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METAMEMORY AMONG SIGHTED AND NON-SIGHTED INDIVIDUALS.

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Abstract

The purpose of this study was to examine the level of metamemory among sighted and non-sighted individuals, and to find the difference between them according to their gender. We used Troyer and Rich's Meta-Memory Scale to assess meta-memory levels among groups of sighted and non-sighted individuals in Jordan. Two hundred and fifty individuals' participants in this study, 99 participants were non-sighted (50 males, 49 females). The study results showed that Strategies sub-scale was in the first order (medium level) for both sighted and non-sighted students. In the second order was the contentment sub-scale. The ability sub-scale was last (low level). Non-sighted individuals' mean on the strategies sub-scale was significantly higher than for sighted people. While there was no difference between the mean scores of sighted non-sighted groups on the contentment and ability sub-scales, neither, there were any differences between males and females on the three sub-scales. The study highlights the need to empower sighted and non-sighted to use different memory strategies.
Keywords: Meta-memory, sighted subjects, non-sighted Subject**.**

Introduction

Non-sighted individuals need cognitive processes of memory to engage better in daily life and to integrate with sighted individuals. However, several difficulties oppose non-sighted individuals in developing cognitive skills compared to sighted individuals. Because they depend mainly on their sense of touch so they are proficient in learning tactile skills while it is hard for them to learn visual skills (Bliss, Kujala & Hamalainan, 2004).

One early scientific studied of metamemory Hart's (1965) examined the accuracy of feeling of knowing (FOK). FOK occurs when an individual feels that he or she has something in memory that cannot be recalled, but would be recognized if seen. Flavell (1971) created the term "metamemory" in a discussion on the development of memory. Flavell (1979) pointed out that metamemory refers to a person's knowledge about the contents and regulation of memory. Since then, numerous metamemory phenomena have been studied, including judgments of learning, feelings of knowing, knowing that you do not know, and know vs. remember. Maltin (2005) confirms that metamemory plays an important role in improving one's memory and the processes involved with it as they showed a positive correlation.

Perez & Garcia (2002) identified metamemory as a type of metacognition that refers to knowledge of one's own memory capabilities and the processes involved in

memory self-monitoring. Troyer & Rich (2002) identified Metamemory as an awareness of an individual's own memory functioning. Metamemory includes the components of contentment, ability, and strategies conducted by Troyer and Rich (2002). Contentment is the confidence, concern and satisfaction in the ability to remember things. Ability refers to memory daily functioning, and strategies involve frequency of use of various strategies and methods of remembering things that help in carry out tasks.

Although there are more than twenty-four thousand visually impaired individuals, in Jordan they did not receive attention and no studies have been carried out about them except one studied. This is because reaching out to these people presents a number of challenges. This study was conducted on 28 sighted, and 28 non-sighted subjects from the same tribe. The researchers compared self-concept and the results showed the low level of self-concept of non-sighted to sighted people, and there are no differences between them due to gender, age or educational level (Al-Jarrah & Autoom, 2004).

Hallahan & Kauffman (2003) agreed that people with visual impairment are more proactive in learning from their environments while sighted people gain more information through their visual sense, and incidental learning. People with visual impairment need to make more effort to obtain information, in addition to the difficulties of movement that limit the ability to move and to identify things, especially for blind individuals.

Schneider & Pressley (1989) suggested that visually impaired people have higher levels of metamemory skills because they considerably rely on using specific mnemonics strategies than normal vision individuals. For instance, the main difference that distinguishes between normal vision and visually impaired individuals is the use of verbal practice strategy when remembering things. According to (Baddeley, 1990) visually impaired individuals use efficient mnemonics strategies such as collecting words or information in memory according to their meaning, thus retrieve them easily.

Gathercole & Adams (1994) mentioned that visually impaired people use more effective mnemonics strategies, such as saying a sequence of unrelated words when more than one word is given to them, so this strategy prompts them to retrieve the largest number of words from short-term memory.

Individuals with normal vision have a problem in using effective mnemonics strategies because of requisite knowledge. While visually impaired individuals' higher motivation level of reparation leads to greater effort in processing information as they are not able to use visual information that is available in their environment. Thus, their dependence on these strategies indicates that they have higher level of memory awareness, which is a basic skill in metamemory. Depending on mnemonics strategies in early stages of their lives also would make up for their deficiencies using other senses such as hearing (Wyver & Markham, 1998).

Several studies compared between sighted and non-sighted in terms of memory and metamemory. One of these studies is study that showed that there are no statistically significant differences in levels of short-term memory, metamemory, and mnemonics strategies between children with visual impairments and normal vision children (Wyver & Markham, 1998). The results of a study conducted by Wakefield et al (2004), showed that there is statistically significant effect of cognitive skills in facilitate visually impaired children performance in cognitive tasks and remembering things (Wakefield, Homewood & Taylor, 2004) showed that there were significant

differences in cognitive tasks related to remembering odors, drawing attention tasks between born blind children, and normal vision children as it showed that born blind children demonstrate superior skills. The results also indicated that there are no statistically significant differences between the groups of students in remembering a story, and that blind children have a better level of performance in remembering and concern tasks compared to others, which facilitates their performance in cognitive tasks such as remembering and naming odors.

In Finland, a studied conducted by Bliss et al. (2004) found that there are statistically significant differences in the level of recognition of the letters by touch, in favor of the blind individuals. The results also indicated that there are significant differences in visual tasks; especially recognition of the letters in favor of sighted individuals. The level of performance of blind individuals who rely on their tactile skills is the same as the visual individuals who rely on their visual skills. The results of Papadopoulos, Argyropoulos & Kouroupetroglou (2008) indicated that there are statistically significant differences between students with visually impairments and normal vision students in distinguishing similar speech patterns in compound speech, the hearing ability, and understanding in favor of students with visual impairments. The study's results of Chen, Huang & Wang (2010) showed that there is no difference in the use of tactile stimuli between born blind individuals and those who became blind at a later age. The results showed statistically significant differences in the performance of spatial working memory between sighted and born blind individuals and those who became blind at later age, in favor of blind individuals since birth.

In France, a studied conducted by Pigeon & Marin- Lamellet (2016) showed that there is a statistically significant effect of both visual skill and age on attention and working memory. The results also found that there is no interactive relationship between the visual skill and the effects of age. This indicates that age-related tracks are similar for blind and normal vision individuals.

In Greece, Argyropoulos, Masoura, Tsiakali, Nikolaraizi & Lappa, (2017) found that there is a statistically positive correlation between verbal working memory and visually impaired students' reading ability that will positively impact students' learning progress.

The purpose of this study was to examine the level of metamemory among sighted and non-sighted individuals, and to find the difference between them according to their gender.

The Problem

In the light of the foregoing studies, there is lack of studies about metamemory that compared between sighted and non-sighted people and there is only one foreign studied that examined the subject of metamemory among sighted and non-sighted people. This indicates a need to investigate such studies in Arab countries and in Jordan in particular to shed more light on the non-sighted compared to sighted people in terms of psychological and mental features, and metamemory is one of them. Therefore, it was the goal of the researchers to investigate this issue so more could be learned regarding this problem. The following questions were used to answer the research study

1. Are there any level differences between sighted and non-sighted individuals on metamemory?

2. Are there any statistically significant difference among participants' base on gender variable on metamemory scale?
3. Are there any statistical differences at (α= 0.05) between sighted and non-sighted on dimension scale?
4. Are there any statistical differences at (α= 0.05) between sighted and non-sighted on strategy dimension?

Significant of the Study

We believe that present study adds to the body of knowledge about this field to the researchers, particularly the Arabic library, as there are few studies on this topic. It also opens the way for developing training programs by specialists to this particular group of people aims at improving the level of their metamemory. The study also provided metamemory scale in Braille for non-sighted students, allowing the possibility to use it on other samples of non-sighted and linked to other variables.

Method

Two hundred and fifty individuals' participants in this study, 99 participants were non-sighted (50 males, 49 females) their age range from 17 and 40 years. Fifty participants were selected from the Academy School for the Blind in Amman district, 31 from the Saudi Center, and 18 students aged between 20 and 50 years selected from Yarmouk University and local community in Irbid governorate whom the researchers could reach theme personally. The scale was printed out in Braille while 50 of the participants answered questions after the researchers read the paragraphs for them one by one. The participants' response to the researcher's record. 151 sighted students (78 males, 73 females) studying Thinking Skills course (HUM 108) were also selected as participants in the study. Participates were volunteered in the study after signing a consent form.

Instrument

Troyer and Rich (2002) metamemory scale was used after translating it from English into Arabic. It was presented to a professor in the university who is fluent in both Arabic and English to check if the translation into Arabic is accurate. The specialists in educational psychology, counseling psychology, educational measurement and evaluation, checked the validity scale. Based on their opinions, the number of items of the scale became (50) items.

The scale was applied on a sample of 30 sighted and non-sighted individuals to verify the indications of construct validity. The Pearson correlation coefficient was calculated between scale items and the total score of each dimension. The values of contentment of memory ranged between (.405 - .665), the values of ability or memory errors were between (.436 - .653), and the values of strategies were between (.456 - .662) while all of these values were at the statistical significance level of 0.05. Thus, as Hattie (1985) indicated, all scale items were kept as they are.

The inter-correlation coefficient was calculated using Pearson correlation coefficient for dimensions of metamemory scale. It was (.543) between metamemory contentment and ability, (.438) between metamemory contentment and strategy, and (.573) between and ability and strategy.

The internal consistency of scale dimensions was assessed using Cronbach's Alpha correlation on 35 sighted and non-sighted students. The result of contentment and ability was (.89) and (.91) for strategy. With a time, interval of two weeks between the two applications, the test-retest was used and it was (.81) for contentment and ability, (.83) for ability dimension, and (.80) for strategy dimension.

To assess the metamemory level, the researchers divided participants' responses into three levels: Low (1-2.33), medium (2.34-3.67), and high (3.68-5).

Results

Regarding the level of metamemory of sighted and non-sighted individuals mean scores were calculated. The arithmetic mean and standard deviation of sighted and non-sighted participants' metamemory were calculated as shown in Table 1.

Table 1 Means and Standard deviations of sighted and non-sighted levels on metamemory

Metamemory dimensions	Participant status					
	Sighted			Non-sighted		
	Mean	Standard deviation	Level	Mean	Standard deviation	Level
Contentment	2.176	.43	Low	2.170	.39	Low
Ability	2.175	.52	Low	2.081	.46	Low
Strategies	2.839	.51	Medium	3.559	.45	Medium

Table 1 shows that sighted individuals' responses level on metamemory dimensions ranged between (2.175) and (2.839) while the non-sighted responses level ranged between (2.081) and (3.559). Metamemory dimensions of sighted and non-sighted were in the following order: Strategy at medium level, followed by the contentment and ability at a low level. The results can be explained in light of the importance of using memory strategies in any person's life. These strategies help non-sighted individuals in enhancing knowledge and creativity. Most of these strategies were linked to the process of imagining the information to be learned in which they rely on the sense of hearing and touch to form an image of the outside world. Unlike sighted people who depend on visual sense in learning, so the mean of strategy dimension of the non-sighted is greater than sighted people. Bukaie (2013) highlights the importance of memory strategies for each individual, in which observation engages one in cognitive processes that develop self-awareness.

An explanation of the low level of memory contentment of both sighted and non-sighted could be due to feeling scared of having a problem in memory that could lead them to forget information, or not to be able to remember things easily, so they become not satisfied with their memory abilities. Miller (1990) reported that self-consciousness about one's own memory is important to determine strengths, weaknesses, and satisfaction about memory, and to assess the difficulty or ease of required memory tasks.

Many people whether sighted or non-sighted constantly forget things and this is the explanation of the low level of memory ability dimension. For instance, forgetting important dates and events, or forgetting to take medication on time. In addition to that, some people forget someone's name immediately after meeting him or her, or recently mentioned phone number. Researchers believe that the reason behind forgetting is the

inability to understand that a certain task needs a specific strategy so that each task requires the use of appropriate strategy, which has reflected negatively on the performance of tasks, and the ability to remember, and avoid falling into memory errors.

Means scores were calculated to assess differences in levels of metamemory between genders within the same groups. The arithmetic mean and standard deviation of sighted and non-sighted participants' metamemory dimensions were calculated as in Table 2

Table 2 Means and Standard deviations of sighted and non-sighted on metamemory dimensions according to gender

Measurement	Gender	Status	Mean	Standard deviation	Number
Contentment	Male	Sighted	2.19	.45	78
		Non-sighted	2.09	.36	50
		Total	2.15	.42	128
	Female	Sighted	2.16	.41	73
		Non-sighted	2.25	.41	49
		Total	2.20	.41	122
	Total	Sighted	2.18	.43	151
		Non-sighted	2.17	.39	99
		Total	2.17	.42	250
Ability	Male	Sighted	2.19	.55	78
		Non-sighted	2.11	.49	50
		Total	2.16	.53	128
	Female	Sighted	2.16	.50	73
		Non-sighted	2.06	.45	49
		Total	2.12	.48	122
	Total	Sighted	2.16	.52	151
		Non-sighted	2.08	.47	99
		Total	2.14	.50	250
Strategy	Male	Sighted	2.85	.58	78
		Non-sighted	3.64	.44	50
		Total	3.16	.65	128
	Female	Sighted	2.83	.43	73
		Non-sighted	3.47	.46	49
		Total	3.09	.54	122
	Total	Sighted	2.84	.51	151
		Non-sighted	3.56	.45	99
		Total	3.12	.60	250

Table 2 shows that based on gender variable there are differences between mean of sighted and non-sighted on metamemory scale. To test the significance of these differences, the researcher used (Two-way MANOVA with a customized interaction) and the results are shown in Table 3.

Table 3 Two-way customized interaction Manova of metamemory dimensions according to status and gender.

Effect	Multivariate Test	Multivariate test value	F	DF	Error DF	Sig.
Participant status	Hotelling's Trace	.630	51.269	3.000	244.000	.000*
Gender	Hotelling's Trace	.018	1.481	3.000	244.000	.220
Participant status × Gender	Wilks' Lambda	.983	1.400	3.000	244.000	.243

As shown in Table 3, with the dimensions of metamemory scale there is an effect on participant status variable at the statistical significance level (α =0.05), while there is no effect on interaction between the variables: participant status and gender at (α =0.05) level. The Two-way multivariate analysis of variance was used to test the metamemory dimensions variables of each participant based on the variable as shown in Table 4.

Table 4 Results of The 2-way customized interaction Manova of metamemory dimensions according to the variables.

Dependent variable	Source	Sum of squares	DF	Mean square	F	Sig.
Contentment	Gender	.278	1	.278	1.610	.206
	Participant status	.001	1	.001	.007	.933
	Participant status × Gender	.504	1	.504	2.921	.089
	Error	42.460	246	.173		
	Total	43.117	249			
Ability	Gender	.111	1	.111	.436	.510
	Participant status	.520	1	.520	2.039	.155
	Participant status ×	.002	1	.002	.008	.930
	Error	62.790	246	.255		
	Total	63.426	249			
Strategy	Gender	.546	1	.546	2.293	.131
	Participant status	30.963	1	30.96	130.08	.000*
	Participant status ×	.326	1	.326	1.369	.243
	Error	58.552	246	.238		
	Total	90.301	249			

As can be seen in Table 4 there are statistical differences at (α= 0.05) level between sighted and sighted on strategy dimension. The level of memory strategy that non-sighted have is better than sighted level. This could be attributed to the fact that non-sighted people primarily depend on hearing and touch senses in learning, and they remember things they may be exposed to; therefore, they seek to find methods and strategies that help them improving their memory and remembering process in order to co-exist with others. Schneider & Pressley (1989) suggested that non-sighted individuals have higher levels of metamemory skills because they considerably rely on using specific mnemonic strategies than individuals with normal vision. According to Baddeley (1990), visually impaired people use efficient mnemonics strategies such as collecting words or information in memory according to their meaning thus retrieve them easily.

An explanation for this result is that using most of mnemonics strategies depend on visualization and encoding, while using visual sense in these processes is not a crucial factor. Segel & Heer (2010) indicated that through visualization, a person finds relatable elements from what he already has and the information learned. This way he makes an effort for arranging a certain path, or order. Their findings indicated that successful data stories humanize the numbers by applying data as a core part of the story. This is so that it can be retrieved easily.

Researchers found that non-sighted are special in the way they try to depend on hearing sense to learn and remember things, so that they can improve hearing and touch senses to be able to use the appropriate strategy that they need. This result could also be explained in light of that sighted people do not use effective mnemonics strategies, while non-sighted make greater efforts to process information because they are not able to use visual elements around them.

Similarly, the results of Wyver & Markham (1998) study indicated that there are no statistically significant differences in the level of short-term memory and metamemory between sighted and non-sighted students. The study carried out by Bliss et al. (2004) also agreed at the same results in which it indicated that there are statistically differences between born blind and gone blind children in cognitive functions related to remembering odors, drawing attention in favor of born blind. There are statistically significant differences in identifying letter by touching in favor of blind individuals as Bliss et al. (2004) indicated in his study. The results of Papadopoulos et al. (2008) study indicated that there are statistically significant differences between students with visual impairments and normal vision students in distinguishing similar speech patterns in compound speech, the hearing ability, and understanding in favor of students with visual impairments. In addition, Chen et al. (2010) agreed at the same result and indicated that there are statistically significant differences between people who are born blind and gone blind at later age in spatial working memory performance in favor of born blind.

There are differences in results between this study and Wyver & Markham (1998) study that found out that there are no statistically significant differences between normal vision and visually impaired students in using mnemonics strategies. The Wakefield et al. (2004) studied results also differ in not indicating any statistical differences when remembering a story. There are statistical differences in visual functions, specially identifying letter by touching in favor of blind individuals as Bliss et al. (2004) indicated in his study.

The present study results showed that there are no statistically significant differences in interaction of participant status with gender variable on metamemory scale. This could be explained as sighted females or males depend on their five senses, especially sight sense in their daily lives. They learn, store, retrieve information appropriately, thus they try to develop their memory using their senses particularly sight sense and ignoring the importance of other senses believing that the sense of sight is enough. On the other hand, researchers state that non-sighted male or female individuals depend on the other senses especially hearing and touch senses to co-exist and manage their lives striving to learn like any other person. They work to prove their presence in society, especially in light of the evolution that helped non-sighted in learning in many ways. This led to open a wide field in learning and make them able compete in sighted people's various fields.

Implications

The research we have conducted in the Jordan and Saudi Arabia reveals that Strategies sub-scale was in the first order (medium level) for both sighted and non-sighted students, while at the same time these strategies help non-sighted individuals in enhancing knowledge and creativity. The non-sighted participants have score better than sighted level on memory strategy due to depend on hearing sense to improve hearing and touch senses. In interpreting the results of our study, we believe that non-sighted teachers should not focus exclusively on methods and strategies that help them improving their memory and remembering process; should be given the opportunity to ask questions and discuss their needs. In addition, non-sighted teachers need to be aware of individual differences among non-sighted students: different levels of thinking, different learning methods, and differences of comprehension. It is very significant that non-sighted teachers evaluate various approaches, applying them to each student as they appropriate for theme. Because of these differences, instructors to all levels must not only dependent, but also study the differences and use a variety of teaching technique to ensure that all students have a quality education.

As a result, the curriculum in Jordan and Saudi Arabia should be revised to include the most update information and to reflect contemporary research in special education in order to prepare sight and non-student for living in the 21st century. The failure of these implications could cause a decline in the positive perceptions toward these students in both countries. Since this research used quantitative research, qualitative methods should also be conducted. Although we are satisfied with the results, the limitation of quantitative studies is recognized. A broad mixed survey may further assistant to the understanding of student's perception toward Metamemory among Sighted and non-Sighted individuals.

Recommendations

This research has generated many questions in need of further investigation. It is recommended that further researches to be embark on in the following areas:

- Training sessions for sighted people in using the appropriate mnemonic strategies. The results of the study indicated that the dimension of memory strategies was at medium level of sighted individuals.

- Educational courses by specialists in the field of educational psychology to guide and enlighten sighted and non-sighted individuals about the ability to use their memory correctly, and avoid falling into the potential memory errors,

according to the results of the study that the dimension of ability of the both sighted and non-sighted is at a low level.

- Future research is needed to account for the varying of sighted and non-sighted based on other variables, in order to give this group attention and the right of research and study of Jordanian society.

References

Al-Jarrah, A. & Autoom, A. (2004). The Effect of Visual Impairment on Self-Concept among a Sample of Visually Impaired and Visually Normal Individuals: A Comparative Study. *Journal of Educational & Psychological Sciences,* 5(1), 38-56.

Argyropoulos, V., Masoura, E., Tsiakali, T., Nikolaraizi, M. & Lappa, C. (2017). Verbal working memory and reading abilities among students with visual impairment. *Research in Development Disabilities, 28*(64), 87- 95.

Baddeley, D. (1990). *Human Memory*. Hillsdale, NJ: Lawrence Erlbaum.

Bliss, I., Kujala, T. & Hamalainen, H. (2004). Comparison of blind and sighted participants' performance in a letter recognition working memory task. *Brain Research Cognitive Brain Research, 18*(3), 273- 277.

Bukaie, N. (2013). Metamemory and Cognitive Flexibility among First-year University Students. *Journal of Educational & Psychological Sciences,* 14(3), 329- 358.

Chen, M., Huang, C. & Wang, C. (2010). Working memory for spatial construction in blind and sighted individuals. *Journal of the Chinese Institute of Industrial Engineers*, *27*(3), 199- 208.

Flavell, J. (1971). First Discussant's Comments: What is Memory Development the development of*? Human Development. 14 (4), 272–278.*

Flavell, J. (1979). Metacognition and cognitive monitoring a new area of cognitive. Developmental inquiry. *Psychological Association*, 34(10), 900- 911.

Gathercole, S. & Adams, A. (1994). Children's phonological working memory: Contributions of long-term knowledge and rehearsal. *Journal of Memory and Language, 33*, 672-688.

Hacker, D. (2001). Metacognition: Definitions and Empirical Foundations. Retrieved on March. 17, 2017, from: *http://www.psyc.memphis.edu /trg/meta.htm.*

Hallahan, D. & Kauffman, J. (2003). *Exceptional learners: Introduction to special education*. Boston: Allyn and Bacon.

Hattie, J. (1985). Methodology review: assessing unidimensionality of tests and items. *Applied Psychological Measurement,* 9, 139-164.

Maltin, M. (2005). Cognition. (^{6th} Ed). New York, Wiley Co.

Miller, R. (1990). *Cognitive Psychology for Teachers.* New York, Macmillan Publishers.

Papadopoulos, K., Argyropoulos, V. & Kouroupetroglou, G. (2008). Discrimination and Comprehension of Synthetic Speech by Students with Visual Impairments: The Case of Similar Acoustic Patterns. *Journal of Visual Impairment & Blindness, 102*(7), 420- 429.

Perez, L. & Garcia, E. (2002). Programme for the improvement of Metamemory in people with medium and mild mental retardation. *Journal of Psychology in Spain*, *6*(1), 96- 103.

Pigeon, C. & Marin-Lamellet, C. (2016). Ageing effects on the attentional capacities and working memory of people who are blind. *Journal of Disability and Rehabilitation*, *2*(3), 1-7.

Radvansky, G. (2006). *Human Memory*. Boston: Pearson Education Group.

Schneider, W. & Pressley, M. (1989). *Memory development between 2 and 20.* New York: Springer-Verlag.

Segel, E. & Heer, J. (2010). Narrative visualization: Telling stories with data. *Educational Activates Department Piscataway, 16* (6), 1139-1148.

Troyer, A. & Rich, J. (2002). Psychometric Properties of a New Metamemory Questionnaire for Older Adults. *Journal of Gerontology Psychological Science, 57b*(1), 19- 27.

Wakefield, C., Homewood, J. & Taylor, A. (2004). Cognitive compensations for blindness in children: an investigation using odour naming. *Perception*, *33*(4), 429- 424.

Wyver, S. & Markham, R. (1998). Do Children with Visual Impairments Demonstrate Superior Short-term Memory, Memory Strategies, and Metamemory? *Journal of Visual Impairment & Blindness,* 92 (11), 1-119.