

SPATIAL ABILITY FOR CHILDREN WITH LEARNING DISABILITIES IN HAIL AND ITS RELATIONSHIP WITH SOME VARIABLES

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Abstract

The purpose of this study is to investigate the special ability for children with learning disabilities in Hail and also to investigate the effect of grade of child variable, type of learning difficulty variable and gender variable on children's special ability

The population of study consisted of children with learning difficulties belonging to the schools the Department of Education in Hail their number are (326) students, Aged (8-12) years from the primary grades third and fourth, fifth and sixth grade, and distributors on the thirty-three source rooms in Hail' school and Appendix (1) shows the distribution of society according to the study variables.

The study sample consisted of (221) students representing 67% population of the study, where they were randomly selected from five levels and all the students were subjected to the test

Results showed that there are no statistical significant differences in the spatial ability of students due to grade variable, there are no statistically significant differences in the spatial ability of students due to type of learning difficulty variable and no statistically significant differences in the spatial ability of students due to the gender variable

Keywords: Spatial abilities, children with learning disabilities, variables

Introduction

The concept of intelligence has a lot of attention in the field of psychology, many of researchers and scientists tackled it in their study and research, as well as they argue in its origin whether it is inherited ability or making by environment.

The intelligence plays a prominent role in an individual's learning and success in school and in life, the difference and variation between individuals in owning this ability consider

one of the main factors lead to the differences in ability to learn and understand the world around them, so the most intelligent individuals are more able to learn and to solve academic problems whether it is professional or social one (Alzeq 2006).

The Researchers disagree in finding one definition to this concept because of the reflection to which direction does the researcher belong, some of them believe that the intelligence is a ability of other public and private.

And others believe that its seven preliminary abilities such as (Thurston), and others believe it's a separate multiple abilities such as (Gardner) (Lahey, 2001), as a result of these differences in the perception of intelligence scholars differed in finding a clear and specific definition of the intelligence. The most prominent definitions of intelligence, as stated in (Zidane, 1990; Nashawati, 1996) is : Kelvin's definition : "the ability to learn, "and Koehler's definition is: "ability to recognize the relationships through foresight and mental compatibility in new situations which correspond to the individual in his life" and Stern noted to the intelligence as""The mental and innate ability of the individual to adapts with problems and new situations in life", as well as Bert and Dober Bourne explained it as : "The ability to gain experience and take advantage of it", and Spearman elucidated it as:" an innate ability in general, or factor affects all types of mental activity No matter what the subject of this activity and its form including ability to recognize the relationships", at last Ormorod(Ormorod,2003)sums up the previous definitions of intelligence as : Adaptive includes modifying human behavior so that he can successfully accomplish tasks, and an interactive includes coordination and interaction between a variety of complex mental processes, also build on previous knowledge involves the use of it to analyze new situations and absorbed and utilized from them, the intelligence also has various field reflects in a variety of academic, emotional and social situations and areas , and also associates with the ability to learn, the intelligent individuals learn more quickly than others, and finally see that the intelligence is determined by culture,so intelligent behavior in a culture is not necessarily have to be intelligent behavior in another one.

Newly appears a theory of multiple intelligences for "Howard Gardner" and it's one of the important educational theories that interpreted intelligence, and it resonated so the researchers work to take advantage of it in all fields, Gardner (Gardner, 1993)believes that the intelligence is a complex construction consisting of a large number of separate and independent ability, so each ability form a special kind of intelligence specializes by a certain area of the brain, and it noted that who loses the ability to perform certain performance be

able to perform other abilities. Also he supposed that there are several types of intelligent behavior and these types separate from each other. These are the types:

- Linguistic intelligence: enable who owns it creativity in writing, speaking and speech, the intelligent linguistically be more capable of learning languages and use it to reach certain goals.
- Logical-Mathematical intelligence: involves the ability to solve logical problems or mathematical equations, so the intelligent logically and mathematically enables better than other to deal with scientific dilemma and understand it.
- Musical intelligence: involves the skill in musical performance and composing the music and estimating it.
- Bodily-Kinesthetic Intelligence: it is special capacity using the body to solve certain problems, for example the elite athletes, dancers and dramatists.
- Interpersonal Intelligence: specialized in the relationship with others and who owns this capacity able to understand the intentions, motivations and desires of others, and enables him to cooperate with other.
- Intra-personal Intelligence: is the capacity to understand oneself and one's thoughts and feelings, and appreciation of the self, therefore he can successfully organizing his life.
- Naturalist Intelligence: Gardner has added this capability in the nineties of the last century, it's the ability to recognize the environment and classified into categories.
- Spatial Intelligence: enables who owns this capability identifying patterns and different forms, which gives him the ability to understand and solve visual dilemmas and understand the three-dimensional shapes, and innovate and form mental images.

This recent type is the subject of this research, it aims to measure the evolution of spatial ability (spatial intelligence) during the years of the study in children with learning disabilities.

Spatial ability:

Spatial ability is defined as the ability to represent and convert non-linguistic information in space (or place) (Chan, 2007)

According to Taha (2006) it's the ability to deal with the place and the transition from one place to another. And this intelligence includes the ability to sail in the sea or air, and this intelligence available to the maritime or aerial navigators, also in the artists visual arts and professional chess players. It is available in the front area in the right half of the brain.

In addition, the spatial ability is note the details of what the individual sees, and the ability as well to imagine and processing visual objects mentally. So the individual behaves like evoke mental images and a similar mental picture of reality and to distinguish between similar things.(Ormrod, 1995).

It is noted from the foregoing that spatial ability is processing mentally images through recycled them in a vacuum, and this what are the study trying to measure.

Spatial ability can be classified into two main types: spatial visualization and spatial orientation, the visualization is the ability to take, recycle and convert an excitement presented as image form, but the orientation is the ability to recognize the order of elements within an excitement for visual form, and the ability to control whatever changed the body of spatial for the excitement.

Accordingly, there are some researchers said that both spatial visualization and spatial orientation require both ability to recycling models mentally, also require visual short-term memory, in addition to the spatial visualization needs to a series of successive operations (Carroll, 1974).

There are multiple types of measuring spatial ability, (Linn & Petersen,1985) characterized between three types of standards and skills that measure spatial ability, which is: spatial perception and spatial visualization and mental rotation. The spatial perception requires from examiners determine horizontal and vertical lines in a fixed form while ignoring other scattered information in the shape. However the spatial visualization requires a complex, analytical and multi-step process, this type also includes test contained forms and the paper folding test , while mental rotation includes tasks imagine how it would be two-dimensional shapes or three-dimensional if it is mentally recycled. The latter type was used in this study, where the mental rotation test used with three-dimensional shapes.

Halpern &LaMay (Halpern& LaMay,2000) also add two other measures of spatial ability, which are : spatiotemporal ability and test generation and maintain the spatial form. Where the first test involves judgment on the responses to some animated visual forms, while the second one includes evoke image such as a picture of alphabet, then use the available information in the image to perform a specific cognitive task.

Significance of the Study

The significance this study came from it's one of the few Arabic studies that are looking at this kind of intelligence in children with learning disabilities, and also from the tool used in a Vandenberg test (Vandenberg, 1975) in the mental rotation that includes three-

dimensional forms, and this test is used for the first time in the Arabic study. It also provides them with an important measure of spatial ability used by researchers and specialists in intelligence and universities to measure spatial ability for its students, to ensure the safety of its educational programs in developing the capabilities and skills of students.

Problem of the study

The intelligence considers one of the important factors which help the child in his achievement, the most intelligent children are more capable than others to learn and acquire experiences from their environment, the kids with learning disabilities category considers non homogeneous in both intelligence or academic achievement, in terms of intelligence find who is his intelligence in average and other higher-than-average, and this means that they have the mental capacity help them to learn with their colleagues with doing some necessary changes especially in the teaching methods used in their education.

Moreover, many researchers such as Aldhher (2004), Zarrad (2002) and Lerner (2003) indicate that Perception Spatial Relations Disabilities is one of the manifestations of learning difficulties represented by children's failure to recognize the spatial relationships such as: top and bottom, and above and below, and near and far, and in front of and behind. Also these children may appear difficulties to estimate the distance between the numbers, and the difficulties of writing in a straight line and difficulties to recognize sequence of numbers.

The researcher starts from the assumption that intelligence is a multiple capabilities, the child with learning difficulties may own one ability or several capabilities, and this means that who is less intelligent in one field may be more intelligent in another one. Throughout the researcher works with the children with learning difficulties he noted that a lot of their behaviors change among their college years, and this change extends to knowledge, skills, values, emotions, different abilities and mental spatial capacity, so this study aims to identify the evolution of spatial ability during the years of the study in its curricula and teaching methods and methods of interaction between students and faculty members.

Questions of the study

This study attempts to answer the following questions:

1- Are there any statistically significant differences at the level of ($\alpha \leq 0.05$) in spatial ability for people with learning difficulties due to the grade of the child variable?

2- Are there any statistically significant differences at the level of ($\alpha \leq 0.05$) in spatial ability for people with learning difficulties due to the type of learning difficulty variable?

3- Are there any statistically significant differences at the level of ($\alpha \leq 0.05$) in spatial ability for people with learning difficulties due to gender variable?

Limitations of study

The results of this study determines generally in light of the size of the sample and the selected method and their characteristics, this study was confined to people with learning difficulties in the age group (8-11) years, and enrolled with learning difficulties rooms for schools affiliated to the Directorate of Education in Hail who registered in the second semester 2011/2012, and the results of this study determines in its device which is a measure contains (43) items of the three-dimensional shapes, therefore the validity and reliability of the tool have been extracted from the of non-verbal measure.

Definition of operational terms

The study included several procedural terms; it can be defined as follows:

Spatial ability: the ability to perceive or solve problems associated with relationships between objects or figures, including position, direction, size, form, and distance, this study measured the degree obtained by the student on the computerized spatial intelligence test for "Vandenberg (Vandenberg, 1975),), which identified the whole mark estimated (43) points.

People with learning difficulties:

Those people who appear to have trouble in one or more of the basic psychological processes which include the understanding and the use of written or spoken language, and appears in hearing ,thinking talking , reading, spelling and arithmetic disorder, and return to a functional infection in the brain, and have no relationship with any obstruction of disabilities, whether it's mental or hearing or optical or other disabilities, (Rousan, Alkhateen and Natour, 2004). In this study, students with learning disabilities known as those children who tested by the Directorate of Education in Hail and registered in its schools

Literature Review

The researcher found little studies in Arabic on the subject of spatial ability, but foreign studies discussed this subject in depth, the following is a review of previous studies:

In Abid's study (1995), which aimed to investigate the development of spatial ability among students in primary and secondary educational level (eighth, tenth, and High School), the sample of this study consisted of (883) students from Mafraq and its suburbs, spatial ability test (Turnover cards) prepared by the ETS Center at Princeton in the United States applied on these students. The result of the study indicates statistically differences between the averages scores of the students in the spatial abilities in different school stages.

Moreover, Abid (1996) made another study aimed to investigate the evolution of spatial ability in educational level of primary school pupils from the second, third, and fourth grade, It also aimed to show the impact of variables of achievement in mathematics and gender in spatial ability, sample of this study consisted of (531) male and female pupils of the aforementioned classes in public schools in alMafraq in Jordan, they Subjected to the spatial relationships test published by the Institute scientific research participants in the United States of America, the results showed that fourth-grade better than third grade and the second in test spatial ability, then the third grade students, then second grade students, the results revealed differences in the scores of pupils on spatial ability test, also the results revealed significant differences in the scores of pupils on spatial ability test, attributable to those with high average, and also showed that there are differences attributed to gender in favor to males.

In addition, Manrique and others (manrique et al, 1997) made a study aimed to investigate the effect of two levels (High and low) in the steric ability in performance on mental rotation tasks. The study was applied on (30) members of the trainee officers at Arizona State University, the results showed that the performance of individuals with high steric ability, was faster than the performance of the group with low steric ability, where the speed increased in performance with progress in the member of session.

Provo and her colleagues (Provo & et al, 1998) made study aimed to create a tool to measure the three-dimensional perception, It also aimed to discover sexual differences on this measurement, this study applied on (62) students in the Faculty of Medicine at the University of Saint Pivo. The results showed that there were no significant differences between males and females in the performance on a scale three-dimensional steric capacity.

Master's study (Master, 1998) aimed to investigate sexual differences on the mental rotation test, which measures the steric ability, and the relationship between performance on this test and general performance. This study was applied on (140) students between the ages

of (17 - 25) years from San Jose State University subjected to (Vandbzg, 1975) test to mental rotation. The results indicated that the male performance was better than the Female Performance, and the results did not show that the general performance on the test has an impact on sexual differences on the mental rotation test especially if the examiners given an unspecified time to perform the test.

As well as, Seng & Chan (Seng & Chan, 2006) made a study aimed to investigate the nature of spatial ability and its relationship to performance in mathematics, where the study applied on (127) male and female students from primary aged (10-11) years, subjected to the (SR_O) and (v2) and it is a three-dimensional tests. The results showed that the steric ability can be defined as unitary , the results also showed that there are no substantial differences between males and females in steric ability, it also showed that there is a statistical significant correlation between steric ability and performance in mathematics.

Seng & Tan (Seng & Tan 2002) also made a study aimed to investigate cultural and sexual differences in a functions of the spatial capabilities of children , this study was applied on (100) children their aged between (8-12) years, they subjected water _level test prepared by Piaget and Anailder (1956), the results showed the performance of children do not like those who Piaget described them in that age group, it also showed that there are cultural differences in performance on spatial ability test, where the Chinese children better than Malays children, and for sexual differences showed boys better than girls in performance on this test, but the differences were not a significance.

In Nancy – Louis & Erin & Gary & Jon (Nancy-Louise & Erin & Gary & Jon ,2003) study which aimed to study the performance of the memory for (135) students their intelligence degrees on Kessler rate (90-115) classified on three models as:

1. Awareness of voice model
2. Double or binary model (defects of pronunciation and optical defects)
3. Difference variable axial voice (which assumes that successful reading depends on integration of network connection which works with different cognitive processes, although the problem in pronunciation is central to reading difficulties)

Were divided into three groups:

Group A: consisted of (45) The student reading difficulties; between 9-12 years of age.

Group B: consisted of (45) students in a model reading level, their age is similar to the first group.

Group C: those who are in the same reading level of the second group, but older groups A and B.

The first group performance with reading difficulties in serial memory, verbal learning and memory performance optical vacuum has been compared with the performance of the second group and the third one, the study concluded that the performance with reading difficulties in the first group was less meaningful than the second group performance for the children in same age, as well as less than the performance of members of the third group whose older than them, the result of the study showed that the variable different voice is responsible for the difference in the performance of memory more than a typical voice consciousness form, and dual form.

Quaiser-Phol & Leman (Quaiser-Phol & Lehman 2007) made a study aimed to identify the sexual differences in performance on spatial ability tests and its relationship to the experiences and attitudes towards achievement. This study applied on (183) students majoring in Art, Humanities, Mathematics and Computer, and subjected to (Vandenberg and Kos) test to mental rotation and this measures the steric ability. The results showed that the performance on the mental rotation test affected by academic specialization and sex, but the effect varies by sex variable where the impact was greater for male students majoring in Arts and Humanities and the impact was lower for students of majoring in computer, and also showed that there is statistical significant correlation between performance on the mental rotation test and computer experience for females only.

In addition, Chan (Chan, 2007) made a study aimed to identify the sexual differences in spatial ability of talented Chinese students, this study applied on (337) male and female students of primary and secondary school aged (7-17 years old) in Hong Kong responded to test the readiness of the multi-dimensional (Jackson, 2003), results showed that males outperformed females in performance on spatial ability test, also the results showed that secondary school students outperformed primary school students, which means that spatial ability improves with progress in years of study as well in age.

As well as, Rayan (Rayan, 2008) made a study aimed to know the effect of sex, age and Grade Point Average variable and the interaction between them in a spatial ability among the students of Al-Quds Open University majoring in primary Education, The results of the study showed a statistical significant differences in spatial ability according to the gender variable in favor of male students, , and according to variable GPA for high GPA category, while the differences not significant according to the variables age and of the interaction between the variables of the study.

Throughout review of previous studies find only three of them (Abid 1995, 1996 and Chan, 2007) emphasized on the spatial ability develop with progress in years of study therefore

this study came to trying to emphasize this idea, those studies also were conducted on school students only. But this study differ from others because it conducted on students with learning difficulties, which means that this study was an attempt to investigate the impact of the type of learning difficulty in spatial ability. Regarding the sex variable the previous studies unresolved any of the gender performance was better, so this study made in an attempt to determine the direction of the difference in performance on the spatial ability test.

The method and procedures

Population of the study and its samples

The population of study consisted of children with learning difficulties belonging to the schools the Department of Education in Hail their number are (326) students, Aged (8-12) years from the primary grades third and fourth, fifth and sixth grade, and distributors on the thirty-three source rooms in Hail' school and Appendix (1) shows the distribution of society according to the study variables.

The study sample consisted of (221) students representing 67% population of the study, where they were randomly selected from five levels, and all the students were subjected to the test, table (1) shows the distribution of the sample according to the independent variables.

Table (1) Distribution of the sample according to the independent variables

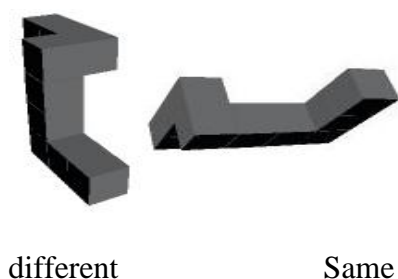
Grade					GENDER		KIND OF DIFFICULTIES				
sixth	fifth	fourth	third	Second	female	male	Account	spilin g	wrinting	readin g	Written express ion
60	12	44	54	52	52	169	12	34	61	37	77

The study tool:

The study tool consisted of a mental rotation test for Vandenburg (Vandenburg,1975) , Which measures the spatial ability, the test is (43)items of three-dimensional geometric shapes, this test does not need to be modified for the Saudi environment because it is non-verbal test is based on geometric shapes. Each item is a two adjoining forms, the examiner asked to judged if they are the same or different, after doing mental rotate to the right shape, and follows an example of one of the paragraphs of the test.

FORM (1)

One of the paragraphs of a mental rotation tests that measure spatial ability:



The correct answer here is (same), the figures are the same

The validity of study tool

Because the test is not a verbal test, but three-dimensional geometric shapes, has been calculated the correlation coefficient between the vertebrae and the overall scale, after it has been deleted item's mark, the correlation coefficients are shown in Table (2)

Table (2)

The correlation coefficient between the vertebrae and the overall scale

Items	Std. Deviation	Items	Std. Deviation
1	.984	23	.982
2	.983	24	.982
3	.983	25	.982
4	.983	26	.982
5	.983	27	.982
6	.983	28	.982
7	.983	29	.982
8	.983	30	.982
9	.983	31	.982
10	.982	32	.982
11	.983	33	.982
12	.983	34	.982
13	.982	35	.982
14	.983	36	.982

15	.982	37	.982
16	.982	38	.982
17	.982	39	.982
18	.982	40	.982
19	.982	41	.982
20	.982	42	.982
21	.982	43	.982
22	.982		

To verify the veracity of the construction of spatial ability scale, factor analysis for the main components of the test was used, table(3) shows the results of factor analysis:

Table (3)

Factor	The value of the underlying root	Contrast Ratio	The cumulative percentage of the variance
First	25.418	59.111	59.111
Second	1.500	3.488	62.599
Third	1.099	2.555	65.154

Table (3) shows that the value of the underlying root of the first factor (25.418) and this explains what (59.111%) of the total variance, which means that the test that includes only one factor, And that it measures a single attribute, As explained by first factor of more than 20% of the total variance, because the test measures a single attribute which is the spatial ability, so the scores of the students was not affected by any other attributes, which means that the test measures what it is set for and the test is trustiness in structure.

Reliability of the study tool

For the purpose of verifying the sample reliability it was extracted internal consistency coefficient using Krobach alpha equation and the result was (0.983), and it's acceptable value to ensure the validity of the scale of the application. And also used the midterm retail method to verify the stability of the tool, where interval's performance divided into two into

two groups :odd intervals, and even intervals, and used calculated Pearson correlation coefficient between the two groups and valued (0.938) and then correct reliability coefficient migraine (variance) using Spearman Brown equation to become the coefficient persistence (0.968), it is also an acceptable value to ensure the validity of the scale of the application.

Statistical Analysis

To show if there is an impact to the variables of the study on the evolution of spatial ability for children with learning disabilities they used the tests of statistical significance, they used One Way Anova test to examine the impact of each types of learning difficulty for the student (reading, writing , calculating, spelling and written expression)and the grade variable (second, third, fourth, fifth, sixth), also they used Paired Sample T-test to examine the impact of gender variable of the student (male, female).

Procedures of the Study

To complete the current study the following procedures were taken:

- 1-Get tested for spatial ability by computerized correspondence on the Internet.
- 2- Review test and check included forms.
- 3- .Load test on the e-learning system model.
- 4- Answer paragraphs of test by students with the existence of the researcher

Discussion of the results

First, the results related to the first question which states:

Are there significant differences at the statistical significant at the level of ($\alpha \leq 0.05$) in spatial ability for people with learning difficulties due to the variable grade of the child?

To answer this question the averages and standard deviations was extracted for the students' responses on spatial ability test according to variable grade, and the table (4) shows those values.

Table (4) Arithmetic means and standard deviations for the students' scores on the test of spatial ability by variable grade

Grade	N	Mean	Std. Deviation
Second	51	19.96	16.24
Third	54	20.12	17.48
Fourth	44	21.83	15.02
Fifth	12	22.67	16.48
Sixth	60	19.36	18.33
Total	221	20.43	16.63

Table (4) shows that there are statistically significant differences between students' scores on spatial ability test depending on variable grade, where the mean score for fourth-graders are the highest mean (22.67), and the mean score for sixth grade students are (19.36) less than the mean, which means that there is increasing in students' scores on spatial ability test from the second grade to the fifth grade, then decreasing in the sixth grade students.

To show if these differences are significant the researcher used One Way Anova, as shown in Table (5)

Table (5) ONE WAY ANOVA results according to grade variable

	Source of	Sum of squares	df	Mean	t	Sig
Spatial ability	Between groups	250.506	4	62.626	.223	.925
	Within groups	60609.512	216	280.600		
	total	60860.018	220			

It's clear from the table (5) there are no statistical significant differences in the spatial ability of students due to grade variable.

This result can be explained by the educational system in resource rooms in Hail doesn't work to provide appropriate programs for children with learning difficulties, or may be due to the acute shortage of trained personnel and Lack of tools appropriate detection and diagnosis, and lack of training programs, so these led to the disappearance of differences between children with learning difficulties, and therefore it can be said that the performance on spatial ability test can be improved with progress in grades but without significant. The result of this study is differ from (Abid 1995, 1996, Ryan, 2008 and Chan, 2007) studies that found the spatial ability evolve through progress with years of study and from grade to another.

Secondly: the results related to the second question which states: - Are there significant differences at the statistical significant at the level of ($\alpha \leq 0.05$) in spatial ability for people with learning difficulties due to the variable type of learning difficulty?

To answer this question was extracted arithmetic mean and standard deviations for the students' responses to spatial ability test depending on the variable difficulty learning, and the table (6) shows those values.

Table (6) Arithmetic mean and standard deviations for the students' scores on spatial ability test according to the variable learning difficulty

Learning difficulties	N	Mean	Std. Deviation
Written Expression	77	18.48	16.956
Reading	37	20.40	16.876
Writing	61	21.46	16.326
Spelling	34	22.18	15.416
Calculating	12	22.33	19.322
Total	221	20.43	16.632

We note from table (6) that there statistically significant differences between student's score on the spatial ability test according to the variable leaning difficulties, where the highest arithmetic mean for the student's score with calculating difficulties of value (22.33) and less arithmetic mean of students' score with difficulties in written expression of the value (18.48)

To know the significance of these differences we used analysis of One Way Anova, as shown in the table (7).

	Source of	Sum of Squares	df	Mean	t	Sig
Spatial ability	Between groups	419.488	4	104.872	.375	.826
	Within groups	60440.530	216	279.817		
	Total	60860.018	220			

It's clear from the table (7) that there are no statistically significant differences in the spatial ability of students due to type of learning difficulty variable.

We can explain this result that the student with learning difficulties most of them are from the same academic level, they are the students who got low average somewhat and therefore there was no significant difference between their scores on the spatial ability test,

and the result of this study agreed with the results of (Abed, 1996; Ryan, 2008) studies , which found that students with high average performed better on spatial ability test.

Thirdly: the results related to the third question which states : Are there significant differences at the statistical significant at the level of ($\alpha \leq 0.05$) in spatial ability for people with learning difficulties due to variable gender?

To answer this question was means and standard deviations for the students' responses on spatial ability test variable were calculated depending on gender, and table (8) shows those values

Table (8) Arithmetic means and standard deviations for the students' scores on the spatial ability test due to gender variable

Gender	N	Mean	Std. Deviation
Male	169	21.29	16.505
Female	52	17.62	16.895

Notes from the table (8) that there are virtual differences between students' scores on spatial ability test depending on variable gender, where the average score for males (21.29) and the average score females (17.62).

To show if there are statistically significant differences T-test was used for independent samples. table (9) shows the results of this analysis

Table (9) Results (T) test for independent samples to extract significant differences between the averages of groups formed depending on the gender variable

Spatial Ability	Gender	N	mean	Std. Deviation	t	df	Sig
	Males	169	21.29	16.505	1.396	219	.164
	Females	52	17.62	16.895			

It's clear from table (9) that there are no statistically significant differences in the spatial ability of students due to the gender variable. This result explains that the curriculum does not differentiate between the sexes in terms of preparation, and the treatment of teachers

with their students equally regardless of their sex, and this transaction is reflected on their performance in public examinations and tests, The result of this study agreed with the result of a study of each of (Steng & Chan, 2000; Provo & et al, 1998) who did not find differences in performance between the sexes, but disagreed with the results of studies (Abid, 1996; Ryan, 2008; Chan, 2007; Quaiser-Phol & Lehman, 2007; Masters, 1996; Steng & Tan, 2002) Who agreed that males were better than females in performance on tests of spatial abilities.

Recommendations

In light of the findings of the study, the researcher recommends the following:

- 1- Interest in sources rooms in terms of providing trained personnel, training programs and tools appropriate detection and diagnosis to achieve the greatest benefit to improve the capabilities of people with special needs of all kinds.
- 2- *Reconsider in the proposed study plan to conform with the developments of the times*
- 3- *Make further studies on the subject of spatial ability and tackle other variables*
- 4- *Make studies to examine the psychometric properties of spatial Intelligence Scale*

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