other things, in the difficulty in understanding the notion of the positive value and the difficulties in conquering the concept of "prisoner" and "loan" (Hawes et al., 2015).

People, according to the ways they use when dealing with mathematics, are divided into two categories: those who mainly apply left hemisphere strategies and those who most use the processes of the right. Those belonging to the first group are distinguished in activities such as measurement, addition and multiplication. If they are given a verbal mathematical problem, they try to determine which category they belong to and solve it according to the prescriptions and techniques they already know. On the contrary, those belonging to the second group are distinguished in the recognition of spatial and symbolic standards, function better in geometry and are more creative in solving problems, especially problems of everyday life (Re et al, 2016).

According to Peters (2018), people who rely solely on the strategies of a single cerebral hemisphere are scarce. Most people use both approaches in order to adapt to the variety of requirements of various mathematical problems. This does not substitute for the theory that there are specific trends and brain preferences for the treatment of student stimuli.

The educational community argues that the right hemisphere strategies do not attract the attention and support that is appropriate to them from most existing curriculum programs where the analytical strategies of the left hemisphere dominate. As a result, there is poor performance of the general student population in activities that require synthetic thinking and overall assessment of events. In addition, the prevailing structure and content of curricula is the cause of many learning difficulties in mathematics.

Hawes et al. (2015) argue that the conquest of the various mathematical concepts and skills depends, especially at the beginning, on the right hemisphere, since it is a new and complex knowledge. At a later stage, the relevant knowledge or skill is transferred to the left hemisphere and becomes a routine knowledge, almost automatically recalled from memory.

The strategies of the two brain hemispheres are complementary and very often both are necessary to meet the demands of mathematics. In relation to general mathematical education, it can be argued that preference in one brain hemisphere's strategies may be one of the possible explanations of a child's failure in mathematics. Therefore, the main objective is to balance the activities of the left and right hemispheres in order to avoid learning difficulties.

2.5 Cognitive style and Mathematics

In the context of the study of factors influencing mathematical performance, the concept of cognitive or learning style. The typical way in which each individual approaches and tries to handle the various cognitive obligations that arise from his interaction with the environment is the cognitive style of the individual (Singh, 2017). The perceptual and mental components of the cognitive style are the result of the interaction between biologically defined characteristics and environmental experiences. These components define the methods and procedures by which the individual processes and maintains the new and difficult information (Sweller, 2011).

According to Steichen et al., (2020), some of the basic parameters of the cognitive style are: 1) whether or not dependence on the field, i.e. the ability to handle information irrespective of its presentation context or the imposition of a new organization on existing data to achieve an outcome. 2) Special visualization, that is, the ability to identify and retain visual patterns and images, despite possible changes in their presentation. 3) Reflection or impulse, i.e. the tendency for reflection and planning before taking action or, on the contrary, the tendency for immediate and spontaneous behavior.

Sweller (2011) argues that the above parameters only constitute a very small part of the cognitive style. These researchers propose a complex model of cognitive style, consisting of twenty elements, grouped into five areas: 1) Direct environment, referring to the person's preferences in terms of sound, light, temperature and furnishings of the workplace. 2) Emotionality, referring to motivation, to the insistence of an individual in achieving an objective, to complying with the rules or challenging them, and to the extent of self-action and autonomy. 3) Sociological preferences, referring to the choice of the individual to work on his own, in pairs, as a member of a group, with the help of an adult or in a variety of conditions. 4) Biophysiological features that refer to the preferred sensory channel for receiving information (acoustic, visual, tactile, kinesthetic) at the time of day with the highest levels of energy, the need for food and the need for movement at the time of engagement with new and difficult information. 5) Specifications of pulse processing, referring to holistic or analytical treatment, to the prevalence of the right or left brain hemisphere and to the impulsive or discreet approach of the stimuli.

2.5.1. Indo-individual and Environmental factors that cause failure in Mathematics

A whole range of factors related to the individual cognitive characteristics and the particularities of each child's environment can be a source of low performance and obstacles to mathematical progress. Among the factors proposed by the relevant researchers there are some differences, probably due to the particular viewpoint of each researcher, but also to the complexity of the mathematical subject.

The fullest reference to mathematical failure factors appears to have been made by Wang et al. (2021). These researchers report the following ten factors: 1) social order and environmental conditions; 2) gender differences; 3) emotional disorders; 4) stress; 5) attitudes towards the subject; 6) factor, 7) linguistic development, 8) perceptual deficiencies, 9) dyscalculia, 10) educational-mathematical.

2.5.2. Social Order and Environment

The low social class and the poor cultural environment have a negative impact on school success in general and on mathematical performance in particular. Children from a low socio-economic environment have limited opportunities to perceive and explore the variety of materials and situations needed to develop proper pre-mathematical experiences. In addition, they are usually deprived of the help of a larger one who will correct their mistakes and help rebuild their knowledge. This results in the majority of children not developing mathematical concepts properly or delaying their digitization in relation to children of senior social strata.

According to Dixson et al., (2017), testing with cultural-free test results proves that children of low socio-economic backgrounds develop adequate mathematical concepts and possess the necessary mental potential. But when these children are forced to function through a code that is foreign to their own attitudes, perceptions and values, they are particularly difficult. Therefore, the weakness of the children of the low social strata is not due to a lack of competence, but to an inability to coincide with the prevailing ideology. More specifically, the students' response to the mathematical requirements of the modern school is difficult.

2.5.3. Gender Differences

Researchers argue that there are differences in mathematical performance among boys and girls (Orton, 1992; Ganley & Lubienski, 2016). Differences are identified depending on the age and the area of mathematics. For most of the time of primary education (age range 6 to 12 years), a slight superiority of girls is observed in computational theories. After the age of 11, there is a predominance of boys in areas such as problem solving and geometry. Various biological, psychological and social factors are being explored to give a clear answer to this differentiation.

2.5.4. Emotional Problems

Mathematics impose by their nature a continuity in thought and an unbreakable consistency in the steps that make up the mathematical activities. Children with emotional and behavioral disorders have low math performance because they lack the self-control and self-concentration they need, especially when it comes to children with primary emotional disturbances. It should be noted that the creation of behavioral and emotional disturbances may be the result rather than the cause of failure in mathematics.

2.5.5. Anxiety

According to the Yerkes-Dodson Act, ideal performance is achieved with a high level of anxiety when the task to be performed is simple, and with a low level of stress when it comes to a difficult activity. The ability in math for many is a difficult task. Therefore, it is obvious that even the slightest anxiety has a negative effect on performance. Stress as a multifactorial origin of a person's reaction can be a phobia toward the source of pressure, in particular mathematics (Tan & Yates, 2011). Many times phobia for math causes very strong emotions like panic. Determining the degree to which anxiety and phobia is a manifestation of a general pattern of action and behavior of a particular student is either linked exclusively to mathematics or has more general causes (Paechter et al., 2017). Forcing a child to handle the written symbols of mathematics without having won the corresponding ideas they represent can be the beginning of such a phobia.

2.5.6. Attitudes towards Mathematics

The student's attitude towards mathematics, i.e. his positive or negative attitude to the subject, is considered one of the factors that can influence his performance in the lesson, as "one cannot succeed in something he learns, maintains a positive relationship with it” (Dixson et al., 2017).

Specifically for mathematics, it has been found that there is a positive correlation between student attitudes and performance. The relevance is greater in the case of executing operations than in the case of problem solving (Re et al., 2016).

Nevertheless, it is true that it is difficult to decide in each case whether the negative attitude is the cause of failure or whether the failure has caused the negative attitude.

2.5.7. Mental Factor

Surveys using the statistical method of analyzing factors have shown the great importance of general intelligence in mathematical performance. It is a fact that children with intellectual disabilities, of all grades, have weaknesses in the field of mathematics. Therefore, low general intelligence and mental retardation are directly related to failure in mathematics and only allow the pursuit of the development of some simple mathematical ideas with direct practical application.

2.5.8. Language of Mathematics (linguistic development)

Didactic interaction in the teaching of mathematics is done through a language that is a mixture of words, numbers, special symbols and shapes and tests the pupil's decoding abilities because it differs substantially from its natural language and additionally is uneven in its kind of structural elements. It is natural to have an interest in developing this "language of mathematics" and especially on those elements that could cause learning difficulties. The sides of the mathematical language most commonly referred to as potential centers of difficulty are 1) mathematical vocabulary, 2) mathematical text and 3) mathematical symbols (Orton, 1992).

In terms of mathematical vocabulary, the words used are of three kinds: a) words with a special mathematical meaning that appear rarely in everyday life such as quotient, addition, etc. Such words can be included in the functional vocabulary of the students through specialized teaching, the aim of which must be the clear association of the term with the meaning or process it expresses, b) the words that appear in both mathematics and everyday life, but with a different meaning. Examples of such words are the difference, the table, the multiplier, etc., c) the words used in both environments of the same importance. These words, like add, rest, multiplication, etc., present unexpected difficulties for students, such as longer, less, more, higher, etc.

In terms of mathematical text, it is usually laconic, distinguished by the density of information it carries and cannot be read quickly, because each word is important and every symbol essential to understanding the message.

In terms of mathematical symbols, they undoubtedly constitute the core of the expressive power of mathematics and are an integral part of the mathematical language. Proper use of symbols requires them to be connected, as clearly as possible, to the ideas they express.

It is a fact that the above difficulties are exacerbated when there are special needs that generally affect the student's language development, such as the existence of speech disorder. Such disorders prevent proper articulation, complete understanding of effective expression, and generally the whole structure and functionality of the child's speech.

2.5.9. Perceptual Factors

Good functioning of perceptual skills helps the child to create stable and reliable concepts of the elements of the world surrounding it. Perceptual dysfunctions and deficiencies have a negative impact on learning and lead to a delay in the formation of concepts. In particular, failure in mathematics is associated with visual-spatial and visual-kinetic problems.

2.5.10. Dyscalculia

According to Butterworth (2011), the difficulties in acquiring the mathematical concepts and skills unexplainably displayed by some children, despite the absence of any obvious problem, are likely to be due to central nervous system dysfunction (some evolutionary disorder) that has similar results with adult brain injuries. Jolles et al. (2016) argue that specific disorders of children's mathematical capacity are associated with specific brain dysfunctions. For example, parrot-occipital region lesions are associated with difficulties in understanding the concept of number, while faults in the frontal region cause difficulties in retrieving information during problem solving.
Posner & Tamar give a detailed description of the phenomenon. According to general abilities and shortcomings, children with dyscrisia usually present:

•Defective visual and spatial perception and organization

•Good listening skills and early speech

• High reading level, in the sense of decoding the written symbols, since the understanding of the text is usually limited

•Distorted body image

•Difficulties in visual-kinetic coordination, which may extend to dysgraphia

•Lack of social empathy, ie well-developed ability to assess social situations and perception of others' feelings

•Higher performance in verbal than non-verbal parts of the test.

As far as pure mathematical skills are concerned, children with dyscalculia have serious difficulties in the following areas and to varying degrees:

•In the formation of one-to-one mapping

•Link the numbers symbols to the quantities they represent

•The connection of the audio and visual symbols of the numbers

•Understanding the regular and absolute dimension of numbers

•Understanding the relationships between part-all

•Achieving the concept of conserving the quantity

•The execution of operations

•Understanding and distinguishing the symbols of the acts

•Understanding the importance of the specific position and sequence of figures in the space (site value)

•The retention and use of algorithms

•Measurements of sizes, volumes, volumes

•Identify maps and graphs

•In drawing up proper plans to solve problems.

Research on subtypes of dyscalculia has begun without consensus; preliminary research has focused on comorbid learning disorders as subtyping candidates. The most common comorbidity in individuals with dyscalculia is dyslexia (Szücs, 2016). Most studies done with comorbid samples versus dyscalculic-only samples have shown different mechanisms at work and additive effects of comorbidity, indicating that such subtyping may not be helpful in diagnosing dyscalculia. But there is variation in results at present (Szücs, 2016).

Due to high comorbidity with other disabilities such as dyslexia and ADHD (Willcutt et al., 2013), some researchers have suggested the possibility of subtypes of mathematical disabilities with different underlying profiles and causes (Willcutt et al., 2013). Whether a particular subtype is specifically termed "dyscalculia" as opposed to a more general mathematical learning disability is somewhat under debate in the scientific literature.

• Semantic memory: This subtype often coexists with reading disabilities such as dyslexia and is characterized by poor representation and retrieval from long-term memory. In this study, the authors found that the role of the neuronal pathway in the left angular gyrus has been shown to be selective in arithmetic fact retrieval strategies (Yonelinas, 2013) and symbolic magnitude judgments (Reilly et al., 2016). This region also shows low functional connectivity with language-related areas during phonological processing in adults with dyslexia (Zatorre et al., 2012). Thus, disruption to the left angular gyrus can cause both reading impairments and difficulty in calculation. This has been observed in individuals with Gerstmann syndrome, of which dyscalculia is one of constellation of symptoms.

• Procedural concepts: Research by Geary has shown that children with math disabilities may rely on immature computational strategies. Specifically, children with mathematical disabilities have shown poor command of counting strategies unrelated to their ability to retrieve numerical facts (Bellettini et al., 2014). This research notes that it is difficult to discern whether poor conceptual knowledge is indicative of a qualitative deficit in number processing or simply a delay in typical mathematical development.

• Working memory: Studies have found that children with dyscalculia have impaired performance on working memory tasks compared to neurotypical children (Menon, 2016a). In addition, research has shown that children with dyscalculia have weaker activation of intraparietal sulcus during visuospatial working memory tasks (Rotzer et al., 2009). Brain activity in this region during such tasks has been linked to overall arithmetic performance (Dumontheil & Klingberg, 2012), indicating that numerical and working memory functions may converge into intraparietal sulcus. However, working memory problems are confused with the domain-general learning difficulties, so these deficits may not be specific to dyscalculia but may reflect a greater learning deficit. Dysfunction in prefrontal regions may also lead to deficits in working memory and other executive function, accounting for comorbidity with ADHD (Willcutt et al., 2013).

2.5.11. The Teacher-Mathematician

Characteristics of the personality and the elements of the professional composition of the teacher are often mentioned among the possible causes of failure in mathematics (Simanowski, 2018). This is natural if we think of the teacher's decisive role in organizing the whole learning process.

Among the elements that are usually considered are the authoritarianism, the image the teacher has for himself, and especially the attitude he has towards mathematics. The answer to this question does not give any safe conclusions. Do teachers 'attitudes and perceptions affect students' attitudes and performance, or vice versa, or both?

Regarding the professional composition of the teacher, attention is concentrated mainly on the way of teaching. The teacher, if he uses formalistic methods of teaching or does not respect the way of thinking and the answers of all students, either ignores the importance of conquering the prerequisite mathematical knowledge, then leads his students to acquire unrelated and disorganized knowledge and to address the techniques of mathematics as magical recipes, no sense and relation to the needs of everyday life.

It is natural that the teacher is not only confronted with the learning psychology and the needs of the curriculum, but also has to cope with the social pressures and criticism of the various training groups involved. The teacher should not only be mathematically acquainted but be familiar with the students' developmental characteristics, be able to distinguish an unusual mathematical behavior requiring direct intervention by an evolutionary particularity and, above all, being able to adapt the program to the particular requirements of each child by previously applying a credible evaluation process (Papadakis et al., 2016).

2.6 Incentive Factors

2.6.1 Individual goals to be achieved

An important place in motivation research and in self-regulated learning studies has in recent decades been the theory of individual goals of achievement and is considered to be one of the most important theoretical approaches to motivation to achieve (Pintrich 2000; Maehr, 2001; Habók et al., 2020). In fact, the study of individual characteristics with the influence of environmental factors on learning motivations aims at interpreting the attainment behavior in the school environment (Maehr, 2001; Wenjuan et al., 2019; Losenno et al., 2020; Habók et al., 2020). The way in which students approach, engage and respond to a treaty of attainment represents an organized set of beliefs (Darling-Hammond et al., 2019). Such a vision is a qualitative approach, since it focuses mainly on why a student is trying to achieve academic success, as well as the criteria he uses to assess his success. In particular, students may engage in an activity for very different reasons, for example because one seeks to improve his / her knowledge and skills or because one seeks high grades and adopts different assessment criteria, such as self-regulation (Pintrich 2000; Lysaght, 2015).

Therefore, more generally, in the context of the theory of individual goals of achievement, the basic orientations towards the goal are: (a) learning objectives or work or perfect knowledge; and (b) performance goals (Maehr, 2001; Andrare, 2019; Gonida & Leondari, 2012).

Students with an appeal to learning have a desire for personal development and acquisition of new skills and knowledge. Learning processes and effort are considered positive. A normal part of the learning process is considered to be mistakes, which act as an incentive for extra effort. Learning is valuable and important and is the main source of satisfaction for these students, and as a criterion for assessing success is self-improvement with self-referral (Pintrich, 2000; Maehr , 2001; Voulala et al., 2004; Wenjuan et al., 2019; Losenno et al., 2020; Habók et al., 2020). Studies show that students with high learning objectives are convinced that hard work and in-depth information processing lead to success, so they seek the perfect knowledge of projects involving a degree of challenge for them by adopting self-regulated learning strategies (Pintrich, 2000; Rees et al., 2016).

Performance-oriented students, on the contrary, aim to demonstrate their abilities to others and to be assessed as capable. (Maehr, 2001; Wenjuan et al., 2019; Losenno et al., 2020; Habók et al., 2020). These students often have the desire to obtain favorable ratings and to avoid negative ratings in terms of their ability. To override others, even with minimal effort, is positively evaluated, while failures are threatening because they are perceived as a sign of low ability. Students with high performance goals emphasize skills demonstration, while the benchmark for success is the predominance over the others, which is determined by the mechanism of social comparison, comparing self with others (Gonida et al., 2009; Pintrich, 2000; Wenjuan et al., 2019; Losenno et al., 2020; Habók et al., 2020). In addition, with regard to the relationship between goal orientation and beliefs for the factors leading to success, it appears that students with performance goals tend to believe that high ability and not the effort is the one that can ultimately lead to success (Rees et al., 2016). In 1996, Elliot and Harackewicz emphasized the need to include in the theory of individual goals of achievement the discrimination-avoidance distinction. The fact is that most of the studies that study the motivation and behavior of students in the educational context are focused on the approaches of class approach, since both teachers and parents focus on encouraging students to engage in a (Schwinger et al., 2014). In addition, it is important to note that, Thus, by 1995, avoidance targets did not appear to have attracted the interest of researchers, since most research focuses on motivation and student approaches (Good et al., 2012; Nicholls 1990; Scherer et al., 2016; Seifert, 1995). In 1996, therefore, the objective of performance was distinguished from a performance-approach target and an objective-avoidance goal (Gonida et al., 2009; Hayat et al., 2020). According to this review of the individual goals of achievement theory, learners with a goal-of-performance approach are interested in demonstrating their abilities to others and performing better than others, while students aiming at performance-avoidance aim to (Gonida & Leondari, 2012; Andrare, 2019).

The theory of individual goals of achievement suggests that the orientation adopted by each student has an important and different effect on a range of cognitive, emotional and behavioral variables. In general, learning objectives are positively linked to self-efficacy beliefs (Gonida & Leondari, 2012), the interest in the work (Andrare, 2019), the causal returns of the success / failure of the students in the effort (Seifert, 1995; Cincinnato et al., 2020), the use of cognitive (Vermetten et al., 2001) and metacognitive strategies (Pintrich, 2000), the positive attitude a (Gonida, Voulala, & Kiosseoglou, 2009) and high school performance (Leondari & Gialamas, 2002).

In addition, learning objectives (through their relationship with depth strategies and interest) seem to predict the occurrence of avoidance behaviors such as avoiding search assistance and academic self-inflicting strategies.

In particular, the learning objectives, as they refer to the students' desire to acquire knowledge, to improve their skills and to believe that the effort leads to success, are negative predictors of avoiding seeking help that they know will not allow them to overcome (Roussel et al., 2011; Schwinger et al., 2014). Similarly, learning objectives also predict academic self-perversion strategies as they are associated with the use of cognitive and self-regulatory strategies, internal motivation, persistence and effort (Leondari & Gonida, 2007; Schwinger et al., 2014). Conversely, performance goals, and in particular performance-avoidance objectives, lead to maladaptational learning patterns (Andrare, 2019). Specifically, with regard to performance-avoidance goals, the majority of research data converge to the view that they are associated with non-functional behaviors. In particular, they are positively correlated with non-adaptive behaviors, such as low levels of commitment to an academic goal, inadequate effort or the absence of substantial effort (Gonida & Leondari, 2012) and the occurrence of avoidance behaviors (Leondari & Gonida, 2007; Roussel et al., 2011; Andrare, 2019). In addition, performance and avoidance goals are negatively linked to self-efficacy beliefs (Leondari & Gialamas, 2002; Gonida & Leondari, 2012), the internal motivation for learning (Andrare, 2019), metacognitive strategies (Gonida et al., 2009; Gonida et al., 2009; Gonida & Leondari, 2012) and school performance (Leondari & Gialamas, 2002; Gonida et al., 2009).

For students who adopt performance-avoidance goals, their primary concern is to avoid negative judgments about their ability, whether or not they are involved in the learning process. Students with these goals are concerned about how others will evaluate them, as the external evaluation is what determines how they will be compared with others, or even whether they will receive any kind of remuneration. These concerns have a negative impact on the choice of the project and on the persistence of its completion (Leondari & Gonida, 2007; Andrare, 2019). As a result, performance-avoidance learners show higher levels of avoidance of search assistance (Roussel et al., 2011) and use of self-inflicting strategies (Leondari & Gonida, 2007; Gonida & Leondari, 2012).

As far as the performance-approach objective is concerned, research data lead to contradictory conclusions. Some research suggests that the performance-approach goal is positively linked to the use of metacognitive strategies (Senko & Dawson, 2017), with self-efficacy beliefs, with self-perception of schooling ability (Leondari & Gialamas, 2002), with participation in the classroom (Voulala et al., 2004; Gonida et al. , 2009), with school performance (Gonida et al., 2009; Andrare, 2019), but also with the search for help (Tanaka et al., 2001; Hayat et al., 2020). Other research suggests that the performance-approach goal is not a predictive factor of self-efficacy beliefs (Gonida & Leondari, 2012; Senko & Dawson, 2017) and metacognitive strategies (Gonida & Leondari, 2012; Senko & Dawson, 2017), such as stress testing (Gonida & Leondari, 2012; Senko & Dawson, 2017), the avoidance of search for help, self-infestation (Leondari & Gonida, 2007; Gonida & Leondari, 2012). In addition, some research suggests that the performance-approach objectives provide for high levels of only certain types of avoidance behaviors. In particular, these surveys indicate that students who adopt performance-of-purpose goals, compared to learners who adopt learning objectives, show high levels of competition in their efforts to be more capable than their classmates associated with higher levels of avoidance (Gonida & Leondari, 2012). On the contrary, there does not seem to be a strong correlation with other forms of avoidance behaviors such as self-subversion strategies and copying by others (Richards & Kosmala, 2013).

However, another group of surveys is somewhere in between these views, suggesting that performance aims are associated with functional behaviors in a positive way (such as high school performance) but do not have the same long-term benefits for learners adopting them, something (Andrare, 2019). Particularly, both learning objectives and performance achievements are seen as inducements to be approached, as they are achieved by finding ways to engage students in academic exercisies. But their difference lies in the fact that, while the performance-attainment goals are quite productive, notably in terms of high academic performance, they do not lead to learning outcomes associated with high-level processes (depth strategies, long-term information restraint), (Andrare, 2019).

Finally, a tendency towards separation and learning orientation has recently been observed in two different objectives: learning-approach goals and learning-avoidance goals (Andrare, 2019). The Learning-Approach objectives refer to the student's effort to personally improve, acquire new knowledge and engage in challenging / challenging goals and have been found to be associated with positive learning outcomes even when the student is in complex conditions of achievement (Andrare, 2019). On the contrary, learning-avoidance goals refer to the student's concern that he / she will not achieve previous positive academic achievements or that he / she will not be able to have a satisfactory level of knowledge and skills according to his or her real potential. Although learning and avoidance goals have not been found to be closely related to the occurrence of avoidance behaviors, they appear to mediate between the relationship of fear of failure and the occurrence of academic self-infliction (Sheynin et al., 2014). The new discourse of Learning Objectives revealed the new 2x2 model of the four objectives of learning and performance, the feasibility and the theoretical documentation examined to provide very good coverage of the content objectives of achievement.

In conclusion, it is noted that individual goals of achievement are associated with a variety of cognitive, emotional and behavioral variables, including the avoidance of seeking help and academic self-inflicting. In particular, learning objectives seem to predict the occurrence of these behaviors as they are linked to positive academic behavior patterns, while goals towards performance and, above all, goals towards performance-avoidance positively predict the adoption of avoidance behaviors, as they are associated with maladaptive academic behaviors.

2.6.2 Self-Efficacy

The concept of self-efficacy was introduced in psychology by the studies of Bandura (1977) for self-regulation of behavior. Self-efficacy concerns a person's personal beliefs about his / her ability to organize and perform the necessary actions to achieve specific goals in relation to various activities and contexts (Bandura, 1977). It differs from other beliefs about self (self-esteem, self-perception), as self-efficacy refers to individual beliefs about concrete situations of achievement (Senko & Dawson, 2017) the individual's experience, the work or activity in question and the specific context in which the learning activity takes place.

"Academic self-efficacy", on the other hand, refers to a person's perceptions of the ability to successfully achieve a particular project in a condition of academic achievement (Schunk, 2020). The individual's beliefs about how effective it is in different situations to achieve, according to socio-cognitive theory, are influenced by (a) his previous performance; (b) observing the performance of others; (c) encouraging or discouraging (d) the psychophysiological responses experienced by the individual in the performance of the activity (eg anxiety, fatigue, calmness) (Bandura, 1977). The results of most research show that academic self-efficacy is positively associated with cognitive processing, critical thinking, learning objectives, use of functional strategies, persistence, academic engagement and student performance and, consequently, with all the process of learning (Bandura, 1977; Gonida & Leondari, 2012; Senko & Dawson, 2017). Motivational researches and self-regulated learning emphasize the positive role of the high beliefs of academic self-efficacy in all processes of self-regulation (Pintrich, et al., 1991; Gonida & Leondari, 2012; Schunk, 2020). Self-efficacy beliefs, therefore, can predict a series of academic decisions, such as the choice of activities, the level of effort, the insistence on difficulties and the emotional responses of the students (Bandura, 1977). In addition, self-efficacy seems to affect the acquisition of skills both directly and indirectly, improving both the use of cognitive and metacognitive strategies (Pintrich et al., 1991; Peters, 2018). In this way, the student has the ability to work with the student in the process of solving difficult learning outcomes. Instead, low self-esteem beliefs have been associated with low effort, fear of taking on new challenging goals, lack of persistence, and resignation to the difficulty that leads to recurrent academic failures (Senko & Dawson, 2017).

In terms of individual goals of achievement, high self-efficacy beliefs seem to be positively correlated with learning objectives at all ages (Pintrich et al., 1991; Guo et al., 2017), while there are contradictory results with respect to the relationship between performance objectives and self-efficacy. Some research suggests a positive correlation (Walker & Green, 2009; Andrade, 2019), other negatives (Richards & Kosmala, 2013) and others suggest that the relationship of the two variables age (Senko & Dawson, 2017). In particular, a positive correlation between performance targets and self-efficacy beliefs for students of the 1st Gymnasium, while a non-significant correlation for students of Fifth grade. However, studies that have separately looked at performance-avoidance goals and performance-of-purpose goals conclude that performance-avoidance goals are those that are primarily associated with self-efficacy (Hayat et al., 2020), while for the performance-approach objectives the findings remain contradictory, sometimes leading to positive correlations (Hayat et al., 2020), sometimes negative (Gonida & Leondari, 2012; Senko & Dawson, 2017).

High self-efficacy beliefs have been negatively linked in recent years with avoidance behaviors, as the latter are, as noted above, maladaptational behaviors in the school context (Gonida & Leondari, 2012). In particular, the search for help investigated the reasons why students who feel they really need help are the ones who are looking for it (Howard-Jones, 2014). The explanation given in the above question is based on the fact that students with high self-efficacy beliefs for a project or for a class of projects have a great deal of confidence in themselves, that they will eventually do it in their work, so when they encounter some difficulty or even when they fail to worry that it will be attributed to lack of skills. As a result, they do not hesitate to seek help in order to go further. On the contrary, students with low self-efficacy tend to believe that others will consider their need for help as a sign of lack of ability, and are therefore more likely to avoid seeking help (Bandura, 1977; Tanaka et al., 2001; Tan & Yates, 2011).

The same seems to be the case with academic autopowering strategies (Petersen, 2014). As mentioned above, academic self-perversion stems from feelings of questioning both the value and the ability of the individual (Sripada, 2016). Thus, when students are confronted with an achievement goal in which they predict that they will fail (low self-esteem beliefs), they withdraw any effort to preserve the low image they have of themselves in relation to these works. Indeed, research has shown that students who have doubts about whether they will be able to achieve a given goal have high levels of academic self-infliction. Fear of a possible failure usually leads students with low self-esteem beliefs to adopt such strategies to alleviate their concern about how they will be seen in others if they fail (Senko & Dawson, 2017). However, people with high self-efficacy beliefs, although less often, may exhibit avoidance behaviors. This can happen when they fear that they will not be able to meet the high expectations that others have for them (Gonida & Leondari, 2012). It has also been suggested that some students, especially those lacking cognitive and metacognitive skills, often tend to overestimate their self-efficacy without showing a correspondingly good performance in the particular subject (Senko & Dawson, 2017), for example, found that high school boys tended to report high self-efficacy beliefs in literary lessons even when their performance was low. It therefore appears that high self-efficacy beliefs in a subject are not always consistent with the corresponding high academic performance in that subject. Research results, on the other hand, suggest that students with low academic performance who report high levels of self-efficacy tend to attribute their poor performance to external factors beyond their own control and feel the need to seek help as they consider that they have sufficient abilities (Howard-Jones, 2014).

Relative research suggests that overestimation of self-efficacy is evident mainly in theoretical lessons that require written expression (Bembenutty, 2009). This is mainly due to a lack of correct and relevant feedback from teachers, as well as to the tendency of many teachers to praise and reward too much the active participation of students in these lessons without necessarily being accompanied by a correspondingly good performance (Schweinle et al., 2006). On the contrary, positive lessons such as mathematics, which have a specific mode of solving usually leading to a given result, do not involve a great deal of subjectivity, so the judgment of individuals about their ability in the particular subject is usually more objective (Schweinle et al., 2006).

In conclusion, it is noted that self-efficacy beliefs have incentive power and are largely related to other incentive variables and to student behavior in the school context. It seems that, in general, students with low self-esteem beliefs often manifest classroom avoidance behaviors by making themselves at a disadvantage in learning (Sripada, 2016).

2.6.3 Self esteem

Self-assessment or otherwise global self-worth (Petersen, 2014) refers to an individual's overall assessment of his / her value as an individual and includes assessments and emotional assessments of himself / herself as a whole, in general, about his life. Self-assessment is a separate dimension of the concept of self and not the sum of individual self-perceptions, so its measurement is made with separate questions that generally assess the feelings of pleasure and satisfaction of one's self (Andrade, 2018). In the literature, self-esteem has been associated with the motivation to achieve, as well as the dimensions of mental health (Peterson, 2014), such as depression and anxiety (Petersen, 2014), reactions of irritability and aggression, of life satisfaction (Seo et al., 2018).

In addition, self-assessment seems to be related to the individual's self-perception in areas such as schooling, behavior and social relationships. In particular, the low self-perception in the above areas is considered to be able to predict a low general self-esteem as these areas are positively evaluated by their students, including those with learning difficulties (Andrade, 2018). However, despite their perceived difficulties in these fields, students with learning disabilities may maintain high levels of general self-esteem (Andrade, 2018), as the relationship between these self-perceptions and self-assessment mediates and other factors such as individual self-perceptions in other areas of competence (eg, athletic ability, artistic skills or some other particular talents of the individual) and the supportive social context with positive evaluations of important others such as parents, teachers and peers (Petersen, 2014).

Important predictive factors of self-esteem are self-efficacy beliefs and aspirations of individual success in specific activities or cognitive subjects, since based on these factors and according to the history of successes or failures, the individual interprets each as a success or failure, elements involved in shaping self-esteem (Leondari & Gonida, 2007). Research data show that the individual's beliefs about his / her effectiveness in a particular subject can influence the general level of self-esteem, while the opposite does not seem to be true (Senko & Dawson, 2017). The history of a person's successes or failures also plays a significant role in the individual's self-esteem. Survey results show that a student's history with continuous failures has an impact on self-esteem, which leads to reduced motivation for learning and, by extension, low academic performance (Rosi et al., 2019). This is because people experiencing continuous failures feel strongly the feeling of inadequacy, leaving more often the effort to achieve a given goal. Thus, any subsequent failure in a goal is perceived by itself as a result of insufficient effort, thus concealing their weaknesses in others and at the same time protecting their already low self-esteem (Rosi et al., 2019). Thus, it can be understood why self-assessment is considered to be equal to the proportion of the individual's achievements to his expectations of succeeding in important areas of his life. As the increase in success can enhance self-esteem, both reducing expectations may have an equally important effect on increasing self-esteem as well as the opposite (Leondari & Gonida, 2007).

As mentioned above, self-esteem is linked to motivation to achieve and, by extension, to the whole process of learning. Research data suggest that self-esteem is associated with adaptive patterns of behavior and student orientation towards learning (Sripada, 2016). Students with high fixed self-esteem seem to adopt more often learning goals, make more effort to achieve a given goal, and have a higher level of cognitive and metacognitive skills, thus facilitating the implementation of self-regulatory strategies while avoiding the adoption avoidance behaviors (Seifert, 1995).

This does not seem to apply to people with low levels of self-esteem. People with low self-esteem are vulnerable, as they are more likely to seek help because they believe that they will be able to confirm that they do not have sufficient abilities and thus their already low self-esteem (Sripada, 2016). The same seems to be the case with selfpacing strategies. As mentioned above, one of the main goals of people who are self-inflicted is to protect their positive self-image for which they themselves have similar doubts.

So, people with low self-esteem are more likely to adopt such non-functional strategies in order to maintain a relatively positive image of themselves, while at the same time relieving their concern about how they will appear to others if they fail (Bobo et al., 2013; Schwinger, 2013; Petersen, 2014).

In the academic environment, the potential consequences of both avoiding search assistance and academic self-undermining strategies tend to be more serious for students with low rather than high self-esteem (Svartdal et al., 2020). Assuming that students who react to potential failure with more academically-oriented goals are usually those who have the highest self-esteem, they are more likely to be less threatened by the search for help process and the potential failure compared to students with low self-esteem (Sripada, 2016). In general, research findings suggest that the need for help and potential failure is more threatening for students with low self-esteem as these students usually self-assess negatively and have low expectations to achieve their goals (Pintrich, 2000; Sripada, 2016).

Accordingly, the same seems to be true with the use of academic self-paced strategies which, according to many researchers, are negatively linked to high self-esteem (Bobo et al., 2013; Petersen, 2014; Svartdal et al., 2020). Although individuals who use such strategies aim either to protect their self-esteem, attributing failure to external factors or to increase their self-esteem by internalizing the benefits of success it seems that students who adopt self-inflicting strategies are usually those who have low levels of self-esteem and do not consider themselves to be more likely to achieve the goal they set (Bobo et al., 2013; Schwinger, 2013). The above finding is consistent with the original hypothesis of Harris et al. (2018), who suggested that people with low self-esteem, because they often express doubts as to whether they will succeed in achieving a condition of attainment, resort to self -population to protect their self-esteem.

Over the years, the concept of stability of self-esteem has emerged as an important aspect of self-esteem, not the level of the latter (Rinaldi & Girelli, 2016). Stability in self-assessment is defined by the short-term and long-term fluctuations that people experience in their self-worth feelings (Peters, 2018) reflecting a change in the basic level of self-assessment, which occurs "slowly and over a long period of time" (Sprecher et al., 2013). According to Sprecher et al. (2013), the tendency of some people to rely solely on social sources of assessment to decide on their general level of self-worth plays a crucial role in developing unstable self-esteem as social assessments, although frequent, are usually contain contradictory information.

In general, it is suggested that the more people base their self-worth on external success criteria (eg, academic success), the more self-esteem is in danger of being unstable (Lawrence & Williams, 2013). The unstable self-esteem is associated with the increased concern of the individual for his global self-worth by influencing his attitude and behavior in various types of activities. In particular, it is suggested that people with a steady self-esteem exhibit more positive and functional behaviors than people with unstable levels of self-esteem, who do not have a solid foundation of self-worth are more vulnerable to a possible failure and tend to manifest (Harris et al., 2018), such as the use of academic self-paced strategies (Sripada, 2016). Something like this seems to be the case with help searching. When, therefore, the search for help "implies" the feeling of inadequacy, it often becomes more threatening for people with unstable self-esteem (Sripada, 2016).

Other research suggests that both high and low self-assessment tend to commit to avoidance behaviors for different reasons. People with low levels of self-esteem are undermined in order to protect themselves against the threat of a possible failure (hence self-perversion is used as a self-protection tool), while highly self-esteemed individuals use self- (Rosi et al., 2019). In addition, the role of self-hypnotism can be avoided. The same is true of avoiding aid seeking, which is used by students with low self-esteem in order to protect themselves from the consequences of seeking help on their self-worth while from students with high self-esteem in order not to appear addicted and incapacitated to their surroundings (Sripada, 2016). However, Lawrence & Williams (2013) point out that people with high self-esteem involved in dysfunctional behaviors are those with unstable high self-esteem that base their self-worth on their success in certain goals and in the assessment of others, are more threatened by negative valuation events.

We therefore observe that despite the different interpretative approaches to the relationship between self-assessment and avoidance behaviors, most surveys agree that, as pupils with low and largely unstable self-esteem have a vulnerable profile, it is much more connected to non-adaptive manners like avoiding search assistance and academic self-inflicting (Senko & Dawson, 2017).

In conclusion, it seems that a multitude of individual factors, cognitive-metacognitive and motivational factors can make a significant contribution to the adoption and manifestation of dysfunctional academic behaviors, such as avoidance behaviors. In particular, low school performance, low self-efficacy beliefs with the concept of uncertainty for success in a project important to the individual, low and unstable self-esteem, in the sense of the person's uncertainty about his overall value, performance goals and, above all, performance-avoidance objectives are important predictors of both academic self-paced strategies and avoidance of seeking help in the classroom.

2.7 ADHD (Attention-Deficit/Hyperactivity Disorder)

2.7.1 Definition and Symptomology

ADHD, according to Kakouros & Maniadaki, is a developmental disorder of organic origin - according to most research data - which has a negative impact on many areas of child's functioning and causes serious and persistent difficulties both in the child itself and in his family and the wider social environment. People with ADHD differ from the average of people at the same level of development in their ability to focus on, control their impulses and in some cases restrict their mobility. They struggle to respond to situations in which other people do it very easily. These difficulties are manifested in different contexts and may have, in the long run, serious implications for academic performance, professional success and social-emotional development (Merrell et al., 2017). The main symptoms of ADHD are:

- Attention Deficit
- Promptitude
- Hyperactivity

According to Barkley (2004), lack of attention refers to diffuse difficulties due to low attention and inability to concentrate. They manifest themselves in academic skills, practices and motor skills, as well as communication through the discussion. It is mainly observed in situations that require attention to unclear or repetitive activities, such as individual school work. Children with deficient attention are not more disturbed than external stimuli compared to children of the same age, but they insist less on activities that are not interesting and have no direct consequences of satisfaction (Barkley, 2004).

The term impulsivity is the action that takes no account of the consequences of acts and refers to the inability to inhibit behavior depending on the social circumstance. The child does not wait for instructions, does not assess the situation, does not take into account the feelings of others, gives the impression of irresponsible and immature. He has a serious difficulty in controlling his reactions to irrelevant stimuli or events, unable to contain and ignore more interesting stimuli (Merrell et al., 2017).

The third element, hyperactivity, means an excessive or developmentally inappropriate level of kinetic or verbal activity that often seems pointless.

According to the DSM-IV Diagnostic and Statistical Manual of Psychiatric Diseases of the American Psychiatric Society (APA, 1994), six or more symptoms of at least one area (attention deficit, hyperactivity-impulsivity) are required to diagnose ADHD and different types (hyperactivity-impulsive type, attention deficit disorder, mixed type and ADHD in partial recession). International Classification of Diseases of the World Health Organization ICD-10 recognizes the hyperactivity disorder for diagnosis requiring symptoms in both areas (attention deficit and hyperactivity-impulsivity) in more than one situation (WHO, 1997). This is a more serious condition, including ADHD, as defined by the American Psychiatric Society.

The behavioral characteristics of ADHD appear early in life and remain stable over time. However, the way they manifest themselves is influenced by the development process. Pre-school age predominates in hyperactivity, while at school, attention is more noticeable due to compliance, attention and performance requirements in the classroom. Adolescence and adulthood dominate attention, attention, urgency, and inner anxiety (Howard-Jones, 2014).

A significant proportion, about 50% of ADHD children, are improving as they grow older. Hyperactivity and impulsivity is usually reduced, and attention disturbance can continue to cause problems in adulthood. Later there are other difficulties such as anger, impatience, strong conscientiousness, high self-esteem, poor self-esteem, poor performance in school, and interpersonal skills (Barkley, 2004).

The following table shows the symptoms of ADHD in childhood.

Attention Deficit	**Impulsivity**	**Hyperactivity**
• The child doesn't complete activities	• Poor self-control	• Excessive concern
• Easily dispersed	• Difficulty to wait for the turn	• Moves constantly
• The child is not concentrated	• Discourse content often inappropriate	• The child speaks too much

2.7.2 The extent of the Problem

ADHD is the most common neuro-psychiatric disorder in children. Studies based on questionnaires indicate that the general population is between 10 and 20%. Studies based on the DSM-IV criteria report lower rates, 3-10% (Howard-Jones, 2014), while those who do not investigate cohabitation report a percentage in the general population of 1-2% respectively. For school-aged children the incidence is 0.5%. The incidence of more severe ICD-10 disorder is 1% (Rutter, 1996). In the US, 3% to 5%

of the general population and 7% of the child population have ADHD. As a result, in a class of 30 children there is at least one child with disorder. Typically, diagnosis occurs after the age of 7 when the behavior of the child is compared to that of other children at school. In older childhood and puberty, frequency is rarer (Wakefield & First, 2003).

The course of ADHD is chronic and occurs more often in boys, with 3-4 / 1 proportions. A high percentage of children (30% ~ 70%) continue to experience difficulties as adults (Howard-Jones, 2014), while the gender difference is attributed to symptomatology. Boys manifest, usually aggressive and anti-social behaviors, which cause greater disintegration, discomfort and threat and are a frequent cause of referral to psychiatric services. Girls show fewer and milder symptoms of hyperactivity or impulsivity but fail in different areas due to severe difficulties in concentration and the extent of attention (Lynch et al., 2014). Teachers worry less and / or later for girls. Historically, roles in family, school, and life experiences are different for both sexes. The academic and emotional difficulties of girls are considered an individual rather than a social problem.

Most research data now support the assessment of whether the ADHD etiology is multifactorial, the first reason being neurological and genetic factors.

On the other hand, the estimates of some researchers (Chudal et al., 2015; Joelsson et al., 2017), which refer to psychosocial causes, have not been scientifically documented. In most cases where there was an important relationship between poor parenting, parental conflicts, psychopathology of parents and the appearance of ADHD, a closer analysis or later research has shown that this relationship is probably the result of effects of childhood ADHD problems on parental behavior despite the cause of the disorder. In other cases, it appeared that the parents of children with ADHD also presented the disorder themselves and hence was the hereditary dimension that made it more difficult for family relationships and influenced the methods of education adopted by these parents (Chudal et al., 2015; Joelsson et al., 2017).

However, it should be noted that both the family and the school environment play a crucial role in the development of the difficulties of the child with ADHD.

Consequently, although the role of environmental factors in the root causes of ADHD is limited, these factors are certainly very much related to its outcome (Kakouros & Maniadakis, 2012).

2.7.3 Primary and Secondary Impacts

The primary impact of these difficulties on the emotional state and behavior and environment of a person with ADHD is obvious:

• The child continuously fails to follow the rules according to the circumstances and to comply with the age requirements.
• It is unable to respond to the instructions, which are easily followed by other children.
• It destroys anything, in situations where most children learn to cooperate.
• However, it may be the child that no one ever cares about: you do not even remember his name! The child who 'dreams constantly'.

Secondary effects are due to the attitude and behavior of others. Children with ADHD are putting a lot of pressure on those with whom they deal and interact. They disappoint teachers, parents and classmates. For this reason, they are often rejected and ignored. The child often experiences rejection, presents emotional problems, low self-esteem, and is isolated. He may present a behavioral disorder (Wiener & Daniels, 2015). The co-existence of ADHD with other psychiatric and developmental disorders is high (Barkley, 2004) and is presented in the table below.

60%	Antiviral / Challenging Disorder
45%	Severe Transmission Disorder
25%	Antisocial / Counterfeiting behavior
30%	Anxiety Disorders

33%	Major Depression
50%	Emotional Problems
50%	Problems in Social Skills
90%	The child does not attribute to school work
20%	Reading Problems - Dyslexia
60%	Written Expression Problems

2.7.4 Different Diagnosis

One of the most important difficulties in differential diagnosis is the distinction of ADHD from the opposing provocative disorder and the disorder of behavior. Differential diagnosis is mainly based on the existence or absence of attention disturbances and impulse control difficulties and the age of first occurrence of these problems. ADHD-related symptoms usually appear earlier in child development compared to the other two Disturbing Behavior Disorders. Also, families of children with behavioral disorder are more likely to have strong family conflicts, low socio-economic levels, anti-social behavior, or substance abuse by their parents.

Differential diagnosis of ADHD from bipolar disorder and other mood disorders is mainly based on the interview with parents. ADHD is a chronic disorder, indications of which occur before the age of 7 years and may be associated with behavioral problems. Mood disorders are characterized by acute episodes of sudden mood swings, usually occurring after the age of 12, and are presented as a significant and sudden change in the child's behavior and the emotional state of the child (American Academy of Child and Adolescent Psychiatry, 2010).

Interaction of ADHD with other disorders significantly affects the degree of seriousness of the child's problems, the priority of therapeutic intervention goals and the outcome of these problems in adolescence.

People with ADHD can experience the world as hostile. In early childhood, a child can cry excessively, without obvious cause. He may have difficulty sleeping and eating and have difficulty in physical contact. Some children experience hypersensitivity to stimuli such as noise and light. The development of understanding the feelings of others may be poor (Spruyt & Gozal, 2011). Because of this, a child with ADHD may be violent to humans or animals but without intent. Also, for this reason, most children find it difficult to understand the consequences of their actions, punishment and rejection by others.

As the child grows up and is expected to respond to more complex instructions, he fails in most situations because he is unable to perceive, restrain, and even repeal short instruction sequences. He has difficulty in processing acoustic stimuli and understanding, even though his hearing is normal. It forgets and breaks easily.

Due to these particular features, the child with ADHD is as if it is constantly in the mist. He understands that there are many around, but he is unable to distinguish them and understand them with precision.

2.7.5 Children with ADHD in the classroom

At school, students with ADHD differ from their classmates in the following:

- The ability to keep track of different learning tasks, but also in the game.
- They are easier to understand, have poor attention, and have difficulty getting started and completing their schoolwork or other activities.
- They are more careless in class, ignore instructions and rules or find it difficult to follow.
- They seem to be over-organized. They forget very easily and lose things.

- They show excessive nervousness and mobility in the classroom and in other situations requiring compliance.
- It is constantly on the move, "under steam", to an excessive extent, compared to peers.
- They may be aggressive towards classmates and intervene in their work.
- They last deliver their work, usually incomplete or do not deliver at all.
- They are constantly making noise and talking a lot.
- They are constantly interrupting others, having difficulty waiting for their turn in the game or questions in the classroom at the time of the lesson.
- The mental skills of children with ADHD are usually on average high, but performance is fluctuating. It is usually lower than the mental level.
- The child often gives the impression of being abstract and lazy or not motivated.
- It seems that he is wasting his abilities to break up and oppose others. It does not sit in its place, it bothers, it does not complete tasks.

Therefore, in the classroom, the child listens for one minute to the instructions of the teacher, then breaks down from something they ignore, the other students are removed. If it is hyperactive, it moves nervously and gets up from its position. Meanwhile, the teacher finishes the instructions. The child breaks apart from the movement of other children in the classroom, most of whom comply with the instructions. Because he does not hire part of the instructions, he is confused, he does not know exactly what to do. He can not respond and is in danger of being punished. (Wiener & Daniels, 2015).

In direct association with the predominant symptoms of carelessness, impulsivity and hyperactivity, there are a number of disruptions to the positive learning behavior of the class of behavior, with the result that these children are placed in a high-risk group in terms of reduced school performance, problematic social relations (Barkley, 2004).

It is therefore reasonably necessary to use intervention methods that in some cases depending on the intensity and duration of the problem may take the form of a structured program, while others may remain at the level of use of individual techniques or means. Only three types of intervention are experimentally supported as effective ways to treat ADHD: the use of pharmaceutical preparations, behavioral modification programs and the combined use of the two previous interventions (Barkley, 2004).

2.7.6 Educational Perceptions

Teachers feel more capable of facing a child with ADHD in cases where they feel the problem is common and has no serious or long-term impact on the child's life. It is also characteristic of the fact that the self-competence of teachers is proportional to their experience. It has been found that although teachers are willing and able to help students with ADHD, their information on the disorder is incomplete. However, the active role teachers play in identifying, diagnosing and addressing the disorder requires more systematic training on child psychopathology issues.

Surveys in the US have shown that many teachers believe that medication guarantees control of its characteristics even when its origin is not biological. On the other hand, other research shows that 97% of teachers believe that children with ADHD can learn successfully and effectively within the normal classroom. In addition, 94% agreed that students with ADHD have difficulties in organizing their school work, as 50% of these teachers believe that these students also have difficulty playing (Hechtman et al., 2004).

2.7.7 Psychopedagogical Treatment

The role of teachers is better understood in the context of the multi-level approach, which is considered the most effective method of coping with children with ADHD. This approach incorporates principles of behavioral theory, cognitive and systemic theory and is characterized by the holistic view of the child and the environment in which he develops (Shaw et al., 2011). On the basis of the multi-level approach, a therapeutic program is shaped by the active participation not only of the child himself but also of parents and teachers.

The teacher is usually the one who first identifies the problem. A well-informed and well-informed teacher is able to grasp in time the existence of serious difficulties and to guide parents to refer the child to the specialist for further investigation. This is the first important step in helping the child successfully deal with his or her difficulties. The teacher's contribution to assessing the child's problems, in collaboration with parents and the specialist, is also considered indisputable. The information it provides about the social and academic functioning of the child is of paramount importance both for the diagnosis and for the determination of therapeutic goals by the specialist.

In addition, the teacher works with parents and specialists to implement the counseling program. The multilevel approach initially aims at improving the child's motivation for acceptable social behavior and interpersonal communication as well as the level of self-esteem. Improving the image that the individual has for himself and his abilities is a prerequisite for his further active participation in the healing program and his success in it. The aforementioned goals can only be achieved if the child is convinced that he can succeed in his efforts (Kakouros & Maniadakis, 2012). The encouraging and supportive attitude of the educator with the parallel adaptation of pedagogical activities to the level of the child's abilities creates the appropriate framework which gives the child the opportunity to experience successes which in turn create a positive attitude towards the educational process and an incentive for extra effort.

Regarding the structured intervention programs there is now an extensive database of research data emphasizing the effectiveness of psychosocial interventions in improving the behavioral and school performance of students with ADHD. In their extensive analysis, Pfiffner et al. (2013) and Clarke et al. (2013) conclude that school-based interventions for students with ADHD have spectacular results in behavior. In particular, behavioral and training programs that focus on stimulus control (eg work modification, changing environmental conditions) are more effective than cognitive-behavioral intervention in managing behavioral problems.

Respectively, Ghuman & Ghuman (2013) reported that interventions using drugs and multimodal treatment –a combination of pharmaceutical and behavioral / cognitive interventions - delivering more significant results in managing the problems of carelessness, hyperactivity and impulsivity compared to intervention programs within the school. However, the cognitive benefits and the corresponding school performance appear qualitatively and quantitatively higher in the case of school-based intervention programs compared to the pharmaceutical and combined interventions, while there is no difference in the impact of the programs on promoting pupils' social relations. It should also be noted that, apart from side-effects seen in the use of medication (eg somnolence, weight loss, etc.), few studies are being conducted that evaluate the effects of long-term pharmaceutical intervention and the few reported significant long-term benefits arise (Pfiffner et al., 2013; Clarke et al., 2013).

In contrast, the systematic implementation of aid programs to reduce hyperactivity or increase attention concentration dramatically alters the levels of specific ADHD symptoms. In addition, enhancing desirable classroom behavioral responses (eg number and problem solving) not only leads to increased productivity and correctness of responses, but indirectly reduces out-of-work behavior (off-task behavior) and hyperactivity (Pfiffner et al., 2013; Clarke et al., 2013).

Typically, in the design of intervention programs, techniques for increasing the desired behavior, such as the token economy system, are incorporated, and research results show that social enhancers such as praise are not sufficient to increase or maintain behavior in the desired levels (Pfiffner et al., 2013; Clarke et al., 2013). In the technique of gradual shaping of behavior, behavior is analyzed in smaller steps and systematically reinforced each step towards the desired behavior (Taylor et al., 2010). To build a desired behavior is necessary:

1. The recording of unwanted behavior in an observation protocol, its predecessors and subsequent events (Taylor et al., 2010)

2. Basic Line Identification (Buckley et al., 2016) and

3. Functional description of target behavior and determination of amplifiers (Poole et al., 2012).

In conclusion, as noted by Barkley (2004), behavioral enhancement programs can deliver immediate, significant and short-term behavioral improvement, and corresponding outcomes in the school performance of students with ADHD. Second, physical amplifiers are considered more effective to reduce pupils' disruptive behavior and increase their performance compared to positive attention and social enhancers. It is further underlined that an equally promising positive result technique is the use of home based contingencies based on the behavior and performance displayed by the pupil in the class as it is recorded daily on school report cards or school - home notes) by the teacher.

School-home notes are a technique for improving school performance, which according to Blazar & Kraft (2017) requires:

1. The daily assessment of the student's behavior by the teacher and

2. The corresponding application of amplifiers by parents based on these ratings.

The use of notes offers a number of advantages compared to the interventions implemented exclusively by the class teacher (Blazar & Kraft, 2017). They establish a frequent, predictable, positive communication between parents and teachers, replacing the partial, negative feedback usually provided to parents. In addition, teachers are not required to differentiate the flow of their teaching. It is a short and simple to apply technique that brings together teacher preferences, as all that is required is to record and evaluate the student's behavior at predetermined intervals during the school day. With the notes, parents are also offered the opportunity to offer powerful boosters to their children, which are usually not feasible to be offered by school, while at the same time relieving teachers from searching for the right amp. Surveys confirm the comparative advantages of parental involvement in aid schemes for pupils' school performance compared to teacher participation (Hyadon et al., 2011). The technique of the notes was originally designed to increase pupils' school productivity, however, as pointed out by her rapporteur, the problematic behaviors in the classroom (Hyadon et al., 2011) may also be targeted. The purpose of behavioral intervention programs was to address problematic behaviors by linking assessment to intervention techniques to express the desired behavior. Each intervention action includes the hierarchy of objectives, as well as pre-agreed reinforcement strategies, with the corresponding selective changes in the environment of the classroom. From the internal evaluation of the implementation of the intervention plans, the conclusion of the faithful and systematic implementation of the initial plan is drawn, despite the difficulties of coordinating parents and teachers.

The stagnation of results or even regression of behavior are common in similar intervention programs, since as noted, behavioral techniques should be applied in all contexts in which engages the student in the long run in order to achieve generalization of positive their results (Barkley, 2004). In addition, it is noted that intervention programs based solely on the provision of enhancers to students lead to a temporary improvement of their behavior. This view is reinforced by the fact that the successful intervention plans, as the relevant literature, for students with behavioral problems are most frequently used techniques that have to do with building skills and consequences-based interventions (Long et al., 2016).

As Pfiffner et al. (2013) and Clarke et al. (2013) point out, the exclusive use of positive aids to control the behavior of children with ADHD in the classroom is not sufficient to maintain the new improved behavior. The research evaluating the results of the systematic and regular use of verbal scolding and response cost to control the behavior of children with ADHD has shown a significant reduction of their disruptive behavior, particularly in the case of using the technique of reaction cost. It therefore appears that the combined use of indirect punishment in the form of response cost and positive aid leads to an increase in the frequency of on-task behavior and the correctness of the student's answers. Maintaining the positive results from the combined use of the two techniques is firmly in place with the use of a positive aid scheme in which the response cost technique is phased out.

Therefore, the proposal formulated for future case studies, focusing on the exploratory interest in the effectiveness of behavioral management programs, involves combining the techniques of organizing the study with techniques that directly focus on symptom management.

2.8 Adaptations of Greek Curriculums for Mathematics in Gymnasium

The learning difficulties relate to a population of "normal" intelligence whose basic characteristic is the disparity between cognitive functions as well as between cognitive functions and school performance. In terms of performance, difficulties can arise in language, reading, writing and mathematics. Difficulties in mathematics are the least studied form of learning difficulties, because on the one hand there are often not only cases with mathematical difficulties, and on the other, mathematical competence involves various endogenous and exogenous factors.

A case of learning difficulties is the specific disorder in arithmetic (dyscalculia). We can talk about this disorder as long as the pupil complies with the requirements of the above definition and presents serious problems only in the field of mathematics and not primarily in other areas of school learning, particularly in the oral and written language. These problems also have to be identified in specific fields of mathematics (such as the measurement or the concept of number and decimal numerical system or calculations and operations or the use of mathematical symbols, etc.) and not in the whole of school mathematics, which include many different fields (concepts, reasoning, strategies, organization, etc.) (Markovitis & Tzouriadou, 1991; Morsanyi et al., 2018; Soares et al., 2018). Progressively, this particular disorder usually affects the learning of mathematics as well as more widely in school learning. The special disorder in mathematics is mainly found in younger ages (first grades in primary school). As pupils pass from childhood to adolescence, many of the features of the initial symptomatology of the disorder gradually recede or even disappear. However, their consequences remain on the three levels: school knowledge, strategies and learning behaviors and incentives. It should be noted, however, that the specific disorder in arithmetic, separated from other cases of special disorders, appears at a very low frequency, and therefore the relevant research data are limited and often controversial. Often the characteristics of this disorder overlap with other exogenous (teaching, personality and motivation) which makes their study particularly complex and difficult (Dirks et al., 2008).

Difficulties and obstacles to acquiring school mathematical knowledge may arise from other cases of special disorders (learning difficulties). It has been observed that problems in the visual-kinetic perception are associated with difficulties in the ability to measure, classify, compare, and "one-to-one" matching. Perceptual disturbances in some cases are associated with difficulties in understanding the symbols or lacking in the combination of visual and acoustic symbols (Pieters et al., 2012). Distortions in the perception of relationships in space are associated with corresponding concepts in mathematics. Disorders in the development of speech or reading ability are associated with difficulties in obtaining mathematical concepts (Hawes et al., 2015). The inability to quickly and automatically recall numerical operations as well as the difficulties in automating basic numerical skills, according to some researchers, are associated with weaknesses in memory functions (Menon, 2016).

A common and basic feature of all learning difficulties is the incomplete or no development of strategies in areas where specific learning difficulties arise. While the pupil possesses the required mental capacities, he does not develop appropriate strategies that will allow the synthesis of the elements of the pre-existing knowledge together with the new data for the building of the new knowledge (Tzouriadou, 2011). Thus, for example, it does not develop effective strategies for decoding the language symbols or for processing speech impulses or for conceptual correlation or automation of numerical calculations, and so on. The absence or incomplete development of strategies implies the impossibility of constructing concepts, which in turn makes the child's learning effort more difficult in the next step. Given the evolutionary and cumulative nature of school learning, weaknesses in the level of processing methods and strategies have progressively led to significant shortcomings in the level of school knowledge. Moreover, the systematic difficulty or failure in completing schoolwork creates negative feelings, motivations and views about oneself and school learning.

Similar characteristics also pose many students with school difficulties without identified deficiencies. Social, cultural and, most importantly, educational factors are responsible for the inability of many students to have the school-based methods of working and editing school projects, as well as strategies and ways of thinking. The same factors are responsible for the lack of meaning in the taught school knowledge, for the formation of negative motivations and learning behaviors (Barbas et al., 2008).

It is important to point out the distinction between processing methods and strategies on the one hand, from the "techniques" and "tricks" that the teacher often considers as aid to his pupils. Without underestimating the value of these special techniques, the main problem for most students with math problems is their inability to process the mathematical work they face at school effectively and logically. Thus, for example, coping with a problem such as "The student performs operations with 0 as if he does not see it" may perhaps be associated with some special visual-perceptual deficiencies, but it is certainly linked to conceptual obstacles about 0. If we approach it from this point of view, instead of teaching "teasing", it is easier to support the student in understanding the role of 0 in writing numbers by creating appropriate conditions that help him to distinguish this role himself. Accordingly, the various categories of errors (Hernandez & Chapa, 2010) are due both to the particular thinking processes used by each student and to the particular features of mathematical concepts and applications through which it would be possible to overcome them.

Such a findings lead us to the conclusion that students with serious difficulties in school mathematics - whether these are associated with special disabilities (learning difficulties) or exogenous factors - have similar characteristics in the process of school learning, which are the most important, her. This reinforces the view that the most appropriate and effective pedagogical approach to addressing school difficulties in the mathematics of these pupils is the common learning activity within the classroom, provided that it is able to meet the pupils' needs regarding development of their own ability to process and build school knowledge, along with the formation of meaning and positive incentives.

This orientation does not negate the need for extra special teaching outside the classroom where the nature and intensity of learning difficulties require it. This can and must result from the systematic pedagogical and interdisciplinary assessment of the particular student. In any case, participation in the classroom joint program is not related to the implementation of a specific pedagogical program, it does not aim at addressing a disorder but rather in enhancing the student's effort, together with all his classmates, to acquire the ability to "learn how to learn", as well as to strengthen the collective collective identity of the member of the school group. These are first-priority needs and only participation in the classroom's common learning activity, under the conditions mentioned, can satisfy them.

For all the reasons that have been analyzed, there is a direction in which many modern views converge for adolescents with learning disabilities. We do not try to "teach" mathematics in different ways or using different techniques, but we systematize activities and teaching situations that, taking into account the specific difficulties of children as well as the previous knowledge and experience, allow them to self-efface to overcome their deficits in mathematical learning. In this way, in addition to his / her schooling, he / she will develop skills that will enable them to get to know, to cope, to interpret, to understand, to control situations and to work their daily lives in an effective way. (Barbas et al., 2008).

In other words, we adjust the objectives and the program material based on:

- The particular characteristics of the children we face, which give us the specific difficulties and criteria for selecting the material chosen for the approximation of mathematical concepts and procedures of interest.

- The very characteristics of mathematical concepts, their peculiarities, the conditions of their development, the conceptual frame of reference, which give us the ways in which these difficulties can be addressed.

In particular, the thematic unit identifies the deficits that students face in the particular concepts and processes involved, ie the starting point of their learning deficits. Then, the specific features of the concepts are analyzed and, starting from this, appropriate activities are proposed through which students will build the meaning of the concepts or processes involved. For each of the learning deficits, there are indicated activities and materials that can support their uptake (Tzouriadou, 2011).

In this sense, Program Adaptation involves a more systematic analysis of objectives at levels determined by mathematical concepts and procedures and we are interested in developing students with learning difficulties.

2.8.1 Teaching and learning of mathematical concepts and processes: new teaching approaches

Mathematics is a high spiritual creation of man with many peculiarities compared to other knowledge developed by children. As the most important of these peculiarities can be considered the creation and engagement of mathematical science with mundane objects. Mathematical concepts are totally abstract, ideal entities (as ideas and ideals) that take their meaning from their definitions within the science.

For this reason, their conditions of development in students' perceptions are complex and most students encounter serious difficulties in understanding and managing them.

However, mathematical concepts and processes are involved in everyday activities of people and are indispensable for their operation in the world. For this reason, it is necessary to help children develop some of these concepts and processes.

In recent years there has been a common understanding of the way in which mathematics teaches, through which pupils conquer the meaning of mathematics.

The student is no longer treated as a recipient of mathematical information offered to him by the teacher in the form of narrative or interrogation but he dynamically constructs knowledge. In this way, he is called upon to form his own mathematical behavior through the organization of his personal activity and his experiences. The theory of knowledge building is the cognitive theory that contributes to this direction (Baumert et al., 2010).

At the same time, questions are raised and research concerns are developed on the content and organization of mathematical activities in a way that links informal to formal concepts and processes. It is generally accepted that the creation of a mathematical knowledge requires appropriately shaped teaching situations, which are designed specifically for each concept (Lewis et al., 2008). Besides, for the development of each mathematical concept and depending on the level and age of the students, it is necessary to create activities and problems that cause the students to construct the specific knowledge at all times.

This concept complements the concept of the conceptual field, on the basis of which a mathematical knowledge cannot be built through one or some activities but through a set of situations and problems in which the concept works and takes its meaning (Knaus, 2016). On these issues the scientific community of Mathematics Teaching is studying for years examples and applications.

Modern perceptions of teaching and learning rely heavily on a constructive hypothesis whereby the subject himself dynamically constructs knowledge by organizing his own empirical world. Consequently, mathematical learning requires pupil involvement and development within a suitable organized environment of mathematical experience (Darling-Hammond et al., 2019) which is a set of material and mental conditions, specially designed for every concept that creates the necessary conditions for the approximation of the concepts we seek. By working in this environment the student has the opportunity to engage in activities that bring him into contact with mathematical knowledge, processes and abilities (Darling-Hammond et al., 2019).

For this reason, modern curricula are geared to a teaching methodology based on activities.

2.8.2 What is a mathematical activity?

Activity is a situation in which the person is called upon to act, decide to choose, build, etc. This action mobilizes the previous knowledge, which if not sufficient, the person re-examines, reorganises or enlarges it (Darling-Hammond et al., 2019).

The first of the characteristics of a mathematical activity is action. Action means finding a solution to a problem, strategies in a game, construction, decision, etc., and involves the use of situations, games, material associated with the concept we want to develop, and prompting the child to participate, think and deal with relevant concept. It therefore presupposes its individual, intellectual activity. If the student is "involved" in a phase of the teaching we propose, then he works as he perceives and many times regardless of what the teacher would or would expect from him. In this context he observes, chooses, decides, at the same time expresses in words or other representational means, formulates what he does, develops strategies that help him, as he confirms his action or his decision, corrects in cases of error.

It is well known that the very development of mathematical concepts by man was based on the necessity of dealing with situations and problems for the interpretation, understanding and control of the world around us. In the same way, we seek to develop between students and mathematical concepts a relationship of development and use of concepts and procedures that effectively enable them to get to know, address the situations and problems they encounter.

For this reason, the concept of motivation and the need to develop a knowledge that leads the children to engage in a proposed activity, to agree with the usefulness in the knowledge needed, and to be willing to invest time and effort to obtain it is important. In addition to the knowledge itself, such a process reinforces children's perceptions of self-efficacy and the value of learning.

An activity oriented towards the development of new knowledge is necessary to lead the children into a state of reflection. This should be ensured both by the subject of negotiation, the level and the way of thinking of the child, and by the context in which the activity is organized (subject, script and material) to encourage the child's involvement.

In the context of an activity, the words in words of decision or choice action are important because they lead students to explicitly express what they have done and consequently to become aware of the concepts they come into contact with. The transfer of concepts from the level of action to the level of words is key to their approach.

According to Bruner (1990) "language does not develop through the role of the listener, but through its use. Explaining to the flow of language is not as important as to use it in practice. "The child should be encouraged to express his ideas, to connect, to ask and to answer, to listen and to follow instructions, to discuss, to interpret and to explain, to judge, to speculate, to appreciate.

Controlling the outcome of a decision or action is also necessary to complete the activity. However, the error cannot be corrected by the teacher, because the creation of the wrong knowledge is done by the subject-child itself, so its correction will be realized by it. Given that mistaken or incomplete knowledge was the result of a long-term process of contact with the environment, because the development of knowledge always requires a long process, a sentence or a correction of the teacher is not enough to change it.

All of the above shows that each teaching situation must include a dynamic process of control that allows the child to detect his error in order to lead to correction and new knowledge. At the same time, it helps to evaluate cognitive strategies and develop metacognitive strategies in the course of dealing with situations.

Organization and management are the one dimension of mathematical activity. The second dimension is given by linking the work we propose with the mathematical meaning we seek to develop. Knowing the context of the concepts we are interested in developing and the level of approach that we decide to reach, we end up with a set of activities that are necessary for this concept framework and this level of approximation. Often, it is a mistake to suggest interesting activities that the child is facing without, however, leading to the development of a more general idea, as is usually mathematical ideas, or to consider that the child when dealing with an application can make a generalization that can only come from a set of applications. For example, for fragment comprehension only fraction sharing applications cannot be used in parts that give a dimension to the concept but also reason, sharing, etc., as well as different representations for it, such as schematic, linear or set representations.

In summary, teaching with activities suggests designing and presenting students with a learning situation that is a problem, i.e. an unfamiliar situation for children, and dealing with it develops a new concept associated with mathematics.

Children take on and manage it, working without interference, have ways to find out what's wrong or wrong, and make a more general conclusion.

The teacher is required to find activities that correspond to the concepts, to organize the appropriate materials, the forms of representation and the control procedures, and to encourage the child's activation, the formulation of his ideas and the controls, without interfering in his actions.

2.8.3 Teaching and Learning of Mathematical Concepts and Procedures: Approaches for Students with Learning Difficulties

As stated above, it becomes clear that the didactic methodology proposed for pupils with learning difficulties is not different from the methodology proposed for mathematical learning in all children. The difficulties in mathematics arise from their abstract form, the necessity of generalizations, the peculiarity of their language, the differences in the notions between the way they are used in mathematics and in everyday life, the use of symbolic and representational forms, and these difficulties are differentiated by concept and subject area. More than to diagnose problems and discuss special ways of dealing with them, it is interesting to identify the specific difficulties on a thematic mathematical axis and to suggest methods and activities that can help to overcome them.

The problems faced by pupils with learning difficulties in mathematics in Secondary Education are increased due to the "cumulative" character of knowledge. As a result of this lag compared to their other classmates, it is the great difficulty of achieving the objectives of the curriculum.

In particular, the proposed teaching approach identifies the deficits in mathematical learning in each thematic unit of mathematics and suggests indicative activities and teaching situations that help children overcome these deficits.

Thus, in a complete curriculum, by subject area, the following are presented:

1. The succession of goals and their adaptation for children with learning difficulties (previous classes - present class - adaptation) in a programming sheet, based on the mathematical learning deficits identified in each thematic unit of mathematics. Mathematical concepts are structured in a hierarchical way and rely on previous knowledge. Numerous numerical and geometric concepts have already been developed in children in previous classes as well as in primary schools. Appropriate

mathematical education builds on children's previous knowledge, builds on their experiences, exposes children to generalizations and deductions that will gradually lead them to more systematic knowledge. For this reason, the presentation of the objectives presents the knowledge necessary to meet the objectives of the particular subject and allows the teacher either to rely on them or to seek to cover them if they identify gaps through the appropriate activities.

2. The peculiarities of the concepts, i.e. a clarification of important elements concerning the concepts that concern us, based on the analyzes and research findings of mathematical education on the course of development of the relevant concepts.

3. Highlight the difficulties pupils can encounter (pupils' difficulties), based on the general difficulties we encounter in the development of relevant concepts that help us to understand the deficits as well as the proposed activities.

4. Teaching tips that give instructional criteria for choosing or shaping activities

5. Indicative activities in case of difficulty

6. Questions for self-control and discussion

Each thematic section concludes with these questions that summarize the most important elements of the module and allow the learner to evaluate the knowledge and skills he / she has acquired, and the teacher to evaluate the achievement of the goals.

In this form, the evaluation also acquires a conformational character that allows the student to cope with difficulties and take responsibility for developing the child's own knowledge.

The evolutionary nature of mathematics, as opposed to other lessons which are relatively independent of knowledge (e.g. natural sciences), does not "allow" the existence of gaps that can create significant learning difficulties. This sequence makes it necessary to arrange program adjustments by thematic axis and class (Gainsburg, 2012).

2.8.4 Organizing class with children with school and learning difficulties

Suggested adjustments for pupils with school and learning difficulties should not be limited to the program and in order to benefit these students from their education in the usual classroom, it is necessary to organize teaching practices that take into account their special educational needs.

The physical presence of one or more pupils with school-learning difficulties within a school class does not mean their direct participation in learning activities, especially when there is a gap between their knowledge and the requirements of the mathematical works to be solved. What determines the requirements of mathematical works in each class is a set of prerequisite knowledge that the learner must possess in order to be able to meet the corresponding demands of mathematical works. Those students who have deficiencies or gaps in their knowledge can cover them through the institution of foster teaching (Π.Δ. 429 and 462/1991). In cases where deficiencies are associated with deficiencies, students are invited to attend the Mathematics course in the integration section in order to address their deficiencies through a specialized program (Law 2817/2000). In both cases, pupils are excluded from their classroom and referred to special educational structures separated from the main body of education. This philosophy translates to the student himself the responsibility for the difficulties he faces, when these arise mainly from the very structure and organization of the learning program. It is therefore argued today that pupils with learning disabilities have to participate and to deal with their problems more in the normal class rather than in specific structures (Tzouriadou, 2011).

However, the presence of pupils with learning disabilities within a high school class does not automatically involve their involvement in learning activities. These pupils may be integrated into the classroom without this meaning that they can attend the learning program. The aim of the teaching practice should be to enable children with learning disabilities to participate effectively with their other classmates.

In a class that already works with a modern form of teaching, effective management to enable students to participate actively with and without learning difficulties requires:

- focusing on the whole class,

- checking all the factors that influence the teaching and learning process,

- the implementation of cooperative teaching and learning methods and strategies,

- creating a classroom environment that adapts to the group and is supportive of all.

For this function, some techniques may be:

- Planning the class as a whole and encouraging active cooperative learning.
- Organizing the class into mixed-skill groups that allows the distribution of responses to each activity, so that some of these questions can be addressed by all children.
- The use of alternative activities, the development and utilization of a rich teaching environment with a variety of teaching materials and materials, such as educational material, toys, construction, etc., as well as the exploitation of new technologies and mathematical software.

2.8.5 Organization of students' action in a mathematical activity

Based on the above, we suggest the following organization of the course. Students are organized into small groups of mixed capacities of four or not more than five. Each activity develops in three phases.

a) In the first, each student is individually concerned with the problem posed by the activity. The mode of action is not predetermined by the teacher but is chosen by the student. Another can empirically process the problem at the virtual level (drawing or drawing) and another can process it in the abstract by using mathematical rules or algorithms. The teacher according to the activity determines the time of this phase. It monitors the efforts of each child and intervenes to facilitate the processing of the obstacles it encounters. The facility is mainly about indirectly or promptly suggesting ways to process the problem. The indirect or immediate character of the suggestions depends on each student and the quality of the obstacles he / she has. Under no circumstances does the teacher suggest the solution or validate the correctness or otherwise of the actions of the pupils. Instead, it suggests ways of controlling by students themselves the reasonableness of their actions.

b) In the second phase the students of each group discuss the results of their individual treatments. They compare results, contrast modes of construction or computation, agree or disagree with what their classmate found, recheck their own calculations or construction mode and end up with some common conclusions (even if they do not agree to the result). At this stage, the teacher helps and ensures the productive character of the discussions within the group (eg a student undertakes to record all the answers - solutions, then group them together and the students have to check where the differences are). Students may not be able to analyze how they thought. But they can explain how they measured something or made the thing. This is particularly important because it helps to create speech and thought and, on the other hand, initiates processes of self-control of the actions described. At the same time, students are familiar with the existence of different solutions - which are not necessarily wrong - and acceptance of the expression of different views. Through cooperative action relationships of cooperation, mutual help and acceptance are developed (we could symbolically characterize these processes as "horizontal" development of relationships as opposed to the "vertical - radial" of each pupil separately with the teacher).

c) In the third phase the students of the class discuss all together. The teacher records in the table the opinions of each group (one or more) without evaluating them. Each student who proposes a solution - answer explains his answer (how he found it, because he considers it correct). The teacher discusses the different answers. At this point he can come across three different situations.

One case is to formulate correct solutions in a different way of expression or a different calculation method. In this case, the discussion aims to show that it is the same solution, and on the other hand to record different processing methods or strategies to enrich with them the repertoire of pupils' skills.

Another case is to have different answers (correct and wrong). In this case, the discussion aims to reconsider the way students have computed or constructed the way they were to identify themselves by their own mistake (with the help of their peers' counter arguments). The teacher must be prepared to support self-control and self-correction on the part of the pupils with appropriate questions. In no case does he formulate the correct answer, because that would immediately stop the students' treatment.

Finally all answers can be incorrect. In this case the teacher should ask himself what is missing from the pupils' knowledge and skills and prevents them from working out the problem effectively. It is likely that the problem itself is physically inappropriate, in the sense that it is far from the potential of students. The wording of the correct solution by the teacher does not help to build knowledge from students. It is preferable for the teacher to close the activity by saying that "we need to see it again" and come back with another activity that is more responsive to the students' knowledge and skills.

The variety, extent and particularities of the mathematical concepts taught are very great. The number of activities and hardware that can be used is also inexhaustible. No aid can cover all the needs a class teacher can face with children with learning difficulties in maths.

However, changing from the traditional form of frontal teaching to a teaching that encourages the active and active building of knowledge by students and the perception of the role of the teacher as an organizer of active learning, along with adaptations and supporting material, can help him to develop flexibility in the search for or design of appropriate activities to support and advance children with learning disabilities by developing tools, strategies that allow them to respond to the mathematical demands of their studies in high school.

3 METHODOLOGY

3.1 Defining the problem

As the European Parliament and the Council of the European Union recommends, mathematical competence is defined as "the ability to develop and apply mathematical thinking in order to solve a range of problems in situations of everyday life" (2018, p.9). Having as a basis for building mathematical competence a deep and valid knowledge of numerical concepts and relationships, the emphasis is on both process, action and knowledge. Mathematical competence involves, to varying degrees, the ability and will to use mathematical modes of thinking (logical and spatial thinking) and representations (types, models, constructions, graphs and tables).

Through a multiple perspective, mathematical competence is defined as the ability to understand, judge, act, and use mathematics in a variety of contexts and situations, within and outside the field of mathematics, in which mathematics plays a role (Robertson & Graven, 2020). Every mathematical skill can function both as a component of mathematical knowledge within the field of mathematics and as a bridge connecting him to the rest of the world (Darling-Hammond, 2019). The research was conducted in the context of this doctoral thesis with the aim of exploring the importance of the Mathematics course in various aspects of the life of students with ADHD. These children usually find it difficult to concentrate on reading a problem and to figure out what actions to choose. In addition, it is difficult for them, for example, to concentrate and locate the important information of a problem.

By defining the problem, the researcher realized that students must be competent to function in society. The science of Mathematics is necessary for them to acquire this kind of skills. By this way, the need of man to understand sizes and quantities and to compare numbers and numbers led him to the development of mathematical skills, basic and primary features of human thought (Butterworth, 2019). These abilities relate mainly to numerical concepts, relationships and structures, and represent different cognitive systems of numerical and numerical computation. It should be noted, however, that the relationship of independent arithmetic systems with other general cognitive systems such as reasoning and reasoning through this approach is not negated.

An adequate explanation of all mathematical abilities, especially those involved in solving a problem, involves including in our analysis the language system (Archibald, et al., 2019). In addition, problem solving involves abilities related to computations, reasoning, reading skills and perhaps visual-spatial skills (Archibald, et al., 2019).
The successful manifestation of mathematical skills requires the individual to be careful and organized in the execution of the project, and to act at such a speed to avoid overloading the working memory with excessive volumes of different kinds of information (Fyfe et al., 2019).

The investigation of the predictive value of individual factors in the adoption and manifestation of avoidance behaviors is the main objectives of this study, as students' motivations, cognitive and metacognitive skills, but also their beliefs about the functionality of certain behaviors in the classroom affect their academic behavior. In addition, the research investigates the relationship between the predictive power of individual learning objective and the manifestation of academic self-subversion and the avoidance of seeking help in the classroom, through a number of individual cognitive and metacognitive factors but also motivating factors confirming through this way, the protective value of the learning orientation for the manifestation of the specific dysfunctional behaviors.

3.2. Objectives

The general objective that is aimed at this study is to know the attention that adolescents have of the mathematics task in secondary school in institutions of Greece on some attitudes of psychology, like motivation towards homework, self-concept, self-esteem, and peer relationships as well.

More definitely, the following specific objectives can be defined:

- Determine if there is a relationship between students in the secondary stage (12-15 years) respecting their academic performance in mathematics in institutions in Greece and some characteristics like motivation to the task, self-concept, self-esteem and relationship with peers as well.

- Find out if there is a relation between the students' academic performance in the subject of mathematics in secondary education (12 -15 years) in Greek institutions and the problem solving in mathematics.

3.3 Hypotheses or questions

The research deals with the relationship of academic performance with the motivation to the task of Mathematics. Therefore the main question of the research is based on the question above. In addition, the researcher through the research instrument had the opportunity to discover much more main specific issues about basic questions which are extracted from childrens' daily lives and that all the society of teachers has and are quoted more specifically below.

A question that has to be studied is whether there is any relationship between the performance of students from 12 to 15 years old and the incentive to the task.

Another group of questions is related to the identity profile of the subject. Is there any relationship between the student performance in Mathematics and their gender? Is there any relationship between the students' school area and their performance in Mathematics? Is there any relationship between parental educational background the students' performance in Mathematics? Is there any relationship between the student performance in Mathematics and their parental background? Is there any relationship between the students' last-year degree in Mathematics and their performance in Mathematics?

In these chapters come out obviously numerous questions which have simultaneously teaching, psychometrical, academic and daily benefit. Moreover, a research question that arises is related with the design of the way children with ADHD learn and their metacognitive skills which even indirectly appear a relation with their life decision plans. Additionaly, a question to investigate is whether there is a relationship between the childrens' (with ADHD) socio-demographic characteristics or their last-year performance in mathematics and their learning management between the age of 12 to 15 years old.

3.4 Variables

Below are presented the variables used in the research, separated into six matrices, depending on their type, in order to investigate the use of a set of individual factors (cognitive and metacognitive factors) using self-report tools.

Table 3.

3.1 Socio-Demographic Dimension Variables

Socio-demographic Dimension	Description	Variables
	This dimension includes the variables that identify the research subjects	1. Gender 2. Date of Birth 3. Class 4. School 5. School Area 6. Last-year Degree

3.2 Socio-Academic profile of families Dimension Variables

Socio-academic profile of families Dimension	Description	Variables
	This dimension includes the variables that refer to the studies and situation of the families of the subjects participating in the study	1. Educational level of the father 2. Educational level of the mother 3. Father origin 4. Mother origin

3.3 Lack of Use of Strategy Questions Dimension Variables

Lack of Use of Strategy Questions Dimension	Description	Variables
	This dimension includes the variables that refer to the Lack of Use of Strategy Questions	A1-1. Difficulty study exam Mathematics/learn what I need to know well. A1-2. Difficulty to know what is studying Mathematics referring to. A1-3. Difficulty to study methodically to understand the text I read. A1-4. Difficulty to realize where to start reading. A1-5. Difficulty to understand the main points about something I read. A1-6. Difficulty in efficiently organizing study time. A1-7. Ignorance how to study correctly.

		A1-8. Studying Mathematics by omitting the difficult points.

3.4 Depth Strategy & Self-Regulation Questions Dimension Variables

Depth Strategy & Self-Regulation Questions Dimension	**Description**	**Variables**
	This dimension includes the variables that refer to the Depth Strategy & Self-Regulation Questions	A2-1. Reading something, by highlighting the main ideas. A2-2. Ignorance if I know anything about new piece of information. A2-3. Studying big math lesson by dividing it into sections. A2-4. Studying by explaining the main ideas in my own words. A2-5. Study Mathematics through diagrams.
		A2-6. Do much homework with similar content with that in the classroom. A2-7. Learn something by first trying to understand its meaning. A2-8. First think what should do to learn Mathematics better and then read it. A2-9. First make sure to understand what I am asked to do and then answer a question. A2-10. Before completing an exercise I look over it to avoid mistakes. A2-11. Helpful to solve an exercise/understand a text by recalling older related information. A2-12. Successful material management over study time before a test. A2-13. Resolution of an exercise considering its elements. A2-14. First answer test question, then re-read to reassure answered the question asked.

3.5 Lack of Surface Strategy Questions Dimension Variables

Lack of Surface Strategy Questions Dimension	**Description**	**Variables**
	This dimension includes the variables that refer to the Lack of Surface Strategy Questions	A3-1. Study Mathematics by trying to identify the main ideas and learn by heart.
		A3-2. Studying by trying to learn as much information as I can by heart.
		A3-3. Learn everything will be asked in the exam by heart.

		A3-4. Study Mathematics material over and over to remember it.
		A3-5.When having test, learn everything by heart.

3.6 Cognitive Process Questions Dimension Variables

Cognitive Process Questions Dimension	Description	Variable
This dimension includes the variables that refer to the Cognitive Process Questions)	**Planning** Acquiring a solution method, describe solution plans, or choose solution plans for a problem.	B1-1. I make questions to myself about the lesson before begin to study. B1-2. Think alternative ways to solve a problem and choose the finest.
	Organization Defining how items fit within a structure	B1-3. Proceed slower when detect important information. B1-4. Detect my own instances helps comprehend the information better. B1-5. Use structure-organization of content to better comprehend.
	Monitoring Defining whether a procedure or product has internal coherence, detecting the effectiveness of a procedure as it is being implemented	B1-6. Steadily wonder whether approach my aims. B1-7. Thinking numerous ways to give solution to a problem before giving an answer. B1-8. Solving problem, wonder if all options into consideration taken. B1-9. Periodically review helps understand important mathematical relationships.
		B1-10. When studying, pause to see if I understand.
	Depuration Erasing all considerations with missing information in any of the chosen variables	B1-11. Request for help when do not comprehend something. B1-12. When not be able to figure out math problem I utilize the strategies. B1-13. When new data is puzzling, I hold back and examine again.
		B1-14. Hold back and re-read when disordered.
	Evaluation Critisize the values of	B1-15. When completing exam know how much I succeed or not.

	ideas, materials and methodology by advancing and applying standards and ethics.	B1-16. When complete a job, wonder if there is an easier way to achieve. B1-17. When complete studying, make summary what was acquired. B1-18. When complete a job, wonder if achieved as much as I could.

Note. Source: Own elaboration

3.5 Research design

The methodology constitutes a conceptual framework of reference and logical coherence to describe, explain and justify the path to be followed, with the most appropriate principles and methods for a particular research project. The determination of the methodology is key in the design as well as in the task to be undertaken by the researcher, and requires taking a position regarding the plurality of existing ontological and epistemological options, the approach of the problems to answer or to solve (the object of the investigation) and the selection of the techniques of obtaining and analysis of the information that will be used.

Between the methodology, the method and the techniques there is a difference of extension, of globality: the different approaches or perspectives of educational research (the paradigms, as we have seen) contribute a diversity of methodologies: thus, we will talk about the quantitative methodology and experimental characteristic of the research carried out from a quantitative perspective of its own by the research logic of the interpretive or qualitative paradigm; and the critical methodology, eminently participatory and consistent with the ontological and epistemological assumptions of the critical paradigm.

Each of these methodologies includes different methods or types of research with a variety of particular techniques, of a more practical and operational nature, which allow for effective development.

As a synthesis, in the following table is presented an overview of the main methodologies, types of research and techniques for obtaining information in educational research:

Table 4. Basic Methodologies, Methods and Techniques for obtaining information in Educational Research

PARADIGM	OBJECTIVE	METHODOLOGY	METHODS	TECHNIQUES
Positivist	explain, relate and predict variables	Empirical-analytical methodology, quantitative methodology	Experimental Quasi-experimental Ex-post-facto	instruments (quantification of data): tests, questionnaires, measurement scales, systematic observation
Interpretive	Understand	Humanistic-interpretive methodology, qualitative methodology	Emotional Interpretation Case Studies Fundamental Theory Phenomenological investigation	Strategies for obtaining qualitative information: participant Strategies for obtaining qualitative information: participant observation, in-depth interview, diary, document analysis. The researcher is the main instrument for obtaining information
Critical	Change,	Sociocritical	Action	Combines

transform	methodology	research: participatory, collaborative Evaluative research	instruments and strategies of a qualitative nature

Note. Source: Bisquerra R. A. (2014). *Educational Research Methodology***.** Madrid: Editorial La Muralla S.A.. pp.81.

The quantitative and experimental methodology characteristic of the research carried out from a quantitative perspective of the positivist paradigm.

The quantitative methodology in educational research has been developed by trying to imitate the physical and natural sciences research procedure. From this methodological perspective, the researcher separates himself from the reality that configures the object of study in order to discover regularities and formulate probabilistic generalizations that make his prediction possible. It usually follows the hypothetical-deductive model to formulate some hypotheses (causal relationships between concepts) that must be checked and verified in representative samples selected through sampling techniques; usually uses research modalities that guarantee the necessary experimental control (experimental and quasi-experimental methods, fundamentally) and preferably uses sophisticated techniques for data collection with instruments such as tests, objective tests, scales, questionnaires and observation Systematic with the basic purpose of operationally defining the phenomena in standardized, valid and reliable measures that will subsequently be analyzed through some statistical program.

The primary design of this study was made of a specific character, providing a quantitative methodology; the phases correspond to an ex post facto design basis of the above by Thistlethwaite & Campbell (1960). The phases that were followed to achieve it, were those set out by Sabariego and Bisquerra (2012), these being the following:

- Phase 1: Comprehensive analysis of the literature on the subject, in which a theoretical corpus of greater relevance and updating were made.
- Phase 2: Evaluation of the starting situation: Thereinafter, seek and develop an appropriate instrument for obtaining the data. In the case of its realization, the previous investigations carried out by Barbas, Vermeoulen, Kioseoglou, and Violet (2008), Gonida, & Leontari, (2012) were taken into account; Pintrich, Smith, García, and McKeachie (1991), relating to motivation, self-concept, motivation and adaptability in learning.

Once the instrument was selected and the appropriate tests were carried out in order to provide it with reliability and validity; proceeding to its implementation.

- Phase 3: Study and analysis of the data and preparation of the project. Different data were analyzed and assessed, reflecting and discussing the results with the theoretical framework to be drawn together in this process and help give rigor to our research, in this way to answer the questions that aroused during the research process.

The phase analysis mentioned above premises specific limitations to be taken into consideration. Therefore, it would be vital to refer that the research conducted by adopting the ***ex post facto research*** design which is a method in which groups with qualities that already exist are compared on some dependent variable. Also known as "after the fact" research, an ex post facto design is considered quasi-experimental because the subjects are not randomly assigned - they are grouped based on a particular characteristic or trait (Singh, 2017).

Although differing groups are analyzed and compared in regards to independent and dependent variables it is not a true experiment because it lacks random assignment. The assignment of subjects to different groups is based on whichever variable is of interest to the researchers.

Ex post facto research is ideal for conducting social research when is not possible or acceptable to manipulate the characteristics of human participants. It is a substitute for true experimental research and can be used to test hypotheses about cause-and-effect or correlational relationships, where it is not practical or ethical to apply a true experimental, or even a quasi-experimental, design.

Despite studying facts that have already occurred, ex post facto research shares with experimental research design some of its basic logic of inquiry. For example, attempts are made to: explain a consequence based on antecedent conditions; determine the influence of a variable on another variable, and test a claim using statistical hypothesis testing techniques. Simon & Goes (2013) explained that in the context of social science research an ex post facto investigation seeks to reveal possible relationships by observing an existing condition or state of affairs and searching back in time for plausible contributing factors.

Ex post facto research uses data already collected, but not necessarily amassed for research purposes. Ex post facto literally means *from what is done afterwards*. Ex post facto research can be viewed as an experimental research in reverse. Cohen, Manion, and Morison (2000) noted that instead of taking groups that are equivalent and subjecting them to different treatments to determine differences in the dependent variables, an ex post facto experiment begins with groups that are already different in some respect and searches can transform a non-experimental research design into a *pseudo-experimental* study. Ex post facto research, then, is a method of teasing out possible antecedents of events that have happened but cannot, be manipulated by the investigator. Some of the limitations associated with ex post facto research:

1. There is no random assignment to treatment so there could be inherent confounds in the variables studied.
2. The sample cannot be considered random, so generalization is limited.
3. There is often little information about any dropouts from the treatment.

Some major advantages of conducting an ex post facto study are that the data are already collected, obtaining permission to conduct the study is less involved than enrolling participants, and less time is involved in conducting the study than by creating new data (DeRue et al, 2012).

3.6 Population and Sample

a. Population and Sample description

The sample of the research consists of 12-15 year old adolescents attending secondary school units in the city of Heraklion (Crete), both in the general and in integration classroom. The selection of the sample criterion is the awareness of the Educational and Counseling Support Centers, which, in partnership with the Public Pediatric Medical Centers, are conclusively liable for the diagnosis, differentiation and development of an suitable intervention and support program in agreement with legislation (article 4 of Law 3699, Government Gazette 199A, 2-10-2008 and article 28, par. 21 of Law 4186, Government Gazette 193A, 17-9-2013). Students participating in the study were diagnosed with ADHD diagnosed above (Attention Deficit Hyperactivity Disorder). The sample was selected in both urban and rural (non-urban) area. In addition, the city of Heraklion (prefecture population: 304.270), which was selected for the research, is the 4th biggest city in Greece (population: 10.815.197, Hellenic Statistical Authority, census, 2011). It would be vital to report that an important amount of children with ADHD were selected from this specific prefecture from 17 schools in total. In a non-probability sample, such as in the present research, there is no way to determine the probability that every individual has to be contained in the sample. Therefore, the selection of the sample was made by random through the mutual characteristic of adolescents with ADHD. The above situation explains the fact that all samples of non probability are based on the personal judgment of the researcher instead of some form of mechanistic procedure for the selection of the members of the sample. In a stratified sampling as this, first happens a division of the "population" into mutually excluded groups and then the selection of a simple random sample from each group. After separating the sample into groups, between the schools in urban and rural (non-urban) area, the members were selected only on the basis of convenience (simple random sampling), in which the study was held into the most easily accessible individuals to be part of this study.

b. Type of sampling or sample selection

The sampling method used is feasibility sampling (Zihao et al., 2021; Kim et al., 2015), as it refers to the preference of specific population groups that satisfy specific hypotheses, for the needs of our study, adolescents with ADHD.

Below are presented the descriptives of each variable used separately, in relation to the gender, date of birth, class, school, school area, parental educational background, parental origin, last-year degree in Mathematics and Attention Deficit Hyperactivity Disorder.

Table 5. Socio-demographic variables

	Percentage	Frequency
1. Gender		
Male	72,7%	80
Female	27,3%	30
2. Date of Birth		
2007	,9%	1
2006	28,2%	31
2005	32,7%	36
2004	36,4%	40
2003	1,8%	2
3. Class		
1st class	36,4%	40
2nd class	31,8%	35
3rd class	31,8%	35
4. School Area		
In the city of Heraklion	59,1%	65
Out of the city of Heraklion	40,9%	45
9. Last year Degree in Mathematics		
Lower than 10	9,1%	10
11-12	21,8%	24
13-14	30,0%	33
15-16	23,6%	26
17-18	7,3%	8
19-20	8,2%	9

Note. Source: Own elaboration

Table 6. Descriptives of the sample in relation to ADHD

	Frequency	**Percentage**
Attention Deficit	48	43,6
Attention Deficit & Hyperactivity	17	15,5
Attention Deficit & Impulsitivity	32	29,1
Attention Deficit & Hyperactivity & Impulsitivity	13	11,8
Total	110	100,0

Note. Source: Own elaboration

Table 7. My_grade_in_Mathematics_last_year_was * ADHD Crosstabulation

			ADHD				Total
			Attention Deficit	Attention Deficit & Hyperactivity	Attention Deficit & Impulsitivity	Attention Deficit & Hyperactivity & Impulsitivity	
My_grade_in_Mathematics_last_year_was	Lower than 10	Count	4	2	4	0	10
		% within	40,0%	20,0%	40,0%	0,0%	100,0%
	11-12	Count	7	6	8	3	24
		% within	29,2%	25,0%	33,3%	12,5%	100,0%
	13-14	Count	11	7	8	7	33
		% within	33,3%	21,2%	24,2%	21,2%	100,0%
	15-16	Count	17	1	8	0	26
		% within	65,4%	3,8%	30,8%	0,0%	100,0%
	17-18	Count	4	0	2	2	8
		% within	50,0%	0,0%	25,0%	25,0%	100,0%
	19-20	Count	5	1	2	1	9
		% within	55,6%	11,1%	22,2%	11,1%	100,0%
Total		Count	48	17	32	13	110
		% within	43,6%	15,5%	29,1%	11,8%	100,0%

Note. Source: Own elaboration

Table 8. Class * ADHD Crosstabulation

			ADHD				Total
			Attention Deficit	Attention Deficit & Hyperactivity	Attention Deficit & Impulsitivity	Attention Deficit & Hyperactivity & Impulsitivity	
Class	1st Class	Count	17	8	10	5	40
		% within	42,5%	20,0%	25,0%	12,5%	100,0%
	2nd Class	Count	17	5	10	3	35
		% within	48,6%	14,3%	28,6%	8,6%	100,0%
	3rd Class	Count	14	4	12	5	35
		% within	40,0%	11,4%	34,3%	14,3%	100,0%
	Total	Count	48	17	32	13	110
		% within	43,6%	15,5%	29,1%	11,8%	100,0%

Note. Source: Own elaboration

Table 9. ADHD * Gender Crosstabulation

			Gender		Total
			Male	Female	
ADHD	Attention Deficit	Count	31	17	48
		% within	64,6%	35,4%	100,0%
	Attention Deficit & Hyperactivity	Count	15	2	17
		% within	88,2%	11,8%	100,0%
	Attention Deficit & Impulsitivity	Count	24	8	32
		% within	75,0%	25,0%	100,0%
	Attention Deficit & Hyperactivity & Impulsitivity	Count	10	3	13
		% within	76,9%	23,1%	100,0%
	Total	Count	80	30	110
		% within	72,7%	27,3%	100,0%

Note. Source: Own elaboration

Between the 110 students participating in this study, 72.7% (N = 80) are men, while the remaining 27.3% (N = 30) are women.

Of the 110 students being part in this study, 0,9% (N = 1) were born in 2007, 28,2% (N = 31) in 2006, 32,7% (N = 36) in 2005, 36,4% (N = 40) in 2004, while the remaining 1,8% (N = 2) were born in 2003.

Out of the sample of 110 students, 36,4% (N = 40) attend to the 1st class of Junior High school, while 31,8% (N = 35) attend to the 2nd class and the remaining other 31,8% to the 3rd class of Junior High school.

Of the 110 students participating in this study, 59,1% (N = 65) are living and attend the Junior High school located in an urban environment of the city of Heraklion, while the remaining percentage lives in rural areas of prefecture of Heraklion and consists of 40,9% (N = 45) of the total.

Of the 110 students being part of this study, 9,1% (N = 10) of their last year degree in Mathematics is lower than 10 out of 20, 21,8% (N = 24) is 11-12, 30% (N = 33) is 13-14, 23,6% (N = 26) is 15-16, 7,3% (N = 8) is 17-18, while the remaining 8,2% (N = 9) is 19-20.

Of the 110 students participating in this study, 43,6% (N = 48) have Attention Deficit, 31 of them were boys and 17 girls, 15,5% (N=17) have Attention Deficit & Hyperactivity, 15 of them were boys and 2 girls, 29,1% (N=32) have Attention Deficit & Impulsitivity, 24 of them were boys and 8 girls, while the remaining 11,8% (N = 13) have Attention Deficit & Hyperactivity & Impulsitivity, 10 of them were boys and 3 girls.

Table 7 depicts a cross tabulation between the last year degree in mathematics of students with any kind of ADHD. Of the 110 students, 10 got a grade lower than 10, 24 got 11-12, 33 got 13-14, 26 got 15-16, 8 got 17-18 and 9 got 19-20.

Of the 110 students with ADHD participating in this study, 40 were attending in the 1st class of Junior High school, 35 in the 2nd class and 35 in the 3rd class of Junior High school.

The three tables below describe in detail all the schools (and by school area) included in the research sample, as well as a cross tabulation between the school area and any kind of ADHD separately.

Table 10. Descriptives of the sample in relation to the School

	Frequency	Percentage
1st Junior High school of Heraklion	6	5,5
3rd Junior High school of Heraklion	7	6,4
5th Junior High School of Heraklion	10	9,1
7th Junior High school of Heraklion	4	3,6
8th Junior High school of Heraklion	7	6,4
11th Junior High school of Heraklion	3	2,7
12th Junior High school of Heraklion	2	1,8
Junior High school of Alikarnassos	9	8,2
Junior High school of Arkalochori	6	5,5
Junior High school of Archanes	7	6,4
Junior High school of Gazi	23	20,9
Junior High school of Thrapsanos	2	1,8
Junior High school of Tympaki	4	3,6
Junior High school of Charaka	3	2,7
Junior High school of Arts	10	9,1
Junior High school of Music	3	2,7
Junior High Experimental school	2	1,8
Junior High Special Education school	2	1,8
Total	110	100,0

Note. Source: Own elaboration

Table 11. Descriptives of the sample in relation to School Area

In the city of Heraklion (Urban Area)	Out of the city of Heraklion (Non-urban Area)
1st Junior High school of Heraklion	Junior High school of Arkalochori
3rd Junior High school of Heraklion	Junior High school of Archanes

5th Junior High School of Heraklion	Junior High school of Thrapsanos
7th Junior High school of Heraklion	Junior High school of Tympaki
8th Junior High school of Heraklion	Junior High school of Charaka
11th Junior High school of Heraklion	Junior High school of Gazi
12th Junior High school of Heraklion	
Junior High school of Alikarnassos	
Junior High Special Education school	
Junior High school of Arts	
Junior High school of Music	
Junior High Experimental school	

Note. Source: Own elaboration

Table 12. ADHD * School_Area Crosstabulation

			School_Area		Total
			In the city of Heraklion	Out of the city of Heraklion	
ADHD	Attention Deficit	Count	28	20	48
		% within	58,3%	41,7%	100,0%
	Attention Deficit & Hyperactivity	Count	10	7	17
		% within	58,8%	41,2%	100,0%
	Attention Deficit & Impulsitivity	Count	19	13	32
		% within	59,4%	40,6%	100,0%
	Attention Deficit & Hyperactivity & Impulsitivity	Count	8	5	13
		% within	61,5%	38,5%	100,0%
	Total	Count	65	45	110
		% within	59,1%	40,9%	100,0%

Note. Source: Own elaboration

Table 13. Descriptives of the sample in relation to the Father's Educational Background

	Frequency	**Percentage**
Primary school	28	25,5
Junior High school	24	21,8
High school	30	27,3
Technical Education	6	5,5
University	17	15,5
Other	5	4,5
Total	110	100,0

Note. Source: Own elaboration

Of the 110 students being part of this study, 25,5% (N = 28) of their father's educational background is primary school, 21,8% (N = 24) is Junior High school, 27,3% (N = 30) is High school, 5,5% (N = 6) is Technical Education, 15,5% (N = 17) is University, while the remaining 4,5% (N = 5) is other(unspecified).

Table 14. Descriptives of the sample in relation to the Mother's Educational Background

	Frequency	Percentage
Primary school	12	10,9
Junior High school	18	16,4
High school	45	40,9
Technical Education	13	11,8
University	19	17,3
Other	3	2,7
Total	110	100,0

Note. Source: Own elaboration

Between the 110 students being part of this study, 10,9% (N = 12) of their mother's educational background is primary school, 16,4% (N = 18) is Junior High school, 40,9% (N = 45) is High school, 11,8% (N = 13) is Technical Education, 17,3% (N = 19) is University, while the remaining 2,7% (N = 3) is other(unspecified).

Table 15. Descriptives of the sample in relation to the Father's origin

	Frequency	Percentage
Greece	104	94,5
Albania	4	3,6
EU country	1	,9
America, Canada, Australia	1	,9
Total	110	100,0

Note. Source: Own elaboration

Out of the sample of 110 students, 94,5% (N = 104) of their father's origin is Greece, while 3,6% (N = 4) is Albania, 0,9% (N = 1) is EU country and the remaining other 0,9% is America, Canada and Australia.

Table 16. Descriptives of the sample in relation to the Mother's origin

	Frequency	Percentage
Greece	100	90,9
Albania	3	2,7
Former Soviet Union countries	2	1,8

EU country	3	2,7
America, Canada, Australia	1	,9
Asia, Africa	1	,9
Total	110	100,0

Note. Source: Own elaboration

Out of the sample of 110 students, 90,9% (N = 100) of their mother's origin is Greece, while 2,7% (N = 3) is Albania, 1,8% (N = 2) is Former Soviet Union countries, 2,7% (N = 3) is EU country, 0,9% (N =1) is America, Canada and Australia and the remaining other 0,9% is Asia and Africa.

3.7 Instrument

In the context of the research, the researcher in contact with the school management was requested to carry out the research. Subsequently, after receiving the written permission of the student's parents and guardians with the ADHD, in contact with the school and in a scheduled meeting that would not interfere with the proper functioning of the school, the researcher conducted the in-class research in collaboration with the school and the classroom teacher. The survey was conducted throughout the classroom to ensure the anonymity and equal treatment of the participants and to avoid targeting children with ADHD who are the subject of the survey. It is important to clarify that there was no interpersonal communication between the students and the researcher, since the research was not conducted in the form of an interview, but in the whole classroom of the students. After completing the questionnaires from the students, in collaboration with the teacher of the department, it was indicated to the researcher which questionnaires were completed by the students with ADHD in order to collect them exclusively. The researcher collected the data through a questionnaire created for the purpose of this research.

The survey questionnaire collection phase last eight weeks.

It would be vital to refer that in the stabilized specialized instrument that was used for the research there was a specific chapter of questions that had more relationship with absence of strategies, a second chapter that had specific relationship with the depth strategies and the Self-Regulation and a last chapter that had a relationship with the surface strategies.

a. Validity and Reliability

This ongoing research in the study of teaching approaches and strategies that lead to the solution of life problems requires the study of a specific basic parameter and is used in the questionnaire named 'Using Strategies' by the Assistant Professor of Psychology of Aristotle University of Thessaloniki, Gonida Sofia-Eleftheria and the Professor of School Psychology of the School of Preschool Education of the University of Thessaly, Leontari Angeliki (2012).

The purpose of this questionnaire is to measure the use of strategies by Gymnasium and High School students. The questionnaire was initially based on a number of other tools in English, such as the relevant scales from the Motivated Strategy Learning Questionnaire (MSLQ, Pintrich et al., 1991), the Learning and Study Strategies Questionnaire (LASSI, Weinstein, Shulte, & Palmer, 1987) and the related scales used by Andrade (2019). A series of pilot exams preceded the formulation of the final questionnaire, which included questions from the above questionnaires as well as new questions.

The validity and reliability of the research are important factors that the researcher must ensure for his research. This questionnaire guarantees its validity, since the analysis of the principal components with a rectangular varimax rotation applied to the data revealed the existence of the above three factors taking into account the Kaiser criterion (unit-specificity) and the Catell criterion (graph of 'elbow', scree plot). Query loads per factor were> .40. Internal consistency reliability (Cronbach's alpha) was a = .82 for the subscale measuring the absence of strategies, a = .80 for the subscale of high-level strategies, and a = .62 for the subscale of low-level strategies. In addition, in terms with the research internal consistency reliability (Cronbach's alpha) are estimated to be a = .81 for the subscale measuring the absence of strategies, a = .78 for the subscale of high-level strategies, and a = .71 for the subscale of low-level strategies, eventually about the same level as those of the author.

Table 17. Descriptives of Validity and Reliability of the research

Dimension	Author (year)	Cronbach's alpha Author	Cronbach's alpha research
Lack of Use of Strategy Questions	Gonida, & Leontari, (2012)	.82	.81
Depth Strategy & Self-Regulation Questions	Gonida, & Leontari, (2012)	.80	.78
Sub-scale of Use of Low-Level Strategy Questions	Gonida, & Leontari, (2012)	.62	.71
Cognitive Process Questions			.87
Entire Instrument (all dimensions)			.89

Note. Source: Own elaboration

Factor Analysis is significantly affected by the quality of the data available to us. The variables should be sufficiently correlated ($r > .20$) and at the same time not overly correlated ($r < .80$). Equations should be linear and the values should be close to median. SPSS provides two indicators for data quality control, one of which is the Keiser-Meyer-Olkin Index rates adequacy of the sample (> .50).

It can be obvious through the table below that factor analysis is useful in the research since the indicators fulfill all the conditions mentioned above.

Table 18. Kaiser Mayer Olkin and Bartlett's Test

Dimensions	
1. Lack of Use of Strategy Questions	.86
2. Depth Strategy & Self-Regulation Questions	.76
3. Sub-scale of Use of Low-Level Strategy Questions	.77
4. Cognitive Process Questions	.85

Note. Source: Own elaboration

The KMO and Bartlett's test is statistically significant as all four values of the sub-dimensions are close to 0.8. It would be important to mention that the closer to value 1 the value r is, the more useful to apply the factor analysis to the research study.

In the subsequent tables are extracted through factor analysis the four sub-dimensions and separated properly in components. The components were grouped according to the values of r, (where $0.2 < r < 0.8$) and the variables were divided into subgroups so that their values were more related to each other.

In the first dimension the division was made into two components.

Table 19. Dimension of Lack of Use of Strategy Questions

Lack of Use of Strategy Questions Dimension	Component 1		Component 2	
	A1_2	.762	A1_1	.521
	A1_3	.803	A1_4	.750
	A1_5	.533	A1_6	.529
	A1_7	.764	A1_8	.823

Note. Source: Own elaboration

In the second dimension the division was made into four components.

Table 20. Dimension of Depth Strategy & Self-Regulation Questions

Depth Strategy & Self-Regulation Questions Dimension	Component 3		Component 4		Component 5		Component 6	
	A2_4	.713	A2_10	.776	A2_3	.560	A2_1	.749
	A2_7	.701	A2_12	.646	A2_5	.740	A2_2	.664
	A2_9	.472	A2_14	.765	A2_6	.616	A2_8	.387
	A2_13	.699			A2_11	.526		

Note. Source: Own elaboration

In the third dimension no division was made.

Table 21. Dimension of Sub-scale of Use of Low-Level Strategy Questions

Lack of Surface Strategy Questions Dimension	Component 7	
	A3_1	.747
	A3_2	.643
	A3_3	.587
	A3_4	.659
	A3_5	.756

Note. Source: Own elaboration

In the fourth dimension the division was made into five components.

Table 22. Dimension of Cognitive Process Questions

Cognitive Process Questions Dimension	Component 8		Component 9		Component 10		Component 11		Component 12	
	B1_10	.643	B1_1	.732	B1_2	.498	B1_5	.620	B1_3	.457
	B1_14	.640	B1_4	.659	B1_7	.739	B1_6	.747	B1_15	.807
	B1_16	.575	B1_9	.666	B1_8	.461	B1_11	.465		
	B1_17	.625			B1_12	.695	B1_13	.544		
	B1_18	.770								

Note. Source: Own elaboration

b. Instrument design

The questionnaire consists of 27 questions (see Appendix 8.1 Questionnaire in Greek and 8.2 Questionnaire in English) which are organized into three sub-scales:

a) the subscale measuring the use of high-level strategies such as depth strategies, metacognitive strategies, and self-regulation strategies, such as:

– When I study, I try to explain the main ideas in my own words,

- When I read Math, I make drawings or diagrams to which I attach the main points.
- When I finish an exercise, I look at it from the beginning again to avoid mistakes.

b) the sub-scale that measures the use of low-level strategies, such as surface strategies, such as:

- When studying, I try to store as much information as I can,
- When I study, I read the Mathematics material many times so that I can I remember.

c) the scale that measures the absence of strategies, such as

- When I read about Mathematics, I often think I don't know what it's about,
- I often find that I don't know where to start reading.

The questionnaire includes an additional 17 questions which were named as the scale of Cognitive Process Questions and devided into 5 sub-categories:

a) the sub-scale of Planning

- I make questions to myself about the lesson before I start studying.

b) the sub-scale of Organization, such as

- I find my own examples to better understand the information.

c) the sub-scale of Monitoring, such as

- When I solve a problem, I wonder if I have taken all options into consideration.

d) the sub-scale of Depuration, such as

- When I cannot figure out a math problem, I change the strategies.

e) the sub-scale of Evaluation, such as

- When I complete a job, I wonder if I have learned as much as I could.

The sample of the research (children with ADHD) answered the questions on a 5-point Likert-type scale (1 = not at all, 2= a little, 3= rather, 4= much, 5= very strong).

c. Administration - Implementation of the instrument

The research needs to ensure the acquiescence of the parents and guardians of the students, the namelessness of the study participants and the defense, accordingly the current legislation of their sensitive personal data, the prevision of the possibility for the study participants to discontinue their participation. At any stage of its conduct and protection in research from exposure to possible physical or psychological risk or suffering or other adverse effects for the same price them in the research process.

Ensuring informed consent of parents and guardians of students in research ensures that all participants, parents and students fully understand the purpose of the research, the process in which they are going to be involved, the reasons for their participation, the optional the nature of their participation, their ability to leave at any stage of the research.

The present research is concerned with investigating the relationship of logical-mathematical thinking with logical life decisions and solving life problems.

The Ministry of Education, Research and Religious Affairs was authorized to do so (see on Appendix 8.3 Approval Conducting Research with all the accompanying documents of the University). The research initially provided for the completion of questionnaires by pupils. The data collection was mainly done through self-report questionnaires by the students of the 1st, 2nd and 3rd grade of the Gymnasium. The data collection was planned to be completed in one meeting, the duration of which was set after consultation with the school management and classroom teachers, outside the daily schedule.

It is important to note that student participation was ensured with the written consent of parents, the principle of confidentiality was respected and all information was used solely for the purpose of the research. Survey data remained on the researcher's computer with a security code and there is no risk of leakage.

In addition to the formal part of ensuring, by letter, the informed consent of the research participants or the parents and guardians of underage students, it was considered necessary for the researcher to harmonize the conduct of his research with the Articles 3 and 12 of the Convention on the Rights of the Child

(a) In all actions involving children, the best interests of the child shall be taken into account (Art. 3); and

(b) The right of children to be able to express their views freely, taking into account their age and maturity, should be guaranteed (Art. 12).

Therefore, in the context of conducting the research, in parallel with the letter of parental consent, the underage pupils were provided with the appropriate facilities in respect of:

(i) Informing them of the purpose and procedure of the investigation

(ii) Ensuring their anonymity and the confidentiality of the data

(iii) The voluntary nature of their participation; and

(iv) Their ability to withdraw at any stage of its conduct

(Law 2472/1997, on the Protection of Individuals respecting the Personal Data Processing Data in Greece)

The research is aimed at students with ADHD who have difficulties with the usual ways of oral and written communication. The researcher is given the opportunity to explore alternative ways of communication that will facilitate the obtaining of genuine answers regarding the optional participation or the withdrawal of participating students with disabilities at any stage of the research.

In the spirit of respect for human rights, every effort was made by the researcher to carry out the research with the cooperation of the Principal and the teacher of each school unit. In relation to ensuring the anonymity of research participants and the protection of sensitive personal data in accordance with existing legislation, the investigator, in accordance with existing legislation[1], provides a complete description of how to ensure, at each stage of the research (collection, processing and disclosure), the anonymity of all involved and treats the research data as absolutely confidential them.

Finally, it is noted that the researcher has made sure that the procedure of the collection of the research data is accordant with the international contracts and conventions as regards to human rights in education.

3.8 Data analysis strategies

It would be important to mention the quantitive nature of the data obtained and that the analyze occured through a statistical program, specifically, the SPSS v18 performing descriptive and inferential tests as well.

4. RESULTS

This chapter presents all the results generated by the research, after applying statistical analyzes to the quantitive data. Initially, in the present study are presented the descriptives of each variable used separately. In addition, the following are the results of the Inferential Analysis performed to investigate the dimensions of Lack of Use of Strategy, Depth Strategy & Self-Regulation, Surface Strategy and Cognitive Process questions depending on the gender, the age, the class, the school area, the parental educational background and origin, the last-year degree in Mathematics and Attention Deficit Hyperactivity Disorder.

The dimensions analyzed below, include both cognitive and metacognitive strategies. Cognitive strategies help to more effectively encode, retain and understand learning material. Metacognitive strategies refer to the voluntary control, regulation and organization of cognitive processes, such as planning, selecting cognitive strategies, controlling the effectiveness of strategies, and adapting or regulating them when solving a cognitive project.

4.1. DIMENSION 1. Lack of Use of Strategy Questions

The subscale that measures the Lack of Use of Strategy questions is consisted of 8 questions and is focused on studying students who do not use learning strategies. Usually this kind of students has external motivations or high performance goals and aim to avoid failure so that they do not feel inadequate in front of others.

A. DESCRIPTIVE

Table 23. Descriptives of sample in Lack of Use of Strategy Questions

	N	Mean	Std. Deviation
A1_1	110	3.05	1.323
A1_2	110	2.61	1.300
A1_3	110	2.84	1.289
A1_4	110	2.95	1.529
A1_5	110	2.80	1.333
A1_6	110	3.11	1.416
A1_7	110	2.79	1.415
A1_8	110	2.76	1.568

Note. Source: Own elaboration

In this subscale the sample of 110 adolescents being part of this research appeareded a higher mean in question A1_6. So most of them find difficult to efficiently organize their study time, while the same sample of participants showed the lowest mean in question A1_2 which indicates the situation while pupils studying Mathematics, they do not think often they do not know what it is about.

B. INFERENTIAL ANALYSIS DEPENDING ON THE GENDER

We have proceeded to compare Lack of Use of Strategy Questions in accordance with the gender by analysing T-Students (n.s = 0.05), yielding the results illustrated in Table 24. In the research was used the independent sample t-student test in order to compare the means of males and females.

Table 24. Results of the t-Student test[2] according to Gender

Lack of Use of Strategy Questions	Gender		Statistical t; p-value	FAVORABLE
	MALE N, M (SD)	**FEMALE N, M (SD)**		
A1_1	80; 3.06 (1.276)	30; 3.00 (1.462)	t=.220; p=.827	not significant
A1_2	80; 2.58 (1.339)	30; 2.70 (1.208)	t=-.448; p=.655	not significant
A1_3	80; 2.88 (1.325)	30; 2.73 (1.202)	t=.512; p=.610	not significant
A1_4	80; 3.04 (1.513)	30; 2.73 (1.574)	t=.929; p=.355	not significant
A1_5	80; 2.94 (1.353)	30; 2.43 (1.223)	t=1.785; p=.077	not significant
A1_6	80; 3.10 (1.498)	30; 3.13 (1.196)	t=-.121; p=.904	not significant
A1_7	80; 2.81 (1.424)	30; 2.73 (1.413)	t=.260; p=.795	not significant
A1_8	80; 2.74 (1.573)	30; 2.83 (1.577)	t=-.284; p=.777	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between the gender of the students and the Lack of Use of Strategy questions.

C. INFERENTIAL ANALYSIS DEPENDING ON THE DATE OF BIRTH

[2] T-Student test for two independent samples. This option should be used when the comparison is made between the means of two independent populations (the individuals of one of the populations are different from the individuals of the other) for example, in the case of the comparison of the populations of men and women. Therefore, it compares the means of a variable for two groups of cases (Rubio and Berlanga, 2012, p.88).

We have proceeded to compare Lack of Use of Strategy Questions according to date of birth by analysing ANOVA (n.s = 0.05), yielding the results illutrated in Table 25. In the research was used the independent sample Anova test in order to compare the means of date of birth.

Table 25. Results of the Anova test[3] according to Date of Birth

Lack of Use of Strategy Questions	Date of Birth					Statistical F; p-value	FAVORABLE
	2007 N, M (SD)	**2006 N, M (SD)**	**2005 N, M (SD)**	**2004 N, M (SD)**	**2003 N; M (SD)**		
A1_1	1; 3.00 (.)	31; 3.42 (1.285)	36; 3.06 (1.308)	40; 2.68 (1.309)	2; 4.50 (.707)	F=2.089; p=.087	not significant
A1_2	1; 3.00 (.)	31; 2.61 (1.334)	36; 2.69 (1.283)	40; 2.50 (1.340)	2; 3.00 (1.414)	F=.172; p=.952	not significant
A1_3	1; 1.00 (.)	31; 2.94 (1.237)	36; 2.83 (1.363)	40; 2.83 (1.259)	2; 2.50 (2.121)	F=.579; p=.678	not significant
A1_4	1; 1.00 (.)	31; 3.19 (1.579)	36; 2.89 (1.450)	40; 2.78 (1.527)	2; 5.00 (.000)	F=1.689; p=.158	not significant
A1_5	1; 2.94 (1.353)	31; 2.90 (1.513)	36; 2.72 (1.323)	40; 2.70 (1.203)	2; 3.50 (.707)	F=.951; p=.438	not significant
A1_6	1; 4.00 (.)	31; 2.97 (1.354)	36; 3.17 (1.483)	40; 3.08 (1.439)	2; 4.50 (.707)	F=.671; p=.614	not significant
A1_7	1; 5.00 (.)	31; 2.81 (1.447)	36; 2.89 (1.389)	40; 2.60 (1.392)	2; 3.50 (2.121)	F=.960; p=.433	not significant
A1_8	1; 4.00 (.)	31; 2.94 (1.672)	36; 2.83 (1.612)	40; 2.48 (1.450)	2; 4.00 (1.414)	F=.914; p=.459	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between the date of birth of the students and the lack of use of strategy questions.

D. INFERENTIAL ANALYSIS DEPENDING ON CLASS

We have proceeded to compare Lack of Use of Strategy Questions according to class by analysing ANOVA (n.s = 0.05), yielding the results shown in Table 26. In the research was used the independent sample Anova test in order to compare the means of class.

Table 26. Results of the Anova test according to Class

Lack of Use of Strategy Questions	Class			Statistical F; p-value	FAVORABLE
	1st Class N, M (SD)	**2nd Class N, M (SD)**	**3rd Class N, M (SD)**		
A1_1	40; 3.30 (1.285)	35; 3.11 (1.345)	35; 2.69 (1.301)	F=2.125; p=.124	not significant
A1_2	40; 2.63 (1.353)	35; 2.89 (1.255)	35; 2.31 (1.255)	F=1.718; p=.184	not significant
A1_3	40; 2.95 (1.260)	35; 2.97 (1.382)	35; 2.57 (1.220)	F=1.089; p=.340	not significant
A1_4	40; 3.03 (1.527)	35; 3.11 (1.471)	35; 2.71 (1.601)	F=.662; p=.518	not significant

[3] ANOVA is the acronym for analysis of variance. It is a statistical test developed to simultaneously perform the comparison of the means of more than two populations. To the assumption of Normality should be added the homogeneity of the variances of the populations to be compared (Rubio and Berlanga, 2012, p.88).

A1_5	40; 2.85 (1.477)	35; 2.97 (1.403)	35; 2.57 (1.065)	F=.830; p=.439	not significant
A1_6	40; 2.78 (1.330)	35; 3.57 (1.378)	35; 3.03 (1.465)	F=3.154; p=**.047**	**2nd Class > 3rd Class > 1stClass**
A1_7	40; 2.88 (1.453)	35; 2.91 (1.442)	35; 2.57 (1.357)	F=.621; p=.540	not significant
A1_8	40; 2.90 (1.707)	35; 2.77 (1.536)	35; 2.60 (1.459)	F=.338; p=.714	not significant

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

The table above, in question A1_6 depicts children who were asked if it is difficult for them to organize the time of their study effectively. This question has stronger meaning to adolescents of 2nd Class of Junior High School (M= 3.57) and in 3rd Class (M= 3.03) more than children of the 1st Class (M= 2.78), who answered that they don't find difficult time management of studying, [F(2, 107)= 3.154, p= .047].
In addition, in the table below is illustrated the difference of the replies given from the pupils in-between the classes.

Table 27. Difference between groups (Post Hoc Tests)

Dependent Variable	Class (I) to (J)	Mean Difference (I-J)	Significance
A1_6	2nd Class to 1st Class	,796*	,044

***. The mean difference is significant at the 0.05 level**

Students of 2nd class of Junior High school seem to face harder difficulty to efficiently organize their study time than those of 3rd and more of 1st class (t= 2.472, p=.044).

E. INFERENTIAL ANALYSIS DEPENDING ON SCHOOL AREA

We have proceeded to compare Lack of Use of Strategy Questions according to school area by analysing ANOVA (n.s = 0.05), yielding the results illustrated in Table 28. In the research was used the independent sample Anova test in order to compare the means of school area.

Table 28. Results of the t-Student test according to School Area

Lack of Use of Strategy Questions	School Area		Statistical t; p-value	FAVORABLE
	In the city of Heraklion N, M (SD)	**Out of the city of Heraklion N; M (SD)**		
A1_1	65; 2.95 (1.328)	45; 3.18 (1.319)	t=-.872; p=.385	not significant
A1_2	65; 2.45 (1.250)	45; 2.84 (1.348)	t=-1.591; p=.115	not significant
A1_3	65; 2.88 (1.269)	45; 2.78 (1.330)	t=.395; p=.694	not significant

A1_4	65; 2.88 (1.536)	45; 3.07 (1.529)	t=-.638; p=.525	not significant
A1_5	65; 2.72 (1.269)	45; 2.91 (1.427)	t=-.726; p=.469	not significant
A1_6	65; 2.97 (1.447)	45; 3.31 (1.362)	t=-1.248; p=.215	not significant
A1_7	65; 2.86 (1.333)	45; 2.69 (1.535)	t=.628; p=.532	not significant
A1_8	65; 2.51 (1.448)	45; 3.13 (1.673)	t=-2.090; p=**.039**	**In the city of Heraklion < Out of the city of Heraklion**

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

A statistically important result gives the question A1_8 in which children were asked if they omit the difficult points, when they study Mathematics. Children who live in rural area (out the city of Heraklion) (M=3.13) seem to have this habit of omitting difficult points, more than the children who live in the city (M=2.51), [t(108)=-2.090, p=.039].

F. INFERENTIAL ANALYSIS DEPENDING ON PARENTAL EDUCATIONAL LEVEL FATHER

We have proceeded to compare Lack of Use of Strategy Questions according to father educational background by analysing ANOVA (n.s = 0.05), yielding the results illustrated in Table 29. In the research was used the independent sample Anova test in order to compare the means of father educational background.

Table 29. Results of the Anova test according to Father Educational Background

Lack of Use of Strategy Questions	My Father has finished						Statistical F; p-value	FAVORABLE
	Primary school N, M (SD)	**Junior High school** N, M (SD)	**High school** N, M (SD)	**Technical Education** N, M (SD)	**University** N; M (SD)	**Other** N; M (SD)		
A1_1	28; 3.46 (1.036)	24; 3.13 (1.191)	30; 2.63 (1.245)	6; 3.50 (1.049)	17; 3.06 (1.784)	5; 2.20 (1.789)	F=1.772; p=.125	not significant
A1_2	28; 2.79 (1.397)	24; 2.83 (1.204)	30; 2.37 (1.299)	6; 2.67 (1.633)	17; 2.47 (1.179)	5; 2.40 (1.517)	F=.510; p=.768	not significant
A1_3	28; 2.96 (1.201)	24; 3.17 (1.167)	30; 2.53 (1.224)	6; 3.33 (1.633)	17; 2.76 (1.522)	5; 2.00 (1.225)	F=1.332; p=.256	not significant
A1_4	28; 3.00 (1.587)	24; 3.54 (1.141)	30; 2.47 (1.613)	6; 2.67 (1.366)	17; 3.12 (1.691)	5; 2.60 (1.517)	F=1.492; p=.199	not significant
A1_5	28; 3.18 (1.278)	24; 2.54 (1.179)	30; 2.60 (1.380)	6; 2.67 (1.506)	17; 3.06 (1.478)	5; 2.40 (1.342)	F=.998; p=.423	not significant
A1_6	28; 3.14 (1.433)	24; 3.17 (1.204)	30; 3.03 (1.542)	6; 3.50 (1.761)	17; 3.18 (1.380)	5; 2.40 (1.673)	F=.367; p=.870	not significant
A1_7	28; 2.86 (1.268)	24; 3.00 (1.319)	30; 2.50 (1.526)	6; 2.83 (1.602)	17; 3.06 (1.519)	5; 2.20 (1.643)	F=.658; p=.656	not significant
A1_8	28; 2.96 (1.503)	24; 3.04 (1.488)	30; 2.57 (1.591)	6; 2.83 (1.472)	17; 2.59 (1.805)	5; 2.00 (1.732)	F=.609; p=.693	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between the father educational background and the lack of use of strategy questions.

G. INFERENTIAL ANALYSIS DEPENDING ON PARENTAL EDUCATIONAL LEVEL MOTHER

We have proceeded to compare Lack of Use of Strategy Questions according to mother educational background by analysing ANOVA (n.s = 0.05), yielding the results illustrated in Table 30. In the research was used the independent sample Anova test in order to compare the means of mother educational background.

Table 30. Results of the Anova test according to Mother Educational Background

Lack of Use of Strategy Questions	My Mother has finished						Statistical F; p-value	FAVORABLE
	Primary school **N, M (SD)**	**Junior High school** **N, M (SD)**	**High school** **N, M (SD)**	**Technical Education** **N, M (SD)**	**University** **N; M (SD)**	**Other** **N; M (SD)**		
A1_1	12; 3.00 (1.279)	18; 3.56 (1.199)	45; 3.16 (1.242)	13; 2.77 (1.423)	19; 2.68 (1.455)	3; 2.00 (1.732)	F=1.397; p=.232	not significant
A1_2	12; 2.83 (1.528)	18; 2.89 (1.367)	45;2.69 (1.362)	13; 2.38 (1.193)	19; 2.37 (1.012)	3; 1.33 (.577)	F=1.061; p=.387	not significant
A1_3	12; 3.17 (1.193)	18; 3.22 (1.396)	45; 2.69 (1.294)	13; 2.92 (1.115)	19; 2.74 (1.327)	3; 1.67 (1.155)	F=1.134; p=.347	not significant
A1_4	12; 2.50 (1.679)	18; 3.72 (1.447)	45; 2.98 (1.485)	13; 2.38 (1.387)	19; 2.95 (1.649)	3; 2.33 (.577)	F=1.628; p=.159	not significant
A1_5	12; 2.92 (1.311)	18; 3.28 (1.447)	45; 2.80 (1.342)	13; 2.23 (1.235)	19; 2.84 (1.214)	3; 1.67 (1.155)	F=1.420; p=.223	not significant
A1_6	12; 3.42 (1.240)	18; 3.33 (1.283)	45; 2.96 (1.429)	13; 3.00 (1.633)	19; 3.32 (1.529)	3; 2.00 (1.000)	F=.765; p=.577	not significant
A1_7	12; 2.67 (1.155)	18; 3.17 (1.505)	45; 3.00 (1.462)	13; 2.46 (1.450)	19; 2.37 (1.342)	3; 2.00 (1.000)	F=1.144; p=.342	not significant
A1_8	12; 3.25 (1.545)	18; 3.50 (1.689)	45; 2.76 (1.554)	13; 2.23 (1.423)	19; 2.32 (1.455)	3; 1.67 (.577)	F=2.020; p=.082	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between the mother educational background and the lack of use of strategy questions.

H. INFERENTIAL ANALYSIS DEPENDING ON LAST-YEAR DEGREE IN MATHEMATICS

We have proceeded to compare Lack of Use of Strategy Questions according to the last year degree in Mathematics by analysing ANOVA (n.s = 0.05), yielding the results shown in Table 31. In the research was used the independent sample Anova test in order to compare the means of student's last year degree in Math.

Table 31. Results of the Anova test according to Student's last year degree in Math

Lack of Use of Strategy Questions	My last year degree in Math was						Statistical F; p-value	FAVORABLE
	Lower than 10 **N, M (SD)**	**11-12** **N, M (SD)**	**13-14** **N, M (SD)**	**15-16** **N, M (SD)**	**17-18** **N; M (SD)**	**19-20** **N; M (SD)**		
A1_1	10; 3.70 (1.337)	24; 3.54 (1.250)	33; 3.00 (1.173)	26; 3.00 (1.200)	8; 2.13 (1.642)	9; 2.11 (1.364)	F=3.130; p=**.011**	**Lower than 10 > 11-12 > 13-**

								14, 15-16 > 17-18 > 19-20
A1_2	10; 3.00 (1.333)	24; 2.92 (1.213)	33; 2.76 (1.393)	26; 2.27 (1.251)	8; 2.13 (.991)	9; 2.22 (1.394)	F=1.289; p=.274	not significant
A1_3	10; 2.80 (1.135)	24; 3.00 (1.180)	33; 3.00 (1.173)	26; 3.00 (1.414)	8; 2.50 (1.414)	9; 1.67 (1.323)	F=1.941; p=.094	not significant
A1_4	10; 3.30 (1.418)	24; 3.21 (1.503)	33; 3.06 (1.540)	26; 2.69 (1.543)	8; 2.38 (1.768)	9; 2.78 (1.563)	F=.663; p=.653	not significant
A1_5	10; 2.50 (1.080)	24; 3.54 (1.062)	33; 2.61 (1.456)	26; 2.73 (1.185)	8; 2.50 (1.604)	9; 2.33 (1.500)	F=2.151; p=.065	not significant
A1_6	10; 3.00 (1.414)	24; 3.17 (1.204)	33; 3.09 (1.508)	26; 3.27 (1.402)	8; 2.38 (1.302)	9; 3.33 (1.871)	F=.551; p=.738	not significant
A1_7	10; 3.00 (1.155)	24; 3.17 (1.404)	33; 2.55 (1.460)	26; 2.96 (1.399)	8; 2.38 (1.685)	9; 2.33 (1.323)	F=.982; p=.432	not significant
A1_8	10; 2.90 (1.729)	24; 3.21 (1.382)	33; 2.85 (1.679)	26; 2.65 (1.599)	8; 2.00 (1.414)	9; 2.11 (1.364)	F=1.145; p=.341	not significant

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

The question A1_1 depicts children who find it difficult to study in a way that will help them to learn what they need to know well, when they have a math exam. This question has stronger meaning to children with last year degree in Mathematics lower than 10 (M= 3.70), 11-12 (M= 3.54), 13-14 (M= 3.00) or 15-16 (M= 3.00). Children with last year degree in Maths 17-18 (M= 2.13) or 19-20 (M= 2.11) seem not to have this kind of difficulty, [F(5, 104)= 3.130, p= .011].

Table 32. Difference between groups (Post Hoc Tests)

Dependent Variable	School (I) to (J)	Mean Difference (I-J)	Significance
A1_1	11-12 to 19-20	1.431*	.069

***. The mean difference is significant at the 0.05 level**

Students with lower last year degree in mathematics find it difficult to study in a way that will help them to learn what they need to know well, when they have a math exam than those with higher last degree in maths (t= 2.897, p=.069).

I. INFERENTIAL ANALYSIS DEPENDING ON ADHD

We have proceeded to compare Lack of Use of Strategy Questions according to ADHD by analysing ANOVA (n.s = 0.05), yielding the results illustrated in Table 33. In the research was used the independent sample Anova test in order to compare the means of ADHD.

Table 33. Results of the Anova test according to ADHD

Lack of Use of Strategy Questions	ADHD				Statistical F; p-value	FAVORABLE
	Attention Deficit	**Attention Deficit & Hyperactivity**	**Attention Deficit & Impulsitivity**	**Attention Deficit &Hyperactivity &Impulsitivity**		

	N, M (SD)	N; M (SD)	N, M (SD)	N, M (SD)		
A1_1	48; 3.13 (1.282)	17; 2.94 (1.144)	32; 3.22 (1.362)	13; 2.46 (1.561)	F=1.124; p=.343	not significant
A1_2	48; 2.42 (1.269)	17; 2.88 (1.495)	32; 2.69 (1.230)	13; 2.77 (1.363)	F=.700; p=.554	not significant
A1_3	48; 2.85 (1.321)	17; 3.12 (1.219)	32; 2.56 (1.243)	13; 3.08 (1.382)	F=.903; p=.442	not significant
A1_4	48; 3.00 (1.473)	17; 2.82 (1.551)	32; 2.97 (1.596)	13; 2.92 (1.706)	F=.057; p=.982	not significant
A1_5	48; 2.71 (1.368)	17; 2.94 (1.435)	32; 2.97 (1.307)	13; 2.54 (1.198)	F=.470; p=.704	not significant
A1_6	48; 3.02 (1.436)	17; 2.94 (1.435)	32; 3.31 (1.378)	13; 3.15 (1.519)	F=.360; p=.782	not significant
A1_7	48; 2.71 (1.501)	17; 2.71 (1.160)	32; 2.84 (1.370)	13; 3.08 (1.605)	F=.262; p=.853	not significant
A1_8	48; 2.96 (1.637)	17; 2.35 (1.455)	32; 2.75 (1.566)	13; 2.62 (1.502)	F=.669; p=.573	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between the ADHD and the lack of use of strategy questions.

J. INFERENTIAL ANALYSIS DEPENDING ON OTHER DISORDERS

We have proceeded to compare Lack of Use of Strategy Questions in accordance with other disorders except ADHD by analysing Anova (n.s = 0.05), yielding the results shown in Table 34. In the research was used the independent sample Anova test in order to compare the means of other disorders.

Table 34. Results of the Anova test according to other Disorders

Depth Strategy & Self-Regulation Questions	Other Disorders									Statistical F; p-value	FAVORABLE
	No other Disorder N, M (SD)	**Speech Problems/ Linguistic Evolutionary Disorder/ Lack of Knowledge of Greek Language** N; M (SD)	**Neurofeeding/ Psychophysiological Development Center** N, M (SD)	**Emotional Difficulties** N, M (SD)	**Neurological Problems/ Adolesent Epilepsy with Deductions** N, M (SD)	**High-function Autism Spectrum Disturbance/ Asperger** N, M (SD)	**Vision problems** N, M (SD)	**Mental Immaturity in the context of a Microcephaly** N, M (SD)	**Autism and mental inmaturity** N, M (SD)		
A1_1	90; 3.07 (1.347)	10; 2.70 (1.337)	1; 4.00 (.)	4; 3.50 (.577)	1; 3.00 (.)	1; 2.00 (.)	1; 3.00 (.)	1; 5.00 (.)	1; 1.00 (.)	F=.853; p=.559	not significant
A1_2	90; 2.62 (1.303)	10; 2.30 (1.418)	1; 2.00 (.)	4; 3.00 (1.155)	1; 3.00 (.)	1; 1.00 (.)	1; 2.00 (.)	1; 5.00 (.)	1; 3.00 (.)	F=.797; p=.607	not significant
A1_3	90; 2.74 (1.303)	10; 3.10 (.994)	1; 1.00 (.)	4; 4.25 (.500)	1; 2.00 (.)	1; 2.00 (.)	1; 4.00 (.)	1; 3.00 (.)	1; 5.00 (.)	F=1.593; p=.136	not significant
A1_4	90; 2.82 (1.518)	10; 3.90 (1.287)	1; 5.00 (.)	4; 3.75 (1.258)	1; 1.00 (.)	1; 1.00 (.)	1; 3.00 (.)	1; 2.00 (.)	1; 5.00 (.)	F=1.683; p=.112	not significant
A1_5	90; 2.72 (1.316)	10; 3.10 (1.449)	1; 3.00 (.)	4; 3.75 (1.893)	1; 2.00 (.)	1; 2.00 (.)	1; 2.00 (.)	1; 4.00 (.)	1; 4.00 (.)	F=.680; p=.708	not significant
A1_6	90; 3.20 (1.392)	10; 2.60 (1.265)	1; 4.00 (.)	4; 3.50 (1.732)	1; 1.00 (.)	1; 2.00 (.)	1; 1.00 (.)	1; 1.00 (.)	1; 5.00 (.)	F=1.476; p=.175	not significant
A1_7	90; 2.82 (1.458)	10; 2.50 (1.269)	1; 2.00 (.)	4; 2.50 (.577)	1; 1.00 (.)	1; 2.00 (.)	1; 4.00 (.)	1; 4.00 (.)	1; 5.00 (.)	F=.835; p=.574	not significant

A1_8	90; 2.71 (1.552)	10; 3.70 (1.767)	1; 3.00 (.)	4; 2.75 (1.708)	1; 2.00 (.)	1; 3.00 (.)	1; 2.00 (.)	1; 1.00 (.)	1; 1.00 (.)	F=.830; p=.579	not significant

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between other disorders and the lack of use of strategy questions.

K. INFERENTIAL ANALYSIS DEPENDING ON OTHER LEARNING DIFFICULTIES

We have proceeded to compare Lack of Use Strategy Questions according to other learning difficulties by analysing Anova (n.s = 0.05), yielding the results illustrated in Table 35. In the research was used the independent sample Anova test in order to compare the means of other learning difficulties.

Table 35. Results of the Anova test in accordance with other Learning Difficulties

Depth Strategy & Self-Regulation Questions	Other Learning Difficulties						Statistical F; p-value	FAVORABLE
	No other Learning Difficulty N, M (SD)	**Special Learning Difficulties** N; M (SD)	**General Learning Difficulties** N, M (SD)	**Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity** N, M (SD)	**Difficulties in Writing** N, M (SD)	**Social Interaction Difficulties/ Behavioral Problems** N, M (SD)		
A1_1	12; 3.25 (1.712)	40; 3.08 (1.269)	14; 3.00 (1.359)	34; 3.15 (1.282)	7; 2.43 (1.134)	3; 2.33 (1.528)	F=.572; p=.722	not significant
A1_2	12; 2.83 (1.403)	40; 2.70 (1.344)	14; 2.36 (1.447)	34; 2.65 (1.276)	7; 2.57 (.787)	3; 1.33 (.577)	F=.793; p=.557	not significant
A1_3	12; 2.75 (1.215)	40; 2.68 (1.228)	14; 3.43 (1.284)	34; 2.94 (1.229)	7; 2.86 (1.864)	3; 1.33 (.577)	F=1.635; p=.157	not significant
A1_4	12; 3.17 (1.801)	40; 2.53 (1.502)	14; 3.43 (1.453)	34; 3.03 (1.425)	7; 3.86 (1.345)	3; 2.67 (2.082)	F=1.507; p=.194	not significant
A1_5	12; 2.92 (1.379)	40; 2.88 (1.265)	14; 2.71 (1.490)	34; 2.79 (1.343)	7; 2.71 (1.496)	3; 2.00 (1.732)	F=.268; p=.930	not significant
A1_6	12; 3.42 (1.564)	40; 3.30 (1.506)	14; 2.93 (1.328)	34; 2.62 (1.256)	7; 4.14 (1.215)	3; 3.33 (.577)	F=1.967; p=.090	not significant

A1_7	12; 2.83 (1.528)	40; 2.65 (1.578)	14; 3.07 (1.385)	34; 2.88 (1.274)	7; 3.14 (1.069)	3; 1.33 (.577)	F=.941; p=.458	not significant
A1_8	12; 2.58 (1.505)	40; 2.75 (1.613)	14; 3.07 (1.817)	34; 2.88 (1.610)	7; 2.29 (.951)	3; 2.00 (1.000)	F=.440; p=.819	not significant

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between other learning difficulties and the lack of use of strategy questions.

J. INFERENTIAL ANALYSIS DEPENDING ON FATHER ORIGIN

We have proceeded to compare Lack of Use of Strategy Questions according to father origin by analysing t-student (n.s = 0.05), yielding the results illustrated in Table 36. In the research was used the independent sample t-student test in order to compare the means of father origin.

Table 36. Results of the t-Student test according to father origin

Lack of Use of Strategy Questions	My father comes from		Statistical t; p-value	FAVORABLE
	Greece N, M (SD)	**Other Country N; M (SD)**		
A1_1	104; 3.04 (1.336)	6; 3.17 (1.169)	t=-.230; p=.819	not significant
A1_2	104; 2.63 (1.308)	6; 2.17 (1.169)	t=.856; p=.394	not significant
A1_3	104; 2.86 (1.288)	6; 2.50 (1.378)	t=.656; p=.513	not significant
A1_4	104; 2.90 (1.523)	6; 3.83 (1.472)	t=-1.455; p=.148	not significant
A1_5	104; 2.83 (1.347)	6; 2.33 (1.033)	t=.881; p=.380	not significant
A1_6	104; 3.10 (1.411)	6; 3.33 (1.633)	t=-.397; p=.692	not significant
A1_7	104; 2.82 (1.433)	6; 2.33 (1.033)	t=.813; p=.418	not significant
A1_8	104; 2.70 (1.570)	6; 3.83 (1.169)	t=-1.735; p=.086	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between the father origin and the lack of use of strategy questions.

K. INFERENTIAL ANALYSIS DEPENDING ON MOTHER ORIGIN

We have proceeded to compare Lack of Use of Strategy Questions according to mother origin by analysing t-student (n.s = 0.05), yielding the results illustrated in Table 37. In the research was used the independent sample t-student test in order to compare the means of mother origin.

Table 37. Results of the t-Student test according to mother origin

Lack of Use of Strategy Questions	My mother comes from		Statistical t; p-value	FAVORABLE
	Greece N, M (SD)	**Other Country N, M (SD)**		
A1_1	100; 3.09 (1.319)	10; 2.60 (1.350)	t=1.118; p=.266	not significant
A1_2	100; 2.64 (1.314)	10; 2.30 (1.160)	t=.787; p=.433	not significant
A1_3	100; 2.83 (1.256)	10; 2.90 (1.663)	t=-.163; p=.871	not significant
A1_4	100; 2.90 (1.501)	10; 3.50 (1.780)	t=-1.185; p=.238	not significant
A1_5	100; 2.76 (1.342)	10; 3.20 (1.229)	t=-.995; p=.322	not significant
A1_6	100; 3.15 (1.395)	10; 2.70 (1.636)	t=.958; p=.340	not significant
A1_7	100; 2.82 (1.417)	10; 2.50 (1.434)	t=.680; p=.498	not significant
A1_8	100; 2.76 (1.584)	10; 2.80 (1.476)	t=-.077; p=.939	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between the mother origin and the lack of use of strategy questions.

4.2. DIMENSION 2. Depth Strategy & Self-Regulation questions

The subscale that measures the Depth Strategy & Self-Regulation questions is consisted of 14 questions and is focused on studying students who adopt both in-depth strategies and metacognitive strategies, have internal motivations or high learning objectives and try to understand in depth what they are reading with the help of their previous knowledge.

A. DESCRIPTIVE

Table 38. Descriptives of sample in Depth Strategy & Self-Regulation Questions

	N	Mean	Std. Deviation
A2_1	110	3.15	1.557
A2_2	110	3.12	1.269
A2_3	110	2.55	1.424
A2_4	110	3.25	1.337
A2_5	110	2.22	1.295
A2_6	110	2.63	1.495
A2_7	110	3.78	1.207
A2_8	110	2.95	1.410
A2_9	110	3.76	1.196
A2_10	110	3.40	1.485
A2_11	110	3.23	1.311
A2_12	110	3.29	1.467
A2_13	110	3.85	1.228
A2_14	110	3.68	1.313

Note. Source: Own elaboration

In this subscale the sample of 110 students taking part in this research showed a higher mean in question A2_13. So most of them when they have to give solution to an exercise, they first try to discover what this exercise calls for, while the same sample of participants showed the lowest mean in question A2_5 which indicates the situation while pupils who study Mathematics, do not so often draw designs or diagrams through which they link the main points.

B. INFERENTIAL ANALYSIS DEPENDING ON THE GENDER

We have proceeded to compare Depth Strategy & Self-Regulation Questions in accordance with the gender by analysing T-Students (n.s = 0.05), yielding the results illustrated in Table 39. In the research was used the independent sample t-test in order to compare the means of males and females.

Table 39. Results of the t-Student test according to Gender

Depth Strategy & Self-Regulation Questions	Gender		Statistical t; p-value	FAVORABLE
	MALE N, M (SD)	**FEMALE N; M (SD)**		
A2_1	80; 3.05 (1.566)	30; 3.43 (1.524)	t=-1.151; p=.252	not significant
A2_2	80; 3.10 (1.239)	30; 3.17 (1.367)	t=-.244; p=.807	not significant
A2_3	80; 2.66 (1.414)	30; 2.27 (1.437)	t=1.302; p=.196	not significant
A2_4	80; 3.23 (1.378)	30; 3.33 (1.241)	t=-.377; p=.707	not significant
A2_5	80; 2.25 (1.278)	30; 2.13 (1.358)	t=.419; p=.676	not significant
A2_6	80; 2.58 (1.508)	30; 2.77 (1.478)	t=-.597; p=.552	not significant
A2_7	80; 3.61 (1.217)	30; 4.23 (1.073)	t=-2.458; p=**.016**	**girls> boys**
A2_8	80; 2.89 (1.432)	30; 3.13 (1.358)	t=-.813; p=.418	not significant
A2_9	80; 3.75 (1.238)	30; 3.80 (1.095)	t=-.194; p=.846	not significant
A2_10	80; 3.30 (1.479)	30; 3.67 (1.493)	t=-1.155; p=.251	not significant
A2_11	80; 3.06 (1.334)	30; 3.67 (1.155)	t=-2.190; p=**.031**	**girls> boys**
A2_12	80; 3.25 (1.454)	30; 3.40 (1.522)	t=-.476; p=.635	not significant
A2_13	80; 3.73 (1.242)	30; 4.17 (1.147)	t=-1.694; p=.093	not significant
A2_14	80; 3.51 (1.387)	30; 4.13 (.973)	t=-2.632; p=**.010**	**girls> boys**

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

In question A2_7 students were asked if they learn something by first try to understand its meaning. This question has stronger meaning for the girls (M= 4.23) more than the boys (M= 3.61), [t(108)= -2.458, p= .016].

A statistically significant result gives the question A2_11 in which children were asked if they have to give solution to an exercise or comprehend a text, they try to recall some older data that may be related to them, because that helps them. Girls (M=3.67) show to give more emphasis to this, than boys (M=3.06), [t(108)=-2.190, p=.031].

Moreover, a statistically significant question is the A2_14, where adolescents were asked if each time they answer a question in an exam, they finally read it more than once, in order to be sure they gave the correspodense the question asked. This question has significant impact for girls (M=4.13) more than boys (M=3.51), [t(108)-2.632, p=.010].

C. INFERENTIAL ANALYSIS DEPENDING ON THE DATE OF BIRTH

We have proceeded to make comparisons between the Depth Strategy & Self-Regulation Questions and the date of birth by analysing Anova (n.s = 0.05), yielding the results illustrated in Table 40. In the research was used the independent sample Anova test in order to compare the means of date of birth.

Table 40. Results of the Anova test according to Date of Birth

Depth	Date of Birth	Statistical F; p-	FAVORABLE

Strategy & Self-Regulation Questions	2007 N, M (SD)	2006 N, M (SD)	2005 N, M (SD)	2004 N, M (SD)	2003 N; M (SD)	value	
A2_1	1; 3.00 (.)	31; 3.35 (1.723)	36; 2.89 (1.563)	40; 3.28 (1.467)	2; 2.50 (.707)	F=.531; p=.713	not significant
A2_2	1; 4.00 (.)	31; 3.19 (1.376)	36; 3.06 (1.351)	40; 3.08 (1.163)	2; 3.50 (.707)	F=.220; p=.927	not significant
A2_3	1; 3.00 (.)	31; 2.61 (1.358)	36; 2.31 (1.390)	40; 2.70 (1.488)	2; 3.00 (2.828)	F=.456; p=.768	not significant
A2_4	1; 4.00 (.)	31; 3.39 (1.358)	36; 3.14 (1.313)	40; 3.30 (1.363)	2; 2.00 (1.414)	F=.665; p=.618	not significant
A2_5	1; 2.00 (.)	31; 2.13 (1.176)	36; 2.00 (1.331)	40; 2.43 (1.357)	2; 3.50 (.707)	F=1.046; p=.387	not significant
A2_6	1; 1.00 (.)	31; 2.90 (1.469)	36; 2.33 (1.474)	40; 2.68 (1.509)	2; 3.50 (2.121)	F=1.092; p=.364	not significant
A2_7	1; 3.00 (.)	31; 4.16 (1.128)	36; 3.61 (1.248)	40; 3.70 (1.224)	2; 3.00 (.000)	F=1.322; p=.266	not significant
A2_8	1; 2.00 (.)	31; 3.16 (1.508)	36; 2.78 (1.396)	40; 2.93 (1.366)	2; 4.00 (1.414)	F=.694; p=.598	not significant
A2_9	1; 5.00 (.)	31; 3.68 (1.249)	36; 4.03 (1.082)	40; 3.60 (1.236)	2; 3.00 (1.414)	F=1.144; p=.340	not significant
A2_10	1; 5.00 (.)	31; 3.90 (1.399)	36; 3.00 (1.493)	40; 3.28 (1.467)	2; 4.50 (.707)	F=2.280; p=.066	not significant
A2_11	1; 1.00 (.)	31; 2.97 (1.278)	36; 3.17 (1.384)	40; 3.50 (1.240)	2; 4.00 (.000)	F=1.693; p=.157	not significant
A2_12	1; 3.00 (.)	31; 3.52 (1.610)	36; 3.28 (1.523)	40; 3.10 (1.336)	2; 4.00 (1.414)	F=.470; p=.758	not significant
A2_13	1; 5.00 (.)	31; 3.94 (1.315)	36; 3.64 (1.246)	40; 3.98 (1.165)	2; 3.00 (.000)	F=.861; p=.490	not significant
A2_14	1; 5.00 (.)	31; 3.65 (1.450)	36; 3.56 (1.275)	40; 3.80 (1.244)	2; 3.50 (2.121)	F=.423; p=.792	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between the date of birth of the students and the depth strategy & self-regulation questions.

D. INFERENTIAL ANALYSIS DEPENDING ON CLASS

We have proceeded to make comparisons between the Depth Strategy & Self-Regulation Questions and the class by analysing Anova (n.s = 0.05), yielding the results illustrated in Table 41. In the research was used the independent sample Anova test in order to compare the means of class.

Table 41. Results of the Anova test according to Class

Depth Strategy & Self-Regulation Questions	Class			Statistical F; p-value	FAVORABLE
	1st Class N, M (SD)	**2nd Class N; M (SD)**	**3rd Class N, M (SD)**		
A2_1	40; 3.45 (1.663)	35; 2.66 (1.434)	35; 3.31 (1.471)	F=2.777; p=.067	not significant
A2_2	40; 3.18 (1.299)	35; 3.09 (1.337)	35; 3.09 (1.197)	F=062; p=.940	not significant
A2_3	40; 2.55 (1.377)	35; 2.37 (1.395)	35; 2.74 (1.521)	F=.591; p=.556	not significant
A2_4	40; 3.33 (1.269)	35; 3.03 (1.424)	35; 3.40 (1.333)	F=.759; p=.471	not significant
A2_5	40; 2.18 (1.152)	35; 1.91 (1.292)	35; 2.57 (1.399)	F=2.345; p=.101	not significant
A2_6	40; 2.78 (1.510)	35; 2.31 (1.491)	35; 2.77 (1.477)	F=1.127; p=.328	not significant
A2_7	40; 4.05 (1.131)	35; 3.51 (1.245)	35; 3.74 (1.221)	F=1.896; p=.155	not significant
A2_8	40; 3.13 (1.436)	35; 2.66 (1.392)	35; 3.06 (1.392)	F=1.167; p=.315	not significant
A2_9	40; 3.73 (1.176)	35; 3.94 (1.187)	35; 3.63 (1.239)	F=.633; p=.533	not significant
A2_10	40; 3.75 (1.446)	35; 2.97 (1.505)	35; 3.43 (1.441)	F=2.653; p=.075	not significant
A2_11	40; 3.03 (1.271)	35; 3.09 (1.442)	35; 3.60 (1.168)	F=2.139; p=.123	not significant
A2_12	40; 3.60 (1.499)	35; 2.94 (1.571)	35; 3.29 (1.274)	F=1.903; p=.154	not significant
A2_13	40; 3.83 (1.318)	35; 3.74 (1.146)	35; 3.97 (1.224)	F=.308; p=.736	not significant
A2_14	40; 3.73 (1.414)	35; 3.46 (1.336)	35; 3.86 (1.167)	F=.844; p=.433	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between the class and the depth strategy & self-regulation questions.

E. INFERENTIAL ANALYSIS DEPENDING ON SCHOOL AREA

We have proceeded to make comparisons between the Depth Strategy & Self-Regulation Questions and the school area by analysing t-student (n.s = 0.05), yielding the results illustrated in Table 42. In the research was used the independent sample Anova test in order to compare the means of school area.

Table 42. Results of the t-Student test according to School Area

Depth Strategy & Self-Regulation Questions	School Area		Statistical t; p-value	FAVORABLE
	In the city of Heraklion N, M (SD)	**Out of the city of Heraklion N; M (SD)**		
A2_1	65; 2.94 (1.560)	45; 3.47 (1.517)	t=-1.766; p=.080	not significant
A2_2	65; 3.06 (1.210)	45; 3.20 (1.358)	t=-.561; p=.576	not significant
A2_3	65; 2.63 (1.516)	45; 2.44 (1.289)	t=.673; p=.503	not significant
A2_4	65; 3.51 (1.359)	45; 2.89 (1.229)	t=2.440; p=**.016**	**In the city of Heraklion > Out of the city of Heraklion**
A2_5	65; 2.31 (1.380)	45; 2.09 (1.164)	t=.870; p=.386	not significant
A2_6	65; 2.71 (1.444)	45; 2.51 (1.576)	t=.676; p=.500	not significant
A2_7	65; 3.89 (1.201)	45; 3.62 (1.211)	t=1.156; p=.250	not significant
A2_8	65; 2.95 (1.462)	45; 2.96 (1.348)	t=-.006; p=.995	not significant
A2_9	65; 3.82 (1.171)	45; 3.69 (1.240)	t=.544; p=.588	not significant
A2_10	65; 3.22 (1.452)	45; 3.67 (1.508)	t=-1.578; p=.118	not significant
A2_11	65; 3.49 (1.214)	45; 2.84 (1.364)	t=2.616; p=**.010**	**In the city of Heraklion > Out of the city of Heraklion**
A2_12	65; 2.86 (1.323)	45; 2.69 (1.487)	t=-.515; p=.608	not significant
A2_13	65; 3.95 (1.217)	45; 3.69 (1.240)	t=1.114; p=.268	not significant
A2_14	65; 3.63 (1.318)	45; 3.76 (1.317)	t=-.488; p=.626	not significant

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

In question A2_4 children were asked if they try to explain the main ideas in their own words, when they study. Adolescents who live in an urban area (city of Heraklion) (M= 3.51) seem to have this habit of explaining the main ideas of what they learn in their own words, more than those who live in rural area (out of the city) (M= 2.89), [t(108)= 2.440, p= .016].

Moreover, a statistically significant result gives the question A2_11 in which children were asked if they are helped, when they have to give solution to an exercise or comprehend a text, by trying to remember some older information that may be related to them. Adolescents who live in an urban area (city of Heraklion) (M=3.49) seem to react such a way, more than the kids who live in rural area (out of the city) (M=2.84), [t(108)=2.616, p=.010].

F. INFERENTIAL ANALYSIS DEPENDING ON PARENTAL EDUCATIONAL LEVEL

FATHER

We have proceeded to make comparisons between the Depth Strategy & Self-Regulation Questions and the father educational background by analysing Anova (n.s = 0.05), yielding the results illustrated in Table 43. In the research was used the independent sample Anova test in order to compare the means of father educational background.

Table 43. Results of the Anova test according to Father Educational Background

Depth Strategy & Self-Regulation Questions	**My Father has finished**						**Statistical F; p-value**	**FAVORABLE**
	Primary school **N, M (SD)**	**Junior High school** **N, M (SD)**	**High school** **N, M (SD)**	**Technical Education** **N, M (SD)**	**University** **N; M (SD)**	**Other** **N; M (SD)**		
A2_1	28; 3.29 (1.718)	24; 3.54 (1.414)	30; 3.17 (1.487)	6; 3.50 (1.378)	17; 2.29 (1.611)	5; 3.00 (1.225)	F=1.475; p=.204	not significant
A2_2	28; 2.68 (1.278)	24; 3.25 (1.113)	30; 3.43 (1.104)	6; 3.00 (1.673)	17; 3.06 (1.478)	5; 3.40 (1.517)	F=1.171; p=.329	not significant
A2_3	28; 2.36 (1.224)	24; 2.29 (1.429)	30; 2.40 (1.248)	6; 3.33 (1.633)	17; 3.00 (1.732)	5; 3.40 (1.817)	F=1.411; p=.226	not significant
A2_4	28; 3.25 (1.351)	24; 2.96 (1.233)	30; 3.20 (1.349)	6; 3.50 (1.643)	17; 3.53 (1.419)	5; 3.80 (1.304)	F=.585; p=.712	not significant
A2_5	28; 2.07 (1.152)	24; 2.21 (1.062)	30; 1.83 (1.117)	6; 1.83 (1.329)	17; 2.88 (1.616)	5; 3.60 (1.673)	F=2.992; p=**.015**	**Other > University > Junior High school > Primary school > High school, Technical Education**
A2_6	28; 3.00 (1.515)	24; 2.58 (1.283)	30; 2.10 (1.398)	6; 1.50 (.837)	17; 3.24 (1.640)	5; 3.20 (1.789)	F=2.681; p=**.025**	**University > Other > Primary school > Junior High school > High school > Technical Education**
A2_7	28; 3.79 (1.031)	24; 3.83 (1.239)	30; 3.57 (1.357)	6; 4.33 (.816)	17; 4.00 (1.225)	5; 3.40 (1.517)	F=.651; p=.662	not significant
A2_8	28; 3.00 (1.333)	24; 2.88 (1.262)	30; 2.90 (1.348)	6; 3.17 (1.835)	17; 3.24 (1.715)	5; 2.20 (1.643)	F=.467; p=.800	not significant
A2_9	28; 3.86 (1.079)	24; 3.42 (1.060)	30; 4.10 (1.213)	6; 3.83 (.408)	17; 3.47 (1.586)	5; 3.80 (1.304)	F=1.129; p=.350	not significant
A2_10	28; 3.57 (1.260)	24; 3.29 (1.488)	30; 3.47 (1.592)	6; 3.17 (2.041)	17; 3.29 (1.572)	5; 3.20 (1.643)	F=.171; p=.973	not significant
A2_11	28; 3.29 (1.243)	24; 3.13 (1.116)	30; 3.13 (1.383)	6; 3.83 (1.472)	17; 2.88 (1.495)	5; 4.40 (.894)	F=1.388; p=.235	not significant
A2_12	28; 3.32 (1.565)	24; 3.17 (1.341)	30; 3.00 (1.509)	6; 3.83 (1.169)	17; 3.59 (1.460)	5; 3.80 (1.789)	F=.687; p=.635	not significant
A2_13	28; 3.71 (.976)	24; 3.96 (1.160)	30; 3.87 (1.279)	6; 4.17 (.753)	17; 3.76 (1.751)	5; 3.80 (1.304)	F=.197; p=.963	not significant
A2_14	28; 3.82 (1.090)	24; 3.83 (1.129)	30; 3.47 (1.548)	6; 3.67 (1.211)	17; 3.59 (1.583)	5; 3.80 (1.304)	F=.304; p=.910	not significant

Note. Source: Own elaboration

Significant p values are in bold, where p < .05

The table above, in question A2_5 depicts children who draw designs or diagrams to which they link the main points, when they study Mathematics. This question has stronger meaning to adolescents whose fathers have finished other (M= 3.60) or University (M= 2.88). Children whose fathers have finished Junior High school (M= 2.21), Primary school (M= 2.07), High school (M= 1.83) or Technical Education (M= 1.83) seem not to study this way, [F(5, 104)= 2.992, p= .015].

A statistically significant result gives the question A2_6 in which children do a lot of homework, like that which they do in the classroom. This question has stronger meaning to adolescents whose fathers have finished University (M= 3.24), other (M= 3.20) or Primary school (M= 3.00). Children whose fathers have finished Junior High school (M= 2.58), High school (M= 2.10) or Technical Education (M= 1.50) seem not to act the same way and do not do homework like that in the classroom, [F(5, 104)= 2.681, p= .025].

Table 44. Difference between groups (Post Hoc Tests)

Dependent Variable	Father Educational Background (I) to (J)	Mean Difference (I-J)	Significance
A2_5	Other to Junior High School	-1.767*	.059
A2_6	University to Technical Education	-1.135*	.162

***. The mean difference is significant at the 0.05 level**

Students whose fathers have finished University, other or Primary school draw designs or diagrams to which they link the main points, when they study Mathematics than those whose fathers have finished Junior High school, Primary school, High school or Technical Education (t= -2.949, p=.059). In addition, children whose fathers have finished University, other or Primary school do a lot of homework, like that which they do in the classroom than those whose fathers have finished Junior High school, High school or Technical Education (t=-2.597, p=.162).

G. INFERENTIAL ANALYSIS DEPENDING ON PARENTAL EDUCATIONAL LEVEL MOTHER

We have proceeded to make comparisons between the Depth Strategy & Self-Regulation Questions and the mother educational background by analysing Anova (n.s = 0.05), yielding the results illustrated in Table 45. In the research was used the independent sample Anova test in order to compare the means of mother educational background.

Table 45. Results of the Anova test according to Mother Educational Background

Depth Strategy & Self-Regulation Questions	My Mother has finished						Statistical F; p-value	FAVORABLE
	Primary school **N, M (SD)**	**Junior High school** **N, M (SD)**	**High school** **N, M (SD)**	**Technical Education** **N, M (SD)**	**University** **N; M (SD)**	**Other** **N; M (SD)**		
A2_1	12; 3.58 (1.676)	18; 3.94 (1.110)	45; 2.96 (1.665)	13; 2.77 (1.589)	19; 2.84 (1.425)	3; 3.33 (1.528)	F=1.620; p=.161	not significant
A2_2	12; 3.08 (.996)	18; 3.11 (1.183)	45;3.09 (1.328)	13; 2.77 (1.092)	19; 3.37 (1.499)	3; 3.67 (1.528)	F=.452; p=.811	not significant
A2_3	12; 2.33 (1.303)	18; 2.61 (1.243)	45; 2.29 (1.375)	13; 3.00 (1.472)	19; 2.89 (1.761)	3; 3.00 (1.000)	F=.902 p=.483	not significant
A2_4	12; 3.50 (1.243)	18; 3.06 (1.162)	45; 3.33 (1.348)	13; 3.46 (1.664)	19; 2.89 (1.329)	3; 3.67 (.528)	F=.575; p=.719	not significant
A2_5	12; 2.08 (1.311)	18; 2.28 (.895)	45; 2.22 (1.277)	13; 1.92 (1.320)	19; 2.42 (1.575)	3; 2.33 (2.309)	F=.258 p=.935	not significant
A2_6	12; 3.08 (1.505)	18; 2.67 (1.534)	45; 2.69 (1.505)	13; 2.08 (1.188)	19; 2.47 (1.611)	3; 3.00 (2.000)	F=.660; p=.654	not significant
A2_7	12; 3.58 (1.379)	18; 3.33 (1.372)	45; 3.80 (1.198)	13; 3.92 (1.038)	19; 4.16 (.958)	3; 4.00 (1.732)	F=.988 p=.429	not significant
A2_8	12; 3.75 (.965)	18; 3.22 (1.396)	45; 2.82 (1.419)	13; 2.85 (1.463)	19; 2.63 (1.461)	3; 2.67 (2.082)	F=1.225; p=.303	not significant
A2_9	12; 3.92 (1.240)	18; 3.61 (.979)	45; 3.87 (1.254)	13; 3.85 (.987)	19; 3.53 (1.389)	3; 3.67 (1.528)	F=.320; p=.900	not significant
A2_10	12; 4.08 (1.165)	18; 3.17 (1.581)	45; 3.49 (1.440)	13; 3.15 (1.463)	19; 3.00 (1.700)	3; 4.33 (.577)	F=1.226; p=.302	not significant
A2_11	12; 3.83 (1.115)	18; 3.17 (1.249)	45; 2.98 (1.357)	13; 3.23 (1.301)	19; 3.37 (1.300)	3; 4.00 (1.732)	F=1.104; p=.363	not significant
A2_12	12; 3.33 (1.497)	18; 2.89 (1.641)	45; 3.22 (1.412)	13; 3.62 (1.325)	19; 3.58 (1.502)	3; 3.33 (2.082)	F=.554; p=.735	not significant
A2_13	12; 4.25 (.866)	18; 3.44 (1.149)	45; 3.98 (1.158)	13; 3.85 (1.144)	19; 3.63 (1.606)	3; 4.00 (1.732)	F=.868; p=.505	not significant
A2_14	12; 3.75 (1.357)	18; 3.44 (1.381)	45; 3.71 (1.290)	13; 3.85 (1.345)	19; 3.58 (1.387)	3; 4.33 (1.155)	F=.330; p=.894	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between the mother educational background and the depth strategy & self-regulation questions.

H. INFERENTIAL ANALYSIS DEPENDING ON LAST-YEAR DEGREE

We have proceeded to make comparisons between the Depth Strategy & Self-Regulation Questions and the student's last year degree in Mathematics by analysing Anova (n.s = 0.05), yielding the results illustrated in Table 46. In the research was used the independent sample Anova test in order to compare the means of Student's last year degree in Math.

Table 46. Results of the Anova test according to Student's last year degree in Math

Depth Strategy & Self-Regulation Questions	**My last year degree in Math was**						**Statistical F; p-value**	**FAVORABLE**
	Lower than 10 **N, M (SD)**	**11-12** **N, M (SD)**	**13-14** **N, M (SD)**	**15-16** **N, M (SD)**	**17-18** **N; M (SD)**	**19-20** **N; M (SD)**		
A2_1	10; 3.30 (1.829)	24; 2.50 (1.414)	33; 3.58 (1.521)	26; 3.19 (1.524)	8; 3.25 (1.165)	9; 3.00 (1.936)	F=1.400; p=.230	not significant
A2_2	10; 2.90 (1.287)	24; 2.96 (1.334)	33; 3.15 (1.302)	26; 3.23 (1.275)	8; 2.63 (.744)	9; 3.78 (1.302)	F=.905; p=.481	not significant
A2_3	10; 2.70 (1.567)	24; 2.33 (1.404)	33; 2.36 (1.319)	26; 2.88 (1.558)	8; 2.88 (1.356)	9; 2.44 (1.509)	F=.615; p=.689	not significant
A2_4	10; 3.30 (1.337)	24; 2.79 (1.215)	33; 3.24 (1.347)	26; 3.65 (1.468)	8; 3.38 (1.188)	9; 3.22 (1.302)	F=1.059; p=.388	not significant
A2_5	10; 2.50 (1.509)	24; 1.92 (1.060)	33; 1.82 (1.074)	26; 2.69 (1.379)	8; 2.50 (1.414)	9; 2.56 (1.667)	F=1.963; p=.090	not significant
A2_6	10; 2.30 (1.418)	24; 2.33 (1.341)	33; 2.82 (1.446)	26; 2.88 (1.532)	8; 3.13 (2.031)	9; 1.89 (1.453)	F=1.168; p=.330	not significant
A2_7	10; 3.50 (1.269)	24; 3.71 (1.160)	33; 3.45 (1.325)	26; 4.23 (1.070)	8; 3.63 (1.061)	9; 4.33 (1.000)	F=1.798; p=.120	not significant
A2_8	10; 3.40 (.966)	24; 2.71 (1.398)	33; 2.88 (1.516)	26; 3.08 (1.468)	8; 3.13 (1.126)	9; 2.89 (1.691)	F=.420; p=.834	not significant
A2_9	10; 3.60 (1.265)	24; 3.75 (1.032)	33; 3.76 (1.200)	26; 3.77 (1.275)	8; 4.13 (.991)	9; 3.67 (1.658)	F=.189; p=.966	not significant
A2_10	10; 3.30 (1.160)	24; 3.46 (1.351)	33; 3.39 (1.657)	26; 3.23 (1.478)	8; 4.63 (.518)	9; 2.78 (1.787)	F=1.525; p=.189	not significant

A2_11	10; 3.70 (.949)	24; 3.21 (1.318)	33; 2.85 (1.302)	26; 3.81 (1.021)	8; 3.50 (1.195)	9; 2.22 (1.716)	F=3.266; p=**.009**	**15-16 > lower than 10 > 17-18 > 11-12 > 13-14 > 19-20**
A2_12	10; 2.70 (1.337)	24; 3.29 (1.488)	33; 3.30 (1.610)	26; 3.35 (1.325)	8; 3.75 (1.389)	9; 3.33 (1.658)	F=.479; p=.792	not significant
A2_13	10; 3.90 (.994)	24; 4.00 (.885)	33; 3.79 (1.293)	26; 4.00 (1.356)	8; 3.63 (1.506)	9; 3.33 (1.500)	F=.530; p=.753	not significant
A2_14	10; 3.90 (1.287)	24; 3.50 (1.180)	33; 3.55 (1.502)	26; 3.77 (1.275)	8; 4.25 (.886)	9; 3.67 (1.500)	F=.530; p=.753	not significant

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

A statistically important result gives the question A2_11 in which children try to recall some older information that may relate to what they read, in order to help themselves, when they have to give solution to an exercise or comprehend a text. This routine of recalling relative information is better shown in children with last year degree in Mathematics 15-16 (M= 3.81), lower than 10 (M= 3.70), 17-18 (M= 3.50), 11-12 (M= 3.21). Students with last year degree in Maths 13-14 (M= 2.85) or 19-20 (M= 2.22) don’t have this kind of routine when they solve an exercise or trying to comprehend a text, [F(5, 104)= 3.266, p= .009].
In addition, in the table below is illustrated the indifference of the answers between the students and their last year grade in Mathematics.

Table 47. Difference between groups (Post Hoc Tests)

Dependent Variable	My grade in Mathematics last year was (I) to (J)	Mean Difference (I-J)	Significance
A2_11	15-16 to 19-20	-1.585*	.021

***. The mean difference is significant at the 0.05 level**

Students with last-year degree in Mathematics 15-16, lower than 10 or 17-18 try to recall some older information that may relate to them because this helps them, when they have to solve an exercise than those with 11-12, 13-14 or 19-20 (t=-3.281, p=.021).

I. INFERENTIAL ANALYSIS DEPENDING ON ADHD

We have proceeded to make comparisons between the Depth Strategy & Self-Regulation Questions and ADHD by analysing Anova (n.s = 0.05), yielding the results illustrated in Table 48. In the research was used the independent sample Anova test in order to compare the means of ADHD.

Table 48. Results of the Anova test according to ADHD

Depth Strategy & Self-Regulation Questions	ADHD				Statistical F; p-value	FAVORABLE
	Attention Deficit N, M (SD)	**Attention Deficit & Hyperactivity N; M (SD)**	**Attention Deficit & Impulsitivity N, M (SD)**	**Attention Deficit &Hyperactivity &Impulsitivity N, M (SD)**		
A2_1	48; 3.10 (1.574)	17; 3.29 (1.611)	32; 3.25 (1.459)	13; 2.92 (1.801)	F=.194; p=.901	not significant
A2_2	48; 3.15 (1.321)	17; 3.00 (1.225)	32; 3.28 (1.250)	13; 2.77 (1.235)	F=.554; p=.647	not significant
A2_3	48; 2.73 (1.484)	17; 2.59 (1.460)	32; 2.53 (1.436)	13; 1.92 (1.038)	F=1.101; p=.352	not significant
A2_4	48; 3.50 (1.384)	17; 3.00 (1.323)	32; 3.06 (1.216)	13; 3.15 (1.463)	F=.989; p=.401	not significant
A2_5	48; 2.35 (1.436)	17; 2.24 (1.033)	32; 2.25 (1.218)	13; 1.62 (1.193)	F=1.127; p=.342	not significant
A2_6	48; 3.00 (1.502)	17; 2.94 (1.478)	32; 2.22 (1.453)	13; 1.85 (1.144)	F=3.439; p=**.020**	**Attention Deficit> Attention Deficit & Hyperactivity > Attention Deficit & Impulsitivity> Attention Deficit &Hyperactivity &Impulsitivity**
A2_7	48; 4.06 (1.278)	17; 3.71 (1.047)	32; 3.66 (1.153)	13; 3.15 (1.068)	F=2.252; p=.087	not significant
A2_8	48; 3.23 (1.561)	17; 3.00 (1.275)	32; 2.84 (1.247)	13; 2.15 (1.144)	F=2.141; p=.099	not significant
A2_9	48; 3.92 (1.235)	17; 3.71 (1.213)	32; 3.63 (1.129)	13; 3.62 (1.261)	F=.478; p=.698	not significant
A2_10	48; 3.63 (1.453)	17; 3.12 (1.364)	32; 3.38 (1.519)	13; 3.00 (1.683)	F=.887; p=.451	not significant
A2_11	48; 3.38 (1.393)	17; 3.12 (.993)	32; 3.25 (1.344)	13; 2.77 (1.301)	F=.770; p=.513	not significant
A2_12	48; 3.44 (1.443)	17; 3.18 (1.551)	32; 3.19 (1.512)	13; 3.15 (1.463)	F=.279; p=.840	not significant
A2_13	48; 4.13 (1.196)	17; 3.65 (.996)	32; 3.94 (1.216)	13; 2.85 (1.214)	F=4.257; p=**.007**	**Attention Deficit> Attention Deficit & Impulsitivity > Attention Deficit & Hyperactivity > Attention Deficit &Hyperactivity &Impulsitivity**
A2_14	48; 4.02 (1.194)	17; 3.41 (1.622)	32; 3.44 (1.318)	13; 3.38 (1.121)	F=1.948; p=.126	not significant

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

The table above, in the question A2_6 depicts children who do several homework exercises, similar to the ones they do in class. Such a question has stronger meaning to students with Attention Deficit (M= 3.00) and Attention Deficit & Hyperactivity (M= 2.94) more than students with Attention Deficit & Impulsitivity (M= 2.22) and Attention Deficit & Hyperactivity & Impulsitivity (M= 1.85), [F(3, 106)= 3.439, p= .020].

Moreover, a statistically significant result gives the question A2_13 where children with Attention Deficit (M= 4.13) and Attention Deficit & Impulsitivity (M= 3.94) which have to solve an exercise, the first thing they try to do is to understand what this exercise requires of them. In the other hand, students with Attention Deficit and Hyperactivity (M= 3.65) and Attention Deficit & Hyperactivity& Impulsitivity (M=2.85) give less attention to this, [F(3, 106)= 4.257, p=.007].

Additionaly, in the table below is illustrated the indifference between answers given from the children in-between the classes.

Table 49. Difference between groups (Post Hoc Tests)

Dependent Variable	ADHD (I) to (J)	Mean Difference (I-J)	Significance
A2_6	Attention Deficit to Attention Deficit & Hyperactivity & Impulsitivity	1.154*	.073
A2_13	Attention Deficit to Attention Deficit & Hyperactivity & Impulsitivity	1.279*	.004

***. The mean difference is significant at the 0.05 level**

Students with Attention Deficit, Attention Deficit & Hyperactivity or Attention Deficit & Impulsitivity do several homework exercises, similar to the ones they do in class than those with Attention Deficit &Hyperactivity &Impulsitivity (t=2.547, p=.073). Additionaly, adolescents with Attention Deficit, Attention Deficit & Hyperactivity or Attention Deficit & Impulsitivity which have to solve an exercise, the first thing they try to do is to understand what this exercise requires of them than those with Attention Deficit &Hyperactivity &Impulsitivity (t=3.475, p=.004).

J. INFERENTIAL ANALYSIS DEPENDING ON OTHER DISORDERS

We have proceeded to compare Depth Strategy & Self-Regulation Questions according to other disorders except ADHD by analysing Anova (n.s = 0.05), yielding the results shown in Table 50. In the research was used the independent sample Anova test in order to compare the means of other disorders.

Table 50. Results of the Anova test according to other Disorders

Depth Strategy & Self-Regulation Questions	Other Disorders									Statistical F; p-value	FAVORABLE
	No other Disorder N, M (SD)	**Speech Problems/ Linguistic Evolutionary Disorder/ Lack of Knowledge of Greek Language** N; M (SD)	**Neurofeeding/ Psychophysiological Development Center** N, M (SD)	**Emotional Difficulties** N, M (SD)	**Neurological Problems/ Adolesent Epilepsy with Deductions** N, M (SD)	**High-function Autism Spectrum Disturbance/ Asperger** N, M (SD)	**Vision problems** N, M (SD)	**Mental Immaturity in the context of a Microcephaly** N, M (SD)	**Autism and mental inmaturity** N, M (SD)		
A2_1	90; 3.10 (1.594)	10; 3.60 (1.265)	1; 3.00 (.)	4; 3.00 (1.633)	1; 2.00 (.)	1; 5.00 (.)	1; 4.00 (.)	1; 5.00 (.)	1; 1.00 (.)	F=.806; p=.598	not significant
A2_2	90; 3.08 (1.256)	10; 3.40 (1.350)	1; 4.00 (.)	4; 3.50 (1.732)	1; 2.00 (.)	1; 4.00 (.)	1; 3.00 (.)	1; 4.00 (.)	1; 1.00 (.)	F=.731; p=.664	not significant
A2_3	90; 2.59 (1.437)	10; 2.70 (1.494)	1; 1.00 (.)	4; 1.75 (.957)	1; 1.00 (.)	1; 4.00 (.)	1; 4.00 (.)	1; 3.00 (.)	1; 1.00 (.)	F=.888; p=.530	not significant
A2_4	90; 3.38 (1.286)	10; 2.80 (1.398)	1; 1.00 (.)	4; 2.50 (1.291)	1; 2.00 (.)	1; 5.00 (.)	1; 5.00 (.)	1; 2.00 (.)	1; 1.00 (.)	F=1.868; p=.073	not significant
A2_5	90; 2.22 (1.296)	10; 2.00 (1.054)	1; 3.00 (.)	4; 1.50 (.577)	1; 1.00 (.)	1; 3.00 (.)	1; 5.00 (.)	1; 1.00 (.)	1; 5.00 (.)	F=1.746; p=.097	not significant
A2_6	90; 2.51 (1.516)	10; 3.40 (1.350)	1; 2.00 (.)	4; 3.00 (1.414)	1; 2.00 (.)	1; 4.00 (.)	1; 2.00 (.)	1; 5.00 (.)	1; 2.00 (.)	F=.936; p=.490	not significant
A2_7	90; 3.78 (1.234)	10; 3.50 (1.269)	1; 3.00 (.)	4; 4.00 (.816)	1; 5.00 (.)	1; 5.00 (.)	1; 5.00 (.)	1; 4.00 (.)	1; 3.00 (.)	F=.557; p=.811	not significant

A2_8	90; 2.88 (1.421)	10; 3.90 (1.197)	1; 3.00 (.)	4; 2.25 (1.500)	1; 3.00 (.)	1; 4.00 (.)	1; 4.00 (.)	1; 3.00 (.)	1; 1.00 (.)	F=1.106; p=.365	not significant
A2_9	90; 3.76 (1.174)	10; 4.20 (.919)	1; 2.00 (.)	4; 2.50 (1.291)	1; 5.00 (.)	1; 5.00 (.)	1; 2.00 (.)	1; 5.00 (.)	1; 5.00 (.)	F=1.926; p=.064	not significant
A2_10	90; 3.37 (1.502)	10; 4.10 (1.101)	1; 4.00 (.)	4; 2.00 (1.155)	1; 3.00 (.)	1; 4.00 (.)	1; 5.00 (.)	1; 5.00 (.)	1; 1.00 (.)	F=1.439; p=.189	not significant
A2_11	90; 3.13 (1.326)	10; 3.90 (1.197)	1; 4.00 (.)	4; 3.00 (1.414)	1; 5.00 (.)	1; 3.00 (.)	1; 4.00 (.)	1; 4.00 (.)	1; 2.00 (.)	F=.866; p=.548	not significant
A2_12	90; 3.21 (1.480)	10; 4.10 (.994)	1; 3.00 (.)	4; 2.75 (2.062)	1; 1.00 (.)	1; 4.00 (.)	1; 4.00 (.)	1; 4.00 (.)	1; 5.00 (.)	F=1.052; p=.403	not significant
A2_13	90; 3.86 (1.250)	10; 4.00 (1.054)	1; 3.00 (.)	4; 4.00 (1.414)	1; 5.00 (.)	1; 4.00 (.)	1; 4.00 (.)	1; 2.00 (.)	1; 2.00 (.)	F=.753; p=.645	not significant
A2_14	90; 3.70 (1.258)	10; 4.00 (1.054)	1; 2.00 (.)	4; 2.25 (1.893)	1; 1.00 (.)	1; 5.00 (.)	1; 5.00 (.)	1; 5.00 (.)	1; 5.00 (.)	F=2.047; p=**.048**	**Speech Problems/ Linguistic Evolutionary Disorder/ Lack of Knowledge of Greek Language > No other Disorder > Emotional Difficulties**

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

The table above, in the question A2_14 depicts children who give a response in an exam, by re-reading it more than once in order to reassure they gave the answer to the question thet were asked. Such a question has stronger meaning to adolescents with Speech Problems/ Linguistic Evolutionary Disorder/ Lack of Knowledge of Greek Language (M= 4.00) and for children with No other Disorder apart from ADHD (M= 3.78) more than children with Emotional Difficulties (M= 2.25), [F(3, 106)= 2.047, p= .048].

Moreover, in the table below is illustrated the indifference of the responses given from the adolescents in-between the kinds of ADHD.

Table 51. Difference between groups (Post Hoc Tests)

Dependent Variable	Other disorders (I) to (J)	Mean Difference (I-J)	Significance
A2_14	-	-*	-

***. The mean difference is significant at the 0.05 level**

There is a significance in-between students with Attention Deficit and students with Attention Deficit & Hyperactivity & Impulsitivity, or in-between students with Attention Deficit & Impulsitivity and students with Attention Deficit & Hyperactivity & Impulsitivity which mostly appears when they have to solve an exercise and the first thing they try to do is figure out what this exercise calls for.

K. INFERENTIAL ANALYSIS DEPENDING ON OTHER LEARNING DIFFICULTIES

We have proceeded to compare Depth Strategy & Self-Regulation Questions according to other learning difficulties by analysing Anova (n.s = 0.05), yielding the results shown in Table 52. In the research was used the independent sample Anova test in order to compare the means of other learning difficulties.

Table 52. Results of the Anova test according to other Learning Difficulties

Depth Strategy & Self-Regulation Questions	**Other Learning Difficulties**						**Statistical F; p-value**	**FAVORABLE**
	No other Learning Difficulty	**Special Learning Difficulties**	**General Learning Difficulties**	**Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity**	**Difficulties in Writing**	**Social Interaction Difficulties/ Behavioral Problems**		
	N, M (SD)	**N; M (SD)**	**N, M (SD)**	**N, M (SD)**	**N, M (SD)**	**N, M (SD)**		
A2_1	12; 3.25 (1.545)	40; 2.85 (1.626)	14; 4.36 (1.082)	34; 3.26 (1.421)	7; 1.71 (1.254)	3; 3.33 (1.528)	F=3.610; p=**.005**	**General Learning Difficulties > Social Interaction**

								Difficulties/ Behavioral Problems > Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity > No other Learning Difficulty > Special Learning Difficulties > Difficulties in Writing
A2_2	12; 3.83 (1.115)	40; 3.10 (1.355)	14; 3.00 (1.109)	34; 2.88 (1.250)	7; 3.14 (1.215)	3; 3.67 (1.528)	F=1.144; p=.342	not significant
A2_3	12; 2.42 (1.832)	40; 2.35 (1.388)	14; 2.50 (1.454)	34; 2.74 (1.310)	7; 2.57 (1.272)	3; 4.00 (1.732)	F=.915; p=.474	not significant
A2_4	12; 3.92 (1.379)	40; 3.25 (1.335)	14; 3.21 (1.188)	34; 3.15 (1.417)	7; 2.71 (1.113)	3; 3.33 (1.528)	F=.860; p=.511	not significant
A2_5	12; 2.17 (1.528)	40; 2.08 (1.185)	14; 2.14 (1.231)	34; 2.53 (1.376)	7; 2.00 (1.414)	3; 1.67 (1.155)	F=.642; p=.668	not significant
A2_6	12; 2.83 (1.586)	40; 2.30 (1.539)	14; 3.29 (1.590)	34; 2.74 (1.333)	7; 2.00 (1.155)	3; 3.33 (2.082)	F=1.414; p=.225	not significant
A2_7	12; 4.25 (1.055)	40; 3.75 (1.193)	14; 3.43 (1.453)	34; 3.79 (1.149)	7; 3.71 (1.254)	3; 4.00 (1.732)	F=.620; p=.685	not significant
A2_8	12; 2.67 (1.435)	40; 2.63 (1.462)	14; 3.36 (1.447)	34; 3.21 (1.200)	7; 2.86 (1.676)	3; 4.00 (1.732)	F=1.338; p=.254	not significant
A2_9	12; 4.17 (1.030)	40; 3.70 (1.181)	14; 3.43 (1.284)	34; 3.88 (1.094)	7; 3.43 (1.718)	3; 4.00 (1.732)	F=.706; p=.620	not significant
A2_10	12; 3.25 (1.288)	40; 3.13 (1.556)	14; 3.36 (1.646)	34; 4.03 (1.167)	7; 1.71 (.951)	3; 4.67 (.577)	F=4.339; p=**.001**	**Social Interaction Difficulties/**

								Behavioral Problems > Difficulties in Learnign/ Learning Gaps/ Mild Difficulties/ Skills Immaturity > General Learning Difficulties > No other Learning Difficulty > Special Learning Difficulties > Difficulties in Writing
A2_11	12; 3.42 (.900)	40; 3.15 (1.442)	14; 3.50 (1.557)	34; 3.35 (1.098)	7; 1.86 (1.069)	3; 4.00 (1.000)	F=2.100; p=.071	not significant
A2_12	12; 3.75 (1.138)	40; 3.08 (1.607)	14; 4.57 (1.399)	34; 3.41 (1.258)	7; 2.43 (1.813)	3; 3.67 (2.309)	F=1.084; p=.374	not significant
A2_13	12; 4.33 (.985)	40; 3.93 (1.248)	14; 4.00 (1.301)	34; 3.76 (1.156)	7; 2.86 (1.345)	3; 3.33 (1.528)	F=1.534; p=.186	not significant
A2_14	12; 3.58 (1.084)	40; 3.58 (1.448)	14; 4.07 (1.072)	34; 3.79 (1.343)	7; 3.29 (1.496)	3; 3.33 (.577)	F=.521; p=.760	not significant

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

The table above, in the question A2_1 depicts children who prefer to highlight the main ideas, when they read something. Such a question has stronger meaning to adolescents with General Learning Difficulties (M= 4.36), with Social Interaction Difficulties/ Behavioral Problems

(M=3.33), with Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity (M=3.26) or no other Learning Difficulty than ADHD (M=3.25) more than children with Special Learning Difficulties (M=2.85) or Difficulties in Writing (M= 1.71), [F(3, 106)= 3.610, p= .005].

Additionaly, a statistically important result gives the question A2_10 in which children with Social Interaction Difficulties/ Behavioural Problems (M=4.67), with Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity (M=4.03), with General Learning Difficulties (M=3.36) with no other Learning Difficulty than ADHD (M=3.25) or with Special Learning Difficulties (M= 3.13) try to recall some older information that may relate to them because this helps them when they have give solution to an exercise or comprehend a text. In contrast, children with Difficulties in Writing (M= 1.71) show to give less significance to this, [F(3, 106)= 4.339, p=.001].

Moreover, in the table below is illustrated the indifference of the responses given from the adolescents in-between other learning difficulties.

Table 53. Difference between groups (Post Hoc Tests)

Dependent Variable	Other learning difficulties (I) to (J)	Mean Difference (I-J)	Significance
A2_1	Special Learning Difficulties to General Learning Difficulties	1.507*	.020
	General Learning Difficulties to Difficulties in Writing	2.643*	.003
A2_10	Difficulties in Writing to Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity	-2.315*	.002
	Difficulties in Writing to Social Interaction Difficulties/ Behavioural Problems	-2.952*	.038

***. The mean difference is significant at the 0.05 level**

Students with Special Learning Difficulties prefer to highlight the main ideas, when they read something than those with General Learning Difficulties (t=3.297, p=.020). In addition, students with General Learning Difficulties have the same preference as above than those with Difficulties in Writing (t=3.881, p=.003). Students with Difficulties in Writing try to recall some older information that may relate to them because this helps them when they have to solve an exercise or understand a text more than those with Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity (t=4.033, p=.002). In addition, Students with Difficulties in Writing have the same preference as above than those with Social Interaction Difficulties/ Behavioural Problems (t=3.094, p=.038).

L. INFERENTIAL ANALYSIS DEPENDING ON FATHER ORIGIN

We have proceeded to make comparisons between the Depth Strategy & Self-Regulation Questions and the father origin by analysing t-student (n.s=0.05), yielding the results illustrated in Table 54. In the research was used the independent sample t-student test in order to compare the means of father origin.

Table 54. Results of the t-Student test according to father origin

Depth Strategy & Self-Regulation Questions	My father comes from		Statistical t; p-value	FAVORABLE
	Greece N, M (SD)	**Other Country N, M (SD)**		
A2_1	104; 3.11 (1.576)	6; 4.00 (.894)	t=-1.373; p=.173	not significant
A2_2	104; 3.08 (1.267)	6; 3.83 (1.169)	t=-1.427; p=.157	not significant
A2_3	104; 2.51 (1.421)	6; 3.33 (1.366)	t=-1.383; p=.170	not significant
A2_4	104; 3.27 (1.345)	6; 3.00 (1.265)	t=.478; p=.634	not significant
A2_5	104; 2.21 (1.290)	6; 2.33 (1.506)	t=-.223; p=.824	not significant
A2_6	104; 2.64 (1.513)	6; 2.33 (1.211)	t=.493; p=.623	not significant
A2_7	104; 3.78 (1.214)	6; 3.83 (1.169)	t=-.107; p=.915	not significant
A2_8	104; 2.92 (1.405)	6; 3.50 (1.517)	t=-.974; p=.332	not significant
A2_9	104; 3.76 (1.203)	6; 3.83 (1.169)	t=-.146; p=.884	not significant
A2_10	104; 3.38 (1.489)	6; 3.83 (1.472)	t=-.734; p=.465	not significant
A2_11	104; 3.17 (1.303)	6; 4.17 (1.169)	t=-1.824; p=.071	not significant
A2_12	104; 3.31 (1.475)	6; 3.00 (1.414)	t=.498; p=.620	not significant
A2_13	104; 3.84 (1.247)	6; 4.00 (.894)	t=-.316; p=.753	not significant
A2_14	104; 3.68 (1.331)	6; 3.67 (1.033)	t=.029; p=.977	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between the father origin and the depth strategy & self-regulation questions.

M. INFERENTIAL ANALYSIS DEPENDING ON MOTHER ORIGIN

We have proceeded to make comparisons between the Depth Strategy & Self-Regulation Questions and the mother origin by analysing t-student (n.s = 0.05), yielding the results illustrated in Table 55. In the research was used the independent sample t-student test in order to compare the means of mother origin.

Table 55. Results of the t-Student test according to mother origin

Depth Strategy & Self-Regulation Questions	My mother comes from		Statistical t; p-value	FAVORABLE
	Greece N, M (SD)	**Other Country N, M (SD)**		
A2_1	100; 3.22 (1.567)	10; 2.50 (1.354)	t=1.400; p=.164	not significant
A2_2	100; 3.12 (1.249)	10; 3.10 (1.524)	t=.047; p=.962	not significant
A2_3	100; 2.62 (1.405)	10; 1.90 (1.524)	t=1.533; p=.128	not significant
A2_4	100; 3.33 (1.311)	10; 2.50 (1.434)	t=1.894; p=.061	not significant
A2_5	100; 2.21 (1.274)	10; 2.30 (1.567)	t=-.209; p=.835	not significant
A2_6	100; 2.64 (1.501)	10; 2.50 (1.509)	t=.281; p=.779	not significant
A2_7	100; 3.82 (1.201)	10; 3.40 (1.265)	t=1.050; p=.296	not significant
A2_8	100; 3.00 (1.378)	10; 2.50 (1.716)	t=1.070; p=.287	not significant
A2_9	100; 3.80 (1.137)	10; 3.40 (1.713)	t=1.009; p=.315	not significant
A2_10	100; 3.41 (1.491)	10; 3.30 (1.494)	t=.222; p=.824	not significant
A2_11	100; 3.24 (1.319)	10; 3.10 (1.287)	t=.321; p=.749	not significant
A2_12	100; 3.31 (1.495)	10; 3.10 (1.197)	t=.430; p=.668	not significant
A2_13	100; 3.88 (1.183)	10; 3.50 (1.650)	t=.932; p=.353	not significant
A2_14	100; 3.73 (1.302)	10; 3.20 (1.398)	t=1.220; p=.225	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between the mother origin and the depth strategy & self-regulation questions.

4.3 DIMENSION 3. Surface Strategy questions

The subscale that measures the Surface Strategy questions is consisted of 5 questions and is focused on studying students who use only surface strategies. Usually such students have external motivations or high performance goals and aim to avoid failure so that they do not feel inadequate in front of others, as it is mentioned in the beginning of the chapter.

A. DESCRIPTIVE

Table 56. Descriptives of sample in Depth Strategy & Self-Regulation Questions

	N	Mean	Std. Deviation
A3_1	110	2.82	1.235
A3_2	110	3.34	1.183
A3_3	110	3.79	1.150
A3_4	110	3.48	1.290

A3_5	110	3.40	1.428

Note. Source: Own elaboration

In this subscale the sample of 110 children being part of this research showed a higher mean in question A3_3. So most of them try to learn anything they think will be asked of them for the exam by heart, while the same sample of adolescents showed the lowest mean in question A3_1 where while adolescents who study Mathematics, try to identify the main ideas and learn them by heart.

B. INFERENTIAL ANALYSIS DEPENDING ON THE GENDER

We have proceeded to compare Surface Strategy Questions and the gender by analysing T-Students (n.s = 0.05), yielding the results illustrated in Table 57. In the research was used the independent sample t-student test in order to compare the means of males and females.

Table 57. Results of the t-Student test according to gender

Surface Strategy Questions	Gender		Statistical t; p-value	FAVORABLE
	MALE N, M (SD)	**FEMALE N; M (SD)**		
A3_1	80; 2.84 (1.257)	30; 2.77 (1.194)	t=.267; p=.790	not significant
A3_2	80; 3.31 (1.197)	30; 3.40 (1.163)	t=-.344; p=.731	not significant
A3_3	80; 3.83 (1.088)	30; 3.70 (1.317)	t=.506; p=.614	not significant
A3_4	80; 3.35 (1.332)	30; 3.83 (1.117)	t=-1.767; p=.080	not significant
A3_5	80; 3.39 (1.373)	30; 3.43 (1.591)	t=-.149; p=.882	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between the gender and the surface strategy questions.

C. INFERENTIAL ANALYSIS DEPENDING ON THE DATE OF BIRTH

We have proceeded to compare Surface Strategy Questions according to date of birth by analysing Anova (n.s = 0.05), yielding the results illustrated in Table 58. In the research was used the independent sample Anova test in order to compare the means of date of birth.

Table 58. Results of the Anova test according to Date of Birth

Surface Strategy Questions	Date of Birth					Statistical F; p-value	FAVORABLE
	2007	**2006**	**2005**	**2004**	**2003**		
	N, M (SD)	**N, M (SD)**	**N, M (SD)**	**N, M (SD)**	**N, M (SD)**		
A3_1	1; 3.00 (.)	31; 3.06 (1.237)	36; 2.64 (1.397)	40; 2.78 (1.097)	2; 3.00 (1.414)	F=.517; p=.724	not significant
A3_2	1; 5.00 (.)	31; 3.23 (1.283)	36; 3.50 (1.082)	40; 3.25 (1.214)	2; 3.00 (.000)	F=.823; p=.514	not significant
A3_3	1; 5.00 (.)	31; 4.03 (.795)	36; 3.92 (1.105)	40; 3.45 (1.358)	2; 4.00 (1.414)	F=1.659; p=.165	not significant
A3_4	1; 5.00 (.)	31; 3.65 (1.404)	36; 3.31 (1.305)	40; 3.50 (1.198)	2; 3.00 (1.414)	F=.702; p=.592	not significant
A3_5	1; 5.00 (.)	31; 3.94 (1.365)	36; 3.19 (1.327)	40; 3.13 (1.471)	2; 3.50 (2.121)	F=2.037; p=.095	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between the date of birth and the surface strategy questions.

D. INFERENTIAL ANALYSIS DEPENDING ON CLASS

We have proceeded to compare Surface Strategy Questions according to class by analysing Anova (n.s = 0.05), yielding the results illustrated in Table 59. In the research was used the independent sample Anova test in order to compare the means of class.

Table 59. Results of the Anova test according to Class

Surface Strategy Questions	Class			Statistical F; p-value	FAVORABLE
	1st Class	**2nd Class**	**3rd Class**		
	N, M (SD)	**N, M (SD)**	**N, M (SD)**		
A3_1	40; 3.13 (1.285)	35; 2.46 (1.221)	35; 2.83 (1.124)	F=2.821; p=.064	not significant
A3_2	40; 3.25 (1.214)	35; 3.43 (1.220)	35; 3.34 (1.136)	F=.210; p=.811	not significant
A3_3	40; 4.00 (.906)	35; 3.74 (1.314)	35; 3.60 (1.218)	F=1.177; p=.312	not significant
A3_4	40; 3.63 (1.334)	35; 3.11 (1.367)	35; 3.69 (1.105)	F=2.148; p=.122	not significant
A3_5	40; 3.85 (1.350)	35; 2.97 (1.403)	35; 3.31 (1.430)	F=3.810; p=**.025**	**1st Class > 3rd Class > 2nd Class**

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

The table above, in question A3_5 depicts children who were asked if they try to learn everything by heart, when they have a test. This question has stronger meaning to kids in 1st Class of Junior High School (M= 3.85) and in 3rd Class (M= 3.31) more than children of the 2nd Class (M= 2.97), who answered that they don't learn everything by heart, in order to be prepared in a test, [F(2, 107)= 3.810, p= .025].

In addition, in the table below is illustrated the indifference between answers given from the children in-between the classes.

Table 60. Difference between groups (Post Hoc Tests)

Dependent Variable	(I) Class to (J) Class	Mean Difference (I-J)	Significance
A3_5	1st Class to 2nd Class	.879*	.023

***. The mean difference is significant at the 0.05 level**

Students of 1st class of Junior High school try to learn everything by heart, when they have a test than those of 3rd and 2nd class (t=2.729, p=.023).

E. INFERENTIAL ANALYSIS DEPENDING ON SCHOOL AREA

We have proceeded to compare Surface Strategy Questions according to school area by analysing t-student (n.s = 0.05), yielding the results iluustrated in Table 61. In the research was used the independent sample Anova test in order to compare the means of school area.

Table 61. Results of the t-Student test according to School Area

Surface Strategy Questions	School Area		Statistical t; p-value	FAVORABLE
	In the cty of Heraklion N, M (SD)	**Out of the city of Heraklion N, M (SD)**		
A3_1	65; 2.75 (1.323)	45; 2.91 (1.104)	t=-.655; p=.514	not significant
A3_2	65; 3.32 (1.200)	45; 3.36 (1.171)	t=-.141; p=.888	not significant
A3_3	65; 3.77 (1.142)	45; 3.82 (1.173)	t=-.237; p=.813	not significant
A3_4	65; 3.37 (1.306)	45; 3.64 (1.264)	t=-1.101; p=.273	not significant
A3_5	65; 3.45 (1.490)	45; 3.33 (1.348)	t=.406; p=.686	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between the school area and the surface strategy questions.

F. INFERENTIAL ANALYSIS DEPENDING ON PARENTAL EDUCATIONAL LEVEL FATHER

We have proceeded to compare Surface Strategy Questions according to father educational background by analysing Anova (n.s = 0.05), yielding the results shown in Table 62. In the research was used the independent sample Anova test in order to compare the means of father educational background.

Table 62. Results of the Anova test according to Father Educational Backround

Surface Strategy Questions	My Father has finished						Statistical F; p-value	FAVORABLE
	Primary school	Junior High school	High school	Technical Education	University	Other		
	N, M (SD)	N, M (SD)	N, M (SD)	N, M (SD)	N; M (SD)	N; M (SD)		
A3_1	28; 3.00 (1.247)	24; 2.58 (.929)	30; 2.87 (1.332)	6; 2.50 (1.761)	17; 3.00 (1.323)	5; 2.40 (1.140)	F=.560; p=.730	not significant
A3_2	28; 3.11 (1.197)	24; 3.21 (1.062)	30; 3.80 (1.031)	6; 3.50 (1.225)	17; 3.18 (1.380)	5; 2.80 (1.483)	F=1.513; p=.192	not significant
A3_3	28; 4.04 (.881)	24; 3.75 (1.189)	30; 3.67 (1.269)	6; 3.50 (1.049)	17; 4.06 (1.088)	5; 2.80 (1.643)	F=1.355; p=.247	not significant
A3_4	28; 3.61 (1.315)	24; 3.38 (1.439)	30; 3.57 (1.251)	6; 3.33 (1.366)	17; 3.41 (1.326)	5; 3.20 (.837)	F=.178; p=.970	not significant
A3_5	28; 3.50 (1.478)	24; 3.21 (1.351)	30; 3.50 (1.432)	6; 3.33 (1.633)	17; 3.47 (1.375)	5; 3.00 (2.000)	F=.224; p=.951	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between the father educational background and the surface strategy questions.

G. INFERENTIAL ANALYSIS DEPENDING ON PARENTAL EDUCATIONAL LEVEL MOTHER

We have proceeded to compare Surface Strategy Questions according to mother educational background by analysing Anova (n.s = 0.05), yielding the results shown in Table 63. In the research was used the independent sample Anova test in order to compare the means of mother educational background.

Table 63. Results of the Anova test according to Mother Educational Backround

Surface Strategy Questions	My Mother has finished						Statistical F; p-value	FAVORABLE
	Primary school	Junior High school	High school	Technical Education	University	Other		
	N, M (SD)	N, M (SD)	N, M (SD)	N, M (SD)	N, M (SD)	N, M (SD)		
A3_1	12; 3.33 (1.155)	18; 3.22 (1.166)	45; 2.64 (1.228)	13; 2.69 (1.548)	19; 2.74 (1.098)	3; 2.00 (1.000)	F=1.305; p=.268	not significant
A3_2	12; 3.42 (1.564)	18; 3.61 (.608)	45;3.20 (1.236)	13; 3.85 (1.068)	19; 3.16 (1.167)	3; 2.33 (1.528)	F=1.346; p=.251	not significant
A3_3	12; 4.33 (.651)	18; 4.00 (1.029)	45; 3.80 (1.179)	13; 3.54 (1.266)	19; 3.68 (1.157)	3; 2.00 (1.000)	F=2.413 p=**.041**	**Primary school > Junior High school > High school > University > Technical Education > Other**
A3_4	12; 4.17 (.835)	18; 3.67 (1.414)	45; 3.44 (1.289)	13; 3.23 (1.481)	19; 3.21 (1.273)	3; 3.00 (1.000)	F=1.113; p=.358	not significant
A3_5	12; 4.08 (1.165)	18; 3.17 (1.581)	45; 3.40 (1.452)	13; 3.46 (1.050)	19; 3.32 (1.455)	3; 2.33 (2.309)	F=.998 p=.423	not significant

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

In question A3_3 above, can be observed children who try to learn anything they think will be asked of them for the exam by heart. Such a question has stronger meaning to students whose mothers have finished Primary school (M= 4.33), Junior High school (M= 4.00), High school (M= 3.80), University (M= 3.68) or Technical Education (M= 3.54). Children whose mothers have finished other (M= 2.00) seem not to study this way, [F(5, 104)= 2.413, p= .041].

In addition, in the table below is illustrated the indifference between responses given from adolescents in-between the mothers' educational background.

Table 64. Difference between groups (Post Hoc Tests)

Dependent Variable	My mother has finished (I) to (J)	Mean Difference (I-J)	Significance
A3_3	Primary school to other	2.333*	.024

***. The mean difference is significant at the 0.05 level**

Students whose mothers have finished Primary school, Junior High school or High school try to learn anything they think will be asked of them for the exam by heart than those whose mothers have finished University, Technical education or other studies (t=3.245, p=.024).

H. INFERENTIAL ANALYSIS DEPENDING ON LAST-YEAR DEGREE IN MATHEMATICS

We have proceeded to compare Surface Strategy Questions and the last year degree in Mathematics by analysing Anova (n.s = 0.05), yielding the results illustrated in Table 65. In the research was used the independent sample Anova test in order to compare the means of Student's last year degree in Math.

Table 65. Results of the Anova test according to Student's last year degree in Math

Surface Strategy Questions	My last year degree in Math was						Statistical F; p-value	FAVORABLE
	Lower than 10 N, M (SD)	**11-12 N, M (SD)**	**13-14 N, M (SD)**	**15-16 N, M (SD)**	**17-18 N, M (SD)**	**19-20 N, M (SD)**		

A3_1	10; 3.10 (1.449)	24; 2.50 (.978)	33; 3.00 (1.299)	26; 2.77 (1.336)	8; 3.00 (1.195)	9; 2.67 (1.225)	F=.624; p=.682	not significant
A3_2	10; 3.30 (.949)	24; 3.33 (1.204)	33; 3.24 (1.324)	26; 3.46 (1.067)	8; 3.38 (1.061)	9; 3.33 (1.500)	F=.099; p=.992	not significant
A3_3	10; 3.80 (1.317)	24; 3.96 (1.122)	33; 3.94 (1.171)	26; 3.85 (.925)	8; 3.38 (1.188)	9; 3.00 (1.414)	F=1.302; p=.269	not significant
A3_4	10; 3.40 (1.506)	24; 3.42 (1.213)	33; 3.67 (1.242)	26; 3.38 (1.388)	8; 4.00 (1.069)	9; 2.89 (1.364)	F=.816; p=.541	not significant
A3_5	10; 3.30 (1.567)	24; 3.33 (1.341)	33; 3.64 (1.578)	26; 3.23 (1.142)	8; 3.75 (1.488)	9; 3.00 (1.803)	F=.499; p=.776	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between the student's last year degree in Mathematics and the surface strategy questions.

I. INFERENTIAL ANALYSIS DEPENDING ON ADHD

We have proceeded to compare Surface Strategy Questions according to ADHD by analysing Anova (n.s = 0.05), yielding the results illustrated in Table 66. In the research was used the independent sample Anova test in order to compare the means of ADHD.

Table 66. Results of the Anova test according to ADHD

Surface Strategy Questions	ADHD				Statistical F; p-value	FAVORABLE
	Attention Deficit **N, M (SD)**	**Attention Deficit & Hyperactivity N, M (SD)**	**Attention Deficit & Impulsitivity N, M (SD)**	**Attention Deficit &Hyperactivity &Impulsitivity N, M (SD)**		
A3_1	48; 2.63 (1.315)	17; 3.00 (1.118)	32; 3.06 (1.134)	13; 2.69 (1.316)	F=.975; p=.407	not significant
A3_2	48; 3.38 (1.160)	17; 3.12 (1.409)	32; 3.59 (1.073)	13; 2.85 (1.144)	F=1.479; p=.224	not significant
A3_3	48; 3.77 (1.171)	17; 3.53 (1.375)	32; 3.91 (1.027)	13; 3.92 (1.115)	F=.455; p=.714	not significant
A3_4	48; 3.63 (1.331)	17; 3.35 (1.412)	32; 3.53 (1.135)	13; 3.00 (1.354)	F=.870; p=.459	not significant
A3_5	48; 3.33 (1.492)	17; 3.41 (1.460)	32; 3.44 (1.343)	13; 3.54 (1.506)	F=.081; p=.970	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between ADHD and the surface strategy questions.

J. INFERENTIAL ANALYSIS DEPENDING ON OTHER DISORDERS

We have proceeded to compare Surface Strategy Questions according to other disorders by analysing Anova (n.s = 0.05), yielding the results shown in Table 67. In the research was used the independent sample Anova test in order to compare the means of other disorders.

Table 67. Results of the Anova test according to other Disorders

Surface Strategy Questions	Other Disorders									Statistical F; p-value	FAVORABLE
	No other Disorder	**Speech Problems/ Linguistic Evolutionary Disorder/ Lack of Knowledge of Greek Language**	**Neurofeeding/ Psychophysiological Development Center**	**Emotional Difficulties**	**Neurological Problems/ Adolesent Epilepsy with Deductions**	**High-function Autism Spectrum Disturbance/ Asperger**	**Vision problems**	**Mental Immaturity in the context of a Microcephaly**	**Autism and mental inmaturity**		
	N, M (SD)	**N, M (SD)**	**N, M (SD)**	**N, M (SD)**	**N, M (SD)**	**N, M (SD)**	**N, M (SD)**	**N, M (SD)**	**N, M (SD)**		
A3_1	90; 2.73 (1.207)	10; 3.30 (1.260)	1; 2.00 (.)	4; 2.50 (1.291)	1; 1.00 (.)	1; 4.00 (.)	1; 4.00 (.)	1; 5.00 (.)	1; 5.00 (.)	F=1.692; p=.109	not significant
A3_2	90; 3.36 (1.183)	10; 3.80 (.422)	1; 3.00 (.)	4; 1.50 (1.000)	1; 2.00 (.)	1; 3.00 (.)	1; 5.00 (.)	1; 5.00 (.)	1; 3.00 (.)	F=2.280; p=**.028**	**Speech Problems/ Linguistic Evolutionary Disorder/ Lack of Knowledge of Greek Language > No other Disorder > Emotional Difficulties**
A3_3	90; 3.76 (1.105)	10; 3.80 (1.398)	1; 3.00 (.)	4; 3.25 (1.708)	1; 5.00 (.)	1; 5.00 (.)	1; 5.00 (.)	1; 5.00 (.)	1; 5.00 (.)	F=.862; p=.551	not significant
A3_4	90; 3.46 (1.317)	10; 4.20 (.789)	1; 2.00 (.)	4; 3.25 (1.258)	1; 2.00 (.)	1; 4.00 (.)	1; 4.00 (.)	1; 4.00 (.)	1; 1.00 (.)	F=1.287; p=.259	not significant
A3_5	90; 3.32 (1.437)	10; 4.10 (.994)	1; 2.00 (.)	4; 3.50 (1.915)	1; 1.00 (.)	1; 3.00 (.)	1; 4.00 (.)	1; 5.00 (.)	1; 5.00 (.)	F=1.169; p=.325	not significant

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

The table above, in the question A3_2 depicts children who try to learn as much information as they can by heart, when they study. Such a question has stronger meaning in children with Speech Problems/ Linguistic Evolutionary Disorder/ Lack of Knowledge of Greek Language (M= 3.80) and for children with No other Disorder apart from ADHD (M= 3.36) more than children with Emotional Difficulties (M= 1.50), [F(3, 106)= 2.280, p= .028].

Additionaly, in the table below is illustrated the indifference between answers given from the students and other disorders.

Table 68. Difference between groups (Post Hoc Tests)

Dependent Variable	Other disorders (I) to (J)	Mean Difference (I-J)	Significance
A3_2	No other disorder to Emotional Difficulties	1.856*	.011
	Speech Problems/ Linguistic Evolutionary Disorder/ Lack of Knowledge of Greek Language to Emotional Difficulties	2.300*	.005
	Other Difficulties to Emotional Difficulties	2.000*	.045

***. The mean difference is significant at the 0.05 level**

There is a significance in-between students who have emotional difficulties to other difficulties such as linguistic evolutionary disorder, or speech problems who try to learn as much information as they can by heart, when they study.

Students with no other disorder than ADHD try to learn as much information as they can by heart, when they study than those with Emotional difficulties (t=3.2, p=.011). Students with Speech Problems/ Linguistic Evolutionary Disorder/ Lack of Knowledge of Greek Language have the same preference as above than those with Emotional difficulties (t=3.422, p=.005). In addition, students with other difficulties have the same preference as above than those with Emotional difficulties (t=2.728, p=.045).

K. INFERENTIAL ANALYSIS DEPENDING ON FATHER ORIGIN

We have proceeded to compare Surface Strategy Questions according to father origin by analysing t-student (n.s = 0.05), yielding the results illustrated in Table 69. In the research was used the independent sample t-student test in order to compare the means of father origin.

Table 69. Results of the t-Student test according to father origin

Surface Strategy Questions	My father comes from		Statistical t; p-value	FAVORABLE
	Greece	**Other Country**		
	N, M (SD)	**N, M (SD)**		
A3_1	104; 2.84 (1.224)	6; 2.50 (1.517)	t=.647; p=.519	not significant
A3_2	104; 3.38 (1.192)	6; 2.67 (.816)	t=1.433; p=.155	not significant
A3_3	104; 3.81 (1.158)	6; 3.50 (1.049)	t=.635; p=.526	not significant
A3_4	104; 3.48 (1.269)	6; 3.50 (1.761)	t=-.035; p=.972	not significant
A3_5	104; 3.46 (1.407)	6; 2.33 (1.506)	t=1.904; p=.060	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between the father origin and the surface strategy questions.

L. INFERENTIAL ANALYSIS DEPENDING ON MOTHER ORIGIN

We have proceeded to compare Surface Strategy Questions according to mother origin by analysing t-student (n.s = 0.05), yielding the results illustrated in Table 70. In the research was used the independent sample t-student test in order to compare the means of mother origin.

Table 70. Results of the t-Student test according to mother origin

Surface Strategy Questions	My mother comes from		Statistical t; p-value	FAVORABLE
	Greece	**Other Country**		
	N, M (SD)	**N; M (SD)**		
A3_1	100; 2.85 (1.234)	10; 2.50 (1.269)	t=.853; p=.395	not significant
A3_2	100; 3.40 (1.189)	10; 2.70 (.949)	t=1.802; p=.074	not significant
A3_3	100; 3.80 (1.146)	10; 3.70 (1.252)	t=.261; p=.795	not significant
A3_4	100; 3.52 (1.291)	10; 3.10 (1.287)	t=.981; p=.329	not significant
A3_5	100; 3.49 (1.403)	10; 2.50 (1.434)	t=2.123; p=**.036**	**Greece > other country**

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

In question A3_5 children were asked if they learn everything by heart, when they have a test. This question seems to have significant meaning for students whose mothers are Greek (M= 3.49) more than those whose mothers come from another country (M= 2.50), [t(108)= 2.123, p= .036].

4.4 DIMENSION 4. Cognitive Process questions

The subscale that measures the Cognitive Process questions is consisted of 18 questions and is focused on studying students' cognitive skills. Usually such students have more effectively encoded, retain and understand learning material abilities.

A. DESCRIPTIVE

Table 71. Descriptives of sample in Cognitive Process Questions

	N	Mean	Std. Deviation
B1_1	110	2.31	1.353
B1_2	110	2.98	1.165
B1_3	110	3.30	1.231
B1_4	110	3.05	1.316
B1_5	110	3.22	1.244
B1_6	110	3.49	1.346
B1_7	110	3.06	1.183
B1_8	110	3.22	1.184
B1_9	110	2.42	1.350
B1_10	110	3.36	1.353
B1_11	110	4.01	1.296
B1_12	110	2.91	1.358
B1_13	110	3.28	1.235
B1_14	110	3.87	1.250
B1_15	110	2.82	1.272
B1_16	110	3.09	1.398
B1_17	110	2.89	1.423
B1_18	110	3.31	1.269

Note. Source: Own elaboration

In this subscale the sample of 110 students being part of this research showed a higher mean in question B1_11. So most of the students try to make questions in order to be helped when they do not comprehend a meaning, while the same students showed the lowest mean in question B1_1 which shows a situation where students ask themselves questions about what they learned before they start to study.

B. INFERENTIAL ANALYSIS DEPENDING ON THE GENDER

We have proceeded to make comparisons between the Cognitive Process Questions and the gender by analysing t-student (n.s = 0.05), yielding the results illustrated in

Table 72. In the research was used the independent sample t-student test in order to compare the means of male and female.

Table 72. Results of the t-Student test according to Gender

Cognitive Process Questions	Gender		Statistical t; p-value	FAVORABLE
	MALE N, M (SD)	**FEMALE N; M (SD)**		
B1_1	80; 2.35 (1.370)	30; 2.20 (1.324)	t=.516; p=.607	not significant
B1_2	80; 3.04 (1.141)	30; 2.83 (1.234)	t=-.817; p=.416	not significant
B1_3	80; 3.24 (1.285)	30; 3.47 (1.074)	t=-.869; p=.387	not significant
B1_4	80; 2.96 (1.307)	30; 3.27 (1.337)	t=-1.080; p=.282	not significant
B1_5	80; 3.18 (1.251)	30; 3.33 (1.241)	t=-.593; p=.555	not significant
B1_6	80; 3.31 (1.327)	30; 3.97 (1.299)	t=-2.315; p=**.023**	**girls> boys**
B1_7	80; 2.98 (1.222)	30; 3.30 (1.055)	t=-1.287; p=.201	not significant
B1_8	80; 3.21 (1.177)	30; 3.23 (1.223)	t=-.082; p=.935	not significant
B1_9	80; 2.41 (1.402)	30; 2.43 (1.223)	t=-.072; p=.943	not significant
B1_10	80; 3.23 (1.396)	30; 3.73 (1.172)	t=-1.772; p=.079	not significant
B1_11	80; 4.00 (1.331)	30; 4.03 (1.217)	t=-.120; p=.905	not significant
B1_12	80; 2.96 (1.326)	30; 2.77 (1.455)	t=-.672; p=.503	not significant
B1_13	80; 3.23 (1.242)	30; 3.43 (1.223)	t=-.787; p=.433	not significant
B1_14	80; 3.70 (1.297)	30; 4.33 (.994)	t=-2.726; p=**.008**	**girls> boys**
B1_15	80; 2.79 (1.328)	30; 2.90 (1.125)	t=-.412; p=.681	not significant
B1_16	80; 2.94 (1.453)	30; 3.50 (1.167)	t=-1.902; p=.060	not significant
B1_17	80; 2.85 (1.397)	30; 3.00 (1.509)	t=-.491; p=.625	not significant
B1_18	80; 3.15 (1.233)	30; 3.73 (1.285)	t=-2.184; p=**.031**	**girls> boys**

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

Question B1_6 depicts children which were asked if they keep wondering if they can come closer to their aims. Such a question has stronger meaning for girls (M= 3.97) more than boys (M= 3.31), [t(108)= -2.315, p= .023].

Another statistically significant result gives the question B1_14 in which adolescents were asked if they stop and re-read when they have lost control of thinking. Girls (M=4.33) show to give more attention to this, than boys (M=3.70), [t(108)=-2.419, p=.017].

A statistically significant question is the B1_18 where kids were asked when they complete a task, if they wonder if they have gained as much as they could. Such a question has greater impact for girls (M=3.73) more than for boys (M=3.15), [t(108)-2.184, p=.031].

C. INFERENTIAL ANALYSIS DEPENDING ON THE DATE OF BIRTH

We have proceeded to comparisons between the Cognitive Process Questions and the date of birth by analysing Anova (n.s = 0.05), yielding the results illustrated in Table 73. In the research was used the independent sample Anova test in order to compare the means of date of birth.

Table 73. Results of the Anova test according to Date of Birth

Cognitive Process Questions	Date of Birth					Statistical F; p-value	FAVORABLE
	2007 N, M (SD)	**2006 N, M (SD)**	**2005 N, M (SD)**	**2004 N, M (SD)**	**2003 N; M (SD)**		
B1_1	1; 1.00 (.)	31; 2.84 (1.573)	36; 1.89 (1.116)	40; 2.25 (1.214)	2; 3.50 (2.121)	F=2.883; p=**.026**	**2003 > 2006 > 2004 > 2005 > 2007**
B1_2	1; 3.00 (.)	31; 3.13 (1.335)	36; 2.69 (1.037)	40; 3.10 (1.150)	2; 3.50 (.707)	F=.869; p=.485	not significant
B1_3	1; 4.00 (.)	31; 3.52 (1.363)	36; 3.08 (1.131)	40; 3.28 (1.219)	2; 4.00 (1.414)	F=.758; p=.555	not significant
B1_4	1; 5.00 (.)	31; 3.23 (1.477)	36; 2.78 (1.333)	40; 3.08 (1.163)	2; 3.50 (.707)	F=1.140; p=.342	not significant
B1_5	1; 3.00 (.)	31; 3.61 (1.116)	36; 2.94 (1.194)	40; 3.20 (1.324)	2; 2.50 (2.121)	F=1.413; p=.235	not significant
B1_6	1; 5.00 (.)	31; 3.35 (1.404)	36; 3.64 (1.246)	40; 3.45 (1.413)	2; 3.00 (1.414)	F=.569; p=.686	not significant
B1_7	1; 2.00 (.)	31; 3.13 (1.258)	36; 3.11 (1.190)	40; 3.10 (1.081)	2; 1.00 (.000)	F=1.825; p=.130	not significant
B1_8	1; 4.00 (.)	31; 3.55 (1.312)	36; 3.03 (1.108)	40; 3.13 (1.137)	2; 3.00 (1.414)	F=1.025; p=.398	not significant
B1_9	1; 1.00 (.)	31; 2.45 (1.480)	36; 2.08 (1.156)	40; 2.73 (1.396)	2; 2.50 (.707)	F=1.370; p=.249	not significant
B1_10	1; 5.00 (.)	31; 3.48 (1.363)	36; 3.14 (1.397)	40; 3.50 (1.281)	2; 2.00 (1.414)	F=1.299; p=.275	not significant
B1_11	1; 5.00 (.)	31; 4.06 (1.365)	36; 3.83 (1.404)	40; 4.10 (1.194)	2; 4.00 (.000)	F=.367; p=.832	not significant
B1_12	1; 1.00 (.)	31; 3.19 (1.515)	36; 2.78 (1.355)	40; 2.83 (1.196)	2; 3.50 (2.121)	F=1.053; p=.384	not significant
B1_13	1; 5.00 (.)	31; 3.13 (1.258)	36; 3.31 (1.238)	40; 3.35 (1.252)	2; 3.00 (.000)	F=.654; p=.525	not significant
B1_14	1; 3.00 (.)	31; 4.06 (1.263)	36; 3.86 (1.268)	40; 3.80 (1.244)	2; 3.00 (1.414)	F=.574; p=.682	not significant
B1_15	1; 5.00 (.)	31; 2.39 (1.308)	36; 2.69 (1.167)	40; 3.20 (1.224)	2; 3.00 (1.414)	F=2.795; p=**.030**	**2007 > 2004 > 2003 > 2005 > 2006**
B1_16	1; 3.00 (.)	31; 3.35 (1.305)	36; 2.89 (1.469)	40; 3.10 (1.446)	2; 2.50 (.707)	F=.546; p=.703	not significant
B1_17	1; 5.00 (.)	31; 3.19 (1.579)	36; 2.50 (1.320)	40; 2.98 (1.310)	2; 2.50 (2.121)	F=1.694; p=.157	not significant
B1_18	1; 5.00 (.)	31; 3.52 (1.411)	36; 3.22 (1.312)	40; 3.23 (1.121)	2; 2.50 (.707)	F=.938; p=.445	not significant

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

The question B1_1 above, depicts children who make questions to themselves about the lesson, before they begin to study. Such a question has stronger meaning to adolescents who were born in 2003 (M= 3.50), in 2006 (M= 2.84) and in 2004 (M= 2.25). Children who were born in 2005 (M= 1.89) and in 2007 (M= 1.00) seem to wonder less about the lesson before they start studying, [F(4, 105)= 2.883, p= .026].

In addition, a statistical important result gives the question B1_15 in which children who were born in 2007 (M= 5.00), in 2004 (M= 3.20) and in 2003 (M= 3.00), seem to know how it went, when they finish an exam. On the other side, children who were born in 2005 (M= 2.69) and in 2006 (M= 2.39) claim they do not know how it went, when they finish an exam, [F(4, 105)= 2.795, p=.030].

D. INFERENTIAL ANALYSIS DEPENDING ON CLASS

We have proceeded to comparisons between the Cognitive Process Questions and the class by analysing Anova (n.s = 0.05), yielding the results illustrated in Table 74. In the research was used the independent sample Anova test in order to compare the means of class.

Table 74. Results of the Anova test according to Class

Cognitive Process Questions	Class			Statistical F; p-value	FAVORABLE
	1st Class N, M (SD)	**2nd Class N; M (SD)**	**3rd Class N, M (SD)**		
B1_1	40; 2.68 (1.559)	35; 1.91 (1.067)	35; 2.29 (1.274)	F=3.071; p=**.050**	**1stClass > 3rd Class > 2nd Class**
B1_2	40; 3.23 (1.230)	35; 2.54 (1.039)	35; 3.14 (1.115)	F=3.885; p=**.024**	**1stClass > 3rd Class > 2nd Class**
B1_3	40; 3.45 (1.395)	35; 3.00 (1.085)	35; 3.43 (1.145)	F=1.543; p=.218	not significant
B1_4	40; 3.25 (1.428)	35; 2.77 (1.352)	35; 3.09 (1.121)	F=1.264; p=.287	not significant
B1_5	40; 3.55 (1.154)	35; 2.86 (1.115)	35; 3.20 (1.389)	F=3.006; p=.054	not significant
B1_6	40; 3.45 (1.467)	35; 3.57 (1.243)	35; 3.46 (1.336)	F=.091; p=.913	not significant
B1_7	40; 3.08 (1.269)	35; 3.17 (1.150)	35; 2.94 (1.136)	F=.325; p=.723	not significant
B1_8	40; 3.38 (1.275)	35; 3.14 (1.167)	35; 3.11 (1.105)	F=.552; p=.577	not significant
B1_9	40; 2.43 (1.448)	35; 2.09 (1.121)	35; 2.74 (1.400)	F=2.115; p=.126	not significant
B1_10	40; 3.43 (1.394)	35; 3.11 (1.471)	35; 3.54 (1.172)	F=.942; p=.393	not significant
B1_11	40; 4.00 (1.320)	35; 3.83 (1.524)	35; 4.20 (.994)	F=.717; p=.491	not significant
B1_12	40; 3.23 (1.476)	35; 2.63 (1.374)	35; 2.83 (1.150)	F=1.922; p=.151	not significant
B1_13	40; 3.23 (1.209)	35; 3.29 (1.341)	35; 3.34 (1.187)	F=.084; p=.920	not significant
B1_14	40; 3.93 (1.289)	35; 3.94 (1.282)	35; 3.74 (1.197)	F=.275; p=.760	not significant
B1_15	40; 2.55 (1.358)	35; 2.86 (1.264)	35; 3.09 (1.147)	F=1.701; p=.187	not significant
B1_16	40; 3.40 (1.336)	35; 2.66 (1.413)	35; 3.17 (1.382)	F=2.810; p=.065	not significant
B1_17	40; 3.23 (1.493)	35; 2.40 (1.311)	35; 3.00 (1.350)	F=3.435; p=**.036**	**1stClass > 3rd Class > 2nd Class**
B1_18	40; 3.50 (1.414)	35; 3.23 (1.308)	35; 3.17 (1.043)	F=.726; p=.486	not significant

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

The table above, in question B1_1 depicts children who were asked if they make questions to themselves about the lesson, before they begin to study. Such a question has stronger meaning to kids in 1st Class of Junior High School (M= 2.68) and in 3rd Class (M= 2.29) more than children of the 2nd Class (M= 1.91), who answered that they don't have this habit when studying, [F(2, 107)= 3.071, p= .050].

A statistically significant result gives the question B1_2 in which children were asked if they select the best way of problem solving, between many several ones. Children in 1st Class of Junior High School (M= 3.23) and in 3rd Class (M= 3.14) seem to think alternative ways of problem solving more than children of the 2nd Class (M= 2.54), who answered that they don't have this kind of habit, [F(2, 107)= 3.885, p= .024].

In addition, a statistical important result gives the question B1_17 in which children of 1st Class of Junior High School (M= 3.23) and 3rd Class (M= 3.00) make a summary of what they learned, when they finish studying, unlike the students of 2nd Class (M= 2.40), who do not really act the same way, [F(2, 107)= 3.435, p= .036].

In addition, in the table below is illustrated the indifference of answers given between students from different classes.

Table 75. Difference between groups (Post Hoc Tests)

Dependent Variable	(I) Class to (J) Class	Mean Difference (I-J)	Significance
B1_1	1st Class to 2nd Class	,761*	,045
B1_2	1st Class to 2nd Class	,682*	,032
B1_5	1st Class to 2nd Class	,693*	,048
B1_17	1st Class to 2nd Class	,825*	,036

***. The mean difference is significant at the 0.05 level**

Students of 1st class of Junior High school make questions to themselves about the task they learned, before they begin to study more than those of 3rd and 2nd class (t=2.478, p=.045). In addition, students of 1st class of Junior High school select the best way of problem solving, between many different ways more than those of 3rd and 2nd class (t=2.593, p=.032). Students of 1st class of Junior High school are like to utilize the structure and organization of the content to better comprehend more than those of 3rd and 2nd class (t=2.445, p=.048). Finally, students of 1st class of Junior High school make a summary of what they learned, when they finish studying more than those of 3rd and 2nd class (t=2.562, p=.036).

E. INFERENTIAL ANALYSIS DEPENDING ON SCHOOL AREA

We have proceeded to make comparisons between the Cognitive Process Questions and the school area by analysing t-student (n.s = 0.05), yielding the results illustrated in Table 76. In the research was used the independent sample t-student test in order to compare the means of school area.

Table 76. Results of the t-Student test according to School Area

Cognitive Process Questions	School Area		Statistical t; p-value	FAVORABLE
	In the city of Heraklion N, M (SD)	**Out of the city of Heraklion N; M (SD)**		
B1_1	65; 2.12 (1.206)	45; 2.58 (1.515)	t=-1.749; p=.083	not significant

B1_2	65; 2.85 (1.202)	45; 3.18 (1.093)	t=-1.476; p=.143	not significant
B1_3	65; 3.32 (1.213)	45; 3.27 (1.268)	t=-.235; p=.814	not significant
B1_4	65; 3.00 (1.335)	45; 3.11 (1.301)	t=-.434; p=.665	not significant
B1_5	65; 3.23 (1.260)	45; 3.20 (1.236)	t=.127; p=.899	not significant
B1_6	65; 3.48 (1.359)	45; 3.51 (1.342)	t=-.130; p=.897	not significant
B1_7	65; 3.02 (1.205)	45; 3.13 (1.160)	t=-.512; p=.609	not significant
B1_8	65; 3.25 (1.118)	45; 3.18 (1.284)	t=.297; p=.767	not significant
B1_9	65; 2.66 (1.372)	45; 2.07 (1.250)	t=2.317; p=**.022**	**In the city of Heraklion > Out of the city of Heraklion**
B1_10	65; 3.28 (1.352)	45; 3.49 (1.359)	t=-.807; p=.422	not significant
B1_11	65; 4.00 (1.287)	45; 4.02 (1.323)	t=-.088; p=.930	not significant
B1_12	65; 2.72 (1.281)	45; 3.18 (1.435)	t=-1.742; p=.084	not significant
B1_13	65; 3.57 (1.172)	45; 2.87 (1.217)	t=3.042; p=**.003**	**In the city of Heraklion > Out of the city of Heraklion**
B1_14	65; 3.86 (1.321)	45; 3.89 (1.153)	t=-.112; p=.911	not significant
B1_15	65; 2.91 (1.247)	45; 2.69 (1.311)	t=.886; p=.378	not significant
B1_16	65; 3.15 (1.460)	45; 3.00 (1.314)	t=.566; p=.573	not significant
B1_17	65; 2.91 (1.389)	45; 2.87 (1.486)	t=.148; p=.883	not significant
B1_18	65; 3.31 (1.249)	45; 3.31 (1.311)	t=-.014; p=.989	not significant

Note. Source: Own elaboration

Significant p values are in bold, where p < .05

In question B1_9 kids were asked whether they re-examine periodically everything they study, as a way to help them comprehend substancial relationships. Adolescents who live in an urban area (city of Heraklion) (M= 2.66) have this habit of re-examining periodically everything they studied, more than those who live in a rural area (out of the city) (M= 2.07), [t(108)= 2.317, p= .022].

A significant result gives the question B1_13 in which kids were asked if they stop and reconsider, when new information is making them get confused. Adolescents who live in an urban area (city of Heraklion) (M=3.57) react with this way, more than those who live in a rural area (out of the city) (M=2.87), [t(108)=3.042, p=.003].

F. INFERENTIAL ANALYSIS DEPENDING ON PARENTAL EDUCATIONAL LEVEL FATHER

We have proceeded to make comparisons between the Cognitive Process Questions and the father educational background by analysing Anova (n.s = 0.05), yielding the results illustrated in Table 77. In the research was used the independent sample Anova test in order to compare the means of father educational background.

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

Table 77. Results of the Anova test according to Father Educational Backround

Cognitive Process Questions	My Father has finished						Statistical F; p-value	FAVORABLE
	Primary school	**Junior High school**	**High school**	**Technical Education**	**University**	**Other**		
	N, M (SD)	**N, M (SD)**	**N, M (SD)**	**N, M (SD)**	**N; M (SD)**	**N; M (SD)**		
B1_1	28; 2.46 (1.401)	24; 2.38 (1.173)	30; 2.23 (1.431)	6; 1.83 (1.329)	17; 2.29 (1.448)	5; 2.20 (1.643)	F=.250; p=.939	not significant
B1_2	28; 3.04 (1.138)	24; 3.29 (.690)	30; 2.73 (1.202)	6; 3.17 (.983)	17; 2.82 (1.590)	5; 3.00 (1.581)	F=.708; p=.619	not significant
B1_3	28; 3.32 (1.249)	24; 3.67 (1.308)	30; 3.07 (.980)	6; 3.33 (1.211)	17; 3.24 (1.522)	5; 3.00 (1.225)	F=.703; p=.622	not significant
B1_4	28; 2.79 (1.343)	24; 3.42 (1.018)	30; 3.20 (1.375)	6; 2.17 (1.329)	17; 2.76 (1.480)	5; 3.80 (.837)	F=1.761; p=.127	not significant
B1_5	28; 3.18 (1.219)	24; 3.50 (1.103)	30; 2.87 (1.358)	6; 3.00 (1.265)	17; 3.71 (1.160)	5; 2.80 (1.304)	F=1.431; p=.219	not significant
B1_6	28; 2.93 (1.359)	24; 4.00 (1.103)	30; 3.43 (1.331)	6; 3.00 (1.673)	17; 3.82 (1.334)	5; 4.00 (1.225)	F=2.317; p=**.049**	**Junior High school, Other > University > High school > Technical Education > Primary school**
B1_7	28; 2.93 (.979)	24; 3.17 (1.129)	30; 3.07 (1.311)	6; 2.83 (1.472)	17; 3.41 (1.176)	5; 2.40 (1.517)	F=.755; p=.584	not significant
B1_8	28; 3.11 (1.197)	24; 3.21 (.884)	30; 3.23 (1.194)	6; 2.83 (1.169)	17; 3.59 (1.583)	5; 3.00 (1.000)	F=.532; p=.752	not significant
B1_9	28; 2.32 (1.362)	24; 2.50 (1.319)	30; 2.07 (1.202)	6; 2.50 (1.378)	17; 2.88 (1.536)	5; 3.00 (1.581)	F=1.047; p=.394	not significant
B1_10	28; 3.18 (1.090)	24; 3.54 (1.414)	30; 3.27 (1.507)	6; 3.67 (1.033)	17; 3.65 (1.539)	5; 2.80 (1.304)	F=.591; p=.707	not significant
B1_11	28; 3.75 (1.351)	24; 4.50 (.933)	30; 3.83 (1.341)	6; 4.33 (1.211)	17; 4.24 (1.437)	5; 3.00 (1.225)	F=1.882; p=.104	not significant
B1_12	28; 2.93 (1.386)	24; 3.38 (1.313)	30; 2.50 (1.358)	6; 3.17 (1.329)	17; 2.71 (1.312)	5; 3.40 (1.342)	F=1.384; p=.236	not significant
B1_13	28; 3.46 (1.105)	24; 3.25 (1.073)	30; 3.03 (1.450)	6; 3.33 (1.211)	17; 3.41 (1.372)	5; 3.40 (1.140)	F=.406; p=.844	not significant
B1_14	28; 3.96 (.999)	24; 4.00 (1.216)	30; 3.67 (1.398)	6; 3.67 (1.506)	17; 4.18 (1.237)	5; 3.20 (1.643)	F=.758; p=.582	not significant
B1_15	28; 2.61 (1.227)	24; 3.42 (1.100)	30; 2.83 (1.341)	6; 2.83 (1.169)	17; 2.12 (1.317)	5; 3.40 (.548)	F=2.644; p=**.027**	**Junior High school > Other > High school, Technical Education > Primary school > University**
B1_16	28; 3.18 (1.307)	24; 3.71 (1.367)	30; 2.57 (1.357)	6; 2.33 (1.751)	17; 3.41 (1.228)	5; 2.60 (1.342)	F=2.641; p=**.027**	**Junior High school > University > Primary school > Other > High school > Technical Education**
B1_17	28; 2.82 (1.335)	24; 3.17 (1.435)	30; 2.77 (1.431)	6; 2.83 (1.722)	17; 2.76 (1.562)	5; 3.20 (1.483)	F=.305; p=.909	not significant
B1_18	28; 3.39 (1.197)	24; 3.25 (1.260)	30; 3.13 (1.358)	6; 3.17 (.408)	17; 3.65 (1.412)	5; 3.20 (1.643)	F=.402; p=.846	not significant

The table above, in question B1_6 depicts children who are constantly wondering whether they will come closer to their aims. Such a question has stronger meaning to children whose fathers have finished Junior High school (M= 4.00), other (M= 4.00) or University (M= 3.82). Children whose fathers have finished High school (M= 3.43) Technical Education (M= 3.00) or Primary school (M= 2.93) seem to wonder less about their goals, [F(5, 104)= 2.317, p= .049].

A statistically significant result gives the question B1_15 in which children know how it went, when they finish an exam. This situation has stronger meaning to adolescents whose fathers have finished Junior High school (M= 3.42), other (M=

3.40), High school (M= 2.83) or Technical Education (M= 2.83). Children whose fathers have finished Primary school (M= 2.61) or University (M= 2.12) seem not to know how it went, after finishing an exam, [F(5, 104)= 2.644, p= .027].

Additionaly, a statistically significant result gives the question B1_16 in which children who complete a lesson, wonder if there was an easier way to finish it. Such a question has stronger meaning to kids whose fathers have finished Junior High school (M= 3.71), University (M= 3.41) or Primary school (M= 3.18). Children whose fathers have finished other (M= 2.60), High school (M= 2.57) or Technical Education (M= 2.33) seem to wonder less if there was an easier way to do a task, when finishing it, [F(5, 104)= 2.641, p= .027].

In addition, in the table below is illustrated the indifference between answers given from adolescents and the fathers' educational background.

Table 78. Difference between groups (Post Hoc Tests)

Dependent Variable	My father has finished (I) to (J)	Mean Difference (I-J)	Significance
B1_6	Junior High school to Primary school	-1.071*	.059
B1_15	Junior High school to University	1.299*	.017
B1_16	Junior High school to High school	1.142*	.038

***. The mean difference is significant at the 0.05 level**

Students whose fathers have finished Junior High school are constantly wondering whether they will come closer to their aims more than those whose fathers have finished Primary school (t=2.942, p=.059). Students whose fathers have finished Junior High school know how it went, when they finish an exam more than those whose fathers have finished University (t=3.339, p=.017). In addition, students whose fathers have finished Junior High school complete a lesson, are wondering whether there was an easier way to finih it more than those whose fathers have finished High school (t=3.094, p=.038).

G. INFERENTIAL ANALYSIS DEPENDING ON PARENTAL EDUCATIONAL LEVEL MOTHER

We have proceeded to make comparisons between the Cognitive Process Questions and the mother educational background by analysing Anova (n.s = 0.05), yielding the results illustrated in Table 79. In the research was used the independent sample Anova test in order to compare the means of mother educational background.

Table 79. Results of the Anova test according to Mother Educational Backround

Cognitive Process Questions	My Mother has finished						Statistical F; p-value	FAVORABLE
	Primary school N, M (SD)	**Junior High school** N, M (SD)	**High school** N, M (SD)	**Technical Education** N, M (SD)	**University** N, M (SD)	**Other** N, M (SD)		
B1_1	12; 2.83 (1.337)	18; 2.00 (1.283)	45; 2.49 (1.456)	13; 2.00 (1.354)	19; 2.05 (1.129)	3; 2.33 (1.528)	F=.979; p=.434	not significant
B1_2	12; 3.17 (.937)	18; 3.00 (1.085)	45;3.02 (1.252)	13; 3.23 (.927)	19; 2.53 (1.264)	3; 3.33 (1.528)	F=.819; p=.539	not significant
B1_3	12; 3.42 (.900)	18; 3.50 (1.098)	45; 3.22 (1.312)	13; 3.23 (.927)	19; 3.26 (1.558)	3; 3.33 (1.528)	F=.158 p=.977	not significant
B1_4	12; 3.67 (1.371)	18; 3.33 (1.138)	45; 3.02 (1.390)	13; 2.77 (1.092)	19; 2.63 (1.257)	3; 3.00 (2.000)	F=1.213; p=.308	not significant
B1_5	12; 3.33 (.888)	18; 2.83 (1.425)	45; 3.31 (1.328)	13; 3.23 (1.235)	19; 3.32 (1.157)	3; 3.00 (1.000)	F=.446 p=.816	not significant
B1_6	12; 3.58 (1.379)	18; 3.72 (1.320)	45; 3.47 (1.342)	13; 3.15 (1.144)	19; 3.63 (1.461)	3; 2.67 (2.082)	F=.538 p=.747	not significant
B1_7	12; 3.33 (1.155)	18; 2.67 (1.188)	45; 2.93 (1.232)	13; 3.23 (.927)	19; 3.47 (1.219)	3; 3.00 (1.000)	F=1.158 p=.335	not significant
B1_8	12; 3.58 (.900)	18; 3.22 (.943)	45; 3.24 (1.334)	13; 3.77 (.832)	19; 2.53 (1.172)	3; 3.33 (1.155)	F=2.217 p=.058	not significant
B1_9	12; 2.83 (1.193)	18; 2.17 (1.098)	45; 2.40 (1.388)	13; 2.46 (1.664)	19; 2.32 (1.376)	3; 3.00 (1.732)	F=.478 p=.792	not significant
B1_10	12; 3.58 (1.165)	18; 3.22 (1.478)	45; 3.44 (1.358)	13; 3.23 (1.092)	19; 3.32 (1.565)	3; 3.00 (1.732)	F=.200 p=.962	not significant
B1_11	12; 4.42 (.793)	18; 4.39 (1.037)	45; 4.00 (1.297)	13; 3.62 (1.387)	19; 3.89 (1.560)	3; 2.67 (1.528)	F=1.494 p=.198	not significant
B1_12	12; 3.25 (1.357)	18; 3.00 (1.495)	45; 2.80 (1.408)	13; 2.92 (1.115)	19; 2.74 (1.327)	3; 3.67 (1.528)	F=.462 p=.804	not significant
B1_13	12; 4.08 (1.084)	18; 3.06 (1.162)	45; 3.02 (1.252)	13; 3.62 (1.121)	19; 3.42 (1.305)	3; 3.00 (1.000)	F=1.870 p=.106	not significant
B1_14	12; 4.25 (1.288)	18; 3.67 (1.414)	45; 3.73 (1.268)	13; 4.00 (.913)	19; 4.05 (1.224)	3; 4.00 (1.732)	F=.529 p=.754	not significant
B1_15	12; 2.92 (.996)	18; 2.83 (1.249)	45; 2.87 (1.455)	13; 3.00 (1.291)	19; 2.47 (1.073)	3; 3.00 (1.000)	F=.361 p=.874	not significant
B1_16	12; 3.67 (.985)	18; 2.89 (1.530)	45; 3.11 (1.385)	13; 3.23 (1.589)	19; 2.74 (1.447)	3; 3.33 (1.155)	F=.763 p=.578	not significant
B1_17	12; 3.33 (1.231)	18; 2.83 (1.543)	45; 2.80 (1.455)	13; 3.15 (1.281)	19; 2.68 (1.455)	3; 3.00 (2.000)	F=.436 p=.823	not significant
B1_18	12; 3.92 (.793)	18; 2.83 (1.249)	45; 3.38 (1.370)	13; 3.08 (1.115)	19; 3.37 (1.300)	3; 3.33 (1.528)	F=1.189 p=.320	not significant

Note. Source: Own elaboration

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between the mother educational background and the cognitive process questions.

H. INFERENTIAL ANALYSIS DEPENDING ON LAST-YEAR DEGREE IN MATHEMATICS

We have proceeded to make comparisons between the Cognitive Process Questions and the student's last year degree in Mathematics by analysing Anova (n.s = 0.05), yielding the results shown in Table 80. In the research was used the independent sample Anova test in order to compare the means of Student's last year degree in Math.

Table 80. Results of the Anova test according to Student's last year degree in Math

Cognitive Process Questions	My last year degree in Math was						Statistical F; p-value	FAVORABLE
	Lower than 10 N, M (SD)	**11-12 N, M (SD)**	**13-14 N, M (SD)**	**15-16 N, M (SD)**	**17-18 N; M (SD)**	**19-20 N; M (SD)**		
B1_1	10; 2.50 (1.434)	24; 2.25 (1.225)	33; 2.12 (1.386)	26; 2.38 (1.359)	8; 3.00 (1.512)	9; 2.11 (1.453)	F=.638; p=.672	not significant
B1_2	10; 2.60 (1.430)	24; 2.79 (1.062)	33; 2.85 (1.093)	26; 3.27 (1.041)	8; 3.63 (1.188)	9; 3.00 (1.581)	F=1.248; p=.292	not significant
B1_3	10; 3.80 (1.033)	24; 3.25 (1.189)	33; 3.21 (1.341)	26; 3.46 (1.208)	8; 3.63 (.744)	9; 2.44 (1.333)	F=1.474; p=.205	not significant
B1_4	10; 3.10 (1.101)	24; 2.71 (1.398)	33; 3.21 (1.409)	26; 3.23 (1.243)	8; 2.75 (1.035)	9; 3.00 (1.500)	F=.599; p=.701	not significant
B1_5	10; 3.50 (1.354)	24; 3.04 (.908)	33; 3.18 (1.261)	26; 3.42 (1.301)	8; 3.00 (1.309)	9; 3.11 (1.764)	F=.397; p=.850	not significant
B1_6	10; 3.40 (1.350)	24; 3.33 (1.551)	33; 3.39 (1.456)	26; 3.85 (1.047)	8; 3.25 (1.165)	9; 3.56 (1.424)	F=.515; p=.764	not significant
B1_7	10; 3.20 (1.229)	24; 3.13 (1.154)	33; 2.85 (1.202)	26; 3.27 (1.151)	8; 3.00 (1.309)	9; 3.00 (1.323)	F=.413; p=.839	not significant
B1_8	10; 2.90 (.876)	24; 3.17 (1.049)	33; 3.12 (1.269)	26; 3.69 (1.123)	8; 3.25 (1.165)	9; 2.67 (1.500)	F=1.453; p=.212	not significant
B1_9	10; 3.00 (1.563)	24; 2.08 (.929)	33; 2.30 (1.468)	26; 2.92 (1.383)	8; 2.00 (1.195)	9; 2.00 (1.323)	F=1.835; p=.112	not significant
B1_10	10; 3.40 (1.578)	24; 3.13 (1.361)	33; 3.55 (1.277)	26; 3.65 (1.294)	8; 3.13 (1.126)	9; 2.67 (1.658)	F=1.039; p=.399	not significant
B1_11	10; 4.20 (.919)	24; 4.13 (1.296)	33; 4.03 (1.287)	26; 4.27 (1.151)	8; 3.88 (1.126)	9; 2.78 (1.787)	F=2.027; p=.081	not significant
B1_12	10; 2.80 (1.398)	24; 2.54 (1.285)	33; 3.33 (1.429)	26; 2.77 (1.177)	8; 3.75 (1.282)	9; 2.11 (1.269)	F=2.451; p=**.038**	**17-18 > 13-14 > lower than 10 > 15-16 > 11-12 > 19-20**
B1_13	10; 3.30 (1.160)	24; 3.42 (1.060)	33; 3.12 (1.409)	26; 3.69 (.970)	8; 3.13 (1.356)	9; 2.44 (1.424)	F=1.644; p=.155	not significant
B1_14	10; 3.90 (1.449)	24; 3.75 (1.152)	33; 3.73 (1.526)	26; 4.35 (.629)	8; 3.38 (1.188)	9; 3.78 (1.481)	F=1.155; p=.336	not significant
B1_15	10; 2.90 (1.524)	24; 2.75 (1.391)	33; 3.09 (1.182)	26; 2.69 (1.289)	8; 2.88 (1.126)	9; 2.22 (1.093)	F=.766; p=.576	not significant
B1_16	10; 3.20 (1.476)	24; 2.96 (1.459)	33; 3.30 (1.425)	26; 3.23 (1.366)	8; 3.00 (.926)	9; 2.22 (1.481)	F=.959; p=.447	not significant
B1_17	10; 2.80 (1.476)	24; 2.58 (1.501)	33; 2.82 (1.402)	26; 3.38 (1.203)	8; 3.13 (1.458)	9; 2.44 (1.740)	F=1.101; p=.364	not significant
B1_18	10; 3.20 (1.476)	24; 3.42 (1.349)	33; 3.30 (1.311)	26; 3.42 (1.065)	8; 3.13 (1.126)	9; 3.00 (1.581)	F=.224; p=.952	not significant

Note. Source: Own elaboration

Significant p values are in bold, where p < .05

A statistically important result gives the question B1_12 in which adolescents answered that they change their strategies when they are not able to solve a math problem. Such a way of thinking to change strategies represents mostly adolescents with last year degree in Mathematics 17-18 (M= 3.75) or 13-14 (M= 3.33). Adolescents with last year degree in Maths lower than 10 (M= 2.80), 15-16 (M= 2.77), 11-12 (M= 2.54) or 19-20 (M= 2.11) don't to have this way of thinking when they cannot figure out a math problem, [F(5, 104)= 2.451, p= .038].

In addition, in the table below is illustrated the indifference between the answers given from the adolescents and their last year grade in Mathematics.

Table 81. Difference between groups (Post Hoc Tests)

Dependent Variable	My grade in Mathematics last year was (I) to (J)	Mean Difference (I-J)	Significance
B1_12	15-16 to 19-20	1.639*	.176

***. The mean difference is significant at the 0.05 level**

Students with last-year grade in mathematics 15-16 change their strategies when they cannot figure out a math problem more than those with 19-20 (t=2.564, p=.176).

I. INFERENTIAL ANALYSIS DEPENDING ON ADHD

We have proceeded to compare Cognitive Process Questions according to ADHD by analysing Anova (n.s = 0.05), yielding the results shown in Table 82. In the research was used the independent sample Anova test in order to compare the means of ADHD.

Table 82. Results of the Anova test according to ADHD

Cognitive Process Questions	ADHD				Statistical F; p-value	FAVORABLE
	Attention Deficit N, M (SD)	**Attention Deficit & Hyperactivity** N; M (SD)	**Attention Deficit & Impulsitivity** N, M (SD)	**Attention Deficit &Hyperactivity &Impulsitivity** N, M (SD)		
B1_1	48; 2.35 (1.436)	17; 2.35 (.996)	32; 2.47 (1.391)	13; 1.69 (1.316)	F=1.075; p=.363	not significant
B1_2	48; 2.98 (1.229)	17; 3.35 (.996)	32; 2.94 (1.243)	13; 2.62 (.870)	F=1.020; p=.387	not significant
B1_3	48; 3.40 (1.284)	17; 3.18 (1.334)	32; 3.41 (1.073)	13; 2.85 (1.281)	F=.819; p=.486	not significant
B1_4	48; 3.04 (1.220)	17; 3.24 (1.522)	32; 3.03 (1.257)	13; 2.85 (1.625)	F=.214; p=.887	not significant
B1_5	48; 3.46 (1.220)	17; 3.59 (1.228)	32; 2.84 (1.221)	13; 2.77 (1.166)	F=2.754; p=.046	**Attention Deficit & Hyperactivity> Attention Deficit> Attention Deficit & Impulsitivity > Attention Deficit &Hyperactivity &Impulsitivity**
B1_6	48; 3.85 (1.130)	17; 3.00 (1.500)	32; 3.38 (1.343)	13; 3.08 (1.656)	F=2.508; p=.063	not significant
B1_7	48; 3.15 (1.255)	17; 2.94 (1.029)	32; 3.13 (1.264)	13; 2.77 (.927)	F=.428; p=.733	not significant
B1_8	48; 3.56 (1.165)	17; 3.12 (1.317)	32; 2.97 (1.031)	13; 2.69 (1.182)	F=2.862; p=.040	not significant
B1_9	48; 2.44 (1.443)	17; 2.59 (1.372)	32; 2.53 (1.270)	13; 1.85 (1.144)	F=.944; p=.422	not significant
B1_10	48; 3.65 (1.296)	17; 2.88 (1.317)	32; 3.25 (1.391)	13; 3.23 (1.423)	F=1.554; p=.205	not significant
B1_11	48; 4.19 (1.266)	17; 3.88 (1.409)	32; 3.94 (1.216)	13; 3.69 (1.494)	F=.643; p=.589	not significant
B1_12	48; 2.98 (1.376)	17; 3.29 (1.359)	32; 2.69 (1.306)	13; 2.69 (1.437)	F=.890; p=.449	not significant
B1_13	48; 3.58 (1.182)	17; 3.24 (1.348)	32; 2.88 (1.185)	13; 3.23 (1.235)	F=2.196; p=.093	not significant
B1_14	48; 4.27 (1.026)	17; 3.59 (1.228)	32; 3.69 (1.281)	13; 3.23 (1.589)	F=3.524; p=.018	**Attention Deficit> Attention Deficit &**

						Impulsitivity> Attention Deficit & Hyperactivity> Attention Deficit &Hyperactivity &Impulsitivity
B1_15	48; 2.69 (1.240)	17; 3.29 (1.263)	32; 2.91 (1.304)	13; 2.46 (1.266)	F=1.368; p=.257	not significant
B1_16	48; 3.17 (1.342)	17; 3.24 (1.562)	32; 2.84 (1.439)	13; 3.23 (1.363)	F=.477; p=.699	not significant
B1_17	48; 3.04 (1.458)	17; 2.71 (1.213)	32; 2.91 (1.445)	13; 2.54 (1.561)	F=.536; p=.659	not significant
B1_18	48; 3.60 (1.162)	17; 3.41 (1.228)	32; 2.97 (1.402)	13; 2.92 (1.188)	F=2.136; p=.100	not significant

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

The table above, in question B1_5 illustrates students who use the structure and organization of the text to better comprehend. Such a question has stronger meaning to students with Attention Deficit (M= 3.46) and Attention Deficit & Hyperactivity (M= 3.59) more than students with Attention Deficit & Impulsitivity (M= 2.84) and Attention Deficit &Hyperactivity &Impulsitivity (M= 2.77), [F(3, 106)= 2.754, p= .046].

Moreover, a statistical significant result gives the question B1_14 where students with Attention Deficit (M= 4.27) and Attention Deficit & Impulsitivity (M= 3.69), stop and re-read when they lose their stability in thinking. On the other hand, students with Attention Deficit and Hyperactivity (M= 3.59) and Attention Deficit & Hyperactivity & Impulsitivity (M= 3.23) show to give less significance to this, [F(3, 106)= 3.524, p=.018].

Additionaly, in the table below is illustrated the indifference between answers given from students and the classes.

Table 83. Difference between groups (Post Hoc Tests)

Dependent Variable	ADHD (I) to (J)	Mean Difference (I-J)	Significance
B1_5	Attention Deficit & Hyperactivity to Attention Deficit & Hyperactivity & Impulsitivity	.819*	.421
B1_14	Attention Deficit to Attention Deficit & Hyperactivity & Impulsitivity	1.040*	.042

***. The mean difference is significant at the 0.05 level**

Students with Attention Deficit & Hyperactivity use the structure and organization of the text to better understand more than those with Attention Deficit & Hyperactivity & Impulsitivity ($t=1.828$, $p=.421$). In addition, students with Attention Deficit stop and re-read when they are confused more than those with Attention Deficit & Hyperactivity & Impulsitivity ($t=2.751$, $p=.042$).

J. INFERENTIAL ANALYSIS DEPENDING ON OTHER LEARNING DIFFICULTIES

We have proceeded to compare Cognitive Process Questions according to other learning difficulties by analysing Anova (n.s = 0.05), yielding the results shown in Table 84. In the research was used the independent sample Anova test in order to compare the means of other difficulties.

Table 84. Results of the Anova test according to other Learning Difficulties

Cognitive Process Questions	Other Learning Difficulties						Statistical F; p-value	FAVORABLE
	No other Learning Difficulty	**Special Learning Difficulties**	**General Learning Difficulties**	**Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity**	**Difficulties in Writing**	**Social Interaction Difficulties/ Behavioral Problems**		
	N, M (SD)	**N; M (SD)**	**N, M (SD)**	**N, M (SD)**	**N, M (SD)**	**N, M (SD)**		
B1_1	12; 2.33 (1.155)	40; 2.15 (1.442)	14; 2.57 (1.155)	34; 2.56 (1.330)	7; 1.71 (.756)	3; 1.67 (1.155)	F=.848; p=.519	not significant
B1_2	12; 3.17 (1.193)	40; 2.88 (1.137)	14; 3.29 (1.204)	34; 3.15 (1.132)	7; 2.00 (1.155)	3; 2.67 (1.155)	F=1.529; p=.187	not significant
B1_3	12; 3.92 (1.165)	40; 2.90 (1.236)	14; 3.79 (1.251)	34; 3.41 (1.019)	7; 2.57 (.397)	3; 4.33 (1.155)	F=3.133; p=**.011**	**Social Interaction Difficulties/ Behavioral Problems > No other Learning**

								Difficulty > General Learning Difficulties > Difficulties in Learnign/ Learning Gaps/ Mild Difficulties/ Skills Immaturity > Special Learning Difficulties > Difficulties in Writing
B1_4	12; 3.75 (.965)	40; 2.75 (1.391)	14; 3.21 (1.311)	34; 3.21 (1.274)	7; 2.29 (1.113)	3; 3.33 (1.528)	F=1.797; p=.120	not significant
B1_5	12; 3.83 (1.030)	40; 2.63 (1.170)	14; 3.50 (1.401)	34; 3.65 (1.041)	7; 3.29 (1.496)	3; 2.33 (.577)	F=4.202; p=**.002**	**No other Learning Difficulty > Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity > General Learning**

B1_6	12; 4.00 (1.128)	40; 3.18 (1.394)	14; 4.36 (1.008)	34; 3.53 (1.261)	7; 3.14 (.574)	3; 2.00 (1.000)	F=3.039; p=**.013**	**Difficulties > Difficulties in Writing > Special Learning Difficulties > Social Interaction Difficulties/ Behavioral Problems General Learning Difficulties > No other Learning Difficulty > Difficulties in Learnign/ Learning Gaps/ Mild Difficulties/ Skills Immaturity > Special Learning Difficulties > Difficulties in Writing > Social**

								Interaction Difficulties/ Behavioral Problems
B1_7	12; 3.17 (1.193)	40; 2.98 (1.209)	14; 3.57 (1.342)	34; 2.97 (1.114)	7; 3.14 (.900)	3; 2.33 (1.528)	F=.850; p=.517	not significant
B1_8	12; 3.33 (1.155)	40; 3.13 (1.244)	14; 3.50 (1.160)	34; 3.32 (1.093)	7; 2.57(1.512)	3; 3.00 (1.000)	F=.714; p=.615	not significant
B1_9	12; 3.00 (1.206)	40; 2.35 (1.252)	14; 2.57 (1.697)	34; 2.41 (1.417)	7; 1.71 (.756)	3; 2.00 (1.732)	F=.937; p=.460	not significant
B1_10	12; 3.58 (1.443)	40; 3.20 (1.344)	14; 3.79 (1.369)	34; 3.50 (1.237)	7; 2.86 (1.864)	3; 2.33 (.577)	F=1.070; p=.381	not significant
B1_11	12; 4.25 (1.288)	40; 4.05 (1.377)	14; 4.50 (.941)	34; 4.12 (.977)	7; 2.00 (1.414)	3; 3.67 (1.155)	F=4.601; p=**.001**	**General Learning Difficulties > No other Learning Difficulty > Difficulties in Learnign/ Learning Gaps/ Mild Difficulties/ Skills Immaturity > Special Learning Difficulties > Social Interaction Difficulties/ Behavioral Problems > Difficulties in**

								Writing
B1_12	12; 3.17 (1.337)	40; 2.80 (1.454)	14; 3.64 (1.447)	34; 2.91 (1.138)	7; 1.71 (1.113)	3; 2.67 (1.155)	F=2.168; p=.063	not significant
B1_13	12; 4.00 (.739)	40; 3.03 (1.209)	14; 3.64 (1.216)	34; 3.29 (1.244)	7; 3.00 (.732)	3; 2.67 (1.155)	F=1.669; p=.149	not significant
B1_14	12; 4.42 (.793)	40; 3.95 (1.218)	14; 4.29 (1.204)	34; 3.56 (1.260)	7; 3.13 (.574)	3; 4.00 (1.732)	F=1.764; p=.127	not significant
B1_15	12; 3.08 (.996)	40; 2.85 (1.312)	14; 2.79 (1.251)	34; 2.85 (1.351)	7; 1.86 (1.069)	3; 3.33 (1.155)	F=1.014; p=.413	not significant
B1_16	12; 3.17 (1.337)	40; 2.78 (1.368)	14; 3.36 (1.082)	34; 3.29 (1.447)	7; 2.86 (2.035)	3; 4.00 (1.000)	F=.951; p=.451	not significant
B1_17	12; 3.42 (1.621)	40; 2.88 (1.399)	14; 3.43 (1.399)	34; 2.71 (1.360)	7; 1.57 (.976)	3; 3.67 (.577)	F=2.365; p=**.045**	**Social Interaction Difficulties/ Behavioral Problems > General Learning Difficulties > No other Learning Difficulty > Special Learning Difficulties > Difficulties in Learnign/ Learning Gaps/ Mild Difficulties/ Skills Immaturity > Difficulties in Writing**
B1_18	12; 3.83 (1.030)	40; 3.10 (1.317)	14; 3.43 (1.222)	34; 3.41 (1.234)	7; 2.57 (1.272)	3; 4.00 (1.732)	F=1.370; p=.242	not significant

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

The table above, in the question B1_3 depicts children who prefer to give more attention when they find important material. Such a question has stronger meaning to children with Social Interaction Difficulties/ Behavioural Problems (M= 4.33), with No other Learning Difficulty (M=3.92), with General Learning Difficulties (M=3.79) or Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity (M=3.41) more than children with Special Learning Difficulties (M=2.90) or Difficulties in Writing (M= 2.57), [F(3, 106)= 3.133, p= .011].

Additionaly, a statistically significant result gives the question B1_5 in which children with no other Learning Difficulty than ADHD (M=3.83), with Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity (M=3.65), with General Learning Difficulties (M=3.50) or with Difficulties in Writing (M=3.29) use the structure and organization of the content to better comprehend. In contrast, children with Special Learning Difficulties (M=2.63) or with Social Interaction Difficulties/ Behavioural Problems (2.33) show to give less attention to this, [F(3, 106)= 4.202, p=.002].

In the question B1_6 depicts children who are constantly wondering whether they will come closer to their aims. Such a question has stronger meaning to children with General Learning Difficulties (M= 4.36), with no other Learning Difficulty than ADHD (M=4.00), with Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity (M=3.53), with Special Learning Difficulties (M=3.18), with Difficulties in Writing (M=3.14) more than children with Social Interaction Difficulties/ Behavioral Problems (M=2.00), [F(3, 106)= 3.039, p= .013].

Moreover, a statistically significant result gives the question B1_11 in which children with General Learning Difficulties (M=4.50), with no other Learning Difficulty than ADHD (4.25), with Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity (M=4.12), with Special Learning Difficulties (M=4.05), with Social Interaction Difficulties/ Behavioural Problems (M=3.67) request to be helped when they do not comprehend something. In contrast, children with Difficulties in Writing (M= 2.00) show to give less attention to this, [F(3, 106)= 4.601, p=.001].

To conclude, in the question B1_17 depicts children who make a summary of what they learned, when they finish studying. Such a question has stronger meaning to children with Social Interaction Difficulties/ Behavioural Problems (M=3.67), with General Learning Difficulties (M=3.43) or with no other Learning Difficulty (M=3.42) more than children with Special Learning Difficulties (M=2.88), with Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity (M=2.71) or with Difficulties in Writing (M=1.57), [F(3, 106)= 2.365, p= .045].

Additionaly, in the table below is illustrated the indifference between answers given from students and other learning difficulties.

Table 85. Difference between groups (Post Hoc Tests)

Dependent Variable	Other learning difficulties (I) to (J)	Mean Difference (I-J)	Significance
B1_3	Social Interaction Difficulties/ Behavioral Problems to Difficulties in Writing	1.762*	.480
B1_5	No other Learning Difficulty to Special Learning Difficulties	1.208*	.031
	Special Learning Difficulties to Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity	1.022*	.004
B1_6	General Learning Difficulties to Social Interaction Difficulties/ Behavioral Problems	2.357*	.073
B1_11	No other Learning Difficulty to Difficulties in Writing	2.250*	.002
	Special Learning Difficulties to Difficulties in Writing	2.050*	.001
	General Learning Difficulties to Difficulties in Writing	2.500*	.000
	Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity to Difficulties in Writing	2.118*	.001
B1_12	General Learning Difficulties to Difficulties in Writing	1.929*	.032
B1_17	Social Interaction Difficulties/ Behavioral Problems to Difficulties in Writing	2.095*	.451

***. The mean difference is significant at the 0.05 level**

Students with Social Interaction Difficulties/ Behavioral Problems prefer to go slower when they find important information more than those with Difficulties in Writing (t=2.172, p=.480). In addition, students with no other Learning Difficulty than ADHD work with the structure and organization of the text to better comprehend more than those with Special Learning Difficulties (t=3.162, p=.031). Students with Special Learning Difficulties have the same preference as above more than those with Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity (t=2.172, p=.004). Students with Social General Learning Difficulties are constantly wondering whether they will come closer to their aims more than those with Social Interaction Difficulties/ Behavioral Problems (t=2.877, p=.073). In addition, students with no other Learning Difficulty request to be helped when they do not comprehend something more than those with Difficulties in Writing (t=3.940, p=.002). Students with Special Learning Difficulties have the same preference as above more than those with Difficulties in Writing (t=4.166, p=.001). Students with General Learning Difficulties have the same preference as above as well more than those with Difficulties in Writing (t=4.496, p=.000). Students with Difficulties in

Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity have the same preference as above as well more than those with Difficulties in Writing ($t=4.253$, $p=.001$). Students with General Learning Difficulties prefer to change their strategies when they cannot clarify a math problem more than those with Difficulties in Writing ($t=3.146$, $p=.032$). To conclude, students with Social Interaction Difficulties/ Behavioral Problems prefer to make a summary of what they learned, when they finish studying more than those with Difficulties in Writing ($t=2.198$, $p=.451$).

J. INFERENTIAL ANALYSIS DEPENDING ON OTHER DISORDERS

We have proceeded to compare Cognitive Process Questions according to other disorders by analysing Anova (n.s = 0.05), yielding the results shown in Table 86. In the research was used the independent sample Anova test in order to compare the means of other disorders.

Table 86. Results of the Anova test according to other Disorders

Surface Strategy Questions	Other Disorders									Statistical F; p-value	FAVORABLE
	No other Disorder	**Speech Problems/ Linguistic Evolutionary Disorder/ Lack of Knowledge of Greek Language**	**Neurofeeding/ Psychophysiological Development Center**	**Emotional Difficulties**	**Neurological Problems/ Adolesent Epilepsy with Deductions**	**High-function Autism Spectrum Disturbance/ Asperger**	**Vision problems**	**Mental Immaturity in the context of a Microcephaly**	**Autism and mental inmaturity**		
	N, M (SD)	**N, M (SD)**	**N, M (SD)**	**N, M (SD)**	**N, M (SD)**	**N, M (SD)**	**N, M (SD)**	**N, M (SD)**	**N, M (SD)**		
B1_1	90; 2.32 (1.364)	10; 2.10 (1.287)	1; 2.00 (.)	4; 2.00 (1.155)	1; 1.00 (.)	1; 3.00 (.)	1; 4.00 (.)	1; 5.00 (.)	1; 1.00 (.)	F=1.022; p=.425	not significant
B1_2	90; 2.92 (1.173)	10; 3.50 (1.080)	1; 3.00 (.)	4; 3.00 (1.155)	1; 2.00 (.)	1; 4.00 (.)	1; 4.00 (.)	1; 4.00 (.)	1; 1.00 (.)	F=1.015; p=.430	not significant
B1_3	90; 3.31 (1.215)	10; 3.30 (1.252)	1; 5.00 (.)	4; 2.75 (1.258)	1; 2.00 (.)	1; 4.00 (.)	1; 5.00 (.)	1; 4.00 (.)	1; 1.00 (.)	F=1.258; p=.274	not significant
B1_4	90; 2.99 (1.311)	10; 3.60 (1.075)	1; 3.00 (.)	4; 3.00 (1.414)	1; 1.00 (.)	1; 5.00 (.)	1; 3.00 (.)	1; 5.00 (.)	1; 1.00 (.)	F=1.445; p=.187	not significant
B1_5	90; 3.12 (1.270)	10; 3.90 (1.101)	1; 4.00 (.)	4; 3.00 (1.155)	1; 3.00 (.)	1; 3.00 (.)	1; 4.00 (.)	1; 5.00 (.)	1; 3.00 (.)	F=.813; p=.593	not significant
B1_6	90; 3.49 (1.318)	10; 3.90 (1.449)	1; 2.00 (.)	4; 2.75 (1.708)	1; 5.00 (.)	1; 4.00 (.)	1; 4.00 (.)	1; 1.00 (.)	1; 4.00 (.)	F=1.064; p=.394	not significant
B1_7	90; 3.09 (1.177)	10; 3.40 (1.174)	1; 1.00 (.)	4; 2.75 (1.258)	1; 1.00 (.)	1; 4.00 (.)	1; 3.00 (.)	1; 2.00 (.)	1; 3.00 (.)	F=1.089; p=.377	not significant
B1_8	90; 3.23 (1.171)	10; 3.50 (.850)	1; 2.00 (.)	4; 2.75 (2.062)	1; 2.00 (.)	1; 5.00 (.)	1; 4.00 (.)	1; 2.00 (.)	1; 2.00 (.)	F=1.019; p=.426	not significant
B1_9	90; 2.46 (1.350)	10; 2.00 (1.247)	1; 2.00 (.)	4; 1.75 (1.500)	1; 3.00 (.)	1; 3.00 (.)	1; 4.00 (.)	1; 5.00 (.)	1; 1.00 (.)	F=1.082; p=.382	not significant
B1_10	90; 3.39 (1.355)	10; 3.70 (1.160)	1; 1.00 (.)	4; 3.00 (1.414)	1; 1.00 (.)	1; 3.00 (.)	1; 4.00 (.)	1; 2.00 (.)	1; 5.00 (.)	F=1.250; p=.278	not significant
B1_11	90; 3.96 (1.323)	10; 4.60 (.699)	1; 4.00 (.)	4; 3.25 (1.708)	1; 5.00 (.)	1; 5.00 (.)	1; 5.00 (.)	1; 2.00 (.)	1; 5.00 (.)	F=1.047; p=.406	not significant
B1_12	90; 2.94 (1.360)	10; 3.00 (1.247)	1; 2.00 (.)	4; 2.50 (1.915)	1; 1.00 (.)	1; 4.00 (.)	1; 3.00 (.)	1; 4.00 (.)	1; 1.00 (.)	F=.757; p=.642	not significant

B1_13	90; 3.27 (1.261)	10; 3.50 (1.080)	1; 3.00 (.)	4; 2.75 (1.708)	1; 3.00 (.)	1; 3.00 (.)	1; 3.00 (.)	1; 4.00 (.)	1; 5.00 (.)	F=.425; p=.904	not significant
B1_14	90; 3.88 (1.270)	10; 3.70 (1.418)	1; 4.00 (.)	4; 4.00 (1.155)	1; 5.00 (.)	1; 3.00 (.)	1; 4.00 (.)	1; 3.00 (.)	1; 5.00 (.)	F=.340; p=.948	not significant
B1_15	90; 2.81 (1.289)	10; 3.00 (1.155)	1; 2.00 (.)	4; 2.50 (1.291)	1; 3.00 (.)	1; 2.00 (.)	1; 4.00 (.)	1; 5.00 (.)	1; 1.00 (.)	F=.887; p=.530	not significant
B1_16	90; 3.03 (1.426)	10; 3.40 (.843)	1; 3.00 (.)	4; 2.75 (1.708)	1; 3.00 (.)	1; 1.00 (.)	1; 5.00 (.)	1; 5.00 (.)	1; 5.00 (.)	F=1.097; p=.371	not significant
B1_17	90; 2.93 (1.460)	10; 3.30 (1.059)	1; 1.00 (.)	4; 2.00 (1.414)	1; 3.00 (.)	1; 2.00 (.)	1; 4.00 (.)	1; 2.00 (.)	1; 1.00 (.)	F=.920; p=.503	not significant
B1_18	90; 3.21 (1.294)	10; 3.50 (1.179)	1; 3.00 (.)	4; 4.00 (.816)	1; 3.00 (.)	1; 3.00 (.)	1; 5.00 (.)	1; 5.00 (.)	1; 5.00 (.)	F=.927; p=.498	not significant

Note. Source: Own elaboration
Significant p values are in bold, where $p < .05$

Analysing the table above we discern that no statistically significant data is displayed, which shows that there is no intimacy between other disorders and the cognitive process questions.

K. INFERENTIAL ANALYSIS DEPENDING ON FATHER ORIGIN

We have proceeded to make comparisons between the Cognitive Process Questions and the father origin by analysing t-student (n.s = 0.05), yielding the results illustrated in Table 87. In the research was used the independent sample t-student test in order to compare the means of father origin.

Table 87. Results of the t-Student test according to father origin

Cognitive Process Questions	My father comes from		Statistical t; p-value	FAVORABLE
	Greece N, M (SD)	**Other Country N; M (SD)**		
B1_1	104; 2.28 (1.354)	6; 2.83 (1.329)	t=-.976; p=.331	not significant
B1_2	104; 3.00 (1.182)	6; 2.67 (.816)	t=.680; p=.498	not significant
B1_3	104; 3.27 (1.232)	6; 3.83 (1.169)	t=-1.093; p=.277	not significant
B1_4	104; 3.06 (1.328)	6; 2.83 (1.169)	t=.404; p=.687	not significant
B1_5	104; 3.14 (1.234)	6; 4.50 (.548)	t=-2.667; p=**.009**	**other country > Greece**
B1_6	104; 3.48 (1.365)	6; 3.67 (1.033)	t=-.328; p=.744	not significant
B1_7	104; 3.10 (1.162)	6; 2.50 (1.517)	t=1.203; p=.232	not significant
B1_8	104; 3.22 (1.198)	6; 3.17 (.983)	t=.109; p=.913	not significant
B1_9	104; 2.43 (1.364)	6; 2.17 (1.169)	t=.468; p=.641	not significant
B1_10	104; 3.36 (1.336)	6; 3.50 (1.761)	t=-.253; p=.801	not significant
B1_11	104; 4.01 (1.303)	6; 4.00 (1.265)	t=.018; p=.986	not significant
B1_12	104; 2.93 (1.374)	6; 2.50 (1.049)	t=.757; p=.451	not significant
B1_13	104; 3.25 (1.252)	6; 3.83 (.753)	t=-1.126; p=.263	not significant
B1_14	104; 3.88 (1.241)	6; 3.67 (1.506)	t=.414; p=.680	not significant
B1_15	104; 2.81 (1.262)	6; 3.00 (1.549)	t=-.359; p=.721	not significant
B1_16	104; 3.09 (1.394)	6; 3.17 (1.602)	t=-.136; p=.892	not significant
B1_17	104; 2.92 (1.405)	6; 2.33 (1.751)	t=.987; p=.326	not significant
B1_18	104; 3.31 (1.285)	6; 3.33 (1.033)	t=-.048; p=.962	not significant

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

In question B1_5 children were asked if they utilize the structure and organization of the text to better comprehend. Such a question has significant meaning for students whose fathers come from other countries (M= 4.50) more than those whose fathers come from Greece (M= 3.14), [t(108)= -2.667, p= .009].

L. INFERENTIAL ANALYSIS DEPENDING ON MOTHER ORIGIN

We have proceeded to comparisons between the Cognitive Process Questions and the mother origin by analysing t-student (n.s = 0.05), yielding the results illustrated in Table 88. In the research was used the independent sample Anova test in order to compare the means of mother origin.

Table 88. Results of the t-Student test according to mother origin

Cognitive Process Questions	My mother comes from		Statistical t; p-value	FAVORABLE
	Greece N, M (SD)	**Other Country N; M (SD)**		
B1_1	100; 2.34 (1.372)	10; 2.00 (1.155)	t=.756; p=.451	not significant
B1_2	100; 3.03 (1.141)	10; 2.50 (1.354)	t=1.377; p=.171	not significant
B1_3	100; 3.34 (1.174)	10; 2.90 (1.729)	t=1.079; p=.283	not significant
B1_4	100; 3.12 (1.320)	10; 2.30 (1.059)	t=1.901; p=.060	not significant
B1_5	100; 3.18 (1.258)	10; 3.60 (1.075)	t=-1.018; p=.311	not significant
B1_6	100; 3.51 (1.337)	10; 3.30 (1.494)	t=.469; p=.640	not significant
B1_7	100; 3.12 (1.174)	10; 2.50 (1.179)	t=1.591; p=.114	not significant
B1_8	100; 3.29 (1.157)	10; 2.50 (1.269)	t=2.041; p=**.044**	**Greece > other country**
B1_9	100; 2.46 (1.352)	10; 2.00 (1.333)	t=1.027; p=.307	not significant
B1_10	100; 3.37 (1.323)	10; 3.30 (1.703)	t=.155; p=.877	not significant
B1_11	100; 4.02 (1.271)	10; 3.90 (1.595)	t=.278; p=.781	not significant
B1_12	100; 2.98 (1.371)	10; 2.20 (1.033)	t=1.748; p=.083	not significant
B1_13	100; 3.27 (1.238)	10; 3.40 (1.265)	t=-.316; p=.753	not significant
B1_14	100; 3.88 (1.249)	10; 3.80 (1.317)	t=.192; p=.848	not significant
B1_15	100; 2.82 (1.242)	10; 2.80 (1.619)	t=.047; p=.962	not significant
B1_16	100; 3.11 (1.377)	10; 2.90 (1.663)	t=.451; p=.653	not significant
B1_17	100; 2.96 (1.428)	10; 2.20 (1.229)	t=1.622; p=.108	not significant
B1_18	100; 3.32 (1.270)	10; 3.20 (1.317)	t=.284; p=.777	not significant

Note. Source: Own elaboration
Significant p values are in bold, where p < .05

In question B1_8 children were asked if when they give solution to a problem, they are wondering if they have taken all options into awareness. This question seems to have significant meaning for students whose mothers are Greek (M= 3.29) more than those whose mothers come from another country (M= 2.50), [t(108)= 2.041, p= .044].

4.5 THE RELATIONSHIP BETWEEN DIMENSIONS

4.5.1 Significance in Dimension 2 “Depth Strategy & Self-Regulation Questions”

Linear regression is a statistical method by which the linear correlation between certain variables can be checked. In other words, the rate of influence of some variables (independent) on another variable (dependent) is controlled. In this research the role of independent variables is called to be followed by 3 variables (dimensions). Selecting the Dimension 2, each independent mediator expresses the following:

a. Dimension 1: Lack of Use of Strategy Questions

b. Dimension 3: Use of Low-Level Strategy Questions

c. Dimension 4: Cognitive Process Questions

Also, in the linear regression model there is the dependent variable. This role will be played by the mediator variable (Dimension 2) associated with Depth Strategy & Self-Regulation Questions

At this point of the research, it will be studied through linear regression whether the variables of Dimension 1 'Lack of Use of Strategy', Dimension 3 ' Use of Low-Level Strategy, as well as the variable of Dimension 4 ' Cognitive Process' affect the variable intention of the sample related to Dimension 2 'Depth Strategy & Self-Regulation'.

Table 89. Correlations

		Dimension2	Dimension1	Dimension3	Dimension4
Pearson Correlation	Dimension2	1,000	-,072	,506	,706
	Dimension1	-,072	1,000	,049	,184
	Dimension3	,506	,049	1,000	,441
	Dimension4	,706	,184	,441	1,000
Sig. (1-tailed)	Dimension2	.	,227	,000	,000
	Dimension1	,227	.	,307	,027
	Dimension3	,000	,307	.	,000

More analytically, initially the correlation method will be used in order to study the correlation of the 4 variables with each other. The Pearson coefficients are used to achieve this goal. The closer its value is to 1, the greater the correlation is considered. If the value is higher than 0.5 the correlation of the variables is considered to be sufficiently satisfactory.

	Dimension4	,000	,027	,000	.
N	Dimension2	110	110	110	110
	Dimension1	110	110	110	110
	Dimension3	110	110	110	110
	Dimension4	110	110	110	110

More particularly in the table below:

Correlation is significant at the 0.01 level (2-tailed).

In the table above, the Pearson factor values start from -.072 and reach up to .706. Although all values appear to be quite satisfying, the lowest correlation of all variables is the one referred to Dimension 1, in relation with the rest (1, .049, .184 respectively).

Consequently, Linear Regression is applied, the results of which are presented in the following table:

Table 90. Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.764[a]	.584	.572	.45164

a. Predictors: (Constant), Dimension4, Dimension1, Dimension3

b. Dependent Variable: Dimension2

The value of R square indicates the degree of influence of the 3 independent variables on the dependent variable. The closer it is to 1 the greater the influence. The number of r - square is 0.584. This indicates that the dependent variable (sample intention for the Dimension 2) is interpreted by 58.4% (high percentage) of the 3 independent variables (Dimension 1, Dimension 3, Dimension 4).

The following table and more specifically its first column shows in more detail the degree of correlation of each independent variable with the dependent.

Table 91. Coefficients

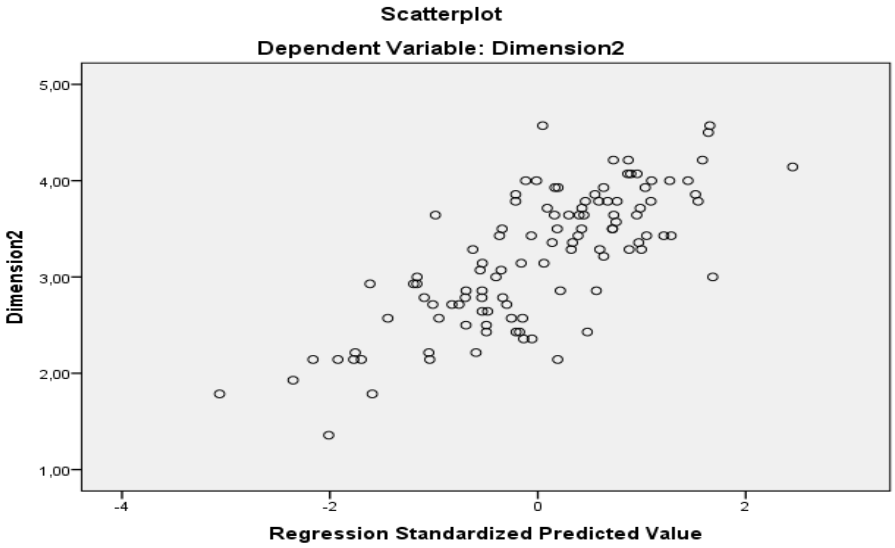
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,054	,242		4,354	,000
	Dimension1	-,152	,048	-,201	-3,152	,002
	Dimension3	,188	,056	,234	3,344	,001
	Dimension4	,621	,069	,640	9,016	,000

a. Dependent Variable: Dimension2

More specifically, the formula that can describe this correlation is as follows:

One unit of the variable intent is affected by -0.152 units by Dimension 1, by 0.188 by Dimension 3 and by 0.621 by the Dimension 4. The algebraic form of the above description:

Dimension 2 = 1.054 + (-.152)*Dimension 1 + (.188)*Dimension 3 + (.621)*Dimension 4



The homoscedasticity and the linearity of the residuals that are studied in the graphs meet these assumptions as shown above.

4.5.2 Significance in Dimension 4 “Cognitive Process Questions”

Through the **Linear regression,** if Dimension 4 is selected, each independent mediator expresses the following:

a. Dimension 1: Lack of Use of Strategy Questions
b. Dimension 3: Use of Low-Level Strategy Questions
c. Dimension 2: Depth Strategy & Self-Regulation Questions

Also, in the linear regression model there is the dependent variable. This role will be played by the mediator variable (Dimension 4) associated with Cognitive Process Questions

At this point of the research, it will be studied through linear regression whether the variables of Dimension 1 ‘Lack of Use of Strategy’, Dimension 3 ‘ Use of Low-Level Strategy, as well as the variable of Dimension 2 ‘Depth Strategy & Self-Regulation’ affect the variable intention of the sample related to Dimension 4 ‘Cognitive Process Questions’.

More analytically, initially the correlation method will be used in order to study the correlation of the 4 variables with each other. The Pearson coefficients are used to achieve this goal. The closer its value is to 1, the greater the correlation is considered. If the value is higher than 0.5 the correlation of the variables is considered to be sufficiently satisfactory.

Table 92. Correlations

		Dimension4	Dimension1	Dimension2	Dimension3
Pearson Correlation	Dimension4	1,000	,184	,706	,441
	Dimension1	,184	1,000	-,072	,049
	Dimension2	,706	-,072	1,000	,506
	Dimension3	,441	,049	,506	1,000
Sig. (1-tailed)	Dimension4	.	,027	,000	,000
	Dimension1	,027	.	,227	,307
	Dimension2	,000	,227	.	,000
	Dimension3	,000	,307	,000	.
N	Dimension4	110	110	110	110
	Dimension1	110	110	110	110
	Dimension2	110	110	110	110
	Dimension3	110	110	110	110

Correlation is significant at the 0.01 level (2-tailed).

In the table above, the Pearson factor values start from -.072 and reach up to .706. Although all values appear to be quite satisfying, the lowest correlation of all variables is the one referred to Dimension 1, in relation with the rest (.184, 1, .049 respectively).

Consequently, Linear Regression is applied, the results of which are presented in the following table:

Table 93. Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.748[a]	.559	.547	.47891

a. Predictors: (Constant), Dimension3, Dimension1, Dimension

b. Dependent Variable: Dimension4

The value of R square indicates the degree of influence of the 3 independent variables on the dependent variable. The closer it is to 1 the greater the influence. The number of r - square is 0.559. This indicates that the dependent variable (sample intention for the Dimension 4) is interpreted by 55.9% (high percentage) of the 3 independent variables (Dimension 1, Dimension 3, Dimension 2).

The following table and more specifically its first column shows in more detail the degree of correlation of each independent variable with the dependent.

Table 94. Coefficients

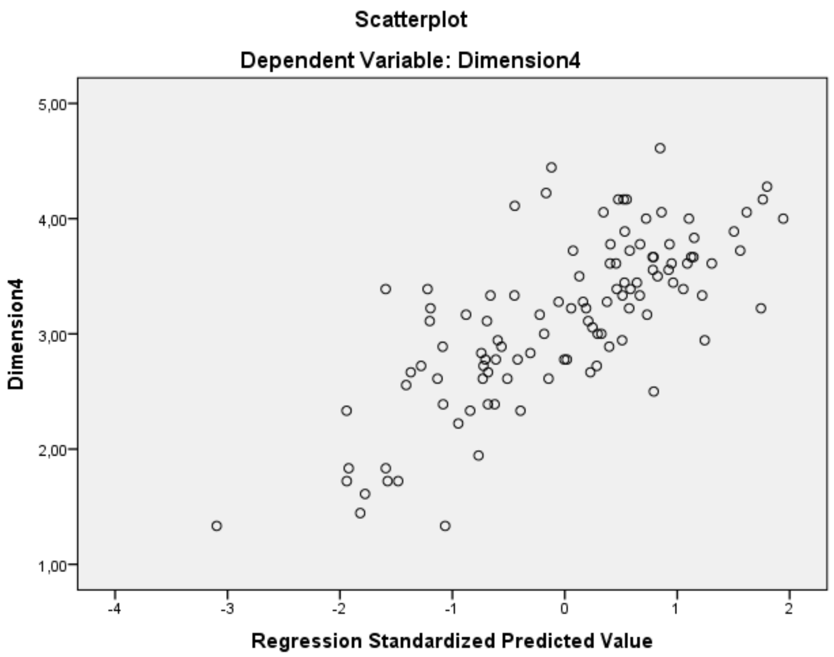
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,155	,278		,556	,579
	Dimension1	,178	,050	,228	3,516	,001
	Dimension2	,699	,077	,678	9,016	,000
	Dimension3	,072	,062	,087	1,154	,251

a. Dependent Variable: Dimension4

More specifically, the formula that can describe this correlation is as follows:

One unit of the variable intent is affected by 0.178 units by Dimension 1, by 0.699 by Dimension 2 and by 0.072 by the Dimension 3. The algebraic form of the above description:

Dimension 4 = 0.155 + (.178)*Dimension 1 + (.072)*Dimension 3 + (.699)*Dimension 2



The homoscedasticity and the linearity of the residuals that are studied in the graphs meet these assumptions as shown above.

5. CONCLUSIONS - DISCUSSION

Metacognition refers to the knowledge that the person has about the processes of his thinking. In the current study, metacognition is defined as the knowledge of knowledge, which is the awareness of awareness or ignorance and concerns the monitoring and control of knowledge.

The transition from the cognitive to the metacognitive level takes place through the knowledge of the individual about his basic knowledge. At the cognitive level, mental representations are produced as a result of the basic knowledge of the individual and certain actions are performed, which are characterized as cognitive, such as reasoning, judgment and evaluation. At the metacognitive level, the individual observes his cognitive level to construct the metacognitive level, that is, the results of metacognitive knowledge arise from the knowledge of basic knowledge (know what I know) (Shea, 2020).

The most basic metacognitive skills are (a) awareness, (b) reflection and (c) self-regulation. Awareness refers to the knowledge of information, related to the individual or his cognitive environment (software, classmates, associates, trainer, etc.), and arises as a result of the individual's interaction with his environment (Medina et al., 2017). Reflection is the mental activity in which individuals participate in exploring their experiences to arrive at new perceptions (Lundgren et al., 2017). Reflection can take place either during activities (reflection in action) or after reflection on action (Liu & Ball, 2019). For self-regulation, which is defined as the ability of the individual to monitor and modify / control his or her behavior, cognition, and mood, as well as the environment, if necessary in order to achieve a goal (Kostaridou-Eukleides, 2005, p. 248).

The student's study at a metacognitive level is therefore inspected both at the level of monitoring his actions, as well as the actions of his classmates and the overall learning environment, with the aim of self-awareness and the team in which works (group-awareness).

Study on the perceptions of Greek students, of the secondary education, on the course of mathematics, referring to some aspects of their competence of learning to learn, from the perspective of school psychology in education

The aim of this research is to study the Use and Absence of Cognitive and Metacognitive Strategies. The Gonida and Leontari Strategy Use Scale (2012) was used to evaluate the use of cognitive and metacognitive strategies. An attempt was made to investigate possible developmental differences between high school students in terms of the manifestation of their prognostic factors. According to the theoretical structure of the questionnaire, three factors were provided with the addition of the 4th factor:

(a) use of depth strategies

(b) use of surface strategies

(c) lack of use of strategies

as well as a combination of the above in a fourth factor:

(d) cognitive process strategies.

According to the theory of individual achievement goals, the orientation adopted by each student has a significant and different effect on a number of cognitive emotional and behavioral variables (Leondari & Gonida, 2007; Jiang et al., 2014; Luftenegger et al., 2014; Schwinger et al., 2014; Wang et al., 2021). In particular, learning objectives, which are characterized by students 'desire to acquire new knowledge and improve their skills, have been associated with a variety of positive adaptive learning patterns, such as high self-esteem, the causal performance of students' success in effort, but also the general positive attitude towards learning activities (Gonida et al., 2009; Schwinger et al., 2014; Amerstorfer & Munster-Kistner, 2021).

Many learning designs, like how to achieve goals, school performing, and level of persisting in achieving an aim have been linked in the past to the use and absence of cognitive and metacognitive strategies (Anthonysamy, 2021). So cognitive as metacognitive strategies are key self-regulated learning strategies combined with various positive learning results and moreover students who use strategies are expected avoid engaging in dysfunctional behaviors as well (Akamatsu et al., 2019).

The results of the study of Chatzikyriakou, (2014) indicate that the use of cognitive and metacognitive strategies is not a significant negative predictor of the occurrence of either of the two avoidance behaviors, but on the contrary, the absence of use of the above strategies is one of the most important factors in predicting academic self-behavior. It seems, then, that the students who lack self-regulatory learning skills, such as the intentional use of cognitive and metacognitive strategies opportunities to exhibit academic self-undermining behaviors. In combination, in fact, with their desire to be emphasized by the teacher and the parents in the detailed analysis of how they have to solve a Mathematics exercise, rather than in the final academic performance, according to which the students stated that they can self-destructive behaviors to avoid studying, these findings may indicate that students who eventually resort to such behaviors to avoid studying may do so because they do not have effective ways to study them, lack strategies that would facilitate them and thus engage in behaviors that compete with their academic goals, because studying for them is a painful, time consuming and unpleasant experience. In the process, of course, these weaknesses become more and more and the gaps accumulate resulting in a truly self-destructive behavior.

At the end of high school, avoidance of seeking help as well as academic self-sabotage are primarily related to individual variables, such as beliefs about the benefits and negative consequences of seeking help, learning goals and approaches to knowledge and approach, the use and absence of use of cognitive and metacognitive strategies, self-efficacy, self-esteem and school performance. From the perceptions of contextual factors, the avoidance of seeking help was only related to the perceived goals of the parents towards learning.

On the other hand, the lack of use of cognitive and metacognitive strategies, as a positive predictor of academic self-undermining confirms how academic self-undermining was expected to be adopted by students who do not use functional strategies, such as cognitive and metacognitive strategies.

a. The Contribution of Individual factors

Investigating the predictive value of individual factors in the use or not of strategies was one of the main objectives of this study, as, according to the literature, students' motivations, cognitive and metacognitive skills, but also their beliefs about the functionality of certain behaviors in the classroom affect their academic behavior (Leondari & Gonida, 2007; Schwinger et al., 2014; Abdelrahman, 2020).

b. Individual goals to achieve

Indeed, it is a fact that the indirect negative predictive power of individual learning objectives in the manifestation of academic self-subversion and the avoidance of seeking help in the classroom, through a number of individual cognitive and metacognitive factors but also motivating factors confirming through this way, the protective value of the learning orientation for the manifestation of the specific dysfunctional behaviors. Several students focus on the essence of learning in the sense of understanding the lesson, the acquisition of new knowledge, as well as the reward from the teacher as a means of recognizing their effort for improvement. This finding is in line with previous findings which suggest that learning-oriented students focus on learning per se, improving their skills and acquiring new skills, emphasizing effort and having as a point of reference themselves with a view to personal development (Leondari & Gonida, 2007; Luftenegger et al., 2014; Siqueira et al., 2020).

Below is a detailed description of the conclusions separately by each main component - dimension of the scale.

5.1 Dimension 1: Lack of Use of Strategy Questions

As the negative predictive relationship of self-beliefs to the manifestation of avoidance behaviors has already been investigated, it has been studied by other researchers who claim that students maintain a positive self-image, having confidence in their ability to succeed in a subject such as Mathematics, they are less likely to exhibit dysfunctional behaviors such as academic self-undermining and avoiding seeking help (Bobo et al., 2013; Schwinger, 2013; Steinmayr et al., 2019). In addition, the lack of use of the above strategies is one of the most important factors in predicting the behavior of academic self-undermining. Students who report not using cognitive and cognitive strategies due to their limited cognitive awareness are more likely to avoid seeking help from the teacher, but are more likely to do so for other reasons such as getting a ready answer or in inappropriate circumstances and not as a self-regulatory strategy (Chatzikyriakou, 2014).

The conclusions of the present research regarding the factor of the Lack of Use of Strategies are presented in detail below. It would be essential to mention that the research was conducted in greater depth and in addition to the metacognitive data, a comparison was made in terms of various demographic data as shown below. In this subscale the sample of 110 students who are participants in this research showed a higher mean in this question. So most of them find difficult to efficiently organize their study time (lack of organization of the learning process), while the same case of students showed the lowest mean which illustrates the situation while students studying about Mathematics, they do not think often they do not know what it is about.

In general no statistically significant data is displayed, which shows that there is no intimacy between the gender of the students and the Lack of Use of Strategy questions. Similarly, date of birth, parental educational level of father and mother, ADHD, father and mother origin do not seem to be statistically significant.

More particularly we can discern specific statistically significant data. This question depicts children who were asked if it is difficult for them to organize the time of their study effectively (lack of organization of the learning process). This specific question has stronger meaning to children in 2nd Class of Junior High School and in 3rd Class more than children of the 1st Class, who answered that they don’t find difficult time management of studying. A similar study indicates that executive skills can lead to the greater levels of self-direction needed as children become older and even later in college and careers (Darling-Hammond et al., 2020). In contrast, Zenner et al. (2014) don’t find any clear validation that exists as the use of mindfulness strategies for monitoring and redirecting attention offer benefits for learning in different age and as a result in different class groups.

Another statistically important result gives the question in which children were asked if they omit the difficult points, when they study Mathematics (lack of connection with prior knowledge and experience and lack of degree of persistence). Children who live out the city of Heraklion seem to have this habit of omitting difficult points, more than the children who live in the city. In the same way, results of the research of Taghieh et al. (2019) shows that there are significant differences between children of urban and non-urban areas with respect to their metacognitive and cognitive strategies.

Children find it difficult to study in a way that will help them to learn what they need to know well, when they have a math exam (lack of organization of the learning process). This specific question has stronger meaning to children with low or mediocre last year degree in Mathematics. Children with good or excellent last year degree in Maths seem not to have this kind of difficulty. In the research of Young and Fry (2008) were studied partial and accumulated grades of students in one of the courses they were taking. It was found that there is a high correlation between the metacognitive instrument used and the cumulative grade point and in addition with the final grade.

5.2 Dimension 2: Depth Strategy & Self-Regulation questions

Regarding the second factor to be investigated, previous studies have shown that the basic self-regulated learning strategies that are associated with positive learning results are cognitive and metacognitive strategies (Hayat et al., 2020) which as well as affecting the desire of students to emphasize by the teacher and parents in the detailed analysis of how they should solve a Mathematics exercise, rather than the final academic performance. That is, it seems that when students comprehend that the teacher and their parents are emphasizing the essential learning proceeding, showing them the appropriate strategies to learn how to solve a problem on their own, then these students consciously avoid engage in the use of avoidance behaviors that will distract them from achieving their academic goals (Metcalfe, 2017).

After the presentation of the conclusions related to the Depth Strategy & Self-Regulation factor at this point, the conclusions of the present research regarding the same factor to be studied are presented in detail. In this subscale students who were participants in this research showed a higher mean in this question. So most of them when they have to solve an exercise, they first try to clarify what this exercise calls for, while students of the same sample showed the lowest mean which illustrates the situation while students who study Mathematics, do not so often draw designs or diagrams through which they link the main points.

Generally no statistically significant data is displayed, which shows that there is no intimacy between the date of birth of the students and the Depth Strategy & Self-Regulation questions. Similarly class, parental educational level of mother, other disorders, father and mother origin do not seem to be statistically significant. Similarly, other researchers don't extract through their studies any clear validation as the use of mindfulness strategies for monitoring and redirecting attention offer benefits for learning in different age or class groups in the same way (Zenner et al., 2014).

More particularly we can discern specific statistically significant data. Children were asked if they learn something by first try to understand its meaning (use of adaptive strategies). This question has more significant meaning for the girls of the sample more than the boys. Another statistically important result derives from the question in which children were asked if they have to solve an exercise or understand a text, they try to keep in mind some older information that may be related to them, because that helps them (retrieval of prior information). Girls show to give more importance to this, than the boys. In addition, students were asked if each time they answer in a test, they re-read it again, in order to reassure that they answer the question asked (self-control and self-regulation). This question has significant impact for the girls more than the boys. Furthermore, children were asked if they try to explain the main ideas in their own words, when they study (voluntary participation in learning with active involvement and utilization of acquired knowledge in other cases as well). Similar research indicates that even the numerical mastery students had higher results, there wasn't any significant difference in-between the gender (Alci & Karatas, 2011).

Children who live in an urban area (city of Heraklion) seem to have this habit of explaining the main ideas of what they learn in their own words, more than those who live in a non-urban area (out of the city). A statistically important result derives from the question, in which children were asked if they are helped, when they have to give solution to an exercise or to understand a text, by trying to remember some older information that may be related to them (retrieval of prior information). Children who live in an urban area (city of Heraklion) seem to react this way above, more than the children who live in a non-urban area (out of the city). Additionally, children draw designs or diagrams to which they link the main points, when they study Mathematics (active involvement in learning and cultivation of personal identity in learning). Significant differences appear as well another research between students who live so in urban as in non-urban areas with respect to their learning strategies, cognitive and metacognitive too by the same way (Taghieh et al., 2019).

A statistically significant result gives the question in which children do a lot of homework, like that which they do in the classroom (active involvement in learning). This question has stronger meaning to children whose fathers have finished other or University. Children whose fathers have finished Junior High school, Primary school, High school or Technical Education seem not to study this way. In addition, a statistically important result gives the question, in which children try to recall some older information that may relate to what they read, in order to help themselves, when they have to give solution to an exercise or to understand a text (retrieval of prior information). This question has stronger meaning to children whose fathers have finished University, other or Primary school. Children whose fathers have finished Junior High school, High school or Technical Education seem not to act the same way and do not do homework like that in the classroom. The results of our study are in line with the literature as Teng & Zhang (2021) carried out a study in which parental background was based on three factors of occupation, education and income in consent form. Children of higher socioeconomic parental status indicated higher and faster metacognitive knowledge as well (Teng & Zhang, 2021).

This routine of recalling relative information represents better children with low or mediocre last year degree in Mathematics. Children with excellent last year degree in Maths seem not to have this kind of routine when solving an exercise or trying to comprehend a text. In addition, children who do several homework exercises, similar to the ones they do in class (active involvement in learning). Similar studies state that these kind of metacognitive instruments appear the same results on the grade point average and be able to become a powerful tool for pedagogues to know which students appear the need of direct instruction on metacognition, and more especially in large courses (Young & Fry, 2008).

This question has stronger meaning to children with Attention Deficit and Attention Deficit & Hyperactivity more than children with Attention Deficit & Impulsivity and Attention Deficit & Hyperactivity &Impulsivity. Moreover, a statistically significant result gives the question in which students with Attention Deficit and Attention Deficit & Impulsivity which have to solve an exercise, the first thing they try to do is to understand what this exercise requires of them. In opposition to the above, children with Attention Deficit and Hyperactivity and Attention Deficit & Hyperactivity& Impulsivity show to give less importance to this. Additionally, children who prefer to highlight the main ideas, when they read something (voluntary participation in learning). This question has stronger meaning to children with General Learning Difficulties, with Social Interaction Difficulties/ Behavioural Problem, with Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity or no other Learning Difficulty than ADHD more than children with Special Learning Difficulties or Difficulties in Writing. In addition, a statistically important result gives the question in which children with Social Interaction Difficulties/ Behavioural Problems, with Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity, with General Learning Difficulties with no other Learning Difficulty than ADHD or with Special Learning Difficulties try to recall some older information that may relate to them because this helps them when they have to solve an exercise or understand a text. In contrast, children with Difficulties in Writing show to give less importance to this. Similarly, a research of Sibley et al. (2019) shows affection in children with ADHD and their motivational and goal-directed features of self-regulated learning. Reparative metacognitive strategies like goal setting and implementation motives may integrate in students with ADHD through class interventions (Sibley et al., 2019).

5.3 Dimension 3: Surface Strategy questions

The literature on the use of surface strategies states that adolescents who use strategies are expected to avert engaging in dysfunctional behaviors (Petersen, 2014; Darling-Hammond, 2020). It seems, therefore, that students who lack self-regulatory learning skills, such as the intentional use of cognitive and metacognitive strategies, are ultimately more likely to exhibit academic self-destructive behaviors, as well as how much use is affected. functional learning strategies from achievement goals, individual and contextual, leading students to consciously use maladaptive strategies that act as a means of self-defense (Metcalfe, 2017).

In this subscale the sample of 110 participants of this study showed a higher mean in the question in which most of them try to learn anything they think will be asked of them for the exam by heart, while the same sample of adolescents showed the lowest mean in the situation while studying Mathematics, they try to identify the main ideas and learn them by heart.

Analysing the results we discern that no statistically significant data is displayed, which shows that there is no intimacy between the gender and the surface strategy questions. Similarly date of birth, school area, parental educational level of father, last-year degree in Math, ADHD and father origin do not seem to be statistically significant. Similar study of Alci & Karatas (2011) found that there is not significant difference in-between the metacognitive tools used to determine the metacognitive awareness and the school area or gender of their sample.

Children who try to learn as much information as they can by heart, when they study (do not seek to acquire the meaning of learning). This question has stronger meaning to children with Speech Problems/ Linguistic Evolutionary Disorder/ Lack of Knowledge of Greek Language and for children with No other Disorder apart from ADHD more than children with Emotional Difficulties. Such a kind of students call for a need of a school-based intervention which will integrate reparative metacognitive strategies like implementation motives and goal setting are (Sibley et al., 2019).

In addition, children were asked if they learn everything by heart, when they have a test (do not seek to acquire the meaning of learning). This question seems to have significant meaning for students whose mothers are Greek more than those whose mothers come from another country. This question seems to have significant meaning for students whose mothers are Greek more than those whose mothers come from another country. Cultivation of personal identity in learning, self-control and self-regulation seems to be more significant for adolescents whose mothers are greek and at the same time whose fathers come from other countries. Previous research seems to agree with the current study as Dermitzaki & Kallia (2021) show the significant role of parents and their origin status in the development of their children's self-regulated learning skills.

Moreover, children were asked if they try to learn everything by heart, when they have a test. This question has stronger meaning to children in 1st Class of Junior High School and in 3rd Class more than children of the 2nd Class, who answered that they don't learn everything by heart, in order to be prepared in a test. Similarly, the research of Darling-Hammond et al. (2020) showed that executive skills can lead to the greater levels of self-direction needed as children become older.

Children who try to learn anything they think will be asked of them for the exam by heart. This question has stronger meaning to children whose mothers have finished Primary school, Junior High school, High school, University or Technical Education. Children whose mothers have finished other seem not to study this way.

5.4 Dimension 4: Cognitive Process questions

Positive learning outcomes are associated with basic self-regulated learning strategies which are cognitive and metacognitive strategies (Uppal & Kumar, 2021). This fact is also evident from the desire of students to emphasize by the teacher and parents in the detailed analysis of how they should solve a Math exercise, rather than the final academic performance (Yeh et al., 2019). After listing the factor-related cognitive strategic conclusions at this point, the conclusions of the present study regarding the same factor to be studied are presented in detail.

In this subscale the sample of the students who are part of this research showed a higher mean in trying to ask for help when they do not comprehend something, while the same sample of adolescents showed the lowest mean in the question which illustrates the situation while children ask themselves questions about the lesson before they start studying. As a result, achievement motivation, skill acquisition, beliefs even performance-goal orientation becomes a part of learning-goal orientation (Schunk, 2020).

Analysing the appropriate results we discern that no statistically significant data is displayed, which shows that there is no intimacy between the parental educational level of mother and the cognitive process questions.

Students were asked if they keep wondering if they can reach their aims (self-questioning, self-control). This question has stronger meaning for the girls more than the boys. A statistically important result gives the question in which students were asked if they stop and re-read when they are misunderstood (self-control, self-regulation). Girls show to give more importance to this, than the boys. In another statistically significant question children were asked when they complete a job, if they wonder if they have learned as much as they could (awareness control). This question has more impact for the girls more than the boys. In contrast with the results above, the research of Alci & Karatas (2011) indicated that although numerical students had higher results in applying the metacognitive tools, the differences were not significant according to gender.

Students who make questions to themselves about the subject, before they begin studying (voluntary participation in learning with active involvement and utilization of acquired knowledge). This question has stronger meaning to adolescents who were born in 2003, in 2006 and in 2004. Children who were born in 2005 and in 2007 seem to wonder less about the lesson before they start to study. In addition, a statistical important result gives the question in which children who were born in 2007, in 2004 and in 2003, seem to know how it went, when they finish an exam (self-assessment). On the other side, children who were born in 2005 and in 2006 claim they do not know how it went, when they finish an exam. Zenner et al. (2014) showed that there is no any clear validation as the use of mindfulness strategies for monitoring and redirecting attention offer benefits for learning in different age groups. Another study indicates that as children become older their executive skills can lead to the greater levels of self-direction needed (Darling-Hammond et al., 2020).

Moreover, children who were asked if they make questions to themselves about the lesson, before they start to study (voluntary participation in learning with active involvement and utilization of acquired knowledge). Such a question has stronger meaning to children in 1st Class of Junior High School and in 3rd Class more than children of the 2nd Class, who answered that they don't have this habit when studying. A statistically significant result gives the question in which children were asked if they make a choice of solving a problem with the best way, between a number of different ways (use of adaptive strategies personal identity in learning). Children in 1st Class of Junior High School and in 3rd Class seem to think numerous ways of solving a problem more than children of the 2nd Class, who answered that they don't have this kind of habit. In addition, a statistical important result gives the question in which children of 1st Class of Junior High School and 3rd Class make a summary of what they learned, when they finish studying (active involvement in learning and awareness check), unlike the students of 2nd Class, who do not really act the same way. Another research indicates that none clear validation can be found as the use of mindfulness strategies for monitoring and redirecting attention offer benefits for learning of different ages (Zenner et al., 2014).

In addition, children were asked if they re-examine periodically something they are studying, in order to help them comprehend essential relationships (self-questioning, self-control and self-regulation). Children who live in an urban area (city of Heraklion) seem to have this habit of re-examining periodically what they study, more than those who live in a non-urban area (out of the city). A statistically important result gives the question in which adolescents were asked if they stop and reconsider, when new information is making them confused (self-control and self-regulation). Adolescents who live in an urban area (city of Heraklion) seem to react this way above, more than children who live in a non-urban area (out of the city). As mentioned above, a research that comes to an agreement of the existence of significance between adolescents depending on their school area and their performances in mathematics. Such a research shows that students from urban and non-urban areas appear significant differences on their cognitive and metacognitive strategies (Taghieh et al., 2019).

Children regularly wonder whether they will reach their aims (awareness check). This question has stronger meaning to children whose fathers have finished Junior High school, other or University. Children whose fathers have finished High school Technical Education or Primary school seem to wonder less about their goals. A statistically significant result gives the question in which children know how it went, when they finish an exam (self-control and self-assessment). This question has stronger meaning to adolescents whose fathers have finished Junior High school, other, High school or Technical Education. Children whose fathers have finished Primary school or University seem not to know how it went, after finishing an exam. In addition, a statistically significant result gives the question in which children who complete a task, wonder if there was an easier way to finish it (active involvement in learning and cultivation of personal identity). This question has stronger meaning to children whose fathers have finished Junior High school, University or Primary school. Children whose fathers have finished other, High school or Technical Education seem to wonder less if there was an easier way to do a task, when finishing it. As mentioned above, children of higher socioeconomic parental status appear to have higher as much as faster metacognitive knowledge too (Teng & Zhang, 2021). The current research is in line with the literature as Teng & Zhang (2021) carried out a study in which parental background was based on three factors of occupation, education and income in consent form.

A statistically important result gives the question in which students answered that they change their strategies when they cannot figure out a math problem (self-regulation). Thinking of changing strategies represents better children with good last year degree in Mathematics. Students with low, mediocre or excellent last year degree in Maths don't have this kind of routine when they are not able to figure out a math problem. Applying the same metacognitive instrument in the past in different group of students showed the same results as the correlation between the tool and the grade point average was high (Young & Fry, 2008).

Students use the structure and organization of the text in order to better understand (active involvement in learning and cultivation of personal identity). This question has stronger meaning to children with Attention Deficit and Attention Deficit & Hyperactivity more than children with Attention Deficit & Impulsitivity and Attention Deficit & Hyperactivity & Impulsitivity. In addition, a statistical important result gives the question in which children with Attention Deficit and Attention Deficit & Impulsitivity, stop and re-read when they are confused (active involvement in learning and cultivation of personal identity). In opposition to the above, children with Attention Deficit and Hyperactivity and Attention Deficit & Hyperactivity &

Impulsitivity show to give less importance to this. Children prefer to go slower when they find significant information (voluntary participation in learning with active involvement). This question has stronger meaning to children with Social Interaction Difficulties/ Behavioural Problems, with No other Learning Difficulty, with General Learning Difficulties or Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity more than children with Special Learning Difficulties or Difficulties in Writing. In addition, a statistically important result gives the question in which children with no other Learning Difficulty than ADHD, with Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity, with General Learning Difficulties or with Difficulties in Writing are using the structure and organization of the text to better comprehend (cultivation of personal identity in learning). In contrast, children with Special Learning Difficulties or with Social Interaction Difficulties/ Behavioural Problems show to give less importance to this. In addition, children constantly wonder whether they will reach their aims (self-questioning, self-control and self-regulation). This question has stronger meaning to children with General Learning Difficulties, with no other Learning Difficulty than ADHD, with Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity, with Special Learning Difficulties, with Difficulties in Writing more than children with Social Interaction Difficulties/ Behavioural Problems. In addition, a statistically important result gives the question in which children with General Learning Difficulties, with no other Learning Difficulty than ADHD, with Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity, with Special Learning Difficulties, with Social Interaction Difficulties/ Behavioural Problems ask for help when they do not comprehend something (seeking guidance of cognitive processing on a conscious level). In contrast, children with Difficulties in Writing show to give less importance to this. To conclude, children make a summary of what they learned, when they finish studying (active involvement in learning and cultivation of personal identity). This question has stronger meaning to children with Social Interaction Difficulties/ Behavioural Problems, with General Learning Difficulties or with no other Learning Difficulty more than children with Special Learning Difficulties, with Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity or with Difficulties in Writing. As mentioned above, the research of Sibley et al. (2019) shows the affection of children with ADHD and their goal-directed and motivational features of learning. This research indicates that group differences are less stable during this developmental period.

Children were asked if they use the structure and organization of the text to better comprehend (cultivation of personal identity in learning). This question seems to have significant meaning for students whose fathers come from other countries more than those whose fathers come from Greece. In addition, children were asked if when they give solution to a problem, they wonder if they have considered all options (self-control and self-regulation). This question seems to have significant meaning for students whose mothers are Greek more than those whose mothers come from another country. Previous research seems to be in line with the current study as Dermitzaki & Kallia (2021) indicate the significant role of parents and their origin status in the development of their children's self-regulated learning skills. Cultivation of personal identity in learning, self-control and self-regulation seems to be more significant for adolescents whose mothers are Greek and at the same time whose fathers come from other countries.

5.5 The Relationship between Dimensions

a. Significance in Dimension 2 "Depth Strategy & Self-Regulation Questions"

The primary conclusion of this point of the research is that through the linear regression is drawn a strong relationship between Dimension 2 "Depth Strategy & Self-Regulation Questions" and Dimension 3 "Surface Strategy questions" and Dimension 4 "Cognitive Process questions". On the other hand, Dimension 1 seems to have reversible and deterrent role to Dimension 2. Due to these facts, it is obvious that Depth Strategy & Self-Regulation and Use of Low-Level Strategy questions have great binding and could be used as an integral part of conclusions. Previous research indicates that achievement goals are connected with children's studying and the object of learning. Students who are learning-oriented seem to use deep processing strategies as these strategies require conceptual understandings and cognitive effort, in contrast with surface-level processing strategies which require only rehearsal and memorization. Even the obvious differences between the dimensions used, bibliography demonstrates that achievement motivation, skill acquisition, beliefs even performance-goal orientation as part of learning-goal orientation and makes up a mechanism with numerous effects (Schunk, 2020).

b. Significance in Dimension 4 “Cognitive Process Questions”

The primary conclusion of this point of the research is that through the linear regression is drawn a strong relationship between Dimension 4 “Cognitive Process questions” and Dimension 2 “Depth Strategy & Self-Regulation Questions”. In addition, Dimension 1 “Lack of Use of Strategy” and Dimension 3 “Surface Strategy questions” have positive relationship with Dimension 4. Due to these facts, it is obvious that Cognitive Process and Depth Strategy & Self-Regulation questions have great binding.

In conclusion, all of the above components of the Use of Strategy scale as well as the variables to which they relate were used appropriately so that they can be understood by the entire sample of students being addressed and most importantly translated into appropriate metacognitive skills they possess. However, the analysis of key components of the scale did not confirm the theoretical factor structure, highlighting the existence of two factors. According to these results, the questions that examine the use of depth strategies as well as the questions that examine the use of surface strategies as well as the Cognitive Process questions constitute a factor, that of the use of strategies, while the questions concerning the absence of any kind of strategies constitute a second factor. More specifically, students who use Depth Strategy & Self-Regulation Questions with the above characteristics seem to use of adaptive strategies, retrieve prior information, have self-control and self-regulation, offer voluntary participation in learning with active involvement and utilization of acquired knowledge in other cases as well, have cultivation of personal identity in learning and voluntary participation in learning. These characteristics seem to have stronger meaning in specific part of the sample of the research such as the girls, children who live in an urban area, children whose fathers have higher education, children with mediocre or good last year degree in Mathematics, children with Attention Deficit with or without Hyperactivity, children with comorbidity with General Learning

Difficulties or Social Interaction Difficulties/ Behavioural Problem, or Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity. As mentioned above, specific researches indicate that even the numerical mastery students had higher results, there wasn't any significant difference in-between the gender (Alci & Karatas, 2011), there was a high correlation between the metacognitive instrument used and the cumulative grade point and in addition with the final grade (Young & Fry, 2008), there was a significant difference between students who live so in urban as in non-urban areas with respect to their learning strategies, cognitive and metacognitive too by the same way (Taghieh et al., 2019).

Students whose use Surface Strategy Questions do not seek to acquire the meaning of learning. These characteristics seem to have stronger meaning in specific part of the sample of the research such as children with comorbidity with Speech Problems/ Linguistic Evolutionary Disorder/ Lack of Knowledge of Greek Language and students whose mothers are Greek.

Students who use Cognitive Process Questions have self-questioning, self-control, self-regulation, awareness control, voluntary participation in learning with active involvement in learning and utilization of acquired knowledge, self-assessment, do self-questioning, self-control and self-regulation, have cultivation of personal identity and voluntary participation in learning with active involvement and even more they seek guidance of cognitive processing on a conscious level. These characteristics seem to have stronger meaning in specific part of the sample of the research such as children whose mothers are Greek, whose fathers come from other countries, children with comorbidity with Social Interaction Difficulties/ Behavioural Problems, with General Learning Difficulties or Difficulties in Learning/ Learning Gaps/ Mild Difficulties/ Skills Immaturity, with Special Learning Difficulties, with Difficulties in Writing, children who live in an urban area , whose fathers have higher education, girls, children in 1st Class of Junior High School and in 3rd Class, with last year degree in Mathematics good or mediocre, with Attention Deficit & Impulsitivity with or without Hyperactivity. Similar study mentioned above deals with the same issue and shows that the motivational and goal-directed features affect children with ADHD. Class interventions for adolescents with ADHD may integrate reparative metacognitive strategies (Sibley et al., 2019).

Students with Lack of Use of Strategy have lack of organization of the learning process and lack of connection with prior knowledge and experience and lack of degree of persistence. These characteristics seem to have stronger meaning in specific part of the sample of the research such as children of 2nd Class ,children who live in a rural area, children with insufficient or mediocre last year degree in Mathematics. Such a research appears high correlation between the level of organization and generally the ability of using metacognitive skills and the grade point average of the students as mentioned above (Young & Fry, 2008).

5.6 Contribution - Implementation suggestions in specific contexts

Students 'perceptions of a meaningful relationship with their teacher, combined with the perceived emphasis on improving their skills as it is shown from their parents' point of view, therefore play an important role in the development of their individual learning goals that act as protective towards the manifestation of avoidance behaviours. In addition, the strengthening of self-beliefs, either in relation to specific cognitive objects or in general, creates favorable conditions for greater self-confidence, use of cognitive and metacognitive strategies that will help them achieve their goal and, consequently, willingness to seek help when they feel they need it. It seems, therefore, that academic self-undermining, as a behavior that occurs mainly in the academic context, is encouraged by school-type variables while the avoidance of seeking help is influenced more by more general types of individual variables (eg, self-esteem). The findings highlight the value of intervention at school and in the family with the aim of educating socially and academically competent students who will not be characterized by fear of failure and indication of low ability, but will seek learning and skills acquisition in a safe environment and acceptance.

The present research dealt with an interesting research topic in the field of Education and utilizing the available literature went further both theoretically and methodologically. Specifically, as mentioned in the theoretical part of the research, the emergence of the complex network of relationships between the factors under consideration involved in the adoption of use or non-strategies, the examination of the psychological dimension of the classroom and family environment in a holistic approach to interpretation of the use of the research tool and the formulation of the model for the development of the strategies of students with ADHD during school and adolescence (12-15 years old) has not been examined internationally in the past.

The findings of the present research can be a scientific basis for the school pedagogue, psychologist and the collaboration with students, teachers and parents. In particular, the school psychologist can exercise a counseling and training role, within the school and the family with the aim of the protective role of learning objectives, the use of strategies, the absence of the use of strategies as a risk factor, the contribution of a meaningful relationship teacher-student and the value of messages to learning.

In relation to students, the school pedagogue and psychologist could use the findings of the present study to better understand the reasons why a student may avoid seeking help in the classroom or resorting to the use of strategies. Self-undermining and, consequently, to take targeted actions empirically substantiated, which will respond more successfully to the profile of the particular student. The school pedagogue and psychologist in collaboration with the management and teachers of the school could organize primary and secondary prevention / intervention programs to improve the educational climate of the class, to strengthen the learning motivation of children.

As far as parents are concerned, the school pedagogue can make them aware of issues related to their contribution to the motivation of their children, while proposing functional ways of engaging with their children. For example, through the praise that parents can give to students for their effort and not for the final performance, the encouragement to acquire new knowledge and skills and the dedication of their time to enjoyable, constructive learning activities.

Finally, the school pedagogue can promote cooperation between teachers and parents with the aim of creating a positive atmosphere between them and encouraging - as far as possible - the compatibility of the two frameworks in terms of the messages they send to children about learning, performance, school success and assessment.

5.7 Limitations of the Study and Suggestions for Further Research

The current study leads to numerous of findings regarding the intentions why high school students resort to the utilize of strategies at school, which deescalate the process of learning and undermine learning results. The generalization of the findings of this research is limited as a convenience sampling proccess was utilized. A future research in the area of use of strategies in the school environment has much more to subscribe, mostly through more holistic and, therefore, more realistic approaches which, on the one hand, will examine academic and non-academic factors over time, much more combination of statistical models, a more generalized sample and on the other hand, will take into account both the school framework and the family background which also show numerous changes in the dynamics of time.

RESUMEN EXTENSO EN ESPAÑOL

Resumen Extenso en Español

ESTUDIO SOBRE LAS PERCEPCIONES DEL ALUMNADO GRIEGO, DE LA ETAPA DE SECUNDARIA EN LA ASIGNATURA DE MATEMÁTICAS, REFERENTES A ALGUNOS ASPECTOS DE LA COMPETENCIA DE APRENDER A APRENDER, DESDE UNA PERSPECTIVA DE LA PSICOLÓGICA ESCOLAR EN EDUCACIÓN

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6. EXTENDED SUMMARY IN SPANISH

6.1 Marco teórico

La metacognición se refiere al conocimiento que tiene la persona sobre los procesos de su pensamiento. En el estudio actual, la metacognición se define como el conocimiento del conocimiento, es decir, la conciencia o de la conciencia o la ignorancia y se refiere al seguimiento y control del conocimiento.

El tránsito del nivel cognitivo al metacognitivo se produce a través del conocimiento del individuo sobre sus conocimientos básicos. A nivel cognitivo, las representaciones mentales se producen como resultado de los conocimientos básicos del individuo y se realizan determinadas acciones, que se caracterizan como cognitivas, como el razonamiento, el juicio y la evaluación. En el nivel metacognitivo, el individuo observa su nivel cognitivo para construir el nivel metacognitivo, es decir, los resultados del conocimiento metacognitivo surgen del conocimiento del conocimiento básico (saber lo que sé) (Fleming & Dolan, 2012).

Las habilidades metacognitivas más básicas son (a) la conciencia, (b) la reflexión y (c) la autorregulación. La conciencia se refiere al conocimiento de información, relacionada con el individuo o su entorno cognitivo (software, compañeros de clase, asociados, profesores, etc.), y surge como resultado de la interacción del individuo con su entorno (Medina et al., 2017). La reflexión es la actividad mental en la que los individuos participan explorando sus experiencias para llegar a nuevas percepciones (Lundgren et al., 2017). La reflexión puede tener lugar durante las actividades (reflexión en la acción) o después de la reflexión sobre la acción (Liu & Ball, 2019). Para la autorregulación, que se define como la capacidad del individuo para monitorear y modificar/controlar su comportamiento, cognición y estado de ánimo, así como el entorno, si es necesario para lograr una meta (Kostaridou-Eukleides, 2011).

6.1.1 Requerimientos cognitivos y dificultades en el aprendizaje de las matemáticas

Los investigadores clasifican el conocimiento matemático a través del estudio sistemático de las habilidades y conocimientos individuales que los alumnos deben adquirir para ser considerar que han tenido éxito en el dominio cognitivo de las matemáticas. La mayoría de las clasificaciones a menudo distinguen la importancia y el papel de los elementos estructurales básicos, que en la terminología de A. Orton (1992) son: 1) retención y recuperación de datos, 2) el uso de algoritmos, 3) conceptos de aprendizaje, 4) resolución de problemas.

6.1.1.1 Retención y recuperación de datos

El conocimiento matemático requiere que se retenga la memoria y se recuperen los datos (datos numéricos, términos, fórmulas de simbólicas). En este proceso intervienen varios tipos de memoria, como la de trabajo a corto, a largo plazo, de ordenación, con el objetivo de la utilización automatizada de los datos mencionados anteriormente (Orton, A., 1992). Se considera que la automatización de la recuperación de datos aritméticos es de vital importancia para realizar tareas complejas, como números de trayectos multiples (vectores) y resolución de problemas. Si un estudiante no es capaz de retener las operaciones parciales, sumas, diferencias, productos o cocientes, no será capaz de realizar una tarea compleja (Re et al., 2016). Los estudiantes que, conscientes del papel de la 'llevada' en una suma, se olvidan de utilizarlo, ocupados en encontrar sumas parciales, son un ejemplo representativo.

La asociación de la retención a largo plazo y el uso automatizado de datos con la práctica continua y la repetición contradice los puntos de vista más nuevos que aceptan que la retención a largo plazo presupone la comprensión en lugar del no aprendizaje (Camina, E. & Guell, F., 2017). La enseñanza de datos matemáticos tiene como objetivo tanto cultivar la capacidad de uso creativo en las lecciones escolares (resolución de problemas, física, química) como dentro de las necesidades prácticas de la vida cotidiana. No hace falta decir, por supuesto, a estos objetivos en el tiempo, la satisfacción formal de los requisitos del plan de estudios. El uso generalizado de las habilidades matemáticas requiere la comprensión del significado de los diversos datos. Por ello, se argumenta que la memorización debe postergarse hasta la creación de suficiente fundamento conceptual (Orton, A., 1992). Además, cada nuevo aprendizaje debe integrarse en una red organizada de conocimientos interrelacionados para poder asimilarlo mejor (Parisi et al., 2019). Los datos numéricos, símbolos, términos y fórmulas deben ser claros no solo en cuanto a lo que afirman, sino también cómo se relacionan entre sí, por qué funcionan y cuándo se usan, para que el niño no esté ocioso cuando no puede recordar de inmediato. datos requeridos de la memoria (Hernandez & Chapa, 2010). El conocimiento del niño debe formar una estructura conceptual en lugar de ser piezas individuales de información (Committee on the Science of Children Birth to Age 8, 2015). Un ejemplo representativo sería el término 'menos' que, para tener la funcionalidad necesaria dentro del vocabulario matemático de un niño, debe tener un conocimiento coherente y unidad con el símbolo correspondiente, con las palabras 'menos', 'fuera ' y los tipos y situaciones a través de los cuales se utiliza.

Existe la percepción de que en las primeras etapas del contacto del alumno con las matemáticas es lógico e ineludible transmitir algunos elementos con reconocimiento mecánico y el patrón "estímulo-reacción" del aprendizaje dependiente clásico. La opinión predominante entre los científicos es que en la enseñanza se debe dar importancia a la comprensión del significado de los datos utilizados y luego a la memorización de su expresión simbólica (Hernández & Chapa, 2010).

6.1.1.2 Uso de Algoritmos

El algoritmo es un conjunto de reglas, definidas con precisión, que muestran cómo obtener información de salida definida en función de la información de entrada dada después de un número finito de operaciones (Simanowski, 2018). Los pasos especificados que se toman para ejecutar operaciones con números enteros, fraccionarios o decimales son ejemplos comunes de algoritmos. Los algoritmos son una parte esencial del conocimiento matemático. La memoria es importante en la capacidad de utilizar algoritmos, ya que los algoritmos constan de muchos y estrictos pasos, especialmente a un nivel más complejo que en el caso de los datos numéricos (Hernandez & Chapa, 2010).

A menudo, los estudiantes usan algoritmos y encuentran resultados de acciones sin comprender realmente el significado del proceso que sigue. Esto tiene el efecto de hacer que los alumnos se equivoquen cuando tienen que enfrentarse a situaciones con elementos comunes, aunque no sean exactamente iguales. Por ejemplo, los estudiantes que realizan mecánicamente números de dos dígitos con llevada, cuando se les pide que hagan números de tres dígitos, pueden intentar transferir a todas las llevadas a la columna de las centenas al no conocer correctamente la importancia del valor del sitio y generalizar el 'agregamos a la columna de la izquierda'. La vida cotidiana apoya principalmente el significado de los algoritmos. La incapacidad de algunos niños para captar la importancia de algunos elementos de los algoritmos se debe principalmente al desconocimiento de este significado. Por ejemplo, la necesidad de que las divisiones sean el resto siempre menor que el divisor son las 'reglas no-lógicas', que, según R. Skemp (1976), constituyen la 'comprensión instrumental', que se contrapone al conocimiento de lo que hago y por qué lo hago, que se caracteriza como "comprensión relacional". El mismo investigador continúa que la comprensión correlativa: 1) es más adaptable a nuevas situaciones; 2) es más fácil de recordar; 3) puede ser más fácilmente una motivación de aprendizaje; y 4) proporciona la base para un mayor desarrollo conceptual. De lo contrario, la memoria está cargada de comprensión instrumental cuando no tiene sentido recordar. Realizar la multiplicación con llevada es un ejemplo representativo de un caso en el que los estudiantes primero suman la llevada a decenas y luego multiplican con las unidades moviendo las acciones que realizan para sumar a un contexto diferente de multiplicación. Los estudiantes con problemas de memoria inherentes maximizan las dificultades descritas anteriormente.

El hecho de que la comprensión correlativa ofrece una gran cantidad de ventajas no puede omitirse en el valor de la comprensión instrumental. Como señala R. Skemp (1976), la comprensión instrumental ofrece un refuerzo positivo directo y una sensación de éxito a los estudiantes al garantizar respuestas correctas, aunque no comprensibles, a las preguntas del profesor. También ofrece ventajas a través de respuestas estandarizadas a problemas familiares. Además, A. Orton (1992) informa que existe evidencia que respalda la opinión de que la comprensión instrumental puede facilitar la correlación si se usa correctamente. Ciertamente, debe evitarse el uso de la comprensión instrumental como un enfoque único para el conocimiento matemático. Los algoritmos dependen bastante de las habilidades visuales y espaciales del niño en su proceso de aplicación al realizar operaciones numéricas, aunque son una secuencia específica de acciones. La correcta percepción de la estructura y la parte editorial de los números (serie de dígitos - valor positivo), el inicio de la ejecución del acto desde el punto correcto (columna, número), y sobre todo la colocación de los dígitos en las columnas correctas en la constatación de algunos resultados; la transferencia de dígitos de orden superior ("retenidos") presupone la operación continua de la percepción espacial (National mapping division, 1990). Cabe señalar que es posible que un estudiante conquiste verbalmente el orden de los pasos algorítmicos, pero no sea capaz de realizar las acciones en el orden en que están redactadas (Bellettini et al., 2014).

6.1.1.3 Conceptos de aprendizaje

Se sabe que los conceptos describen alguna regularidad o relación dentro de un conjunto de datos y se representan mediante una señal o símbolo. El conjunto, el número o la suma pueden ser un ejemplo de conceptos matemáticos. A través de estos, se le brinda al usuario la oportunidad de adaptarse a nuevas situaciones con conceptos ya conquistados, que son el elemento principal del poder simbólico de las matemáticas. Al mismo tiempo, estos conceptos suelen implicar muchas dificultades en la lección, ya que su incapacidad para comprender está detrás de un bajo rendimiento (Hernández & Chapa, 2010).

En el contexto de la prevención de dificultades, surge la pregunta de cómo aprender los conceptos. Investigaciones relevantes concluyen que un concepto no puede ser transmitido como un conocimiento prefabricado por alguien que se lo guarda a alguien que lo ignora (Orton, A., 1992). El desarrollo conceptual requiere que el estudiante desarrolle relaciones entre varias unidades de información antiguas o nuevas (Darling-Hammond, 2018). Esta construcción es de carácter personal y depende de los conocimientos previos, la experiencia y la actitud del alumno hacia la materia. Como resultado, el alumno está en el centro del proceso de aprendizaje, teniendo un papel tan activo como sea posible. Un ejemplo podría ser el caso de un alumno que tiene dudas sobre si el sustraendo es siempre inferior al minuendo y si debe aceptar una serie de explicaciones verbales en caso de error. Este estudiante en particular tendría que aplicar una serie de deducciones, que se ejecutarán con una variedad de material, para observar la relación entre la resta y la differencia, lo que finalmente lleva a una conclusión relativa. Por tanto, el profesor debe, en tal caso, ayudar, animar y orientar al alumno para que sintetice las cualidades y características de los conceptos. En la realidad educativa, donde interactúan estudiantes con diferentes antecedentes, sería apropiado utilizar una variedad de métodos de enseñanza para abordar las necesidades individuales de cada estudiante. El uso exclusivo de una determinada herramienta o método de enseñanza en realidad contribuye a la creación de asociaciones en lugar de conceptos, limitando drásticamente las posibilidades de generalizar conocimientos y transferir aprendizajes (Alosaimi, 2016). Hay casos de niños que realizan los cuatro actos utilizando exclusivamente material específico, porque los números sólo cobran sentido a través de este material. En conclusión, la enseñanza de conceptos requiere el uso de varios métodos, como el análisis de conceptos por parte del profesor, la discusión de conceptos entre profesor y alumnos, la representación de conceptos a través de materiales específicos o el descubrimiento de conceptos a través de la resolución de problemas. El hecho de que algunos estudiantes se acerquen a la realidad de diferentes maneras requiere el uso de diferenes métodos y estímulos. Hay alumnos capaces de manejar descripciones verbales de un concepto con facilidad y dar lugar a aplicaciones prácticas mientras que otros realizan primero lo que se les enseña y luego transmiten su discurso verbal.

El uso de ejemplos positivos y negativos exitosos también juega un papel importante. Los ejemplos positivos deben elegirse de tal manera que solo las propiedades que forman el concepto tengan el mismo significado, mientras que los ejemplos negativos deben distinguirse claramente de los positivos (Romppel et al., 2013). Para el concepto de adición, por ejemplo, los ejemplos positivos son casos de unión, acumulación, elongación, síntesis, etc., mientras que los ejemplos negativos son casos de abstracción, desprendimiento, corte, consumo, etc. (Simanowski, 2018). Particularmente en el caso de proyectos complejos y conceptos, palabras y habilidades multifacéticos, la selección de ejemplos positivos necesita una atención especial.

Los conceptos matemáticos están relacionados con su encadenamiento. Así, el alumno tiene la necesidad de controlar hasta qué punto ha conquistado los conceptos "preconcebidos", antes de aprender un nuevo concepto de orden superior (Skemp, R., 1976). Un ejemplo representativo es la conquista del valor honorario, requisito previo para la comprensión de la llevada en la multiplicación. La falta de comprensión de este algoritmo lo convierte en una aplicación mecánica de una secuencia de acciones.

6.1.1.4 Resolución de problemas

En matemáticas, la resolución de problemas es el proceso de encontrar a quienes solicitan un enunciado o propuesta que describa relaciones cuantitativas entre diferentes elementos. Para encontrar a los que se pregunta se utilizan los datos de la propuesta (problema) y otros elementos y sugerencias, cuya verdad y potencia ya conocemos (Re et al., 2016).

Las etapas de la resolución de un problema son: 1) la traducción, la transformación de los elementos de un problema en una representación mental, 2) la integración, la combinación de representaciones individuales en una imagen mental comprensiva y comprensiva del problema, 3) el diseño, es decir, la invención y el control de un plan de solución, 4) la ejecución, la conversión del plan en operaciones numéricas específicas y la búsqueda del resultado. Las primeras tres etapas descritas anteriormente son de naturaleza cualitativa, mientras que el cuarto cuanto tiene por objeto presentar la solución en forma numérica (Maehr, 2001).

Para representar y resolver tales problemas, se necesitan diferentes tipos de conocimiento: 1) conocimiento lingüístico, conocimiento de la estructura del idioma griego y el significado de las palabras, 2) conocimiento fáctico, conocimiento del entorno, 3) conocimiento de modelos 4) Conocimiento estratégico, conocimiento de cómo desarrollar un plan para resolver y presentar una respuesta adecuada, 5) Conocimiento algorítmico, conocimiento de cómo ejecutar las tareas (Maehr, 2001). En el caso de deficiencias de los conocimientos anteriores se presentan diversos errores tales como: 1) desajuste entre el modelo mental del problema que construye el estudiante y la situación descrita en el problema, 2) desajuste entre el modelo mental y su expresión cuantitativa (Volkamer y Renaud, 2013). Kirbulut & Beeth (2013) argumentan que la incapacidad para construir la representación adecuada del problema es la causa principal de las respuestas incorrectas de los niños a los problemas numéricos verbales debido a conceptos erróneos, inadecuación conceptual y conocimiento inadecuado de los procesos. Según Santrock (2016), se propone clasificar los problemas verbales según el tipo de situación descrita en 4 categorías. Más específicamente, se pueden distinguir en 1) problemas de cambio, 2) problemas de combinación, 3) problemas de comparación, 4) problemas de simulación.

Según Re (2016), aspectos importantes de la resolución exitosa de problemas con respecto a los niños más pequeños son: 1) la capacidad de ejecutar operaciones, 2) el nivel de adquisición del vocabulario matemático y 3) el grado de carga de corto plazo. memoria por los términos y la extensión del problema. Una forma de reducir la carga es mejorar la velocidad de lectura, ya que disminuye el número de palabras restringidas (Re et al., 2016). La capacidad de una persona para utilizar estrategias y procedimientos apropiados también juega un papel importante para impulsar la organización y ejecución rápidas y seguras del plan de resolución.

En los últimos años, los estudios sobre la capacidad del niño para elegir la estrategia adecuada de resolución de problemas han conducido esencialmente a un indicador de si el individuo "sabe aprender", es decir, su capacidad metacognitiva (Agaliotis, 2009). De manera característica, Díaz (2015) reporta que el pobre desarrollo de la capacidad metacognitiva se presenta en niños que son incapaces de encontrar lo que van a hacer sin haber sido previamente guiados por una estrategia para resolver un problema.

Además, según la psicología pedagógica moderna, la autoestima del individuo en función de su actividad cognitiva particular es un aporte importante. Esta supuesta habilidad, disponible, es un catalizador para la persistencia del individuo en el diseño e implementación de la solución del problema (Romppel et al., 2013). La visión negativa que una persona tiene de sus capacidades repercute negativamente en la solución de problemas matemáticos en una medida máxima con respecto a cualquier otro elemento estructural (Senko & Dawson, 2017).

6.1.2 Características nativas de las matemáticas como fuente de dificultades de aprendizaje

Las matemáticas como materia cognitiva se caracterizan por algunas peculiaridades que, si se tienen en cuenta en la enseñanza, pueden convertirse en causas de bajo rendimiento o fracaso escolar (Tshabalala & Ncube, 2016). Algunas de las peculiaridades más importantes son: 1) la naturaleza jerárquica de las matemáticas, 2) el código matemático de comunicación, 3) las formas de representación del conocimiento matemático. A continuación, se analiza y examina la naturaleza de estas peculiaridades y su posible relación con las dificultades en la evolución del conocimiento matemático de los niños.

6.1.2.1 La naturaleza jerárquica de las matemáticas

Los conceptos y habilidades matemáticas se estructuran de forma estrictamente jerárquica y se apoyan decididamente en sus antecesores (Linnebo, 2013). Cualquier cobertura incompleta de las secciones del plan de estudios puede conducir al colapso de la estructura matemática y al fracaso en el aprendizaje. Las matemáticas requieren inherentemente una consideración particular y la evaluación de las dificultades de aprendizaje, a medida que el estudiante pasa al siguiente capítulo de la materia, debe haber adquirido los conocimientos previos (Scherer et al., 2016).

6.1.2.2 El código matemático de la comunicación

En matemáticas el código a través del cual se expresan las ideas y situaciones es fuente de dificultad. Las palabras y símbolos utilizados para la comunicación matemática tienen una forma muy especial. Los términos y símbolos matemáticos se refieren a todas las entidades, acciones y situaciones existentes y, al mismo tiempo, a ninguna en absoluto. Esta situación lleva a la necesidad de enseñar el uso específico de la lengua. Adicionalmente, la representación de conceptos matemáticos requiere especial atención y precisión (Agaliotis, 2009).

Una visión común de investigadores como Darling-Hammond (2019), que sugiere que los niños desarrollan habilidades matemáticas integradas en un sistema comprensible de necesidades y actividades. Lo mismo continúa diciendo que, sin embargo, los niños que ingresan al sistema educativo organizado se ven obligados a vincular sus ideas y habilidades preexistentes al código oficial de comunicación de las matemáticas, tratando de restablecer un equilibrio cognitivo en esta transición.

6.1.2.3 Las formas de representación del conocimiento matemático

Según Santrock (2016), la Psicología Cognitiva, entre otras cosas, lleva a la conclusión de que una persona aprende cuando tiene la capacidad de construir conocimiento por sí misma. Agaliotis (2009) agrega que la construcción activa del conocimiento se logra a través de la representación de la realidad. Como refieren Metsamuuronen & Rasanen (2018), Bruner separó la representación en 1) práctica, 2) figurativa y 3) simbólica. La representación transaccional es principalmente cinestésica y táctil. La representación figurativa se basa en el uso de imágenes y gráficos concisos. Finalmente, la representación simbólica se caracteriza por sistemas simbólicos abstractos y pensamiento simultáneo sobre posibles hechos reales. Es cierto que los tres tipos de representaciones tienen una conexión directa entre ellos y la ausencia de conquista de uno repercute directamente en el resto. Lingefjärd & Ghosh (2016), argumentan que especialmente en la enseñanza de las matemáticas, el uso del sistema simbólico matemático para aprender con comprensión puede conducir a la representación de la realidad y el niño es capaz de comprender las representaciones de conceptos a través de materiales concretos, símbolos e imágenes.

6.1.3 Estilo cognitivo y Matemáticas

En el contexto del estudio de los factores que influyen en el rendimiento matemático, el concepto de estilo cognitivo o de aprendizaje. La forma típica en que cada individuo aborda y trata de manejar las diversas obligaciones cognitivas que surgen de su interacción con el entorno es el estilo cognitivo del individuo (Singh, 2017). Los componentes perceptivos y mentales del estilo cognitivo son el resultado de la interacción entre las características definidas biológicamente y las experiencias ambientales. Estos componentes definen los métodos y procedimientos mediante los cuales el individuo procesa y mantiene la información nueva y difícil (Sweller, 2011). Según Steichen et al., (2020), algunos de los parámetros básicos del estilo cognitivo son: 1) la dependencia o no del campo, es decir, la capacidad de manejar la información independientemente de su contexto de presentación o la imposición de una nueva organización en los datos existentes para lograr un resultado. 2) Visualización especial, es decir, la capacidad de identificar y retener patrones e imágenes visuales, a pesar de posibles cambios en su presentación. 3) Reflexión o impulso, es decir, la tendencia a la reflexión y la planificación antes de actuar o, por el contrario, la tendencia al comportamiento inmediato y espontáneo.

Sweller (2011) argumenta que los parámetros anteriores solo constituyen una parte muy pequeña del estilo cognitivo. Estos investigadores proponen un modelo complejo de estilo cognitivo, compuesto por veinte elementos, agrupados en cinco áreas: 1) Entorno directo, referido a las preferencias de la persona en cuanto a sonido, luz, temperatura y mobiliario del lugar de trabajo. 2) Emocionalidad, referida a la motivación, a la insistencia de un individuo en lograr un objetivo, en cumplir con las reglas o desafiarlas, y en la medida de la auto-acción y autonomía. 3) Preferencias sociológicas, referidas a la elección del individuo de trabajar solo, en pareja, como miembro de un grupo, con la ayuda de un adulto o en una variedad de condiciones. 4) Rasgos biofisiológicos que se refieren al canal sensorial preferido para recibir información (acústica, visual, táctil, cinestésica) en el momento del día con los niveles más altos de energía, la necesidad de alimento y la necesidad de movimiento en el momento de relacionarse con información nueva y difícil. 5) Especificaciones del procesamiento de pulsos, referidas al tratamiento holístico o analítico, al predominio del hemisferio cerebral derecho o izquierdo y al acercamiento impulsivo o discreto de los estímulos.

6.1.4 TDAH (Trastorno por Déficit de Atención/Hiperactividad) - Definición y Sintomatología

El TDAH, según Kakouros & Maniadaki, es un trastorno del desarrollo de origen orgánico -según la mayoría de los datos de investigación- que tiene un impacto negativo en muchas áreas del funcionamiento del niño y provoca dificultades graves y persistentes tanto en el propio niño como en su familia y el entorno social más amplio. Las personas con TDAH se diferencian de la media de personas del mismo nivel de desarrollo en su capacidad de concentración, control de sus impulsos y en algunos casos restringen su movilidad. Les cuesta responder a situaciones en las que otras personas lo hacen con mucha facilidad. Estas dificultades se manifiestan en diferentes contextos y pueden tener, a largo plazo, serias implicaciones para el rendimiento académico, el éxito profesional y el desarrollo socioemocional (Merrell et al., 2017). Los principales síntomas del TDAH son:

- Deficit de atención
- Prontitud
- Hiperactividad

Según Barkley (2004), la falta de atención se refiere a las dificultades difusas debidas a la baja atención y la incapacidad para concentrarse. Se manifiestan en habilidades académicas, prácticas y motrices, así como la comunicación a través de la discusión. Se observa principalmente en situaciones que requieren atención a actividades poco claras o repetitivas, como el trabajo escolar individual. Los niños con déficit de atención no se distraen más por los estímulos externos que los niños de su misma edad, pero insisten menos en actividades que no les interesan y no tienen consecuencias directas de satisfacción (Barkley, 2004).

El término impulsividad es la acción que no tiene en cuenta las consecuencias de los actos y se refiere a la incapacidad de inhibir la conducta en función de la circunstancia social. El niño no espera instrucciones, no evalúa la situación, no tiene en cuenta los sentimientos de los demás, da la impresión de irresponsable e inmaduro. Tiene serias dificultades para controlar sus reacciones ante estímulos o eventos irrelevantes, incapaz de contener e ignorar estímulos más interesantes (Merrell et al., 2017). El tercer elemento, la hiperactividad, significa un nivel de actividad cinética o verbal excesivo o inapropiado para el desarrollo que a menudo parece inútil.

Según el Manual Diagnóstico y Estadístico de Enfermedades Psiquiátricas de la Sociedad Estadounidense de Psiquiatría (APA, 1994) DSM-IV, se requieren seis o más síntomas de al menos un área (déficit de atención, hiperactividad-impulsividad) para diagnosticar TDAH y diferentes tipos (hiperactividad-tipo impulsivo, trastorno por déficit de atención, tipo mixto y TDAH en recesión parcial). La Clasificación Internacional de Enfermedades de la Organización Mundial de la Salud CIE-10 reconoce el trastorno de hiperactividad para su diagnóstico requiriendo síntomas en ambas áreas (déficit de atención e hiperactividad-impulsividad) en más de una situación (OMS, 1997). Esta es una afección más grave, incluido el TDAH, según la definición de la Sociedad Estadounidense de Psiquiatría.

6.1.5 Enseñanza y aprendizaje de conceptos y procedimientos matemáticos: enfoques para estudiantes con dificultades de aprendizaje

Como se ha dicho anteriormente, queda claro que la metodología didáctica propuesta para alumnos con dificultades de aprendizaje no es diferente de la metodología propuesta para el aprendizaje matemático en todos los niños. Las dificultades en matemáticas surgen de su forma abstracta, la necesidad de generalizaciones, la peculiaridad de su lenguaje, las diferencias en las nociones entre la forma en que se usan en matemáticas y en la vida cotidiana, el uso de formas simbólicas y representacionales, y estas dificultades se diferencian por concepto y área temática. Más que diagnosticar problemas y discutir formas especiales de enfrentarlos, es interesante identificar las dificultades específicas en un eje matemático temático y sugerir métodos y actividades que pueden ayudar a superarlas.

Los problemas a los que se enfrentan los alumnos con dificultades de aprendizaje de las matemáticas en Educación Secundaria Obligatoria Secundaria se ven incrementados por el carácter "acumulativo" de los conocimientos. Fruto de este rezago respecto a sus demás compañeros, es la gran dificultad para alcanzar los objetivos del plan de estudios.

En particular, el enfoque didáctico propuesto identifica los déficits en el aprendizaje matemático en cada unidad temática de matemáticas y sugiere actividades indicativas y situaciones didácticas que ayuden a los niños a superar estos déficits.

Así, en un plan de estudios completo, por áreas temáticas, se presentan los siguientes:

1. La sucesión de objetivos y su adaptación para niños con dificultades de aprendizaje (clases anteriores - clase actual - adaptación) en una ficha de programación, a partir de los déficits de aprendizaje matemático identificados en cada unidad temática de

matemáticas. Los conceptos matemáticos están estructurados de forma jerárquica y se basan en conocimientos previos. Numerosos conceptos numéricos y geométricos ya se han desarrollado en niños en clases anteriores, así como en escuelas primarias. La educación matemática adecuada se basa en el conocimiento previo de los niños, se basa en sus experiencias, expone a los niños a generalizaciones y deducciones que los conducirán gradualmente a un conocimiento más sistemático. Por ello, la presentación de los objetivos presenta los conocimientos necesarios para cumplir con los objetivos de la asignatura en particular y permite al docente apoyarse en ellos o buscar cubrirlos si identifica lagunas a través de las actividades adecuadas.

2. Las peculiaridades de los conceptos, es decir, una clarificación de elementos importantes relacionados con los conceptos que nos conciernen, con base en los análisis y resultados de la investigación de la educación matemática sobre el curso del desarrollo de los conceptos relevantes.

3. Destacar las dificultades que pueden encontrar los alumnos (dificultades de los alumnos), a partir de las dificultades generales que encontramos en el desarrollo de conceptos relevantes que nos ayuden a comprender los déficits así como las actividades propuestas.

4. Consejos didácticos que dan criterios didácticos para elegir o dar forma a las actividades

5. Actividades orientativas en caso de dificultad

6. Preguntas para el autocontrol y la discusión

Cada sección temática concluye con estas preguntas que resumen los elementos más importantes del módulo y permiten al alumno evaluar los conocimientos y habilidades que ha adquirido, y al docente evaluar el logro de las metas. De esta forma, la evaluación también adquiere un carácter conformacional que permite al estudiante hacer frente a las dificultades y asumir la responsabilidad de desarrollar el propio conocimiento del niño.

La naturaleza evolutiva de las matemáticas, a diferencia de otras enseñanzas que son relativamente independientes del conocimiento (por ejemplo, las ciencias naturales), no "permite" la existencia de lagunas que puedan crear dificultades de aprendizaje significativas. Esta secuencia obliga a ordenar los ajustes del programa por eje temático y clase (Gainsburg, 2012).

6.2 Metodología

6.2.1 Definición del problema

La competencia matemática, en línea con la Recomendación del Parlamento Europeo y el Consejo de la Unión Europea, se define como “la capacidad de desarrollar y aplicar el pensamiento matemático para resolver una serie de problemas en situaciones de la vida cotidiana” (2018, p. 9). Teniendo como base para construir la competencia matemática un conocimiento profundo y válido de los conceptos y relaciones numéricas, el énfasis está tanto en el proceso como en la acción y el conocimiento. La competencia matemática implica, en diversos grados, la capacidad y la voluntad de utilizar modos matemáticos de pensamiento (pensamiento lógico y espacial) y representaciones (tipos, modelos, construcciones, gráficos y tablas).

A través de una perspectiva múltiple, la competencia matemática se define como la capacidad de comprender, juzgar, actuar y utilizar las matemáticas en una variedad de contextos y situaciones, dentro y fuera del campo de las matemáticas, en el que las matemáticas juegan un papel (Robertson & Graven, 2020). Cada habilidad matemática puede funcionar como un componente del conocimiento matemático dentro del campo de las matemáticas y como un puente que lo conecta con el resto del mundo (Darling-Hammond, 2019). La investigación se realizó en el contexto de esta tesis doctoral con el objetivo de explorar la importancia del curso de Matemáticas en diversos aspectos de la vida de los estudiantes con TDAH. A estos niños generalmente les resulta difícil concentrarse en leer un problema y decidir qué acciones elegir. Además, les cuesta, por ejemplo, concentrarse y localizar la información importante de un problema.

Al definir el problema, el investigador se dio cuenta de que los estudiantes deben ser competentes para funcionar en la sociedad. La ciencia de las Matemáticas es necesaria para que adquieran este tipo de habilidades. De esta forma, la necesidad del hombre de comprender tamaños y cantidades y de comparar números y números lo llevó al desarrollo de habilidades matemáticas, rasgos básicos y primarios del pensamiento humano (Butterworth, 2019). Estas habilidades se relacionan principalmente con conceptos, relaciones y estructuras numéricas, y representan diferentes sistemas cognitivos de cálculo numérico y numérico. Cabe señalar, sin embargo, que no se niega la relación de los sistemas aritméticos independientes con otros sistemas cognitivos generales como el razonamiento y el razonamiento a través de este enfoque.

Una adecuada explicación de todas las habilidades matemáticas, especialmente las involucradas en la resolución de un problema, pasa por incluir en nuestro análisis el sistema del lenguaje (Archibald, et al., 2019). Además, la resolución de problemas implica habilidades relacionadas con los cálculos, el razonamiento, las habilidades de lectura y quizás las habilidades visoespaciales (Archibald, et al., 2019). La manifestación exitosa de las habilidades matemáticas requiere que el individuo sea cuidadoso y organizado en la ejecución del proyecto, y que actúe con tal velocidad que evite sobrecargar la memoria de trabajo con volúmenes excesivos de diferentes tipos de información (Fyfe et al., 2019).

La investigación del valor predictivo de los factores individuales en la adopción y manifestación de conductas de evitación es el principal objetivo de este estudio, ya que las motivaciones de los estudiantes, sus habilidades cognitivas y metacognitivas, pero también sus creencias sobre la funcionalidad de ciertas conductas en el aula afectan su comportamiento académico. Además, la investigación busca la relación entre el poder predictivo del objetivo de aprendizaje individual y la manifestación de la autosubversión académica y la evitación de buscar ayuda en el aula, a través de una serie de factores cognitivos y metacognitivos individuales, pero también factores motivadores que confirman a través de este manera, el valor protector de la orientación de aprendizaje para la manifestación de las conductas disfuncionales específicas.

6.2.2 Objectivos

El objetivo general que se persigue con esta investigación es conocer la percepción que tienen los estudiantes de la asignatura de matemáticas de secundaria en instituciones de Grecia sobre algunos aspectos psicológicos, como la motivación hacia los deberes, el autoconcepto, la autoestima y las relaciones con los compañeros.

Más concretamente, se pueden definir los siguientes objetivos específicos:

- Determinar si existe relación entre el rendimiento académico de los estudiantes de matemáticas de la etapa secundaria (12 -15 años) en instituciones de Grecia y algunos aspectos como la motivación hacia la tarea, el autoconcepto, la autoestima, la relación con los compañeros

- Averiguar si existe una relación entre el rendimiento académico de los estudiantes de la asignatura de matemáticas en la etapa secundaria (12 -15 años) en instituciones griegas y la resolución de problemas matemáticos.

6.2.3 Hipótesis o preguntas

La investigación trata sobre la relación del rendimiento académico con la motivación a la tarea de Matemáticas. Por lo tanto, la pregunta principal de la investigación se basa en la pregunta anterior. Además, el investigador a través del instrumento de investigación tuvo la oportunidad de descubrir muchas más cuestiones específicas principales sobre cuestiones básicas que se extraen de la vida cotidiana de los estudiantes y que toda la sociedad docente tiene y se citan más específicamente a continuación.

Una cuestión que se tiene que estudiar es si existe alguna relación entre el desempeño de los estudiantes de 12 a 15 años y la motivación hacia la tarea.

Otro grupo de preguntas está relacionado con el perfil identitario del sujeto. ¿Existe alguna relación entre el rendimiento de los estudiantes en Matemáticas y su género? ¿Existe alguna relación entre el desempeño de los estudiantes en Matemáticas y su área escolar? ¿Existe alguna relación entre el desempeño de los estudiantes en Matemáticas y la formación de sus padres? ¿Existe alguna relación entre el rendimiento de los alumnos en Matemáticas y el entorno de sus padres? ¿Existe alguna relación entre el rendimiento de los estudiantes en Matemáticas y su último año de grado en Matemáticas?

En estos capítulos surgen evidentemente numerosos interrogantes que tienen valor a la vez didáctico, académico, psicométrico y cotidiano. Por lo tanto, una pregunta de investigación que se plantea está relacionada con la relación entre el diseño de aprendizaje de los niños con TDAH y sus habilidades metacognitivas que incluso se relacionan indirectamente con sus planes de decisión de vida. Además, otra interrogante es si existe una relación entre la gestión del aprendizaje de los niños de 12 a 15 años con TDAH y sus características sociodemográficas o su desempeño del último año en matemáticas.

6.2.4 Variables

A continuación se presentan las variables utilizadas en la investigación, separadas en seis matrices, según su tipo, con el fin de investigar el uso de un conjunto de factores individuales (factores cognitivos y metacognitivos) utilizando herramientas de autoinforme.

Tabla 1.
1.1 Variables de la Dimensión Sociodemográfica

Dimensión Sociodemográfica	Descripción	Variables
	Esta dimensión incluye las variables que identifican a los sujetos de investigación	5. Género 6. Fecha de nacimiento 7. Clase 8. Escuela 9. Área Escolar 10. Grado de último año

1.2 Perfil Socio-Académico de las familias Dimensión Variables

Perfil socio-académico de las familias Dimensión	Descripción	Variables
	Esta dimensión incluye las variables que hacen referencia a los estudios y situación de las familias de los sujetos participantes en el estudio.	1. Nivel educativo del padre 2. Nivel educativo de la madre 3. Origen paterno 4. Origen de la madre

1.3 Falta de Uso de Preguntas de Estrategia Dimensión Variables

Falta de uso de la dimensión Preguntas de estrategia	Descripción	Variables
	Esta dimensión incluye las variables que hacen referencia a las Preguntas de Falta de Uso de la Estrategia.	A1-1. Dificultad estudiar examen Matemáticas/aprender bien lo que necesito saber. A1-2. Dificultad para saber a qué se refiere estudiar Matemáticas. A1-3. Dificultad para estudiar metódicamente para comprender el texto que leo. A1-4. Dificultad para darse cuenta de por dónde empezar a leer. A1-5. Dificultad para comprender los puntos principales de algo que leo. A1-6. Dificultad para organizar eficientemente el

		tiempo de estudio. A1-7. Ignorancia de cómo estudiar correctamente. A1-8. Estudiar Matemáticas omitiendo los puntos difíciles.

1.4 Estrategia de profundidad y preguntas de autorregulación Variables de dimensión

Profundidad Preguntas de estrategia y autorregulación Dimensión	**Descripción**	**Variables**
	Esta dimensión incluye las variables que hacen referencia a las Preguntas de Estrategia de Profundidad y Autorregulación	A2-1. Leer algo, subrayando las ideas principales. A2-2. Desconocimiento si sé algo sobre nueva información. A2-3. Estudiar una gran lección de matemáticas dividiéndola en secciones. A2-4. Estudiar explicando las ideas principales con mis propias palabras. A2-5. Estudia Matemáticas a través de diagramas. A2-6. Hacer mucha tarea con contenido similar al de clases. A2-7. Aprende algo tratando primero de entender su significado. A2-8. Primero piensa qué debes hacer para aprender mejor Matemáticas y luego léelo. A2-9. Primero asegurarse de entender lo que se me pide que haga y luego responder a la pregunta. A2-10. Antes de completar un ejercicio lo reviso para evitar errores. A2-11. Útil para resolver un ejercicio/comprender un texto al recordar información relacionada más antigua. A2-12. Manejo exitoso de material durante el tiempo de estudio antes de una prueba. A2-13. Resolución de un ejercicio considerando sus elementos. A2-14. Primero respondo a la pregunta de prueba, luego vuelva a leer para asegurarse de que

		respondió la pregunta formulada.

1.5 Falta de superficie Estrategia Preguntas Dimensión Variables

Dimensión de preguntas de estrategia de falta de superficie	Descripción	Variables
	Esta dimensión incluye las variables que hacen referencia a las Preguntas de Estrategia de Falta de Superficie	A3-1. Estudia Matemáticas intentando identificar las ideas principales y aprende de memoria. A3-2. Estudiar tratando de aprender tanta información como pueda de memoria. A3-3. Aprenda todo lo que se le pedirá en el examen de memoria. A3-4. Estudie el material de Matemáticas una y otra vez para recordarlo. A3-5. Cuando tenga una prueba, aprenda todo de memoria.

1.6 Proceso Cognitivo Preguntas Dimensión Variables

Dimensión de Preguntas de Proceso Cognitivo	Descripción	Variables
Esta dimensión incluye las variables que hacen referencia a las Preguntas del Proceso Cognitivo)	**Planificación** Desarrollar un método de solución, describir planes de solución o seleccionar planes de solución para un problema dado.	B1-1. Hacerme preguntas sobre la lección antes de empezar a estudiar. B1-2. Piensa diferentes formas de resolver un problema y elige la mejor.
	Organización Determinar cómo encajan los elementos dentro de una estructura.	B1-3. Ve más despacio cuando encuentres información importante. B1-4. Encontrar mis propios ejemplos ayuda a comprender mejor la información. B1-5. Utilizar la estructura-organización del texto para comprender mejor.
	Vigilancia Determinar si un proceso o producto	B1-6. Me pregunto constantemente si alcanzaré mis metas.

tiene consistencia interna, detectando la efectividad de un procedimiento a medida que se implementa.	B1-7. Pensar en varias formas de resolver el problema antes de responder. B1-8. Resolviendo el problema, me pregunto si se han tomado en consideración todas las opciones. B1-9. La revisión periódica ayuda a comprender relaciones matemáticas importantes.
Depuración Eliminando todas las observaciones con datos faltantes en alguna de las variables seleccionadas	B1-10. Cuando estudie, haga una pausa para ver si entiendo. B1-11. Pide ayuda cuando no entiendas algo. B1-12. Cuando no puedo resolver un problema matemático, cambio las estrategias. B1-13. Cuando la nueva información es confusa, me detengo y vuelvo a examinar.
Evaluación Juzgar los valores de ideas, materiales y métodos desarrollando y aplicando estándares y criterios.	B1-14. Deténgase y vuelva a leer cuando se confunda. B1-15. Cuando termines el examen sabrás cómo te fue. B1-16. Cuando termina una tarea, se pregunta si existe una manera más fácil de hacerlo. B1-17. Al terminar de estudiar, haga un resumen de lo aprendido. B1-18. Cuando termine la tarea, pregúntese si aprendió tanto como sea posible.

Nota. Fuente: Elaboración propia

6.2.5 Diseño de la investigación

El diseño primario de este estudio fue de carácter específico, aportando una metodología cuantitativa; las fases corresponden a una base de diseño ex post facto de lo anterior por Thistlethwaite & Campbell (1960). Las fases que se siguieron para conseguirlo, fueron las planteadas por Sabariego y Bisquerra (2012), siendo estas las siguientes:

- Fase 1: Análisis exhaustivo de la literatura sobre el tema, en la que se realizó un corpus teórico de mayor relevancia y actualización.

- Fase 2: Evaluación de la situación de partida: A partir de ahí, buscar y desarrollar un instrumento adecuado para la obtención de los datos. Para el caso de su realización se tuvo en cuenta las investigaciones previas realizadas por Barbas, Vermeoulen, Kioseoglou, y Violet (2008), Gonida, & Leontari, (2012); Pintrich, Smith, García y McKeachie (1991), en relación con la motivación, el autoconcepto, la motivación y la adaptabilidad en el aprendizaje.

Una vez seleccionado el instrumento y realizadas las pruebas correspondientes a fin de dotarlo de confiabilidad y validez; procediendo a su ejecución.

- Fase 3: Estudio y análisis de los datos y elaboración del proyecto. Se analizaron y valoraron diferentes datos, reflexionando y discutiendo los resultados con el marco teórico a elaborar en este proceso y ayudar a dar rigurosidad a nuestra investigación, de esta forma dar respuesta a las interrogantes que surgieron durante el proceso de investigación.

El análisis de fase mencionado anteriormente supone limitaciones específicas a tener en cuenta. Por lo tanto, sería de vital importancia referir que la investigación realizada adopte el diseño de investigación ex post facto, que es un método en el que se comparan grupos con cualidades que ya existen en alguna variable dependiente. También conocido como investigación "después del hecho", un diseño ex post facto se considera cuasi-experimental porque los sujetos no se asignan al azar, sino que se agrupan en función de una característica o rasgo particular (Singh, 2017).

Aunque se analizan y comparan diferentes grupos con respecto a las variables independientes y dependientes, no es un verdadero experimento porque carece de asignación aleatoria. La asignación de sujetos a diferentes grupos se basa en la variable de interés para los investigadores.

La investigación ex post facto es ideal para realizar investigaciones sociales cuando no es posible o aceptable manipular las características de los participantes humanos. Es un sustituto de la verdadera investigación experimental y puede usarse para probar hipótesis sobre causa y efecto o relaciones de correlación, donde no es práctico o ético aplicar un verdadero diseño experimental, o incluso cuasi-experimental. A pesar de estudiar hechos que ya han ocurrido, la investigación ex post facto comparte con el diseño de investigación experimental parte de su lógica básica de indagación. Por ejemplo, se intenta: explicar una consecuencia en base a condiciones antecedentes; determinar la influencia de una variable sobre otra variable y probar una afirmación utilizando técnicas estadísticas de prueba de hipótesis. Simon & Goes (2013) explicaron que, en el contexto de la investigación en ciencias sociales, una investigación ex post facto busca revelar posibles relaciones mediante la observación de una condición existente o estado de cosas y buscando en el tiempo los posibles factores contribuyentes.

La investigación ex post facto utiliza datos ya recopilados, pero no necesariamente acumulados para fines de investigación. Ex post facto significa literalmente *de lo que se hace después*. La investigación ex post facto puede verse como una investigación experimental a la inversa. Cohen, Manion y Morison (2000) notaron que en lugar de tomar grupos que son equivalentes y someterlos a diferentes tratamientos para determinar las diferencias en las variables dependientes, un experimento ex post facto comienza con grupos que ya son diferentes en algún aspecto y las búsquedas pueden transformar un diseño de investigación no experimental en un estudio *pseudo-experimental*. La investigación ex post facto, entonces, es un método para descubrir posibles antecedentes de eventos que han ocurrido pero que el investigador no puede manipular. Algunas de las limitaciones asociadas con la investigación ex post facto:

1. No hay una asignación aleatoria al tratamiento, por lo que podría haber factores de confusión inherentes a las variables estudiadas.

2. La muestra no puede considerarse aleatoria, por lo que la generalización es limitada.

3. A menudo hay poca información sobre los abandonos del tratamiento.

Algunas de las principales ventajas de realizar un estudio ex post facto son que los datos ya están recopilados, obtener el permiso para realizar el estudio es menos complicado que inscribir a los participantes, y se requiere menos tiempo para realizar el estudio que para crear nuevos datos (DeRue et al, 2012).

6.2.6 Población y Muestra

a. Población y descripción de la muestra

La muestra de la investigación consta de estudiantes de 12 a 15 años que asisten a unidades de escuela secundaria en Heraklion, Creta, tanto en integración como en el aula general. El criterio de selección de la muestra es el conocimiento de los Centros de Apoyo Educativo y de Orientación, que, en conjunto con los Centros Médicos Pediátricos Públicos, son los últimos responsables del diagnóstico, diferenciación y desarrollo de un adecuado programa de intervención y apoyo de acuerdo con la legislación (artículo 4 de la Ley 3699, Gaceta Oficial 199A, 10-2-2008 y artículo 28, inciso 21 de la Ley 4186, Gaceta Oficial 193A, 17-9-2013). Los estudiantes que participaron en el estudio fueron diagnosticados con TDAH diagnosticado anteriormente (trastorno por déficit de atención con hiperactividad). La muestra fue seleccionada tanto en zona urbana como no urbana. Además, la ciudad de Heraklion (población de la prefectura: 304.270), que fue seleccionada para la investigación, es la cuarta ciudad más grande de Grecia (población: 10.815.197, Autoridad Estadística Helénica, censo, 2011). Sería de vital importancia informar que una cantidad importante de niños con TDAH fueron seleccionados de esta prefectura específica de 17 escuelas en total. En una muestra no probabilística, como en el presente estudio, no hay forma de calcular la probabilidad que tiene cada individuo de ser incluido en la muestra. Así, la selección de la muestra se realizó de forma aleatoria a través de la característica común de los alumnos con TDAH. La situación anterior explica el hecho de que todas las muestras de no probabilidad se basan en el juicio personal del investigador en lugar de alguna forma de procedimiento mecánico para la selección de los miembros de la muestra. En un muestreo estratificado como este, primero ocurre una división de la "población" en grupos mutuamente excluidos y luego la selección de una muestra aleatoria simple de cada grupo. Después de dividir la muestra en grupos, entre las escuelas del área urbana y no urbana, la selección de los integrantes se realizó solo por conveniencia (muestreo aleatorio simple), en el que la investigación se centró en las personas más accesibles para participar en la investigacion.

b. Tipo de muestreo o selección de la muestra

El método de muestreo utilizado es el muestreo de factibilidad (Zihao et al., 2021; Kim et al., 2015), ya que se refiere a la selección de ciertos grupos poblacionales que satisfacen supuestos específicos, para las necesidades de nuestra investigación, estudiantes con TDAH.

A continuación se presentan los descriptivos de cada variable utilizada por separado, en relación al sexo, fecha de nacimiento, clase, escuela, área escolar, formación de los padres, origen de los padres, último año de licenciatura en Matemáticas y Trastorno por Déficit de Atención con Hiperactividad.

De los 110 estudiantes que participan en este estudio, el 72,7% (N = 80) son hombres, mientras que el 27,3% restante (N = 30) son mujeres.

De los 110 estudiantes que participaron en este estudio, 0,9% (N = 1) nació en 2007, 28,2% (N = 31) en 2006, 32,7% (N = 36) en 2005, 36,4 % (N = 40) en 2004, mientras que el 1,8% restante (N = 2) nació en 2003.

De la muestra de 110 estudiantes, el 36,4% (N = 40) cursa 1º de Secundaria, mientras que el 31,8% (N = 35) cursa 2º y el restante 31,8% a la 3ra clase de la escuela secundaria.

De los 110 estudiantes que participan en este estudio, el 59,1% (N = 65) vive y asiste a la escuela secundaria ubicada en un entorno urbano de la ciudad de Heraklion, mientras que el porcentaje restante vive en áreas rurales de la prefectura de Heraklion y consta del 40,9% (N = 45) del total.

De los 110 estudiantes que participan en este estudio, el 9,1% (N = 10) de su último año de grado en Matemáticas es inferior a 10 sobre 20, el 21,8% (N = 24) es 11-12, 30% (N = 33) es 13-14, 23,6% (N = 26) es 15-16, 7,3% (N = 8) es 17-18, mientras que el 8,2% restante (N = 9) es 19-20.

De los 110 estudiantes que participaron en este estudio, el 43,6% (N=48) presenta Déficit de Atención, 31 de ellos eran niños y 17 niñas, el 15,5% (N=17) presenta Déficit de Atención e Hiperactividad, 15 de ellos eran niños y 2 niñas, el 29,1% (N=32) presenta Déficit de Atención e Impulsividad, de ellos 24 eran niños y 8 niñas, mientras que el 11,8% restante (N=13) presenta Déficit de Atención e Hiperactividad e Impulsividad, 10 de ellos eran niños y 3 niñas.

De los 110 estudiantes con TDAH que participaron en este estudio, 40 asistían a la 1ª clase de secundaria, 35 a la 2ª clase y 35 a la 3ª clase de secundaria.

De los 110 estudiantes que participaron en este estudio, el 25,5% (N = 28) de la formación del padre es primaria, el 21,8% (N = 24) es secundaria, el 27,3% (N = 30) es Bachillerato, el 5,5% (N=6) es Educación Técnica, el 15,5% (N=17) es Universitario, mientras que el restante 4,5% (N=5) es otro (no especificado).

De los 110 estudiantes que participaron en este estudio, el 10,9% (N = 12) de la educación de su madre es primaria, el 16,4% (N = 18) es secundaria, el 40,9% (N = 45) es Bachillerato, el 11,8% (N=13) es Educación Técnica, el 17,3% (N=19) es Universitario, mientras que el restante 2,7% (N=3) es otro (no especificado).

De la muestra de 110 estudiantes, el 94,5% (N = 104) de origen paterno es Grecia, mientras que el 3,6% (N = 4) es Albania, el 0,9% (N = 1) es país de la UE y el otro 0,9% restante es América, Canadá y Australia.

De la muestra de 110 estudiantes, el 90,9 % (N = 100) de origen materno es Grecia, mientras que el 2,7 % (N = 3) es Albania, el 1,8 % (N = 2) es la antigua Unión Soviética países, el 2,7% (N = 3) es país de la UE, el 0,9% (N = 1) es América, Canadá y Australia y el otro 0,9% restante es Asia y África.

6.2.7 Instrumento

En el contexto de la investigación, se solicitó al responsible que se pusiese en contacto con la dirección de la escuela para llevar a cabo la encuesta. Posteriormente, tras recibir el permiso por escrito de los padres y tutores del alumno con TDAH, en contacto con el colegio y en una reunión programada que no interfiriera con el buen funcionamiento del colegio, la investigadora realizó la encuesta de forma presencial en colaboración con la escuela y el maestro de aula. La encuesta se llevó a cabo en toda la clase para garantizar el anonimato y la igualdad de trato de los participantes y para evitar apuntar a los niños con TDAH que son el tema principal. Es importante aclarar que no hubo comunicación interpersonal entre los estudiantes y la encuesta, ya que la investigación no se realizó en forma de entrevista, sino en toda el aula de los estudiantes. Tras cumplimentar los cuestionarios de los alumnos, en colaboración con el profesor del departamento, se indicaba a la investigadora qué cuestionarios cumplimentaban los alumnos con TDAH para poder recogerlos exclusivamente. El investigador recolectó los datos a través de un cuestionario creado para el propósito de esta investigación.

La fase de recogida del cuestionario de la encuesta duró ocho semanas.

Sería de vital importancia referir que en el instrumento especializado estabilizado que se utilizó para la investigación había un capítulo específico de preguntas que tenían más relación con ausencia de estrategias, un segundo capítulo que tenía relación específica con las estrategias de profundidad y la Autorregulación. y un último capítulo que tuvo relación con las estrategias de superficie.

a. Validez y fiabilidad

Esta investigación en curso en el estudio de los enfoques y estrategias de enseñanza que conducen a la solución de los problemas de la vida requiere el estudio de un parámetro básico específico y se utiliza en el cuestionario denominado 'Uso de estrategias' por el Profesor Asistente de Psicología de la Universidad Aristóteles de Tesalónica, Gonida Sofia-Eleftheria y la Profesora de Psicología Escolar de la Escuela de Educación Preescolar de la Universidad de Tesalia, Leontari Angeliki (2012).

El propósito de este cuestionario es medir el uso de estrategias por parte de los estudiantes de Gymnasium y High School. El cuestionario se basó inicialmente en una serie de otras herramientas en inglés, como las escalas relevantes del Motivated Strategy Learning Questionnaire (MSLQ, Pintrich et al., 1991), el Learning and Study Strategies Questionnaire (LASSI, Weinstein, Shulte, & Palmer, 1987) y las escalas relacionadas utilizadas por Andrade (2019). Una serie de exámenes piloto precedieron a la formulación del cuestionario final, que incluía preguntas de los cuestionarios anteriores, así como preguntas nuevas.

La validez y confiabilidad de la investigación son factores importantes que el investigador debe velar por su investigación. Este cuestionario garantiza su validez, ya que el análisis de los componentes principales con una rotación varimax rectangular aplicada a los datos reveló la existencia de los tres factores anteriores teniendo en cuenta el criterio de Kaiser (unidad-especificidad) y el criterio de Catell (gráfico de 'codo'). ', gráfico de sedimentación). Las cargas de consulta por factor fueron > .40. La confiabilidad de la consistencia interna (alfa de Cronbach) fue a =

.82 para la subescala que mide la ausencia de estrategias, a = .80 para la subescala de estrategias de alto nivel y a = .62 para la subescala de estrategias de bajo nivel. Además, en términos de la confiabilidad de la consistencia interna de la investigación (alfa de Cronbach) se estima que es a = .81 para la subescala que mide la ausencia de estrategias, a = .78 para la subescala de estrategias de alto nivel y a = .71 para la subescala de estrategias de bajo nivel, eventualmente en el mismo nivel que las del autor.

El análisis factorial se ve significativamente afectado por la calidad de los datos disponibles para nosotros. Las variables deben estar suficientemente correlacionadas ($r > .20$) y al mismo tiempo no demasiado correlacionadas ($r <.80$). Las ecuaciones deben ser lineales y los valores deben estar cerca de la mediana. SPSS proporciona dos indicadores para el control de calidad de los datos, uno de los cuales es el Índice de Keiser-Meyer-Olkin que califica la adecuación de la muestra (> .50).

La prueba de KMO y Bartlett es estadísticamente significativa ya que los cuatro valores de las subdimensiones están cerca de 0,8. Sería importante mencionar que cuanto más cerca del valor 1 esté el valor r, más útil será para aplicar el análisis factorial al estudio de investigación.

En las tablas posteriores se extraen mediante análisis factorial las cuatro subdimensiones y se separan adecuadamente en componentes. Los componentes se agruparon según los valores de r, (donde $0,2 < r < 0,8$) y las variables se dividieron en subgrupos para que sus valores estuvieran más relacionados entre sí.

En la primera dimensión la división se hizo en dos componentes.

En la segunda dimensión la división se hizo en cuatro componentes.

En la tercera dimensión no se hizo división.

En la cuarta dimensión la división se hizo en cinco componentes.

b. Diseño de instrumentos

El cuestionario consta de 27 preguntas (ver Apéndice) que están organizadas en tres subescalas:

a) la subescala que mide el uso de estrategias de alto nivel como estrategias de profundidad, estrategias metacognitivas y estrategias de autorregulación, tales como:

– Cuando estudio, trato de explicar las ideas principales con mis propias palabras,

– Cuando leo matemáticas, hago dibujos o diagramas a los que adjunto los puntos principales.

– Cuando termino un ejercicio, lo vuelvo a mirar desde el principio para evitar errores.

b) la subescala que mide el uso de estrategias de bajo nivel, como las estrategias superficiales, tales como:

– Cuando estudio, trato de almacenar la mayor cantidad de información posible,

– Cuando estudio, leo el material de Matemáticas muchas veces para poder recordar.

c) la escala que mide la ausencia de estrategias, como

– Cuando leo sobre Matemáticas, muchas veces pienso que no sé de qué se trata,

– A menudo encuentro que no sé por dónde empezar a leer.

El cuestionario incluye 17 preguntas adicionales que se denominaron como la escala de Preguntas del proceso cognitivo y se separaron en 5 subcategorías:

a) la subescala de Planificación

– Me hago preguntas sobre la lección antes de empezar a estudiar.

b) la subescala de Organización, como

– Busco mis propios ejemplos para comprender mejor la información.

c) la subescala de Monitoreo, como

– Cuando resuelvo un problema, me pregunto si he tenido en cuenta todas las opciones.

d) la subescala de Depuración, como

– Cuando no puedo resolver un problema de matemáticas, cambio las estrategias.

e) la sub-escala de Evaluación, como

– Cuando termino una tarea, me pregunto si he aprendido tanto como sea posible.

La muestra de la investigación (niños con TDAH) respondió las preguntas en una escala tipo Likert de 5 puntos (1= nada, 2= un poco, 3= bastante, 4= mucho, 5= muy fuerte).

c. Administración - Implementación del instrument

La investigación debe garantizar el consentimiento de los padres y tutores de los alumnos, el anonimato de los participantes de la investigación y la protección, de conformidad con la legislación vigente, de sus datos personales sensibles, la provisión de la posibilidad de que los participantes de la investigación rescindan su participación. En cualquier etapa de su realización y protección en la investigación de la exposición a posibles riesgos o sufrimientos físicos o psíquicos u otros efectos adversos sufridos en el proceso de investigación.

Asegurar el consentimiento informado de los padres y tutores de los estudiantes en la investigación asegura que todos los participantes, padres y estudiantes comprendan completamente el propósito de la investigación, el proceso en el que van a estar involucrados, las razones de su participación, la naturaleza opcional de su participación, su capacidad para salir en cualquier etapa de la investigación.

La presente investigación se preocupa por buscar la relación del pensamiento lógico-matemático con las decisiones lógicas de vida y la resolución de problemas de la vida. El Ministerio de Educación, Investigación y Asuntos Religiosos fue autorizado para hacerlo. La investigación preveía inicialmente la cumplimentación de cuestionarios por parte de los alumnos. La recolección de datos se realizó principalmente a través de cuestionarios de autoinforme por parte de los estudiantes del 1°, 2° y 3° grado del Gymnasium. Se planeó completar la recolección de datos en una reunión, cuya duración se fijó después de consultar con la dirección de la escuela y los maestros de aula, fuera del horario diario.

Es importante señalar que la participación de los estudiantes se aseguró con el consentimiento por escrito de los padres, se respetó el principio de confidencialidad y toda la información se utilizó únicamente para el propósito de la investigación. Los datos de la encuesta permanecieron en la computadora del investigador con un código de seguridad y no hay riesgo de fuga.

Además de la parte formal de asegurar, mediante carta, el consentimiento informado de los participantes de la investigación o de los padres y tutores de los estudiantes menores de edad, se consideró necesario que el investigador armonice la conducción de su investigación con los artículos 3 y 12 de la Convención de los Derechos del Niño

(a) En todas las acciones que involucren a niños, se tendrá en cuenta el interés superior del niño (Art. 3); y

(b) Debe garantizarse el derecho de los niños a poder expresar libremente sus opiniones, teniendo en cuenta su edad y madurez (art. 12). Por lo tanto, en el contexto de la realización de la investigación, en paralelo con la carta de consentimiento de los padres, se proporcionó a los alumnos menores de edad las instalaciones adecuadas con respecto a:

(i) Informarles del propósito y procedimiento de la investigación.

(ii) Asegurar su anonimato y la confidencialidad de los datos

(iii) El carácter voluntario de su participación; y

(iv) Su capacidad de retirarse en cualquier etapa de su conducta

(Ley 2472/1997, sobre la protección de las personas con respecto al procesamiento de datos personales en Grecia).

La investigación está dirigida a alumnos con TDAH que presentan dificultades con las formas habituales de comunicación oral y escrita. Se le brinda al investigador la oportunidad de explorar vías alternativas de comunicación que le faciliten la obtención de respuestas genuinas respecto a la participación opcional o el retiro de los estudiantes con discapacidad participantes en cualquier etapa de la investigación.

Con espíritu de respeto a los derechos humanos, la investigadora hizo todo lo posible por llevar a cabo la investigación con la colaboración del Rector y el docente de cada unidad escolar. En relación con garantizar el anonimato de los participantes de la investigación y la protección de datos personales sensibles de conformidad con la legislación vigente, el investigador, de conformidad con la legislación vigente, proporciona una descripción completa de cómo garantizar, en cada etapa de la investigación (recolección, procesamiento y divulgación), el anonimato de todos los involucrados y trata los datos de la investigación como absolutamente confidenciales.

Finalmente, se destaca que el investigador se ha asegurado de que el proceso de recolección de datos de la investigación sea compatible con los tratados y convenciones internacionales relacionados con los derechos humanos en la educación.

6.3 Resultados

Este capítulo presenta todos los resultados generados por la investigación, luego de aplicar análisis estadísticos a los datos cuantitativos. Inicialmente, en el presente estudio se presentan los descriptivos de cada variable utilizada por separado. Además, los siguientes son los resultados del análisis inferencial realizado para investigar las dimensiones de la falta de uso de la estrategia, la estrategia profunda y la autorregulación, la estrategia superficial y las preguntas del proceso cognitivo según el género, la edad, la clase, la escuela. área, la formación y procedencia de los padres, el último curso de grado en Matemáticas y el Trastorno por Déficit de Atención con Hiperactividad.

Las dimensiones analizadas a continuación, incluyen tanto estrategias cognitivas como metacognitivas. Las estrategias cognitivas ayudan a codificar, retener y comprender de manera más efectiva el material de aprendizaje. Las estrategias metacognitivas se refieren al control voluntario, la regulación y la organización de los procesos cognitivos, como la planificación, la selección de estrategias cognitivas, el control de la eficacia de las estrategias y la adaptación o regulación de las mismas al resolver un proyecto cognitivo.

6.3.1 Dimensión 1: Falta de uso de preguntas de estrategia

En la pregunta A1_6, se muestra a niños a quienes se les preguntó si les resulta difícil organizar el tiempo de estudio de manera efectiva. Esta pregunta parece tener un significado más fuerte para los niños de 2° Básico ($M= 3.57$) y 3° Básico ($M= 3.03$) más que para los niños de 1° ($M= 2.78$), quienes respondieron que no. encuentran difícil la gestión del tiempo de estudio, [$F(2, 107)= 3.154$, $p= .047$].

Un resultado estadísticamente importante da la pregunta A1_8 en la que se pregunta a los niños si omiten los puntos difíciles, cuando estudian Matemáticas. Los niños que viven fuera de la ciudad de Heraklion ($M=3.13$) parecen tener este hábito de omitir puntos difíciles, más que los niños que viven en la ciudad ($M=2.51$), [$t(108)=-2.090$, $p=. 039$].

La pregunta A1_1 describe a los niños a los que les resulta difícil estudiar de una manera que les ayudará a aprender bien lo que necesitan saber, cuando tengan un examen de matemáticas. Esta pregunta parece tener un significado más fuerte para los niños con grado de último año en Matemáticas inferior a 10 (M= 3,70), 11-12 (M= 3,54), 13-14 (M= 3,00) o 15-16 (M= 3,00) . Los niños con grado de último año en Matemáticas 17-18 (M= 2,13) o 19-20 (M= 2,11) no parecen tener este tipo de dificultad, [F(5, 104)= 3,130, p= ,011].

6.3.2 Dimensión 2: Estrategia de profundidad y preguntas de autorregulación

En la pregunta A2_7 se preguntó a los niños si aprenden algo tratando primero de entender su significado. Esta pregunta parece tener más significado para las chicas (M= 4,23) de la muestra que para los chicos (M= 3,61), [t(108)= -2,458, p= ,016].

Un resultado estadísticamente importante da la pregunta A2_11 en la que se pregunta a los niños si tienen que resolver un ejercicio o entender un texto, intentan recordar alguna información más antigua que pueda estar relacionada con ellos, porque eso les ayuda. Las chicas (M=3,67) muestran darle más importancia que los chicos (M=3,06), [t(108)=-2,190, p=,031].

Otra pregunta estadísticamente significativa es la A2_14, en la que se pregunta a los niños si cada vez que contestan una pregunta en un test, finalmente la vuelven a leer, para asegurarse de que han dado la respuesta a la pregunta planteada. Esta pregunta parece tener un impacto significativo para las chicas (M=4.13) más que para los chicos (M=3.51), [t(108)-2.632, p=.010]. En la pregunta A2_4 se preguntó a los niños si intentan explicar las ideas principales con sus propias palabras, cuando estudian. Los niños que viven en la ciudad de Heraklion (M= 3,51) parecen tener este hábito de explicar las ideas principales de lo que aprenden con sus propias palabras, más que los que viven fuera de la ciudad (M= 2,89), [t(108)= 2.440, p= .016].

Un resultado estadísticamente importante lo da la pregunta A2_11 en la que se pregunta a los niños si se les ayuda, cuando tienen que resolver un ejercicio o comprender un texto, al tratar de recordar alguna información más antigua que pueda estar relacionada con ellos. Los niños que viven en la ciudad de Heraklion (M=3.49) parecen reaccionar de esta manera más arriba que los niños que viven fuera de la ciudad (M=2.84), [t(108)=2.616, p=.010].

En la pregunta A2_5 se representa a niños que dibujan diseños o diagramas a los que vinculan los puntos principales, cuando estudian Matemáticas. Esta pregunta parece tener mayor significado para los niños cuyos padres han terminado otra (M= 3,60) o Universidad (M= 2,88). Los niños cuyos padres han terminado Secundaria (M= 2.21), Primaria (M= 2.07), Bachillerato (M= 1.83) o Educación Técnica (M= 1.83) parecen no estudiar de esta manera, [F(5, 104))= 2.992, p= .015].

Un resultado estadísticamente significativo da la pregunta A2_6 en la que los niños hacen muchos deberes, como los que hacen en el aula. Esta pregunta parece tener un significado más fuerte para los niños cuyos padres han terminado la Universidad (M= 3,24), otros (M= 3,20) o la escuela primaria (M= 3,00). Los niños cuyos padres han terminado Secundaria (M= 2.58), Bachillerato (M= 2.10) o Educación Técnica (M= 1.50) parecen no comportarse de la misma manera y no hacen los deberes así en el salón de clases, [F(5, 104)= 2.681, p= .025].

Un resultado estadísticamente importante da la pregunta A2_11 en la que los niños intentan recordar alguna información más antigua que pueda relacionarse con lo que leen, para ayudarse a sí mismos, cuando tienen que resolver un ejercicio o entender un texto. Esta rutina de recordar información relativa representa mejor a niños con último año de grado en Matemáticas 15-16 (M= 3.81), menor que 10 (M= 3.70), 17-18 (M= 3.50), 11-12 (M= 3.21) . Los niños con último curso de grado en Matemáticas 13-14 (M= 2,85) o 19-20 (M= 2,22) parecen no tener este tipo de rutina a la hora de resolver un ejercicio o intentar comprender un texto, [F(5, 104) = 3.266, p= .009].

En la pregunta A2_6 se muestra a niños que hacen varios ejercicios de tarea, similares a los que hacen en clase. Esta pregunta parece tener un significado más fuerte para los niños con Déficit de Atención (M= 3.00) y Déficit de Atención e Hiperactividad (M= 2.94) más que para los niños con Déficit de Atención e Impulsitividad (M= 2.22) y Déficit de Atención e Hiperactividad e Impulsividad (M= 1.85) , [F(3, 106)= 3.439, p= .020].

Además, un resultado estadísticamente importante da la pregunta A2_13 en la que los niños con Déficit de Atención (M= 4,13) y Déficit de Atención e Impulsitividad (M= 3,94) que tienen que resolver un ejercicio, lo primero que intentan es entender qué este ejercicio requiere de ellos. En cambio, los niños con Déficit de Atención e

Hiperactividad (M= 3,65) y Déficit de Atención e Hiperactividad e Impulsitividad (M=2,85) muestran una menor importancia a esto, [F(3, 106)= 4,257, p=.007].

6.3.3 Dimensión 3: Preguntas de estrategia de superficie

En la pregunta A3_5, se muestra a los niños a quienes se les preguntó si intentan aprender todo de memoria cuando tienen un examen. Esta pregunta parece tener un significado más fuerte para los niños de 1º de Secundaria (M= 3,85) y de 3º (M= 3,31) más que para los de 2º (M= 2,97), quienes respondieron que no. aprender todo de memoria, para estar preparado en un examen, [F(2, 107)= 3.810, p= .025].

En la pregunta A3_3, se observan niños que intentan aprender de memoria todo lo que creen que se les pedirá para el examen. Esta pregunta parece tener un significado más fuerte para los niños cuyas madres terminaron la escuela primaria (M= 4.33), la secundaria (M= 4.00), la secundaria (M= 3.80), la universidad (M= 3.68) o la educación técnica (M= 3.68). 3.54). Los niños cuyas madres han terminado otros (M= 2,00) parecen no estudiar de esta manera, [F(5, 104)= 2,413, p= ,041].

En la pregunta A3_5 se preguntó a los niños si aprenden todo de memoria, cuando tienen un examen. Esta pregunta parece tener un significado significativo para los estudiantes cuyas madres son griegas (M= 3,49) más que aquellos cuyas madres son de otro país (M= 2,50), [t(108)= 2,123, p= ,036].

6.3.4 Dimensión 4: Preguntas sobre procesos cognitivos

En la pregunta B1_6 se preguntó a los niños si siguen preguntándose si podrán alcanzar sus metas. Esta pregunta parece tener más significado para las chicas (M= 3,97) de la muestra que para los chicos (M= 3,31), [t(108)= -2,315, p= ,023].

Un resultado estadísticamente importante da la pregunta B1_14 en la que se pregunta a los niños si se detienen y vuelven a leer cuando están confundidos. Las chicas (M=4,33) muestran dar más importancia a esto que los chicos (M=3,70), [t(108)=-2,419, p=,017].

Otra pregunta estadísticamente significativa es la B1_18 en la que se pregunta a los niños cuando terminan un trabajo, si se preguntan si han aprendido lo máximo posible. Esta pregunta parece tener un impacto significativo para las chicas (M=3.73) más que para los chicos (M=3.15), [t(108)-2.184, p=.031].

La pregunta B1_1 representa a los niños que se hacen preguntas sobre la lección antes de comenzar a estudiar. Esta pregunta parece tener un significado más fuerte para los niños que nacieron en 2003 (M= 3,50), en 2006 (M= 2,84) y en 2004 (M= 2,25). Los niños que nacieron en 2005 (M= 1,89) y en 2007 (M= 1,00) parecen preguntarse menos sobre la lección antes de empezar a estudiar, [F(4, 105)= 2,883, p= ,026].

Además, un resultado estadístico importante da la pregunta B1_15 en la que los niños que nacieron en 2007 (M= 5,00), en 2004 (M= 3,20) y en 2003 (M= 3,00), parecen saber cómo les fue, cuándo terminar un examen. Por otro lado, los niños que nacieron en 2005 (M= 2.69) y en 2006 (M= 2.39) afirman no saber cómo les fue, cuando terminan un examen, [F(4, 105)= 2.795, p =.030].

En la pregunta B1_1 se muestra a niños a quienes se les preguntó si se hacían preguntas sobre la lección antes de comenzar a estudiar. Esta pregunta parece tener un significado más fuerte para los niños de 1° de Secundaria (M= 2,68) y de 3° (M= 2,29) más que para los de 2° (M= 1,91), quienes respondieron que no. tienen este hábito a la hora de estudiar, [F(2, 107)= 3.071, p= .050].

Un resultado estadísticamente significativo da la pregunta B1_2 en la que se pregunta a los niños si eligen la mejor manera de resolver un problema, entre muchas maneras diferentes. Los niños de 1º de Secundaria (M= 3,23) y de 3º (M= 3,14) parecen pensar en formas diferentes de resolver un problema más que los niños de 2º (M= 2,54), quienes respondieron que no No tengo este tipo de hábito, [F(2, 107)= 3.885, p= .024].

Además, un resultado estadísticamente importante da la pregunta B1_17 en la que los niños de 1º de Secundaria (M= 3.23) y 3º de Bachillerato (M= 3.00) hacen un resumen de lo aprendido, al terminar de estudiar, a diferencia de los estudiantes de 2ª Clase (M= 2,40), que en realidad no actúan de la misma manera, [F(2, 107)= 3,435, p= ,036].

En la pregunta B1_9 se preguntó a los niños si reexaminan periódicamente algo que estudian, para ayudarlos a comprender las relaciones importantes. Los niños que viven en la ciudad de Heraklion (M= 2.66) parecen tener este hábito de reexaminar periódicamente lo que estudian, más que los que viven fuera de la ciudad (M= 2.07), [t(108)= 2.317, p= .022].

Un resultado estadísticamente importante da la pregunta B1_13 en la que se preguntó a los niños si se detenían y reconsideraban, cuando la nueva información es confusa. Los niños que viven en la ciudad de Heraklion (M=3.57) parecen reaccionar de esta manera más arriba que los niños que viven fuera de la ciudad (M=2.87), [t(108)=3.042, p=.003].

En la pregunta B1_6, los niños se preguntan constantemente si alcanzarán sus metas. Esta pregunta parece tener un significado más fuerte para los niños cuyos padres terminaron la escuela secundaria (M= 4,00), otros (M= 4,00) o la universidad (M= 3,82). Los niños cuyos padres han terminado Secundaria (M= 3,43) Educación Técnica (M= 3,00) o Primaria (M= 2,93) parecen preguntarse menos por sus metas, [F(5, 104)= 2,317, p= ,049].

Un resultado estadísticamente significativo da la pregunta B1_15 en la que los niños saben cómo les fue, cuando terminan un examen. Esta pregunta parece tener un significado más fuerte para los niños cuyos padres terminaron la secundaria (M= 3,42), otra (M= 3,40), secundaria (M= 2,83) o educación técnica (M= 2,83). Los niños cuyos padres terminaron la Primaria (M= 2.61) o la Universidad (M= 2.12) parecen no saber cómo les fue, después de terminar un examen, [F(5, 104)= 2.644, p= .027].

Además, un resultado estadísticamente importante da la pregunta B1_16 en la que los niños que terminan una tarea, se preguntan si había una forma más fácil de hacerlo. Esta pregunta parece tener un significado más fuerte para los niños cuyos padres han terminado la escuela secundaria (M= 3,71), la universidad (M= 3,41) o la escuela primaria (M= 3,18). Los niños cuyos padres han terminado otra (M= 2,60), Bachillerato (M= 2,57) o Educación Técnica (M= 2,33) parecen preguntarse menos si existe una manera más fácil de hacer una tarea, al terminarla, [F(5 , 104)= 2.641, p= .027].

En la pregunta B1_5 se describe a niños que usan la estructura y organización del texto para comprender mejor. Esta pregunta parece tener un significado más fuerte para los niños con Déficit de Atención (M= 3.46) y Déficit de Atención e Hiperactividad (M= 3.59) más que para los niños con Déficit de Atención e Impulsividad (M= 2.84) y Déficit de Atención e Hiperactividad e Impulsividad (M= 2.77) , [F(3, 106)= 2.754, p= .046].

Además, un resultado estadísticamente importante da la pregunta B1_14 en la que los niños con Déficit de Atención (M= 4,27) y Déficit de Atención e Impulsitividad (M= 3,69), se detienen y vuelven a leer cuando están confundidos. En cambio, los niños con Déficit de Atención e Hiperactividad (M= 3,59) y Déficit de Atención e Hiperactividad e Impulsitividad (M= 3,23) muestran que le dan menos importancia, [F(3, 106)= 3,524, p=.018].

6.3.5 La relación entre las dimensiones

La **regresión lineal** es un método estadístico mediante el cual se puede comprobar la correlación lineal entre determinadas variables. En otras palabras, se controla la tasa de influencia de unas variables (independientes) sobre otra variable (dependiente). En esta investigación el papel de las variables independientes está llamado a ser seguido por 3 variables (dimensiones). Seleccionando la Dimensión 2, cada mediador independiente expresa lo siguiente:

a. Dimensión 1: Falta de uso de preguntas de estrategia

b. Dimensión 3: Uso de preguntas de estrategia de bajo nivel

c. Dimensión 4: Preguntas sobre el proceso cognitivo

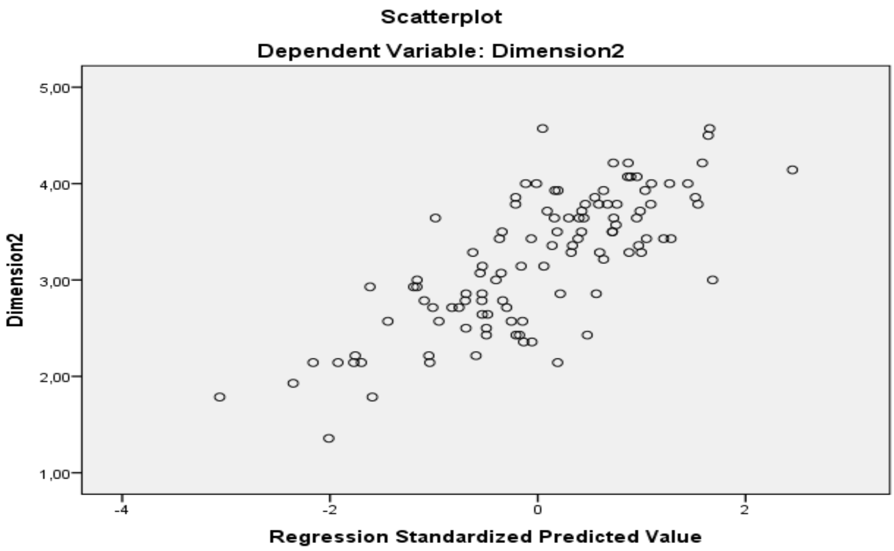
Además, en el modelo de regresión lineal existe la variable dependiente. Este papel lo jugará la variable mediadora (Dimensión 2) asociada a las Preguntas de Estrategia de Profundidad y Autorregulación.

En este punto de la investigación se estudiará mediante regresión lineal si las variables de la Dimensión 1 'Falta de Uso de Estrategia', Dimensión 3 'Uso de Estrategia de Bajo Nivel', así como la variable de la Dimensión 4 'Proceso Cognitivo' afectan la variable intención de la muestra relacionada con la Dimensión 2 'Estrategia de profundidad y autorregulación'.

El valor de R cuadrado indica el grado de influencia de las 3 variables independientes sobre la variable dependiente. Cuanto más cerca esté de 1, mayor será la influencia. El número de r - cuadrado es 0.584. Esto indica que la variable dependiente (intención muestral para la Dimensión 2) es interpretada por el 58,4% (porcentaje alto) de las 3 variables independientes (Dimensión 1, Dimensión 3, Dimensión 4).

Una unidad de la variable intención se ve afectada por -0,152 unidades por la Dimensión 1, por 0,188 por la Dimensión 3 y por 0,621 por la Dimensión 4. La forma algebraica de la descripción anterior:

Dimensión 2 = 1.054 + (-.152)*Dimensión 1 + (.188)*Dimensión 3 + (.621)*Dimensión 4



La homocedasticidad y la linealidad de los residuos que se estudian en los gráficos cumplen con estos supuestos como se muestra arriba.

A través de la **regresión Lineal**, si se selecciona la Dimensión 4, cada mediador independiente expresa lo siguiente:

a. Dimensión 1: Falta de uso de preguntas de estrategia

b. Dimensión 3: Uso de preguntas de estrategia de bajo nivel

c. Dimensión 2: Estrategia de profundidad y preguntas de autorregulación

Además, en el modelo de regresión lineal existe la variable dependiente. Este papel lo jugará la variable mediadora (Dimensión 4) asociada a las Preguntas de Proceso Cognitivo.

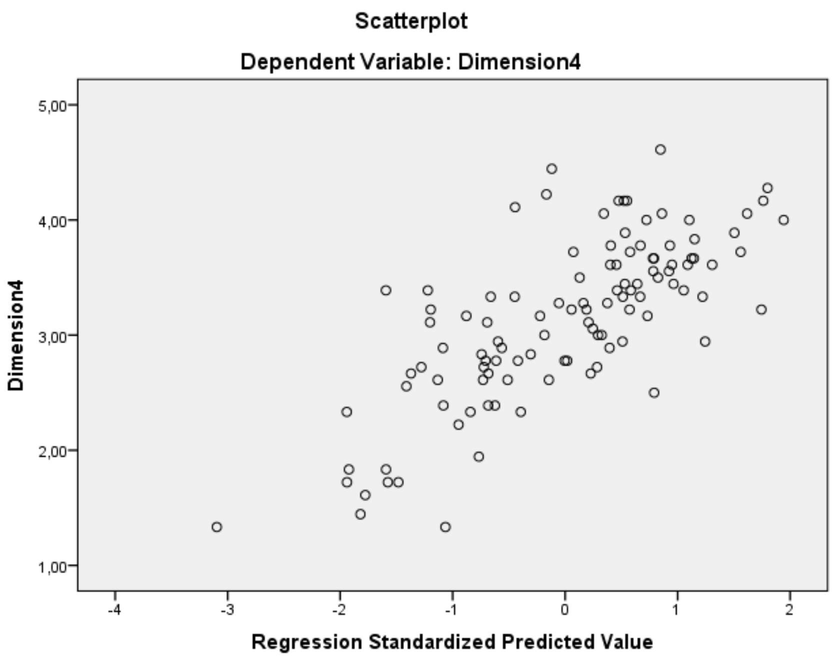
En este punto de la investigación, se estudiará mediante regresión lineal si las variables de la Dimensión 1 'Falta de Uso de Estrategia', Dimensión 3 'Uso de Estrategia de Bajo Nivel, así como la variable de la Dimensión 2 'Estrategia de

Profundidad & Autorregulación' afectan la variable intención de la muestra relacionada con la Dimensión 4 'Preguntas del Proceso Cognitivo'.

El valor de R cuadrado indica el grado de influencia de las 3 variables independientes sobre la variable dependiente. Cuanto más cerca esté de 1, mayor será la influencia. El número de r - cuadrado es 0.559. Esto indica que la variable dependiente (intención muestral para la Dimensión 4) es interpretada por el 55,9% (porcentaje alto) de las 3 variables independientes (Dimensión 1, Dimensión 3, Dimensión 2).

Una unidad de la variable intención se ve afectada por 0,178 unidades por la Dimensión 1, por 0,699 por la Dimensión 2 y por 0,072 por la Dimensión 3. La forma algebraica de la descripción anterior:

Dimensión 4 = 0.155 + (.178)*Dimensión 1 + (.072)*Dimensión 3 + (.699)*Dimensión 2



La homocedasticidad y la linealidad de los residuos que se estudian en los gráficos cumplen con estos supuestos como se muestra arriba.

6.4 Discusión y Conclusiones

La metacognición se refiere al conocimiento que tiene la persona sobre los procesos de su pensamiento. En el estudio actual, la metacognición se define como el conocimiento del conocimiento, que es la conciencia de la conciencia o la ignorancia y se refiere al seguimiento y control del conocimiento.

El tránsito del nivel cognitivo al metacognitivo se produce a través del conocimiento del individuo sobre sus conocimientos básicos. A nivel cognitivo, las representaciones mentales se producen como resultado de los conocimientos básicos del individuo y se realizan determinadas acciones, que se caracterizan como cognitivas, como el razonamiento, el juicio y la evaluación. En el nivel metacognitivo, el individuo observa su nivel cognitivo para construir el nivel metacognitivo, es decir, los resultados del conocimiento metacognitivo surgen del conocimiento del conocimiento básico (saber lo que sé) (Shea, 2020).

Las habilidades metacognitivas más básicas son (a) la conciencia, (b) la reflexión y (c) la autorregulación. La conciencia se refiere al conocimiento de información, relacionada con el individuo o su entorno cognitivo (software, compañeros, asociados, entrenador, etc.), y surge como resultado de la interacción del individuo con su entorno (Medina et al., 2017). La reflexión es la actividad mental en la que los individuos participan explorando sus experiencias para llegar a nuevas percepciones (Lundgren et al., 2017). La reflexión puede tener lugar durante las actividades (reflexión en acción) o después de la reflexión sobre la acción (Liu & Ball, 2019). Para la autorregulación, que se define como la capacidad del individuo para monitorear y modificar/controlar su comportamiento, cognición y estado de ánimo, así como el entorno, si es necesario para lograr una meta (Kostaridou-Eukleides, 2005). , pág. 248).

Por tanto, se inspecciona el estudio del estudiante a nivel metacognitivo tanto a nivel de seguimiento de sus acciones, como de las acciones de sus compañeros y del entorno general de aprendizaje, con el objetivo de la autoconciencia y del equipo en el que trabaja (conciencia de grupo).

El objetivo de esta investigación es estudiar el Uso y Ausencia de Estrategias Cognitivas y Metacognitivas. Se utilizó la Escala de Uso de Estrategias de Gonida y Leontari (2012) para evaluar el uso de estrategias cognitivas y metacognitivas. Se hizo un intento de investigar las posibles diferencias de desarrollo entre los estudiantes de secundaria en términos de la manifestación de sus factores pronósticos. De acuerdo con la estructura teórica del cuestionario, se aportaron tres factores con la adición del 4º factor:

(a) uso de estrategias de profundidad

(b) uso de estrategias superficiales

(c) falta de uso de estrategias

así como una combinación de los anteriores en un cuarto factor:

(d) estrategias de proceso cognitivo.

De acuerdo con la teoría de las metas de logro individuales, la orientación adoptada por cada estudiante tiene un efecto significativo y diferente sobre una serie de variables cognitivas, emocionales y conductuales (Leondari & Gonida, 2007; Jiang et al., 2014; Luftenegger et al., 2014; Schwinger et al., 2014; Wang et al., 2021). En particular, los objetivos de aprendizaje, que se caracterizan por el deseo de los estudiantes de adquirir nuevos conocimientos y mejorar sus habilidades, se han asociado con una variedad de patrones positivos de aprendizaje adaptativo, como una alta autoestima, el desempeño causal del éxito de los estudiantes en el esfuerzo , sino también la actitud positiva general hacia las actividades de aprendizaje (Gonida et al., 2009; Schwinger et al., 2014; Amerstorfer & Munster-Kistner, 2021).

Diversos patrones de aprendizaje, como las metas de logro, el rendimiento escolar y el grado de persistencia en el logro de una determinada meta, se han relacionado en el pasado con el uso y la ausencia de estrategias cognitivas y metacognitivas (Anthonysamy, 2021). Por lo tanto, las estrategias cognitivas como metacognitivas son estrategias clave de aprendizaje autorregulado combinadas con varios resultados de aprendizaje positivos y, además, se espera que los estudiantes que usan estrategias eviten participar en comportamientos disfuncionales también (Akamatsu et al., 2019).

Los resultados del estudio de Chatzikyriakou, (2014) indican que el uso de estrategias cognitivas y metacognitivas no es un predictor negativo significativo de la ocurrencia de alguna de las dos conductas de evitación, sino por el contrario, la ausencia de uso de las estrategias anteriores. es uno de los factores más importantes para predecir el comportamiento académico propio. Parece, entonces, que los estudiantes que carecen de habilidades de aprendizaje de autorregulación, como el uso intencional de estrategias cognitivas y metacognitivas, tienen oportunidades para exhibir comportamientos académicos de autodestrucción. En combinación, de hecho, con su deseo de ser enfatizado por el profesor y los padres en el análisis detallado de cómo tienen que resolver un ejercicio de Matemáticas, más que en el rendimiento académico final, según el cual los alumnos afirman que pueden -comportamientos destructivos para evitar estudiar, estos hallazgos pueden indicar que los estudiantes que eventualmente recurren a tales comportamientos para evitar estudiar pueden hacerlo porque no tienen formas efectivas para estudiarlos, carecen de estrategias que los faciliten y por lo tanto incurren en comportamientos que compiten con sus metas académicas, porque estudiar para ellos es una experiencia dolorosa, lenta y desagradable. En el proceso, por supuesto, estas debilidades se vuelven más y más y las brechas se acumulan dando como resultado un comportamiento verdaderamente autodestructivo.

Al finalizar la secundaria, la evitación de buscar ayuda así como el autosabotaje académico se relacionan principalmente con variables individuales, tales como creencias sobre los beneficios y consecuencias negativas de buscar ayuda, metas de aprendizaje y enfoques del conocimiento y enfoque, el uso y ausencia de uso de estrategias cognitivas y metacognitivas, autoeficacia, autoestima y rendimiento escolar.

A partir de las percepciones de los factores contextuales, la evitación de buscar ayuda solo se relacionó con las metas percibidas de los padres hacia el aprendizaje. Por otro lado, la falta de uso de estrategias cognitivas y metacognitivas, como predictor positivo de autodestrucción académica, confirma cómo se esperaba que la autodestrucción académica fuera adoptada por estudiantes que no utilizan estrategias funcionales, como las estrategias cognitivas y metacognitivas.

a. La contribución de los factores individuales

Investigar el valor predictivo de los factores individuales en el uso o no de estrategias fue uno de los principales objetivos de este estudio, ya que, según la literatura, las motivaciones de los estudiantes, sus habilidades cognitivas y metacognitivas, pero también sus creencias sobre la funcionalidad de determinadas conductas en el aula afectan su comportamiento académico (Leondari & Gonida, 2007; Schwinger et al., 2014; Abdelrahman, 2020).

b. Metas individuales a lograr

De hecho, es un hecho que el poder predictivo negativo indirecto de los objetivos de aprendizaje individuales en la manifestación de la autosubversión académica y la evitación de buscar ayuda en el aula, a través de una serie de factores cognitivos y metacognitivos individuales, pero también factores motivadores que confirman a través de este manera, el valor protector de la orientación de aprendizaje para la manifestación de las conductas disfuncionales específicas. Varios estudiantes se centran en la esencia del aprendizaje en el sentido de la comprensión de la lección, la adquisición de nuevos conocimientos, así como la recompensa por parte del profesor como forma de reconocer su esfuerzo por mejorar. Este hallazgo está en línea con hallazgos previos que sugieren que los estudiantes orientados al aprendizaje se enfocan en aprender per se, mejorando sus habilidades y adquiriendo nuevas habilidades, enfatizando el esfuerzo y teniendo como punto de referencia a sí mismos con miras al desarrollo personal (Leondari & Gonida, 2007; Luftenegger et al., 2014; Siqueira et al., 2020).

A continuación se presenta una descripción detallada de las conclusiones separadamente por cada componente principal - dimensión de la escala.

6.4.1 Dimensión 1: Falta de uso de preguntas de estrategia

Como ya se ha investigado la relación predictiva negativa de las autocreencias con la manifestación de conductas de evitación, ha sido estudiada por otros investigadores que afirman que los estudiantes mantienen una autoimagen positiva, teniendo confianza en su capacidad para tener éxito en una materia como Matemáticas, es menos probable que muestren conductas disfuncionales como autodegradación académica y evitar buscar ayuda (Bobo et al., 2013; Schwinger, 2013; Steinmayr et al., 2019). Además, la falta de uso de las estrategias anteriores es uno de los factores más importantes para predecir el comportamiento de autodestrucción académica. Los estudiantes que informan que no usan estrategias cognitivas y cognitivas debido a su conciencia cognitiva limitada tienen más probabilidades de evitar buscar ayuda del maestro, pero es más probable que lo hagan por otras razones, como obtener una respuesta preparada o en circunstancias inapropiadas y no como un estrategia de autorregulación (Chatzikyriakou, 2014).

Las conclusiones de la presente investigación en cuanto al factor de la Falta de Uso de Estrategias se presentan en detalle a continuación. Sería fundamental mencionar que la investigación se realizó con mayor profundidad y además de los datos metacognitivos, se realizó una comparación en cuanto a varios datos demográficos como se muestra a continuación. En esta subescala la muestra de 110 estudiantes que son partícipes de esta investigación mostró una media superior en esta pregunta. Así que la mayoría de ellos encuentran difícil organizar eficientemente su tiempo de estudio (falta de organización del proceso de aprendizaje), mientras que el mismo caso de los estudiantes mostró la media más baja, lo que ilustra la situación mientras los estudiantes que estudian sobre Matemáticas, no piensan muchas veces que no lo hacen. saber de qué se trata.

En general no se muestran datos estadísticamente significativos, lo que demuestra que no existe intimidad entre el género de los estudiantes y las preguntas de Falta de Uso de Estrategia. Del mismo modo, la fecha de nacimiento, el nivel educativo de los padres del padre y de la madre, el TDAH, el origen del padre y de la madre no parecen ser estadísticamente significativos.

Más particularmente, podemos discernir datos específicos estadísticamente significativos. Esta pregunta describe a los niños a quienes se les preguntó si les resulta difícil organizar el tiempo de su estudio de manera efectiva (falta de organización del proceso de aprendizaje). Esta pregunta específica tiene un significado más fuerte para los niños de 2.° grado de secundaria y de 3.° grado más que para los niños de 1.° grado, quienes respondieron que no les resulta difícil administrar el tiempo para estudiar. Un estudio similar indica que las habilidades ejecutivas pueden conducir a mayores niveles de autodirección necesarios a medida que los niños crecen e incluso más tarde en la universidad y las carreras (Darling-Hammond et al., 2020). Por el contrario, Zenner et al. (2014) no encuentran ninguna validación clara que exista, ya que el uso de estrategias de atención plena para monitorear y redirigir la atención ofrece beneficios para el aprendizaje en diferentes edades y, como resultado, en diferentes grupos de clase.

Otro resultado estadísticamente importante lo da la pregunta en la que se preguntó a los niños si omiten los puntos difíciles, cuando estudian Matemáticas (falta de conexión con los conocimientos y experiencias previas y falta de grado de persistencia). Los niños que viven fuera de la ciudad de Heraklion parecen tener la costumbre de omitir los puntos difíciles, más que los niños que viven en la ciudad. De la misma forma, resultados de la investigación de Taghieh et al. (2019) muestra que existen diferencias significativas entre niños de zonas urbanas y no urbanas con respecto a sus estrategias metacognitivas y cognitivas.

A los niños les cuesta estudiar de una manera que les ayude a aprender bien lo que necesitan saber, cuando tienen un examen de matemáticas (falta de organización del proceso de aprendizaje). Esta pregunta específica tiene un significado más fuerte para los niños con un título de último año bajo o mediocre en Matemáticas. Los niños con buena o excelente licenciatura en Matemáticas el último año parecen no tener este tipo de dificultad. En la investigación de Young y Fry (2008) se estudiaron las calificaciones parciales y acumuladas de los estudiantes en alguno de los cursos que estaban cursando. Se encontró que existe una alta correlación entre el instrumento metacognitivo utilizado y la nota acumulada y además con la nota final.

6.4.2 Dimensión 2: Estrategia de profundidad y preguntas de autorregulación

En cuanto al segundo factor a investigar, estudios previos han demostrado que las estrategias básicas de aprendizaje autorregulado que se asocian con resultados de aprendizaje positivos son las estrategias cognitivas y metacognitivas (Hayat et al., 2020) que además de afectar el deseo de los estudiantes de énfasis por parte del docente y los padres en el análisis detallado de cómo deben resolver un ejercicio de Matemáticas, más que en el rendimiento académico final. Es decir, parece que cuando los estudiantes comprenden que el profesor y sus padres están enfatizando el proceso esencial de aprendizaje, mostrándoles las estrategias adecuadas para aprender a resolver un problema por sí mismos, entonces estos estudiantes evitan conscientemente el uso de conductas de evitación. que los distraerá de alcanzar sus metas académicas (Metcalfe, 2017).

Después de la presentación de las conclusiones relacionadas con el factor Estrategia de profundidad y autorregulación en este punto, se presentan en detalle las conclusiones de la presente investigación con respecto al mismo factor a estudiar. En esta subescala los estudiantes que fueron participantes de esta investigación mostraron una mayor media en esta pregunta. Así que la mayoría de ellos cuando tienen que resolver un ejercicio, primero tratan de aclarar lo que pide este ejercicio, mientras que los estudiantes de la misma muestra mostraron la media más baja lo que ilustra la situación mientras que los estudiantes que estudian Matemáticas, no suelen dibujar diseños o diagramas a través de los cuales se vinculan los puntos principales.

Generalmente no se muestran datos estadísticamente significativos, lo que demuestra que no hay intimidad entre la fecha de nacimiento de los estudiantes y las preguntas de Estrategia de Profundidad y Autorregulación. De igual forma la clase, el nivel educativo de los padres de la madre, otros trastornos, el origen del padre y de la madre no parecen ser estadísticamente significativos. Del mismo modo, otros investigadores no extraen a través de sus estudios ninguna validación clara ya que el uso de estrategias de atención plena para monitorear y redirigir la atención ofrece beneficios para el aprendizaje en diferentes grupos de edad o clase de la misma manera (Zenner et al., 2014).

Más particularmente, podemos discernir datos específicos estadísticamente significativos. Se preguntó a los niños si aprenden algo tratando primero de entender su significado (uso de estrategias adaptativas). Esta pregunta tiene un significado más significativo para las chicas de la muestra que para los chicos. Otro resultado estadísticamente importante se deriva de la pregunta en la que se preguntó a los niños si para resolver un ejercicio o comprender un texto, intentan tener en cuenta alguna información más antigua que pueda estar relacionada con ellos, porque eso les ayuda (recuperación de información previa). Las chicas muestran dar más importancia a esto que los chicos. Además, se preguntó a los estudiantes si cada vez que contestan una pregunta en una prueba, la vuelven a leer, para asegurarse de que dieron la respuesta a la pregunta planteada (autocontrol y autorregulación). Esta pregunta parece tener un impacto significativo para las niñas más que para los niños. Además, se preguntó a los niños si intentan explicar las ideas principales con sus propias palabras cuando estudian (participación voluntaria en el aprendizaje con participación activa y utilización de los conocimientos adquiridos también en otros casos). Investigaciones similares indican que incluso los estudiantes de dominio numérico obtuvieron resultados más altos, no hubo ninguna diferencia significativa entre el género (Alci & Karatas, 2011).

Los niños que viven en un área urbana (ciudad de Heraklion) parecen tener este hábito de explicar las ideas principales de lo que aprenden con sus propias palabras, más que aquellos que viven en un área no urbana (fuera de la ciudad). Un resultado estadísticamente importante se deriva de la pregunta, en la que se preguntó a los niños si se les ayuda, cuando tienen que dar solución a un ejercicio o comprender un texto, tratando de recordar alguna información más antigua que pueda estar relacionada con ellos (recuperación de informacion previa). Los niños que viven en un área urbana (ciudad de Heraklion) parecen reaccionar de esta manera más arriba que los niños que viven en un área no urbana (fuera de la ciudad). Además, los niños dibujan diseños o diagramas a los que vinculan los puntos principales, cuando estudian Matemáticas (participación activa en el aprendizaje y cultivo de la identidad personal en el aprendizaje). También aparecen diferencias significativas en otra investigación entre estudiantes que viven tanto en áreas urbanas como no urbanas con respecto a sus estrategias de aprendizaje, tanto cognitivas como metacognitivas por igual (Taghieh et al., 2019).

Un resultado estadísticamente significativo da la pregunta de que los niños hacen muchos deberes, como los que hacen en el aula (participación activa en el aprendizaje). Esta pregunta tiene un significado más fuerte para los niños cuyos padres han terminado otra o Universidad. Los niños cuyos padres han terminado la Secundaria, la Primaria, la Secundaria o la Educación Técnica parecen no estudiar de esta manera. Además, un resultado estadísticamente importante da la pregunta, en la que los niños tratan de recordar alguna información más antigua que puede estar relacionada con lo que leen, para ayudarse a sí mismos, cuando tienen que dar solución a un ejercicio o para comprender un texto (recuperación de información previa). Esta pregunta tiene un significado más fuerte para los niños cuyos padres han terminado la Universidad, otra escuela o la escuela primaria. Los niños cuyos padres han terminado la Secundaria, la Secundaria o la Educación Técnica parecen no actuar de la misma manera y no hacen los deberes así en el aula. Los resultados de nuestro estudio están en línea con la literatura, ya que Teng y Zhang (2021) realizaron un estudio en el que los antecedentes de los padres se basaron en tres factores de ocupación, educación e ingresos en el formulario de consentimiento. Los niños con un estatus parental socioeconómico más alto también indicaron un conocimiento metacognitivo más alto y más rápido (Teng y Zhang, 2021).

Esta rutina de recordar información relativa representa mejor a los niños con bajo o mediocre grado de último año en Matemáticas. Los niños con excelente último año en Matemáticas parecen no tener este tipo de rutina al momento de resolver un ejercicio o tratar de comprender un texto. Además, niños que realizan varios ejercicios de deberes, similares a los que realizan en clase (participación activa en el aprendizaje). Estudios similares afirman que este tipo de instrumentos metacognitivos muestran los mismos resultados en el promedio de calificaciones y pueden convertirse en una herramienta poderosa para que los pedagogos sepan qué estudiantes parecen necesitar instrucción directa en metacognición, y más especialmente en cursos grandes (Young & Fry, 2008).

Esta pregunta tiene un significado más fuerte para los niños con Déficit de atención y Déficit de atención e hiperactividad más que para los niños con Déficit de atención e impulsividad y Déficit de atención e hiperactividad e impulsividad. Además, un resultado estadísticamente significativo da la pregunta en la que los alumnos con Déficit de Atención y Déficit de Atención e Impulsitividad que tienen que resolver un ejercicio, lo primero que intentan hacer es entender qué les exige dicho ejercicio. En contraposición a lo anterior, los niños con Déficit de Atención e Hiperactividad y Déficit de Atención e Hiperactividad e Impulsividad muestran una menor importancia a esta. Adicionalmente, niños que prefieren resaltar las ideas principales, cuando leen algo (participación voluntaria en el aprendizaje). Esta pregunta tiene un significado más fuerte para los niños con dificultades generales de aprendizaje, con dificultades de interacción social/problemas de comportamiento, con dificultades de aprendizaje/brechas de aprendizaje/dificultades leves/inmadurez de habilidades o sin otra dificultad de aprendizaje que el TDAH más que para los niños con dificultades especiales de aprendizaje o dificultades en Escritura. Además, un resultado estadísticamente importante da la pregunta en la que los niños con Dificultades de Interacción Social/ Problemas de Comportamiento, con Dificultades de Aprendizaje/ Brechas de Aprendizaje/ Dificultades Leve/ Inmadurez de Habilidades, con Dificultades Generales de Aprendizaje sin otra Dificultad de Aprendizaje que no sea TDAH o con Aprendizaje Especial Con dificultad tratan de recordar alguna información antigua que les pueda relacionar porque esto les ayuda cuando tienen que resolver un ejercicio o entender un texto. En cambio, los niños con Dificultades en la Escritura muestran que le dan menos importancia a esto. De manera similar, una investigación de Sibley et al. (2019) muestra el afecto en niños con TDAH y sus características motivacionales y dirigidas a objetivos del aprendizaje autorregulado. Las estrategias metacognitivas reparadoras, como el establecimiento de objetivos y los motivos de implementación, pueden integrarse en estudiantes con TDAH a través de intervenciones en clase (Sibley et al., 2019).

6.4.3 Dimensión 3: Preguntas de estrategia de superficie

La literatura sobre el uso de estrategias superficiales establece que se espera que los adolescentes que usan estrategias eviten comportamientos disfuncionales (Petersen, 2014; Darling-Hammond, 2020). Parece, por lo tanto, que los estudiantes que carecen de habilidades de aprendizaje de autorregulación, como el uso intencional de estrategias cognitivas y metacognitivas, en última instancia tienen más probabilidades de exhibir comportamientos académicos autodestructivos, así como la cantidad de uso que se ve afectado. estrategias de aprendizaje funcional a partir de metas de logro, individuales y contextuales, llevando a los estudiantes a utilizar conscientemente estrategias desadaptativas que actúan como medio de autodefensa (Metcalfe, 2017).

En esta subescala la muestra de 110 participantes de este estudio mostró una media más alta en la pregunta en la que la mayoría trata de aprender de memoria todo lo que cree que se les pedirá para el examen, mientras que la misma muestra de adolescentes mostró la media más baja en la situación mientras estudian Matemáticas, intentan identificar las ideas principales y aprenderlas de memoria.

Analizando los resultados percibimos que no se muestran datos estadísticamente significativos, lo que demuestra que no hay intimidad entre el género y las preguntas de estrategia superficial. Del mismo modo, la fecha de nacimiento, el área escolar, el nivel educativo de los padres del padre, el último año de grado en Matemáticas, el TDAH y el origen del padre no parecen ser estadísticamente significativos. Un estudio similar de Alci & Karatas (2011) encontró que no existe una diferencia significativa entre las herramientas metacognitivas utilizadas para determinar la conciencia metacognitiva y el área escolar o el género de su muestra.

Niños que intentan aprender de memoria la mayor cantidad de información posible, cuando estudian (no buscan adquirir el significado de aprender). Esta pregunta tiene un significado más fuerte para los niños con problemas del habla/trastorno evolutivo lingüístico/falta de conocimiento del idioma griego y para los niños sin otro trastorno aparte del TDAH más que para los niños con dificultades emocionales. Este tipo de estudiantes requieren una intervención basada en la escuela que integre estrategias metacognitivas reparadoras como los motivos de implementación y el establecimiento de metas (Sibley et al., 2019).

Además, se preguntó a los niños si aprenden todo de memoria, cuando tienen un examen (no buscan adquirir el significado de aprender). Esta pregunta parece tener un significado significativo para los estudiantes cuyas madres son griegas más que para aquellos cuyas madres provienen de otro país. Esta pregunta parece tener un significado significativo para los estudiantes cuyas madres son griegas más que para aquellos cuyas madres provienen de otro país. El cultivo de la identidad personal en el aprendizaje, el autocontrol y la autorregulación parece ser más significativo para los adolescentes cuyas madres son griegas y al mismo tiempo cuyos padres provienen de otros países. Investigaciones anteriores parecen estar de acuerdo con el estudio actual, ya que Dermitzaki & Kallia (2021) muestran el papel significativo de los padres y su estado de origen en el desarrollo de las habilidades de aprendizaje autorregulado de sus hijos.

Además, se preguntó a los niños si intentan aprender todo de memoria cuando tienen un examen. Esta pregunta tiene un significado más fuerte para los niños de 1° de Secundaria y de 3° más que para los de 2°, quienes respondieron que no se aprenden todo de memoria para estar preparados en un examen. De manera similar, la investigación de Darling-Hammond et al. (2020) demostraron que las habilidades ejecutivas pueden conducir a mayores niveles de autodirección necesarios a medida que los niños crecen. A los niños que intenten aprender cualquier cosa que piensen se les preguntará de memoria para el examen. Esta pregunta tiene un significado más fuerte para los niños cuyas madres han terminado la escuela primaria, la secundaria, la preparatoria, la universidad o la educación técnica. Los niños cuyas madres han terminado otros parecen no estudiar de esta manera.

6.4.4 Dimensión 4: Preguntas sobre procesos cognitivos

Los resultados de aprendizaje positivos están asociados con estrategias básicas de aprendizaje autorregulado que son estrategias cognitivas y metacognitivas (Uppal & Kumar, 2021). Este hecho también se evidencia en el deseo de los estudiantes de enfatizar por parte del docente y los padres en el análisis detallado de cómo deben resolver un ejercicio de Matemáticas, más que en el rendimiento académico final (Yeh et al., 2019). Después de enumerar las conclusiones estratégicas cognitivas relacionadas con el factor en este punto, se presentan en detalle las conclusiones del presente estudio con respecto al mismo factor a estudiar.

En esta subescala la muestra de los estudiantes que forman parte de esta investigación mostró una media más alta en intentar pedir ayuda cuando no comprende algo, mientras que la misma muestra de adolescentes mostró la media más baja en la pregunta que ilustra la situación mientras los niños hacerse preguntas sobre la lección antes de empezar a estudiar. Como resultado, la motivación de logro, la adquisición de habilidades, las creencias e incluso la orientación hacia el objetivo de rendimiento se convierten en parte de la orientación hacia el objetivo de aprendizaje (Schunk, 2020).

Analizando los resultados correspondientes percibimos que no se muestran datos estadísticamente significativos, lo que demuestra que no existe intimidad entre el nivel educativo de los padres de la madre y las preguntas del proceso cognitivo.

Se preguntó a los estudiantes si seguían preguntándose si podrían alcanzar sus objetivos (autocuestionamiento, autocontrol). Esta pregunta tiene un significado más fuerte para las niñas que para los niños. Un resultado estadísticamente importante da la pregunta en la que se preguntaba a los estudiantes si se detenían y releían cuando no se les entendía (autocontrol, autorregulación). Las chicas muestran dar más importancia a esto que los chicos. En otra pregunta estadísticamente significativa se les preguntó a los niños cuando completaban un trabajo, si se preguntaban si habían aprendido tanto como podían (control de conciencia). Esta pregunta tiene más impacto para las niñas que para los niños. En contraste con los resultados anteriores, la investigación de Alci & Karatas (2011) indicó que aunque los estudiantes numéricos obtuvieron mejores resultados al aplicar las herramientas metacognitivas, las diferencias no fueron significativas según el género.

Estudiantes que se hacen preguntas a sí mismos sobre la lección, antes de comenzar a estudiar (participación voluntaria en el aprendizaje con participación activa y utilización de los conocimientos adquiridos). Esta pregunta tiene un significado más fuerte para los adolescentes que nacieron en 2003, 2006 y 2004. Los niños que nacieron en 2005 y 2007 parecen preguntarse menos sobre la lección antes de comenzar a estudiar. Además, un resultado estadísticamente importante da la pregunta en la que los niños que nacieron en 2007, en 2004 y en 2003, parecen saber cómo les fue, cuando terminan un examen (autoevaluación). Por otro lado, los niños que nacieron en 2005 y en 2006 afirman no saber cómo les fue, cuando terminan un examen. Zenner et al. (2014) demostraron que no existe una validación clara ya que el uso de estrategias de atención plena para monitorear y redirigir la atención ofrece beneficios para el aprendizaje en diferentes grupos de edad. Otro estudio indica que a medida que los niños crecen, sus habilidades ejecutivas pueden conducir a los mayores niveles de autodirección necesarios (Darling-Hammond et al., 2020).

Además, se preguntó a los niños si se hacían preguntas a sí mismos sobre la lección, antes de comenzar a estudiar (participación voluntaria en el aprendizaje con participación activa y utilización de los conocimientos adquiridos). Tal pregunta tiene un significado más fuerte para los niños de 1° de Secundaria y de 3° más que para los de 2°, quienes respondieron que no tienen este hábito cuando estudian. Un resultado estadísticamente significativo lo da la pregunta en la que se preguntaba a los niños si elegían resolver un problema de la mejor manera, entre un número de formas diferentes (uso de estrategias adaptativas de identidad personal en el aprendizaje). Los niños de 1° de Secundaria y de 3° parecen pensar más en numerosas formas de resolver un problema que los niños de 2°, quienes respondieron que no tienen este tipo de hábito. Además, un resultado estadísticamente importante da la pregunta en la que los niños de 1º de Secundaria y 3º hacen un resumen de lo aprendido, cuando terminan de estudiar (participación activa en el aprendizaje y chequeo de conciencia), a diferencia de los alumnos de 2º. Clase, que en realidad no actúan de la misma manera. Otra investigación indica que no se puede encontrar una validación clara ya que el uso de estrategias de atención plena para monitorear y redirigir la atención ofrece beneficios para el aprendizaje de diferentes edades (Zenner et al., 2014).

Además, se preguntó a los niños si reexaminan periódicamente algo que están estudiando, para ayudarlos a comprender las relaciones esenciales (autocuestionamiento, autocontrol y autorregulación). Los niños que viven en un área urbana (ciudad de Heraklion) parecen tener este hábito de reexaminar periódicamente lo que estudian, más que los que viven en un área no urbana. a (fuera de la ciudad). Un resultado estadísticamente importante da la pregunta en la que se preguntó a los adolescentes si se detienen y recapacitan, cuando la nueva información los está confundiendo (autocontrol y autorregulación). Los adolescentes que viven en un área urbana (ciudad de Heraklion) parecen reaccionar de esta manera más arriba que los niños que viven en un área no urbana (fuera de la ciudad). Como se mencionó anteriormente, una investigación que llega a un acuerdo de la existencia de significación entre los adolescentes en función de su área escolar y sus desempeños en matemáticas. Tal investigación muestra que los estudiantes de áreas urbanas y no urbanas presentan diferencias significativas en sus estrategias cognitivas y metacognitivas (Taghieh et al., 2019).

Los niños se preguntan regularmente si alcanzarán sus objetivos (verificación de conciencia). Esta pregunta tiene un significado más fuerte para los niños cuyos padres terminaron la escuela secundaria, otra o la universidad. Los niños cuyos padres han terminado la Educación Técnica Secundaria o la Educación Primaria parecen preguntarse menos por sus metas. Un resultado estadísticamente significativo da la pregunta en que los niños saben cómo les fue, cuando terminan un examen (autocontrol y autoevaluación). Esta pregunta tiene mayor significado para los adolescentes cuyos padres terminaron la Enseñanza Media, otra, la Enseñanza Media o la Educación Técnica. Los niños cuyos padres terminaron la escuela primaria o la universidad parecen no saber cómo les fue después de terminar un examen. Además, un resultado estadísticamente significativo da la pregunta en la que los niños que completan una tarea, se preguntan si había una manera más fácil de terminarla (participación activa en el aprendizaje y cultivo de la identidad personal). Esta pregunta tiene un significado más fuerte para los niños cuyos padres han terminado la escuela secundaria, la universidad o la escuela primaria. Los niños cuyos padres han terminado otros estudios, Bachillerato o Educación Técnica, parecen preguntarse menos si existe una manera más fácil de hacer una tarea, al momento de terminarla. Como se mencionó anteriormente, los niños con un estatus parental socioeconómico más alto también parecen tener un conocimiento metacognitivo más alto y más rápido (Teng & Zhang, 2021). La investigación actual está en línea con la literatura, ya que Teng y Zhang (2021) realizaron un estudio en el que los antecedentes de los padres se basaron en tres factores de ocupación, educación e ingresos en forma de consentimiento.

Un resultado estadísticamente importante da la pregunta en la que los estudiantes respondieron que cambian sus estrategias cuando no pueden resolver un problema matemático (autorregulación). Pensar en cambiar estrategias representa mejor a los niños con un buen último año de grado en Matemáticas. Los estudiantes con grado bajo, mediocre o excelente en el último año de Matemáticas no tienen este tipo de rutina cuando no son capaces de resolver un problema de matemáticas. La aplicación del mismo instrumento metacognitivo en el pasado en diferentes grupos de estudiantes mostró los mismos resultados ya que la correlación entre la herramienta y el promedio de calificaciones fue alta (Young & Fry, 2008).

Los estudiantes utilizan la estructura y organización del texto para comprender mejor (participación activa en el aprendizaje y cultivo de la identidad personal). Esta pregunta tiene un significado más fuerte para los niños con Déficit de atención y Déficit de atención e hiperactividad más que para los niños con Déficit de atención e impulsividad y Déficit de atención e hiperactividad e impulsividad. Además, un resultado estadísticamente importante da la pregunta en que los niños con Déficit de Atención y Déficit de Atención e Impulsitividad, se detienen y vuelven a leer cuando están confundidos (participación activa en el aprendizaje y cultivo de la identidad personal). En contraposición a lo anterior, los niños con Déficit de Atención e Hiperactividad y Déficit de Atención e Hiperactividad e Impulsitividad muestran que le dan menos importancia.

Los niños prefieren ir más despacio cuando encuentran información significativa (participación voluntaria en el aprendizaje con implicación activa). Esta pregunta tiene un significado más fuerte para los niños con dificultades de interacción social/problemas de comportamiento, sin otra dificultad de aprendizaje, con dificultades generales de aprendizaje o dificultades en el aprendizaje/brechas de aprendizaje/dificultades leves/inmadurez de habilidades más que para los niños con dificultades especiales de aprendizaje o dificultades en la escritura. Además, un resultado estadísticamente importante da la pregunta en la que los niños sin otra Dificultad de Aprendizaje que no sea el TDAH, con Dificultades de Aprendizaje/ Brechas de Aprendizaje/ Dificultades Leve/ Inmadurez de Habilidades, con Dificultades Generales de Aprendizaje o con Dificultades en Escritura están usando la estructura y organización del texto para comprender mejor (cultivo de la identidad personal en el aprendizaje). En cambio, los niños con Dificultades Especiales de Aprendizaje o con Dificultades de Interacción Social/Problemas de Conducta muestran una menor importancia a esto. Además, los niños se preguntan constantemente si alcanzarán sus objetivos (autocuestionamiento, autocontrol y autorregulación). Esta pregunta tiene un significado más fuerte para los niños con dificultades de aprendizaje general.

6.4.5 La relación entre las dimensiones

a. Importancia en la Dimensión 2 “Estrategia de profundidad y preguntas de autorregulación”

La principal conclusión de este punto de la investigación es que a través de la regresión lineal se dibuja una fuerte relación entre la Dimensión 2 “Preguntas de estrategia de profundidad y autorregulación” y la Dimensión 3 “Preguntas de estrategia de superficie” y la Dimensión 4 “Preguntas de proceso cognitivo”. Por otro lado, la Dimensión 1 parece tener un papel reversible y disuasorio para la Dimensión 2. Debido a estos hechos, es obvio que las preguntas de Estrategia de Profundidad y Autorregulación y Uso de Estrategia de Bajo Nivel tienen un gran vínculo y podrían usarse como un parte integrante de las conclusiones. Investigaciones anteriores indican que las metas de logro están conectadas con el estudio de los niños y el objeto de aprendizaje. Los estudiantes que están orientados al aprendizaje parecen usar estrategias de procesamiento profundo, ya que estas estrategias requieren comprensión conceptual y esfuerzo cognitivo, en contraste con las estrategias de procesamiento de nivel superficial que solo requieren ensayo y memorización. Incluso con las diferencias obvias entre las dimensiones utilizadas, la bibliografía demuestra que la motivación de logro, la adquisición de habilidades, las creencias e incluso la orientación a la meta de desempeño como parte de la orientación a la meta de aprendizaje constituyen un mecanismo con numerosos efectos (Schunk, 2020).

b. Importancia en la Dimensión 4 “Preguntas del Proceso Cognitivo”

La principal conclusión de este punto de la investigación es que a través de la regresión lineal se dibuja una fuerte relación entre la Dimensión 4 “Preguntas del proceso cognitivo” y la Dimensión 2 “Preguntas de profundidad, estrategia y autorregulación”. Además, la Dimensión 1 "Falta de uso de la estrategia" y la Dimensión 3 "Preguntas de estrategia superficial" tienen una relación positiva con la Dimensión 4. Debido a estos hechos, es obvio que las preguntas de Proceso cognitivo y Estrategia profunda y autorregulación tienen una gran vinculación.

En conclusión, todos los componentes anteriores de la escala Uso de la estrategia, así como las variables con las que se relacionan, se usaron de manera adecuada para que puedan ser entendidos por toda la muestra de estudiantes a los que se dirige y, lo que es más importante, traducidos en habilidades metacognitivas apropiadas que poseen. . Sin embargo, el análisis de los componentes clave de la escala no confirmó la estructura factorial teórica, destacando la existencia de dos factores. De acuerdo con estos resultados, tanto las preguntas que examinan el uso de estrategias de profundidad como las preguntas que examinan el uso de estrategias de superficie así como las preguntas del Proceso Cognitivo constituyen un factor, el del uso de estrategias, mientras que las preguntas relativas a la ausencia de cualquier tipo de estrategias constituyen un segundo factor. Más específicamente, los estudiantes que usan preguntas de estrategia profunda y autorregulación con las características anteriores parecen usar estrategias adaptativas, recuperar información previa, tener autocontrol y autorregulación, ofrecer participación voluntaria en el aprendizaje con participación activa y utilización del conocimiento adquirido. en otros casos también, tener cultivo de la identidad personal en el aprendizaje y participación voluntaria en el aprendizaje. Estas características parecen tener un significado más fuerte en parte específica de la muestra de la investigación como son las niñas, los niños que viven en una zona urbana, los niños cuyos padres tienen educación superior, los niños con mediocre o buena carrera de último año en Matemáticas, los niños con Atención Déficit con o sin Hiperactividad, niños con comorbilidad con Dificultades Generales de Aprendizaje o Dificultades de Interacción Social/ Problema de Comportamiento, o Dificultades de Aprendizaje/ Brechas de Aprendizaje/ Dificultades Leve/ Inmadurez de Habilidades. Como se mencionó anteriormente, investigaciones específicas indican que incluso los estudiantes de dominio numérico tuvieron resultados más altos, no hubo ninguna diferencia significativa entre el género (Alci & Karatas, 2011), hubo una alta correlación entre el instrumento metacognitivo utilizado y el acumulado. y además con la nota final (Young & Fry, 2008), hubo una diferencia significativa entre los estudiantes que viven tanto en áreas urbanas como no urbanas con respecto a sus estrategias de aprendizaje, cognitivas y metacognitivas también de la misma manera. (Taghieh et al., 2019).

Estudiantes cuyo uso de Preguntas de Estrategia Superficial no busca adquirir el significado del aprendizaje. Estas características parecen tener un significado más fuerte en parte específica de la muestra de la investigación, como los niños con comorbilidad con Problemas del habla/ Trastorno evolutivo lingüístico/ Falta de conocimiento del idioma griego y estudiantes cuyas madres son griegas.

Los estudiantes que usan Preguntas del proceso cognitivo tienen autocuestionamiento, autocontrol, autorregulación, control de la conciencia, participación voluntaria en el aprendizaje con participación activa en el aprendizaje y utilización del conocimiento adquirido, autoevaluación, autocuestionamiento, autocontrol y autorregulación, tienen cultivo de la identidad personal y participación voluntaria en el aprendizaje con involucramiento activo y más aún buscan orientación del procesamiento cognitivo a nivel consciente. Los Estas características parecen tener un significado más fuerte en una parte específica de la muestra de la investigación, como niños cuyas madres son griegas, cuyos padres provienen de otros países, niños con comorbilidad con Dificultades de Interacción Social/ Problemas de Comportamiento, con Dificultades Generales de Aprendizaje o Dificultades en el Aprendizaje / Brechas de Aprendizaje/ Dificultades Leve/ Inmadurez en Habilidades, con Dificultades Especiales de Aprendizaje, con Dificultades en la Escritura, niños que viven en un área urbana, cuyos padres tienen educación superior, niñas, niños en 1ra Clase de Secundaria y en 3ra Clase, con último año de grado en Matemáticas bueno o mediocre, con Déficit de Atención e Impulsividad con o sin Hiperactividad. Un estudio similar mencionado anteriormente trata el mismo tema e indica que las características motivacionales y dirigidas a objetivos afectan a los niños con TDAH. Las intervenciones de clase para adolescentes con TDAH pueden integrar estrategias metacognitivas reparativas (Sibley et al., 2019).

Los estudiantes con Falta de Uso de la Estrategia tienen falta de organización del proceso de aprendizaje y falta de conexión con el conocimiento y la experiencia previa y falta de grado de persistencia. Estas características parecen tener un significado más fuerte en una parte específica de la muestra de la investigación, como los niños de 2º grado, los niños que viven en una zona rural, los niños con un título de último año insuficiente o mediocre en Matemáticas. Tal investigación parece una alta correlación entre el nivel de organización y, en general, la capacidad de usar habilidades metacognitivas y el promedio de calificaciones de los estudiantes como se mencionó anteriormente (Young & Fry, 2008).

6.5 Contribución - Sugerencias de implementación en contextos específicos

Las percepciones de los estudiantes de una relación significativa con su maestro, combinadas con el énfasis percibido en mejorar sus habilidades como se muestra desde el punto de vista de sus padres, por lo tanto, juegan un papel importante en el desarrollo de sus metas de aprendizaje individuales que actúan como protección hacia la manifestación de conductas de evitación. Además, el fortalecimiento de las autocreencias, ya sea en relación con objetos cognitivos específicos o en general, crea condiciones favorables para una mayor confianza en sí mismo, uso de estrategias cognitivas y metacognitivas que le ayudarán a lograr su objetivo y, en consecuencia, disposición a buscar. ayuda cuando sienten que la necesitan. Parece, por lo tanto, que la autodestrucción académica, como comportamiento que ocurre principalmente en el contexto académico, es fomentada por variables de tipo escolar, mientras que la evitación de buscar ayuda está más influenciada por tipos más generales de variables individuales (p. ej., autodefensa estima). Los hallazgos resaltan el valor de la intervención en la escuela y en la familia con el objetivo de formar estudiantes social y académicamente competentes que no se caracterizarán por el miedo al fracaso y la indicación de baja capacidad, sino que buscarán el aprendizaje y la adquisición de habilidades en un ambiente seguro y aceptación.

La presente investigación abordó un tema de investigación interesante en el campo de la Educación y utilizando la literatura disponible fue más allá tanto teórica como metodológicamente. En concreto, como se menciona en la parte teórica de la investigación, el surgimiento del complejo entramado de relaciones entre los factores considerados que intervienen en la adopción de estrategias de uso o no, el examen de la dimensión psicológica del aula y del entorno familiar en un El enfoque holístico de la interpretación del uso de la herramienta de investigación y la formulación del modelo para el desarrollo de las estrategias de los estudiantes con TDAH durante la escuela y la adolescencia (12-15 años) no ha sido examinado internacionalmente en el pasado.

Los hallazgos de la presente investigación pueden ser una base científica para el pedagogo escolar, el psicólogo y la colaboración con estudiantes, profesores y padres. En particular, el psicólogo escolar puede ejercer una función de asesoramiento y formación, dentro de la escuela y la familia con el objetivo de la función protectora de los objetivos de aprendizaje, el uso de estrategias, la ausencia del uso de estrategias como factor de riesgo, la contribución de una relación significativa maestro-alumno y el valor de los mensajes para el aprendizaje.

En relación con los estudiantes, el pedagogo y psicólogo escolar podría utilizar los hallazgos del presente estudio para comprender mejor las razones por las cuales un estudiante puede evitar buscar ayuda en el aula o recurrir al uso de estrategias. Autodegradarse y, en consecuencia, emprender acciones dirigidas empíricamente fundamentadas, que respondan con mayor éxito al perfil del alumno en particular. El pedagogo y psicólogo escolar en colaboración con la dirección y los docentes de la escuela podrían organizar programas de prevención/intervención primaria y secundaria con el fin de mejorar el clima educativo del aula, para fortalecer la motivación de aprendizaje de los niños.

En lo que respecta a los padres, el pedagogo escolar puede sensibilizarlos sobre cuestiones relacionadas con su contribución a la motivación de sus hijos, al tiempo que les propone formas funcionales de involucrarse con sus hijos. Por ejemplo, a través de los elogios que los padres pueden dar a los alumnos por su esfuerzo y no por el rendimiento final, el estímulo para adquirir nuevos conocimientos y habilidades y la dedicación de su tiempo a actividades de aprendizaje agradables y constructivas.

Finalmente, el pedagogo escolar puede promover la cooperación entre docentes y padres con el objetivo de crear un clima positivo entre ellos y fomentar, en la medida de lo posible, la compatibilidad de los dos marcos en cuanto a los mensajes que envían a los niños sobre aprendizaje, desempeño, éxito escolar y evaluación.

6.6 Limitaciones del estudio y sugerencias para futuras investigaciones

La presente investigación ha llevado a una serie de demostración sobre las razones por las cuales los estudiantes de secundaria recurren al uso de estrategias en la escuela, que degradan el proceso de aprendizaje y socavan los resultados del aprendizaje. La generalización de los resultados de este estudio es limitada ya que se obtuvo un procedimiento de examen por conveniencia. Es evidente que las investigaciones futuras en el campo del uso de estrategias en el contexto escolar tienen mucho más que aportar, principalmente a través de enfoques más holísticos y, en consecuencia, más realistas que, por un lado, examinarán factores académicos y no académicos sobre otros tiempo, mucha más combinación de modelos estadísticos, una muestra más generalizada y por otro lado, se tendrá en cuenta tanto el contexto escolar como el contexto familiar que también cambia en la dinámica del tiempo.

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8. APPENDIX

8.1 Questionnaire in Greek

ΕΡΩΤΗΜΑΤΟΛΟΓΙΟ ΕΡΕΥΝΑΣ

ΟΔΗΓΙΕΣ

Το ακόλουθο ερωτηματολόγιο διερευνά τη σχέση σου και τις αντιλήψεις σου σχετικά με το μάθημα των Μαθηματικών. Επειδή ο καθένας/ η καθεμία μπορεί να έχει διαφορετικές απόψεις, οι απαντήσεις σας θα είναι διαφορετικές. Σε αυτού του είδους τις ερωτήσεις δεν υπάρχουν σωστές ή λανθασμένες απαντήσεις. Οι απαντήσεις σας είναι πολύ σημαντικές και ενδιαφέρουσες για μας, γι' αυτό παρακαλούμε να απαντήσετε με ειλικρίνεια σε όλες τις ερωτήσεις.
Ο εκτιμώμενος χρόνος για να συμπληρωθεί αυτό το ερωτηματολόγιο κυμαίνεται από 12 έως 15 λεπτά.
Ευχαριστώ για τη βοήθειά σας.

Παράδειγμα

Νομίζω ότι θα έχω καλό βαθμό στα Μαθηματικά

1	2	3	4	5
Δεν ισχύει καθόλου για μένα	**Ισχύειλίγογια μένα**	**Ισχύει έτσι κι έτσι για μένα**	**Ισχύει αρκετάγια μένα**	**Ισχύει πολύγια μένα**

ΕΡΕΥΝΗΤΗΣ: **Γιώργος Τσαμπούρης**, υποψήφιος διδάκτωρ του Παιδαγωγικού τμήματος, Πανεπιστήμιο Κόρδοβας

ΕΠΙΒΛΕΠΟΥΣΑ ΚΑΘΗΓΗΤΡΙΑ: **Begoña E. SampedroRequena**, καθηγήτρια Παιδαγωγικής Επιστήμης, Πανεπιστήμιο Κόρδοβας

Κωδικός: ……………………………………..

Φύλλο: ………………………………………..

Ημερομηνία Γέννησης: ……………………….

Τάξη: …………………………………………..

Σχολείο: ……………………………………….

ΣΠΟΥΔΕΣ ΓΟΝΕΩΝ:			
Ο πατέρας μουτελείωσε:		**Η μητέρα μουτελείωσε:**	
Δημοτικό	☐	Δημοτικό	☐
Γυμνάσιο	☐	Γυμνάσιο	☐
Λύκειο	☐	Λύκειο	☐
ΑΤΕΙ	☐	ΑΤΕΙ	☐
Πανεπιστήμιο	☐	Πανεπιστήμιο	☐
Άλλο	☐	Άλλο	☐

ΚΑΤΑΓΩΓΗ ΓΟΝΕΩΝ:			
Ο πατέρας μου κατάγεται από:		**Η μητέρα μου κατάγεται από:**	
Ελλάδα	☐	Ελλάδα	☐
Αλβανία	☐	Αλβανία	☐
Χώρα της πρώην Σοβιετικής Ένωσης	☐	Χώρα της πρώην Σοβιετικής Ένωσης	☐
Χώρα τηςΕυρωπαϊκής Ένωσης	☐	Χώρα τηςΕυρωπαϊκής Ένωσης	☐
Αμερική, Καναδά, Αυστραλία	☐	Αμερική, Καναδά, Αυστραλία	☐
Ασία ή Αφρική	☐	Ασία ή Αφρική	☐

Ο βαθμός μου στα Μαθηματικά πέρυσι ήταν:			
Κάτω από 10	☐	15-16	☐
11-12	☐	17-18	☐
13-14	☐	19-20	☐

A1. ΈλλειψηΣτρατηγικών

1	2	3	4	5
Δεν ισχύει καθόλου για μένα	Ισχύειλίγογια μένα	Ισχύει έτσι κι έτσι για μένα	Ισχύει αρκετάγια μένα	Ισχύει πολύγια μένα

ΈλλειψηΣτρατηγικών	1	2	3	4	5
Α1-1. Όταν έχω διαγώνισμα στα Μαθηματικά, δυσκολεύομαι να μελετήσω με τρόπο που να με βοηθήσει να μάθω καλά αυτά που πρέπει να μάθω.	1	2	3	4	5
Α1-2. Ενώ διαβάζω για τα Μαθηματικά, συχνά νομίζω ότι δεν ξέρω σε τι πράγμα αναφέρεται.	1	2	3	4	5
Α1-3. Μου είναι πολύ δύσκολο να μελετήσω μεθοδικά, έτσι ώστε να μπορέσω να κατανοήσω το κείμενο που διαβάζω.	1	2	3	4	5
Α1-4. Συχνά διαπιστώνω ότι δεν ξέρω από πού να αρχίσω να διαβάζω.	1	2	3	4	5
Α1-5. Πολύ δύσκολα μπορώ να καταλάβω ποια είναι κύρια σημεία σε κάτι που διαβάζω.	1	2	3	4	5
Α1-6. Μου είναι δύσκολο να οργανώσω αποτελεσματικά το χρόνο της μελέτης μου.	1	2	3	4	5
Α1-7. Συχνά διαπιστώνω ότι δεν ξέρω πώς να μελετώ σωστά.	1	2	3	4	5
Α1-8. Όταν μελετώ για τα Μαθηματικά, παραλείπω τα δύσκολα σημεία.	1	2	3	4	5

Α2. Στρατηγικές Βάθους&Αυτο-ρύθμισης

Στρατηγικές Βάθους&Αυτο-ρύθμισης	1	2	3	4	5
Α2-1. Όταν διαβάζω κάτι, υπογραμμίζω τις κύριες ιδέες.	1	2	3	4	5
Α2-2. Όταν συναντώ μια νέα πληροφορία, σκέφτομαι αν ήδη ξέρω κάτι σχετικό με αυτή.	1	2	3	4	5
Α2-3. Όταν το μάθημα των Μαθηματικών που διαβάζω είναι μεγάλο, το χωρίζω σε ενότητες.	1	2	3	4	5
Α2-4. Όταν μελετώ, προσπαθώ να εξηγήσω τις κύριες ιδέες με δικά μου λόγια.	1	2	3	4	5
Α2-5. Όταν διαβάζω Μαθηματικά, φτιάχνω σχέδια ή διαγράμματα στα οποία συνδέω τα κύρια σημεία.	1	2	3	4	5
Α2-6. Λύνω αρκετές ασκήσεις στο σπίτι, παρόμοιες με αυτές που κάνουμε στην τάξη.	1	2	3	4	5
Α2-7. Για να μάθω κάτι, προσπαθώ πρώτα να καταλάβω το νόημά του.	1	2	3	4	5
Α2-8. Πριν ξεκινήσω να διαβάζω Μαθηματικά, σκέφτομαι τι θα πρέπει να κάνω προκειμένου να το	1	2	3	4	5

μάθω καλύτερα.					
Α2-9. Πριν απαντήσω μια ερώτηση, προσπαθώ να σιγουρευτώ ότι έχω καταλάβει τι μου ζητά η ερώτηση αυτή.	1	2	3	4	5
Α2-10. Όταν ολοκληρώσω μια άσκηση, την ξανακοιτάζω από την αρχή για να αποφύγω τα λάθη.	1	2	3	4	5
Α2-11. Όταν έχω να λύσω μια άσκηση ή να κατανοήσω ένα κείμενο, προσπαθώ να θυμηθώ κάποιες παλαιότερες πληροφορίες που μπορεί να έχουν σχέση μ' αυτά, επειδή αυτό με βοηθά.	1	2	3	4	5
Α2-12. Πριν από ένα διαγώνισμα, οργανώνω το χρόνο μου σε σχέση με την ύλη που έχω να διαβάσω, προκειμένου να τα πάω καλά.	1	2	3	4	5
Α2-13. Όταν έχω να λύσω μια άσκηση, το πρώτο πράγμα που προσπαθώ να κάνω είναι να καταλάβω καλά τι μου ζητά αυτή η άσκηση.	1	2	3	4	5
Α2-14. Κάθε φορά που απαντώ μια ερώτηση σε ένα διαγώνισμα, στο τέλος την ξαναδιαβάζω, για να βεβαιωθώ ότι έδωσα την απάντηση που ζητούσε η ερώτηση.	1	2	3	4	5

Α3. Στρατηγικές Επιφανείας

Στρατηγικές Επιφανείας	1	2	3	4	5
Α3-1. Όταν μελετώ Μαθηματικά, προσπαθώ να εντοπίσω τις κυριότερες ιδέες και τις μαθαίνω απ' έξω.	1	2	3	4	5
Α3-2. Όταν μελετώ, προσπαθώ να αποστηθίσω όσες περισσότερες πληροφορίες μπορώ.	1	2	3	4	5
Α3-3. Προσπαθώ να αποστηθίσω οτιδήποτε νομίζω ότι θα με ρωτήσουν στις εξετάσεις.	1	2	3	4	5
Α3-4. Όταν μελετώ, διαβάζω την ύλη των Μαθηματικών πολλές φορές, έτσι ώστε να μπορώ να τη θυμάμαι.	1	2	3	4	5
Α3-5. Όταν έχω διαγώνισμα, προσπαθώ να τα μάθω όλα απ' έξω.	1	2	3	4	5

1	2	3	4	5
Δεν ισχύει καθόλου για μένα	**Ισχύειλίγογια μένα**	**Ισχύει έτσι κι έτσι για μένα**	**Ισχύει αρκετάγια μένα**	**Ισχύει πολύγια μένα**

Σχεδιασμός	**22. Βάζω στον εαυτό μου ερωτήσεις για το μάθημα πριν αρχίσω να μελετάω**	**1**	**2**	**3**	**4**	**5**
	23. Σκέφτομαι διαφορετικούς τρόπους επίλυσης ενός προβλήματος και επιλέγω το καλύτερο	**1**	**2**	**3**	**4**	**5**
Οργάνωση	**9. Προχωρώ πιο αργά όταν βρίσκω σημαντικές πληροφορίες**	**1**	**2**	**3**	**4**	**5**
	31. Ανακαλύπτω τα δικά μου παραδείγματα για να κατανοήσω καλύτερα τις πληροφορίες	**1**	**2**	**3**	**4**	**5**
	41. Χρησιμοποιώ τη δομή και την οργάνωση του κειμένου για να καταλάβω καλύτερα	**1**	**2**	**3**	**4**	**5**
Παρακολούθηση-Έλεγχος	**1. Αναρωτιέμαι συνεχώς αν φτάνω στους στόχους μου**	**1**	**2**	**3**	**4**	**5**
	2. Σκέφτομαι διάφορους τρόπους για την επίλυση ενός προβλήματος πριν την απαντήσω	**1**	**2**	**3**	**4**	**5**
	11. Όταν λύνω ένα πρόβλημα, αναρωτιέμαι αν έχω λάβει υπόψη όλες τις επιλογές	**1**	**2**	**3**	**4**	**5**
	21. Επανεξετάζω περιοδικά για να με βοηθήσει να κατανοώ σημαντικές σχέσεις	**1**	**2**	**3**	**4**	**5**
	34. Όταν μελετώ, υπάρχουν στιγμές που κάνω παύση για να δω αν καταλαβαίνω	**1**	**2**	**3**	**4**	**5**
Διασαφήνιση	**25. Ζητώ βοήθεια όταν δεν καταλαβαίνω κάτι**	**1**	**2**	**3**	**4**	**5**
	40. Όταν δεν μπορώ να καταλάβω ένα πρόβλημα, αλλάζω τις στρατηγικές	**1**	**2**	**3**	**4**	**5**
	51. Όταν οι νέες πληροφορίες προκαλούν σύγχυση, σταματάω και επανεξετάζω	**1**	**2**	**3**	**4**	**5**
	52. Σταματώ και ξαναδιαβάζω όταν έχω μπερδευτεί	**1**	**2**	**3**	**4**	**5**
Αξιολόγηση	**7. Όταν ολοκληρώσω μια εξέταση ξέρω πώς πήγε**	**1**	**2**	**3**	**4**	**5**
	19. Όταν ολοκληρώσω μια εργασία, αναρωτιέμαι αν υπήρχε ένας ευκολότερος τρόπος να το κάνω	**1**	**2**	**3**	**4**	**5**
	24. Όταν τελειώνω τη μελέτη, κάνω μια περίληψη αυτού που έμαθα	**1**	**2**	**3**	**4**	**5**
	50. Όταν ολοκληρώσω μια εργασία, αναρωτιέμαι αν έχω μάθει όσο το δυνατόν περισσότερα	**1**	**2**	**3**	**4**	**5**

8.2 Questionnaire in English

RESEARCH QUESTIONNAIRE

INSTRUCTIONS

The following questionnaire explores your relationship and your perceptions with regards to a Mathematics course. Considering that everyone can have different opinions, your answers will be different. There are no correct or wrong answers to these kinds of questions. Your answers are very important and interesting to us, so please answer all the questions honestly.
The estimated time to complete this questionnaire ranges from 12 to 15 minutes.
Thank you very much for your help.

Example
I think I will receive a good grade in Mathematics
To what extend is this valid to me?

1	2	3	4	5
not at all valid	**somewhat valid**	**quite valid**	**very valid**	**extremely valid**

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Code: ……………………………………..

Gender: …………………………………….

Date of Birth: ……………………………

Class: ………………………………………

School: ……………………………………..

School Area:………………………………

PARENTAL EDUCATIONAL BACKROUND:			
My father has finished:		**My mother has finished:**	
Primary school	☐	Primary school	☐
Junior High school	☐	Junior High school	☐
High school	☐	High school	☐
Technological Education	☐	Technological Education	☐
University	☐	University	☐
Other	☐	Other	☐

PARENTAL BACKROUND:			
My father comes from:		**My mother comes from:**	
Greece	☐	Greece	☐
Albania	☐	Albania	☐
Former Soviet Union countries	☐	Former Soviet Union countries	☐
EU country	☐	EU country	☐
America, Canada, Australia	☐	America, Canada, Australia	☐
Asia or Africa	☐	Asia or Africa	☐

My grade in Mathematics last year was:			
Lower than 10	☐	15-16	☐
11-12	☐	17-18	☐
13-14	☐	19-20	☐

A1. Lack of Use of Strategy

1	2	3	4	5
not at all valid	somewhat valid	quite valid	very valid	extremely valid

Lack of Use of Strategy	1	2	3	4	5
A1-1. When I have a math exam, I find it difficult to study in a way that will help me to learn what I need to know well.	1	2	3	4	5
A1-2. While studying about Mathematics, I often think I do not know what it is about.	1	2	3	4	5
A1-3. It is very difficult for me to study methodically, so that I can understand the text I read.	1	2	3	4	5
A1-4. I often find that I do not know where to start reading.	1	2	3	4	5
A1-5. It is very difficult to understand what the main points about something I read are.	1	2	3	4	5
A1-6. It is difficult for me to efficiently organize my study time.	1	2	3	4	5
A1-7. I often find that I do not know how to study correctly.	1	2	3	4	5
A1-8. When I study Mathematics, I omit the difficult points.	1	2	3	4	5

A2. Depth Strategy& Self-Regulation

Depth Strategy& Self-Regulation	1	2	3	4	5
A2-1. When I read something, I highlight the main ideas.	1	2	3	4	5
A2-2. When I come across a new piece of information, I wonder if I already know anything about it.	1	2	3	4	5
A2-3. When the math lesson I study is very big, I divide it into sections.	1	2	3	4	5
A2-4. When I study, I try to explain the main ideas in my own words.	1	2	3	4	5
A2-5. When I study Mathematics, I draw designs or diagrams to which I link the main points.	1	2	3	4	5

A2-6. I do a lot of homework, like that which we do in the classroom.	1	2	3	4	5
A2-7. To learn something, I first try to understand its meaning.	1	2	3	4	5
A2-8. Before I begin to read Mathematics, I think what I should do to learn it better.	1	2	3	4	5
A2-9. Before I answer a question, I try to make sure I understand what this question is asking me to do.	1	2	3	4	5
A2-10. When I complete an exercise, I look over it from the beginning to avoid mistakes.	1	2	3	4	5
A2-11. When I have to solve an exercise or understand a text, I try to recall some older information that may relate to them because this helps me.	1	2	3	4	5
A2-12. Before a test, I organize my time in relation to the material that I have to study in order to succeed.	1	2	3	4	5
A2-13. When I have to solve an exercise, the first thing I try to do is figure out what this exercise calls for.	1	2	3	4	5
A2-14. Whenever I answer a question in a test, I re-read it again in order to make sure I gave the answer to the question asked.	1	2	3	4	5

A3. Surface Strategy

Surface Strategy	1	2	3	4	5
A3-1. When I study Mathematics, I try to identify the main ideas and learn them by heart.	1	2	3	4	5
A3-2. When I study, I try to learn as much information as I can by heart.	1	2	3	4	5
A3-3. I try to learn anything I think will be asked of me for the exam by heart.	1	2	3	4	5
A3-4. When I study, I study the Mathematics material over and over so that I can remember it.	1	2	3	4	5
A3-5. When I have a test, I try to learn everything by heart.	1	2	3	4	5

1	2	3	4	5
not at all valid	**somewhat valid**	**quite valid**	**very valid**	**extremely valid**

Planning	**22. I ask myself questions about the lesson before I start studying.**	**1**	**2**	**3**	**4**	**5**
	23. I think of different ways of solving a problem and I choose the best.	**1**	**2**	**3**	**4**	**5**
Organization	**9. I go slower when I find important information.**	**1**	**2**	**3**	**4**	**5**
	31. I find my own examples to better understand the information.	**1**	**2**	**3**	**4**	**5**
	41. I use the structure and organization of the text to better understand.	**1**	**2**	**3**	**4**	**5**
Monitoring	**1. I constantly wonder whether I will reach my goals.**	**1**	**2**	**3**	**4**	**5**
	2. I think of several ways to solve a problem before I answer it.	**1**	**2**	**3**	**4**	**5**
	11. When I solve a problem, I wonder if I have taken all options into consideration.	**1**	**2**	**3**	**4**	**5**
	21. I periodically review to help me understand important mathematical relationships.	**1**	**2**	**3**	**4**	**5**
	34. When I study, there are times when I pause to see if I understand.	**1**	**2**	**3**	**4**	**5**
Depuration	**25. I ask for help when I do not understand something.**	**1**	**2**	**3**	**4**	**5**
	40. When I cannot figure out a math problem, I change the strategies.	**1**	**2**	**3**	**4**	**5**
	51. When the new information is confusing, I stop and re-examine.	**1**	**2**	**3**	**4**	**5**
	52. I stop and re-read when I'm confused.	**1**	**2**	**3**	**4**	**5**
Evaluation	**7. When I finish an exam I know how it went.**	**1**	**2**	**3**	**4**	**5**
	19. When I finish a task, I wonder if there was an easier way to do it.	**1**	**2**	**3**	**4**	**5**

	24. When I finish studying, I make a summary of what I learned.	**1**	**2**	**3**	**4**	**5**
	50. When I finish a task, I wonder if I have learned as much as possible.	**1**	**2**	**3**	**4**	**5**

UNIVERSIDAD DE CÓRDOBA

DOCTORAL PROGRAM IN SOCIAL AND LEGAL SCIENCES

Estudio sobre las percepciones del alumnado griego, de la etapa de secundaria en la asignatura de matemáticas, referentes a algunos aspectos de la competencia de aprender a aprender, desde una perspectiva de la psicológica escolar en educación

Study on the perceptions of Greek students, of the secondary education, on the course of mathematics, referring to some aspects of their competence of learning to learn, from the perspective of school psychology in education

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DOCTORAL THESIS

Georgios Tsampouris

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