Khalid Abdu M Al-Makhalid. (2021). Gender Differences in the Effect of Type, Level and amount of Information on Attention Ability Among Saudi High School Students. *International Journal of Early Childhood Special Education (INT-JECSE),* 13(2): 753-762. DOI: 10.9756/INT-JECSE/V13I2.211116

Received: 21.05.2021 Accepted: 24.08.2021

Khalid Abdu M Al-Makhalid[1]

Gender Differences in the Effect of Type, Level and Amount of Information on Attention Ability among Saudi High School Students

Abstract

Boredom has been considered as a significant and prevalent among students in the classroom. Research indicates the necessity to tackle the negative consequences of these important and pervasive academic emotions. Despite the plethora of studies investigating the psychological effect on attention ability, far fewer have considered gender as a moderator of the effect of information characteristics on students' attention ability. Thus, the purpose of this study is to look at gender disparities in the impact of type, level, and amount of information on students' attention capacity. Based on the Guilford structure-of-intellect (SI) model, forty tests were designed and validated to gather and analyse the data. The participants of the study were 60 high school students (level 10 and 11) from the Al-Qunfudah district. An equal number of male and female participants were selected randomly. Type of information represented in semantic and symbolic, the level of information represented in units, cases, relations, while the amount of information was represented in (5,7,9) based on Miller model. Data was collected using newly developed and verified tests. Independent t-test studies revealed no significant variations in the type, level, and amount of information on students' attention skills among male and female students. Several discussions were drawn in light of the findings. Suggestions and recommendations were presented.

Keywords: Psychology Education, Attention Ability, Information Type, Information Level, Amount of Information, Saudi Students.

Introduction

Attentiveness to the knowledge and lessons that have been taught during a class could be the common significant element that may influence the learning process (Chun & Turk-Browne, 2007). Modern psychology had given the differentiation between explicit learning (e.g., memorising for retrieval), where the aim is to acquire information for the reason that it could be recalled to the mind consciously, and implicit learning, in which the execution of the skill is key (e.g. learning to ride a bicycle), and attention at the moment of learning is conceivable for both (Naccache, Blandin, & Dehaene, 2002). Most of the time, conscious recall is known to be crucial for a variety of factors during the learning process in schools. This article would examine novel neuroscience evidence regarding the function of the regulatory attention network in the sense of explicit learning and retrieval, and it is intended to supplement our earlier publication in this journal on the self-regulation mechanisms (Posner, Rothbart & Tang, 2013). During the past few years, we have started to grasp the neurological processes that govern everything that we understand and remember (Squire &

Khalid Abdu M Al-Makhalid[1], Psychology & Education Department, Al-Qunfudah University College, Umm Al-Qura University, Mecca, Kingdom of Saudi Arabia. Email: kamakhalid@uqu.edu.sa

Wixted, 2011; Weible, 2013). These results have enormous implications for the growth of education since explicit learning and memory are critical to academic achievement. Through this article, we would first look at how attentiveness networks are linked to the process of learning and memorisation linked with the hippocampus. The formation of the networks throughout infancy and early childhood is next discussed. Lastly, we examine how attentiveness connects to school-based education by first examining competence as it extends to elementary school abilities and subsequently mathematics as a sample of secondary school abilities.

Some of the features that should be adopted through an efficient attentional system are (1) in a complicated setting, it could rapidly select and concentrate on the essential object; (2) maintain concentration on a single task while observing relevant details and avoiding unnecessary factors; (3) access to the memories which are not active right now but may be important to the present focus; (4) when significant new information comes, it could change your focus immediately. Several fixed components in the attentional system emerge quickly, spontaneously, and reliably, reducing the complexity of the sensory system. They enable us to react swiftly to unexpected hazardous situations. The rest of the flexible components emerge subsequently, and these flexible components may be taught to react to more delicate sensory input, progressive changes, and social expectations, for example, the school processes. (Ornstein & Ehrlich, 1989). Attention has been an especially tricky term for psychologists to describe. Although William James' (1890) oft-quoted statement mentioning that "Everyone understands what the meaning of attention is", it is more accurate to argue that "Nobody knows what attention is," or it could be that not all psychologists accept this idea. The issue is that attention is not a single notion; instead, it is rather a label for several mental processes.

The Guilford structure-of-intellect (SI) model (Guilford, 1967) is one of the best-known models of intelligence in recent years (Sternberg & Grigorenko, 2001). According to Guilford (1967), every intellectual task must include a combination of three aspects: an operation, content and a product. Subsequently, any intellectual task or cognitive test differs from any other in terms of five separate operations, four distinct contents and six categories of products (Undheim & Horn, 1977). However, in the framework related to information processing, Solso (2005) stresses the attention process as one of the components or elements of information processing in human beings. This attention can be changed due to many factors such as colour. Thus, the aim of the current study is to estimate gender differences in the attention ability of a sample of Saudi high school students using the Guilford (SI) model: information type variable (semantic – symbolic), level variable (units, categories, relations), and amount variable (1,2,3,4) with and without the addition of colour. The Guilford structure-of-intellect (SI) model (1967) is one of the best-known models of intelligence in recent years (Sternberg & Grigorenko, 2001).

According to Guilford (1967), every intellectual task must include a combination of three aspects: an operation, content, and product. As a result, each intellectual activity or any test requiring cognitive use is unique, especially in the sense of five major functions (evaluation, convergent production, divergent production, memory, and cognition), four major themes (semantic, symbolic, figural, and behavioural), and six major product categories (units, classes, relations, systems, transformations and implications). As a result, the implications of this structure is that it would be able to guide us to the discovery of a specific collection of 546=120 independent variables, each reflecting a specific individual skill (Undheim & Horn, 1977).

However, it is interesting to note that, in terms of the operation category, the first stage is cognition which is defined by Guilford (1967) as "…awareness, immediate discovery or rediscovery, or recognition of information in various form: comprehension or understanding." This cognition operation overlaps with other operations such as attention and perception. Melis et al. (1999) argued that attention and perception are associated with cognition. All deal with input information and what happens subsequently. As a result, cognition in the SI model goes beyond attention and perception operations. Interestingly, Guilford had studied the subject of attention as a part of his doctoral thesis (1927), when he dealt with the fluctuations of attention related to visual stimuli. Nevertheless, he concentrated on the SI model (Guilford 1967) without dealing with the attention operation (Fruchter et al., 1989).

On the other hand, it is believed that attention is a complicated phenomenon due to the natural difficulty of observing it, which has led to diverse definitions and a range of experimental techniques (Wood et al., 2006). In terms of definitions, the most common definition of attention is presented by William James (1890) "Everyone knows what attention is. It is the taking possession by the mind." (Arbuthnott & Thompson, 2006). Although, recently, this definition has not accepted due to the theoretical

analysis approach, and furthermore because of the evidence from our lives which indicates that our attention to stimulants occurs selectively, as a result of our limited processing capacity. Lovie (1983) mentioned that attention research has never become extinct as has sometimes been suggested.

The essence of attention is selection. There is much more information in the visible world than we ever are able, or need, to use. At every moment, we pay attention to only one or a few objects. This hypothesis seems to agree with a huge body of evidence from learning laboratories (Knudsen, 2007; Sieroff, 2001). Allport (1993), for example, suggests that attention is a process of selection and selective processing, required because of the limited information processing capacity of the brain.

The study of high school Mathematics is one approach to the study of high-level cognitive skills acquired in high school. Applying the concepts of cognitive science, John Anderson, along with his other colleagues, created an intelligent tutoring practice that is now deployed by a number of 1,000 schools in the United States, engaging over 500,000 children (Ritter et al, 2007). Increasingly, imaging studies have been undertaken to link cognitive regions with aspects of the instructor's tasks. fMRI was utilised in research (Anderson, Betts, Ferris, & Fincham, 2013) to examine alterations in cognitive regions after almost a week of practice. The research looked at six cognitive areas that have previously been discovered as being essential in solving Mathematical problems (Anderson 2007). Among these regions was the anterior cingulate, which has been shown to be engaged quickly in problem-solving and was associated with retaining the subgoal utilised in the process of problem-solving. In the indexing and sharing of explicit memory, the ACC collaborates with the lateral prefrontal cortex. However, this research did not focus on the contemporaneous behaviour in the hippocampus region, so it is unknown whether that if these frontal regions are influencing the hippocampus through the channels outlined above, though perhaps upcoming further studies employing intelligent tutor technology will look into this prospect. The importance of attention in school curriculum education cannot be overstated. In this article, we examined current research on the mechanisms through which attention regulates what is learnt. It is our goal that this enhanced knowledge would shed light on the processes associated with achieving high levels of competence required in the majority of the subjects covered in schools.

Gender Disparities in Academic Performance and Cognition

Girls, in general, seem to be further enthusiastic than boys when it comes to performing well in schools; this could be seen at least in the context of primary school. Nevertheless, by the time girls enter secondary school, several did attempt to suppress their intellectual aptitude so that they could be accepted by both genders (Davies, 2005). Although this may happen, it has no significant effect on their academics: from preschool to high school; girls have marginally higher grades as compared to boys (Freeman, 2004). This aspect, though, does not translate into comparable performance since, when children enter high school, they prefer to pick their majors or topics that are commonly linked to their gender, in which subjects like mathematics and science are typically for males, and literature and the arts are for females. By the completion of high school, the disparity in academic selection produces a significant disparity in the academic achievement of males and females in these disciplines. However, remember my word against stereotyping: there are people of both sexes whose actions and decisions contradict social patterns. Those within each gender group are often much greater than disparities across groups. The “distinction” in cognitive capacity between males and females is an excellent illustration.

Numerous studies have found nothing significant. Some other studies conducted have discovered minor disparities, with males doing relatively better in arithmetic and girls performing relatively better in language and literature. Some research has shown that the disparities are not only modest but have been shrinking since the past few years when compared to previous research. Ultimately, the results regarding cognitive skills are essential “non-findings”, and it is important to question the reason why gender disparities have been explored and debated for many years (Hyde, 2005). What impact do educators have on gender roles? Educators commonly aim to engage similarly with both genders and regularly accomplish in doing their roles. However, studies have shown that individuals do occasionally react in different ways to males and females, possibly with no acknowledgement about the situation. There are three types of distinctions that were being observed. The first one is the total concentration given to each gender; the second is the exposure or “publicity” of discussions, and the third is the kind of conduct that causes educators to encourage or condemn students. Generally, teachers engage with male students more frequently than with females by a range of 10%

to 30%, and this depends on students' age and the teacher's personality (Measor & Sykes, 1992). One potential explanation for the distinction is the higher aggressiveness of males, which have been previously mentioned; if males voice out more often in debates or at other times, a teacher may be “compelled” to give extra attention to them compared to female students. Another explanation is that some educators believe that males are particularly susceptible to misbehaving, so they engage with them more often in order to maintain them engaged on their current tasks (Erden & Wolfgang, 2004). Another theory is that males, as compared to females, engage in a broader range of behaviours and contexts. Thus there are just more chances to engage with them. Another gender gap in classroom interplay lends credence to this final hypothesis. Even though with common perception, students' attention spans range from 10 to 15 minutes. However, there is substantial evidence to indicate the contrary. Karen Wilson and James H. Korn, psychologists, found in a 2007 literature assessment that there is very small proof to give support to this notion. Rather The proof they discovered was sketchy and ambiguous. One study's researchers, for instance, voiced admiration for the attention capacity hypothesis after discovering that student note-taking usually decreases throughout the course of a class. However, as Wilson and Korn said that, no conclusive proof of a constant 10 to 15-minute attention span was discovered. In one other research regarding student attention, analytical research observed students throughout a class session and documented reported attention lapses. They observed concentration lapses during the first few minutes of “settling in”, again at 10-18 minutes into the lesson, and then subsequently vary as often as every 3-4 minutes towards the end of the lesson.

Differences in Learning and Cognitive Styles by Gender

Scholars addressed the problem by asking students in three fundamental chemistry classes to record attention lapses using a “clicker”. Each class was delivered by a distinct instructor employing a distinct style of instruction (lecturing, demonstrating, or asking a question). The scholars assessed the average duration of students' observed attention lapses and the connection between attention lapses and the different educational techniques employed by each instructor. Students were instructed to disclose their attention lapses by pushing the button on the clickers when they were conscious of a time when they could not pay attention. The students pressed one key to signify a concentration loss of one minute or less, another for a delay of two to three minutes, and the third one for a lapse of five minutes or more. The clicking results were stored on the server, and the data was outlined into a chronology of each instructor's various teaching techniques. This enabled the researchers to determine whether recorded gaps in concentration increased or decreased (or remained constant) when the instructor moved from one technique to the next. Three intriguing discoveries were made by the scholars. Firstly, the very commonly described duration of attention loss was one minute or less, indicating that extremely brief attention lapses are more prevalent than longer ones. Secondly, the failures happened more often than the current hypothesis predicts. If the 10-15-minute hypothesis was correct, the scholars could have seen a trend of documented lapses for around 10 minutes. However, this did not occur. Rather, they discovered a trend that shown the first "surge" in perceived attention lapses took place only 30 seconds into a teaching section, mirroring the “settling-in” timespan; the subsequent surge took place at 4.5 to 5.5 minutes into the lesson; following the next at 7 to 9 minutes, and the next one at 9 to 10 minutes. They found that “this waxing-and-waning trend persisted all through the presentation, with attention gaps happening more often as the session proceeded”. “By the end of the lesson, lapses happened every two minutes or so”.

Thirdly, they discovered a connection linking attention and active learning, often known as “student-centred” approaches. Demonstrations and discussions were the two most frequently used active learning techniques. During the sessions of demonstrations and discussions, there were fewer perceived attention lapses as compared to while in the lesson’s sequences. If contrasted to the teaching parts that followed the active learning techniques, there were also fewer perceived gaps in attention while in the lesson’s sequences directly after either a demonstration or a discussion. “This final finding,” they add, “indicates that successful learning techniques may have ‘a double perks’: retaining student attention throughout a section and renewing attention shortly following a section”.

Until now, the data indicates that gender disparities in the brain arise only in a few relatively specialised activities, and still though, the gender disparities are frequently skewed. This implies that, with the exception of some particular spatial and numeric activities, it is not yet to be discovered any evidence that males and females have distinct fundamental cognitive capabilities, skills, or talents. Males and females, in which the same things happen to girls and boys, do seem to teachers and educators to

have distinct skills and abilities or inclinations. Starting from secondary school, more females than males show “anxiety with mathematics” and would skip numerical or analytical courses (such as mathematics, physics, and reasoning) when being offered an option (Oakes, 1990).

Gender disparities in aptitude and accomplishment have been researched and understood for decades in terms of linguistic, mathematical, and visual-spatial aspects. Lately, researchers have advocated for a theory-based technique to examining these disparities. Naglieri and Rojahn (2001) used the Planning, Attention, Simultaneous, Successive (PASS) cognitive-processing paradigm, which was based on the neuropsychological research of A.R. Luria (1973), to evaluate 1,100 boys and 1,100 girls who mirrored the US population. Girls outscored boys by approximately 5 points on the Cognitive Assessment System's Planning and Attention measures (d - .30 and .35, individually).

Alvarez et al. (1988) investigated formal characteristics such as rapid action, conversation, and animations, as well as content factors such as aggression and themes, as potential drivers of gender disparities in children's television watching. There have been a number of two studies recorded on this topic. The visual attention of boys and girls was examined during four animated shows that represented four combinations of high and low activity with high and low aggression. Boys had greater visual attention compared to girls. High violence drew more interest compared to low violence. Boys' concentration did not differ between interventions, while girls engaged more in low-action activities than high-action ones. In the second study, nine previous experimental research, in which each one has its independent sample, were analysed again. The methods were identical to those used in the first study previously; the samples varied in age from 3 to 11 years. Boys participated considerably in more sessions than girls. The secondary data analysis sought to find program form and content factors that may explain gender disparities. The majority of content and form characteristics did not explain the trend of gender variations in attention between or within trials. There is no evidence for the idea that violent material and animation are more appealing to males than to females. Boys' higher visual attention was not linked with higher understanding as compared to girls'. It was suggested that females pay more attention to the spoken, aural component of programming while guys pay more attention to the visual material.

DuPaul et al. (2006) examined disparities in intellectual, interpersonal, psychological, and behavioural functioning among 133 boys and 42 girls primary school students who matched scientific diagnostic criteria for ADHD. Teacher evaluations, close inspections of classroom behaviour, and a standardised, norm-referenced performance exam were used to evaluate school performance. The findings revealed that individuals, irrespective of gender, had deterioration through all functional areas. The minor gender disparities found differed throughout domains of functioning and were partly determined by the kind of grade and corresponding group utilised. Particularly, though girls were not prone to develop ADHD as compared to boys when this happens and they did develop it, their effects were as substantial, if not could be more intense, as compared to boys when contrasted to non-ADHD counterparts of the same gender.

Research Questions and Hypotheses

Is there a significant difference in the type, amount, and level of information on attention ability among male and female Saudi high school students at Al-Qunfudah district?

Hypotheses

$H_0$1: In terms of the impact on attention skills, there is no significant difference between male and female students in the symbolic kinds of information.

$H_0$2: In terms of the impact on attention skills, there is no significant difference between male and female pupils in the semantic kinds of information.

$H_0$3. In terms of the impact on attention skills, there is no significant difference between male and female students in (5) amounts of information.

$H_0$4: In terms of the impact on attention skills, there is no significant difference between male and female students in (7) amounts of information.

$H_0$5: In terms of the impact on attention skills, there is no significant difference between male and female students in (9) amounts of information.

$H_0$6: In terms of the impact on attention ability, there is no significant difference between male and female students at the unit level of information.

$H_0$7: In terms of the impact on attention ability, there is no significant difference between male and female students in the class level of information.

$H_0$8: In terms of the impact on attention capacity, there is no significant difference between male and female students in the relation level of information.

Methodology

This study used an experimental research design based on the SI model that seeks to explore the effect of information in terms of type, level and amount on the attention and the significant difference between male and female students. The current study has employed different experimental conditions. The first condition involved presenting the symbolic and semantic information without colour. This is considered to be a featured technique holding one dimension. The design of this study was a practical experimental design of the single empirical group style (2 X 3 X 4). A sample of students was selected from Saudi EF students at Al-Qunfudah district by using a simple random sampling technique. The participants were aged between 15 and 17 years (N= 60). Within each block, there were 12 trials (2 practice trials or warm-ups and 10 main trials). In each trial, there was one type of information (semantic or symbolic), one level of information (unit, class or relation) and one amount of information (1, 2, 3, 4). Words were used to represent the semantic information. Figures were used to represent the symbolic information. These functions have been presented in three levels as follows: units, classes, and relations. The type and level of information were presented in the form of three amounts of information (5, 7, 9) so that ultimately, the study conducted 570 trials; 280 for each condition. The students were divided into two groups male and females. The accuracy of performance of the subjects in each experimental condition (the percentage of correct responses) was judged after each trial by comparing the number of targets presented to those successfully attended to. Afterwards, the percentage for each block was calculated. Data were analysed descriptively and inferentially using frequency and percentage and an independent t-test.

Findings and Results

Gender differences Types of Information

This section presents the findings of an independent t-test of significant differences between male and female students in information types based on the SI model namely: semantic and symbolic.

Table 1.

T-test analysis of genders difference in information type

Type of information	Gender	No students	M	SD	T value	P-value
	Male	30	38	0.23	6.1	0.02
Symbolic	Female	30	35	0.14		
Semantic	Male	30	30	0.23	6	0.03
	Female	30	29	0.15		

Significance level = P<0.010

It can be seen from Table 2. T-test analysis showed no significant difference between male and female students in information type symbolic type of information. Also, the findings showed no significant difference between male and female students in semantic type of information. This indicates that gender can't be considered as a determinant in the effect of information type on students' attention ability. However, it can be noticed that both male and female students had higher mean scores in symbolic type "38, 35" than semantic "30, 29" information.

Gender differences in Amount of Information

This section presents the findings of an independent t-test of significant differences between male and female students in the effect of the amount of information on attention ability based on the SI model (5,7,9).

Table 2.

T-test analysis of genders difference in the amount of information

Amount of information	Gender	No students	M	SD	T value	P-value
5	Male	30	32	2.23	5.7	.015
	Female	30	34	1.14		
7	Male	30	27	1.23	5.5	.025
	Female	30	25	2.15		
9	Male	30	20	1.27	5.4	.020
	Female	30	21	1.50		

Significance level = P<0.010

The independent t-test analysis in Table 2 shows there is no significant difference between male and female students in terms of information level (5,7,9) as the *p*-values were (0.015, 0.025, 0.020) respectively. This means that gender is not a hindering factor in the effect of the amount of information on attention ability. However, it can be noticed that both male and female students scored higher mean scores in (5) amount of information "38, 35" than (7) "27, 25" and (29) "20,21" amount of information. This denotes the idea that attention ability at the highest level when the information amount is 5. This indicated by the mean scores of students (M=34, 32).

Gender differences in Levels of Information

Based on the SI model, this section provides the results of an independent t-test of significant disparities among male and female students on the impact of information level on students' attention capacity. Information levels presented as "Units, class, relation".

Table 3.

Independent T-test analysis of genders differences in the level of information

Level of information	Gender	No students	M	SD	T value	P-value
Units	Male	30	37	2.23	6.7	.012
	Female	30	36	1.14		
Class	Male	30	25	1.23	6.5	.013
	Female	30	24	2.15		
Relations	Male	30	30	1.27	6.4	.020
	Female	30	32	1.50		

Significance level = P<0.010

The independent t-test analysis in Table 3 shows there are no significant differences between male and female students in terms of information level (units, class, relations) as the *p*-values were (0.012, 0.013, 0.020) respectively. This means that gender has no role in the effect of level of information on students' attention ability. These findings show that the hypotheses are supported. However, it can be noticed that both male and female students had higher mean scores in the "unit" information level (37, 36). That was followed by high mean scores to "relations" (30, 32) level of information. On the other hand, the class level of information was had the lowest mean scores. This shows that attention ability is at the highest level when the information levels are "unite, relation, class" accordingly.

Summary of the Results

The following table presents the summary of hypotheses testing.

Table 4.

Summary of hypotheses testing

No	The Null hypothesis	Gender	Mean Score	Sig	Decision
1	In terms of the impact on attention skills, there is no significant difference between male and female students in the symbolic kinds of information.	Male	38	0.30	Supported
		Female	35		
2	In terms of the impact on attention skills, there is no significant difference between male and female pupils in the semantic kinds of information.	Male	30	0.20	Supported
		Female	29		
3	In terms of the impact on attention skills, there is no significant difference between male and female students in (5) amounts of information.	Male	32	0.15	Supported
		Female	34		
4	In terms of the impact on attention skills, there is no significant difference between male and female students in (7) amounts of information.	Male	27	0.25	Supported
		Female	25		
5	In terms of the impact on attention skills, there is no significant difference between male and female students in (9) amounts of information.	Male	20	0.20	Supported
		Female	21		
6	In terms of the impact on attention ability, there is no significant difference between male and female students at the unit level of information.	Male	37	0.12	Supported
		Female	36		
7	In terms of the impact on attention ability, there is no significant difference between male and female students in the class level of information.	Male	25	0.13	Supported
		Female	24		
8	In terms of the impact on attention capacity, there is no significant difference between male and female students in the relation level of information.	Male	30	0.20	Supported
		Female	32		

Discussion

The findings of the study showed that gender has no role in the effect of information in terms of type, amount, level on students' attention ability. Despite the fact of no gender differences, the findings showed that students scored higher scores in the symbolic type of information. This indicates that students' recall rate of numbers is better than letters in the field of memory. The results showed that the attention paid to a number of points was greater than the attention to letters and that the attention to letters was better than the attention to shapes Engineering, although the previous experience did not compare numbers and words, it used different tasks to clarify that the extent varies according to the content of these tasks, and it is consistent with the results of Al-Feki (1988) study as his results showed that the extent of attention to numbers was greater than to words. The results also showed that there no gender differences in the effect of the amount of information on students' attention ability. This indicates both genders can comprehend a similar amount of information with similar attention ability. However, it was worthily noticing that both genders scored higher mean scores in the (5, 7, 9) amounts of information level respectively. This means the attention ability functions better when the amount of information is (5). Looking at the previous studies, despite not applying Miller's criteria, the findings of the study in agreement with the study of Al-Feki (1988), the study showed that attention was at a greater level with the lowest amount of attention. Based on this finding, it can be concluded that the greater the amount of information, the more difficult the task to be comprehended by students' brains. Finally, the data analysis showed that there no gender differences in the effect of level of information on students' attention ability. Looking at the previous studies show that this finding in line with the study of Al-Feki (1988) that showed the extent of attention was higher in relation to the level of units, then relationships, and finally categories, that is, the extent of attention varies according to the complexity of the level of information, and the current researcher explains this result that by increasing the relationship between the presented materials and the extent of attention. The extent of attention increases with the increase in the convergence between the presented materials. The extent of attention at the level of relationships is better than at the level of categories, and perhaps this is due to the fact the tasks at the category level include a larger number of vocabulary, as the category consists of three vocabulary (three numbers or three words), while the relationship includes two vocabulary (two numbers or two words), and thus there is an increase in information at the level of the categories, which causes difficulty in performing the task, as the result of the current hypothesis is consistent with the nature of the information coding process, where when the examinee encodes information at the level of categories, this information is not related to each other except through the name of the category only. While when the information is encoded at the level of relationships, the relationship encodes, and at the same time, the two terms of the relationship are encoded by the bilateral correlation, and thus the examinee has formed a larger and deeper strategy in encoding the information, and thus the extent of attention to it becomes greater than the categories, and according to the current study, it is necessary for the examinee to pay attention for the components of the category (three numbers or three words), and a number of the subjects could not pay attention to the three components of the category, and their answers were considered wrong, while in the relationship it was required that the examinee pay attention to only two items, and thus the category was more difficult than the relationship in terms of its quantitative nature.

Conclusion

This study aimed to investigate the gender differences between male and female students regarding the effect of type, amount and level of information on students' attention ability in the learning process. 60 Saudi high school students (level 10 and 11) from the Al-Qunfudah district participated in the study. The participants were chosen randomly to participate in the validated tests. Based on the Gilford SI model, the type of information represented in semantic and symbolic, the level of information represented in units, cases, and relations, while the amount of information was represented in (5, 7, 9). The analyses of the independent t-test showed that there is no significant difference between male and female students in terms of type, level and amount of information effect on their attention ability. Furthermore, the study found that attention ability was at a higher level with symbolic information; also, the less amount of information, the higher attention level. Finally, units and relation levels have a higher effect on students' attention ability. The study suggests adjustments to the classroom design and enhances the curriculum. This research contributes significantly to the limited studies in the field of psychology education that examine the effect of information on students' attention ability. Future studies might focus on different

aspects of attention of various school level students where more in-depth analyses could be gained.

References

Alakrash, H.M., & Razak, N.A. (2020). Redesigning the English Classroom Towards Fourth Industrial Revolution, Are the Students Motivated? *The Asian ESP Journal*, *6.*

Alakrash, H. (2021). Factors Affecting the Application of Communicative Language Teaching CLT in Syrian Schools. *TESOL and Technology Studies*, *2*(1), 1–14.

DuPaul, G.J., Jitendra, A.K., Tresco, K.E., Junod, R.E.V., Volpe, R.J., & Lutz, J.G. (2006). Children with attention deficit hyperactivity disorder: Are there gender differences in school functioning? *School Psychology Review*, *35*(2), 292-308.

Alvarez, M.M., Huston, A.C., Wright, J.C., & Kerkman, D.D. (1988). Gender differences in visual attention to television form and content. *Journal of Applied Developmental Psychology*, *9*(4), 459-475.

Naglieri, J.A., & Rojahn, J. (2001). Gender differences in planning, attention, simultaneous, and successive (PASS) cognitive processes and achievement. *Journal of Educational Psychology*, *93*(2), 430-437.

Warrick, P.D., & Naglieri, J.A. (1993). Gender differences in planning, attention, simultaneous, and successive (PASS) cognitive processes. *Journal of Educational Psychology*, *85*(4), 693- 701.

Chun, M.M., & Turk-Browne, N.B. (2007). Interactions between attention and memory. *Current opinion in neurobiology*, *17*(2), 177-184.

Naccache, L., Blandin, E., & Dehaene, S. (2002). Unconscious masked priming depends on temporal attention. *Psychological science*, *13*(5), 416-424.

Squire, L.R., & Wixted, J.T. (2011). The cognitive neuroscience of human memory since HM. *Annual review of neuroscience*, *34*, 259-288.

Posner, M.I., Rothbart, M.K., & Tang, Y. (2013). Developing self-regulation in early childhood. *Trends in neuroscience and education*, *2*(3-4), 107-110.

Weible, A.P. (2013). Remembering to attend: the anterior cingulate cortex and remote memory. *Behavioural brain research*, *245*, 63-75.

Ornstein, R., & Ehrlich, P. (1989). *New World. New Mind: Moving Toward Conscious Evolution Touchstone:* New York.

James, W. (1890). The perception of reality. *Principles of psychology*, *2*, 283-324.

Guilford, J.P. (1967). *The nature of human intelligence.*

Sternberg, R.J., & Grigorenko, E.L. (2001). *Unified psychology.*

Undheim, J.O., & Horn, J.L. (1977). Critical evaluation of Guilford's structure-of-intellect theory. *Intelligence*, *1*(1), 65-81.

Solso, R.L., Mac Lin, M.K., & Mac Lin, O.H. (2005). *Cognitive psychology*. Pearson Education New Zealand.

Undheim, J.O., & Horn, J.L. (1977). Critical evaluation of Guilford's structure-of-intellect theory. *Intelligence*, *1*(1), 65-81.

Thompson, V.A. (2009). *Dual-process theories: A metacognitive perspective*. Oxford University Press.

Knudsen, E.I. (2007). Fundamental components of attention. *Annual Review of Neuroscience*, *30*, 57-78.

Siéroff, E. (2001). Feature processing and superiority of three-quarter views in face recognition. *Brain and Cognition*, *46*(1-2), 272-276.

Allport, A. (1993). Attention and control: Have we been asking the wrong questions? A critical review of twenty-five years. *Attention and performance*, *14*, 183-218.

Ritter, S., Anderson, J.R., Koedinger, K.R., & Corbett, A. (2007). Cognitive Tutor: Applied research in mathematics education. *Psychonomic bulletin & review*, *14*(2), 249-255.

Hyde, J.S. (2005). The gender similarities hypothesis. *American psychologist*, *60*(6), 581-592.

Wilson, K., & Korn, J.H. (2007). Attention during lectures: Beyond ten minutes. *Teaching of Psychology*, *34*(2), 85-89.

Measor, L., & Sykes, P.J. (1992). *Gender and Schools* (London: Cassell).

Oakes, J. (1990). Chapter 3: Opportunities, achievement, and choice: women and minority students in science and mathematics. *Review of research in education*, *16*(1), 153-222.

Alvarez, M.M., Huston, A.C., Wright, J.C., & Kerkman, D.D. (1988). Gender differences in visual attention to television form and content. *Journal of Applied Developmental Psychology*, *9*(4), 459-475.

Du Paul, G.J., Jitendra, A.K., Tresco, K.E., Junod, R.E.V., Volpe, R.J., & Lutz, J.G. (2006). Children with attention deficit hyperactivity disorder: Are there gender differences in school functioning? *School Psychology Review*, *35*(2), 292-308.

Al-Feki, Ismail Abdel-Raouf (1988). *The Effect of the Type, Amount and Level of Information on the Extent of Attention,* (Unpublished Ph.D. thesis).

Özdemir, O., Diken, I.H., Diken, Ö., & Şekercioğlu, G. (2013). Reliability and validity of modified turkish version of autism behavior checklist (abc): Results of pilot study. *International Journal of Early Childhood Special Education, 5*(2), 168-186.