

Comparison of cognitive performance (attention function, active memory and problem solving) between male and female students

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ABSTRACT

The aim of this study is to compare cognitive performance (attention function, active memory and problem solving) in high school students of Ilkhechi, Iran. This study is causal-comparative research. The study population included all male and female students of Ilkhechi that its number was 376. The sampling method was cluster random sampling method. Sample size was 100 subjects. To gather information used computerized questionnaire include Continuous Performance Test (CPT), a computerized test Wechsler active memory (WAMS). For analysis of results used independent t-test and analysis of variance. The results showed that There was a significant difference between the performance Attention, (right Attention, presents a false and removed answer), audio-visual active memory and problem solving in boys and girls. Those in girl correct Attention performance and removed answers are more than boys and presents false in boys better than girls.

KEY WORDS: COGNITIVE FUNCTION, ACTIVE MEMORY, ATTENTION

INTRODUCTION

Among the prerequisites Academic and social learning in students, are sustained attention, active memory and problem solving. These skills are excellent cognitive abilities in daily activities and assignments to help stu-

dents to learn (Abedi andJahanian Najaf-Abadi, 2010). So, identify the gender differences and strengths and weaknesses of students in the field of cognitive performance can assist to officials and coaches in training and actions to provide better educational facilities. (Coluccia & Louse, 2004).

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Gender differences in cognitive functions in various spheres of psychological and neuropsychological literature are studied. Also recognizing the mental activity involved in the acquisition, processing, organizing and use of knowledge. These activities include cognitive function and its components, including selective attention, perception, active memory, logical reasoning and problem solving is a (Tende et al., 2012), (Ardila, Rosselli, Matute & Inozemtseva, 2011). (Solso, 2008, quoted by shahabi, 2012).

Cognitive function as well as a series of thought processes is lead to understanding and awareness of thoughts and ideas. It includes all aspects of perception, thinking, reasoning and remembering (James, 2014). The most important cognitive domains nerve psychological assessments, including intelligence, memory, attention, working memory, executive functions, perception, language and information processing speed (Ray, dull, Agustina, 2009. quoted by Nazari Badie, 2011). Gender differences in cognitive function are a controversial issue (Taleb and Alheme, 2012).

Attention also is very important in cognitive function, behavioral and mental. Even small attention deficit affects the learning function (Abedi and Jahanian Najaf Abadi, 2010). Attention like a gatekeeper in mind acts, this is by setting and prioritizing stimulus is processed by the central nervous system. Attention components including regulating arousal and care, selective attention, sustained attention, Attention span or divided attention, inhibitory control and behavior (Seidman, 2007). Merritt et al (2007) study found, there are different responses to selective attention tasks between men and women. Research Feng et al. (2011) also showed there is a significant difference between boys and girls in the field of vision Attention. In addition, the Talib and ALhEmEh (2012) showed no significant difference between men and women in selective visual attention.

Active memory contains information recorded in the permanent memory that has already been fully active in the situation. Active memory is one of the most important cognitive processes underlying thinking and teaching (Dan, 2008, Liza et al., 2009). The results of Johnson and Bouchard (2007) on active memory showed that women in general in terms of memory, a better performance than men. The Lamborn (2006), this study showed no significant difference between genders in Active memory capacity. Tende and colleagues (2012) showed that no significant difference between girls and boys in active memory. Harness (2008) in a study found that women were active memory in retrieval tasks better than men.

Problem solving process in which the learner to learn new ways of combining rules to be learned. Problem solving not only the rule, techniques, skills and concepts

previously learned in a new situation, but a process that creates new learning (Miyake et al., 2000, Gagné, 1975). Klosia and Lausanne (2004) showed that gender differences to differences in the strategies used in problem-solving orientation leads assignments. In view of the above, this study seeks to answer the question whether is there a difference between male and female students in cognitive performance (attention function, active memory and problem solving)?

RESEARCH METHODOLOGY

The study is causal-comparative studies. Where to compare three variables between the two groups were studied. The statistical population is all students, (male and female high school eighth) Ilkhchi in 2015–2016. Sample size is 376 that 191 girls and 185 boys. The sampling method is multistage random cluster in a gender and equal number is chosen. First, the three boy's schools, two schools and three girl's school, two schools were selected from each of four schools selected and 30 subject randomly selected. A total of 120 people, 100 subjects for the final analysis due to the lack of cooperation and the subjects remained.

INSTRUMENTS

A. Continuous Performance Test (CPT)

This test by Razvled et al (1956) was designed. In Occupational Therapy Center of Roshd, Sina Software Persian has been prepared by the Institute of Cognitive Behavioral Sciences. The Persian version of the test, 150 units or Persian image as stimulants, and of these, 30 stimulants the target to stimulate others to be considered as inappropriate stimulants. Duration of each stimulant was 200 milliseconds and the distance between the 2 stimulants a second. Time running tests to understand more subjects including training stage before running the main stage will be 200 seconds.

Measures of the test used in this study include:

1. Error false declaration (commission error): the target stimulants test, is number 5, the subjects see this number should not press space. False declaration error was the number of times that subjects press number 5 with space key. This is an indication of lack of attention or impulsiveness. In this study of 50 numbers answer is considered efforts.
2. Omission errors: stimulants non target in this case the numbers 1 through 9 except the number 5, and subject to see these numbers should press the space bar. Omission errors are the number of times that the subject does not provide these numbers to

the key space. It can also indicate a lack of Attention in this study is considered the fifth attempt of removal response.

3. Attention correct: At this stage, the number of correct answers out of 50 efforts that has to be calculated and the reply with regard to the commission error and omission errors can be considered.

Validity coefficients (retest) different parts of the test are 20 days was carried out on 43 school male students between 0.59 - 0.93. All had significant correlations coefficients were calculated at 0.001. Test validity with criterion validity by comparing two groups normal group and hyperactivity disorder by Hadianfard and colleagues (2000) have been carried out. Statistical comparison of the two groups in different parts of the test showed a significant difference between the performance of the two groups (according to the Narimani and Ismaili, 2012).

B. Wechsler Active memory scale (WAMS)

This test is based on clinical scales of the Wechsler Memory Scale numbers and the software is designed. These tests measure memory capabilities of numbers forward and reverse and check short-term memory in children and adults, and runs on an individual basis. In the first step Digit Span Test (forward and reverse) that a series of numbers by computer visually presented to participants then participants should bring that to repeat the numbers and the second step a series of numbers by computer auditory presented to participants then participants should bring that to repeat the numbers.

Measures of the test used in this study include:

1. Visual active memory span: the numerical memory span subjects, in both forward and reverse stage for visual is submitted to him. (Total scores from 0 - 12).
2. Auditory active memory span: the numerical memory span subjects, in two stages for forward and reverse audio is presented to him. (Total scores from 0 to 12).
3. Total score of auditory and visual memory, active memory is obtained from the sum of the scores is from 0 to 24.

Test-retest reliability of this test report is 0.76 (Kamiabi et al., 2014).

C. Tower of London (TOL)

The test of the 3 bars (A, B and C) which is located on a base and three colored rings (red, blue and green) is formed. Methods: The subjects are told that you must move the colored beads (green, red and blue) and put them in the right place, with minimal moves are neces-

sary to create a sample form. Scoring methods: based on what the person in an attempt to solve the problem, he is awarded an overall score (more efforts score lower and vice versa).

In this study, based on which efforts done as well as the time of effort, time and time before the start of the next test for a total score provided by the PC software program the test is from 12 to 50. The validity of this test report is accepted and 0.79 (Lezak, 2004; quoted from Mashhadi et al., 2009).

RESULTS AND DISCUSSION

Descriptive indicators (mean and standard deviation) presented in Table 1.

First hypothesis: the correct attention, Presenting false and remove the answered is different in male and female students. According to the results of the study can be said to performance correct Attention, Presenting false and remove the answered between boys and girls are different. And in girls, performance Attention correct and remove answered are more than boys and presentation false in boys more than girls. These results are consistent with findings of Johnson and Bouchard (2007), Lamborn (2006), Tende and colleagues (2012), Mariette et al. (2007) and Feng et al. (2011). In its explanation we can say that In Attention correctly, according to the role and mental ability in girls than boys and their emphasis on detail has led them obtain the correct attention score higher than boys. And Also in remove answered, due to high level of anxiety in girls causes not to sign for the prompt answered This increases the removal rate is high in boys than girls are also to false declaration .It can be said that boys, with more confidence, in the position of official test and judge others try to show themselves as active (Stephen, 2000). The results of Pajars and Miller (1996), showed that boys more than girls in self-Attention and recognition of their performance and activities.

The second hypothesis: Auditory and visual active memory in male and female students differently.

The results show that there is different auditory and visual active memory between girls and boys. Based on the findings, we can say that girls score higher than boys in auditory active memory boys score higher than girls in and visual memory. And this finding is consistent with research results Laussel, Bvshkvl, Pryg and Jagy (2011), Dahlyn (2011), Pickering and chab (2005) and Pickering (2006). In its explanation we can say that Based on brain function, according to Kalat (2007) that girls are stronger than boys in terms of auditory, verbal function and speech. Given that the left lobe of brain in girl more powerful than right lobe and auditory center in left lobe so can be explained girls strong auditory memory than boys.

Table 1. Descriptive data on research variables							
	Variable	Sex	Mean	SD	Min	Max	Range
Performance Attention	Remove Answers	Male	3.22	1.47	00	6	6
		Female	4.02	1.57	00	7	7
		Total	3.62	1.56	00	7	7
	Presenting false	Male	4.20	1.24	2.0	7	5
		Female	2.24	1.07	00	5	5
		Total	3.22	1.52	00	7	7
	Correct answer	Male	42.68	1.78	39	46	7
		Female	43.64	1.74	39	47	8
		Total	43.16	1.82	39	47	8
Active Memory	Auditory	Male	6.84	2.68	3	12	9
		Female	8.56	2.04	4	12	8
		Total	7.70	2.52	3	12	9
	visual	Male	8.80	2.08	3	3	9
		Female	7.36	2.43	3	12	9
		Total	8.08	2.37	3	12	9
	Total memory	Male	15.64	3.38	10	24	14
		Female	15.92	3.16	8	22	14
		Total	15.78	3.26	8	24	16
Problem solving	Problem solving	Male	35.18	7.35	19	47	28
		Female	30.16	7.61	16	45	16
		Total	32.67	7.86	16	47	31

Table 2. Levine test to evaluate the homogeneity of variances study variables					
	Variable	F	DF1	DF2	P
Performance Attention	correct Attention	0.004	1	98	0.949
	Presenting false	1.889	1	98	0.172
	Remove Answers	0.480	1	98	0.490
Active Memory	Auditory memory	3.137	1	98	0.094
	Visual memory	2.344	1	98	0.129

Table 3. Multivariate analysis to compare dependent variables for two groups.				
Scale		Value	F	P
Group	Pillai's trace	0.429	24.18	0.001
	Wilks' lambda	0.571	24.18	0.001
	Hotelling's trace	0.751	24.18	0.001
	Roy's largest root	0.751	24.18	0.001
Group	Pillai's trace	0.189	11.31	0.001
	Wilks' lambda	0.811	11.31	0.001
	Hotelling's trace	0.233	11.31	0.001
	Roy's largest root	0.233	11.31	0.001

Table 4. One way ANOVA on scores variables in two groups						
Variable	Dependent variable	Sum square	DF	Mean Square	F	P
Group 1	correct Attention	23.04	1	23.04	7.369	0.001
	Presenting false	96.04	1	96.04	7.703	0.001
	Remove Answers	16	1	16	6.890	0.001
Group 2	Auditory memory	73.960	1	73.960	13.012	0.001
	Visual memory	51.84	1	51.84	10.05	0.002

Dependent variable	Group 1	Group 2	Mean difference	SD Error	P
correct Attention Presenting false	Male	Female	-0.960	0.354	0.008
	Female	Male	0.960	0.354	0.008
Remove Answers correct Attention	Male	Female	1.960	0.233	0.001
	Female	Male	1.960	0.233	0.001
Presenting false	Male	Female	-0.800	0.305	0.01
	Female	Male	0.800	0.305	0.01
Auditory memory	Male	Female	-1.720	0.354	0.001
	Female	Male	1.720	0.354	0.001
Auditory memory	Male	Female	1.44	0.233	0.002
	Female	Male	-1.44	0.233	0.002

problem solving	Group	N	Mean	SD	Mean SD Error
	Male	50	35.18	7.35	1.039
	Female	50	30.16	7.61	1.0775

The third hypothesis: problem solving is different in male and female students. According to the results of the study can be said that girls and boys are different in problem solving and organization. And scores in boys are more than girls. And this finding is consistent with research results Klosia and Lausanne (2004), Harness (2008) and the Talib and ALhEmEh (2012). In its explana-

tion can be said that the boys in the ability to organize and consider all aspects of work, are better than girls. And that the expectations of society and opportunities in families give the boys and the risk of childhood trying to follow the boys, but the girls will not be allowed. Lakes and Kimberly (2004) found that self-regulation and cognitive skills training is more effective in boys than in girls. Mythos and colleagues (2009) reported that girls are self-regulating more than boys. Also Genova and Latham (2010) and Walker (2011) found significant differences in the levels of self-regulation. The ability to adapt and learn social skills due to the opportunities that society gives boys that a successful sons, encouraged by the community but if this fails of girls are more to blame.

Levene test for homogeneity of variances		Independent t test to compare the means					
Variable	F	P	Mean differences	Standard Error	DF	t	P
problem solving	0.461	0.499	5.02	1.497	98	3.352	0.001

Variable	dependent Variable	Sum square	DF	Mean Square	F	P
Group	correct Attention	23.04	1	23.04	7.36	0.008
	Presenting false	1.96	1	1.96	0.182	0.670
	Remove Answers	630.01	1	630.01	11.238	0.001
Error	correct Attention	306.40	98	3.127		
	Presenting false	1053.20	98	10.747		
	Remove Answers	5494.10	98	56.062		
Totoal	correct Attention	186608	100			
	Presenting false	25956	100			
	Remove Answers	112857	100			

Table 9. Comparison pairs, on scores variables in two groups					
dependent Variable	Group 1	Group 2	Mean difference Groups	SD Error	P
correct Attention	Male	Female	-0.960	0.354	0.008
	Female	Male	0.960	0.354	0.008
Active Memory	Male	Female	-0.280	0.656	0.670
	Female	Male	0.280	0.656	0.670
Problem solving	Male	Female	5.02	1.497	0.001
	Female	Male	-5.02	1.497	0.001

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