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SPATIAL ABILITY: THE FORECASTER OF ANATOMY KNOWLEGDE AND CO-RELATION OF SPATIAL ABILITY AND ANATOMY KNOWLEDGE BETWEEN MALE AND FEMALE PHYSIOTHERAPY COLLEGE STUDENTS – AN OBSERVATIONAL STUDY

Maria Agnella I.*, Megala K., Dr. Madhumathi K. and Dr. Senthil Selvam

[1,2]BPT IV Year, Sopt, Vels Institute of Science, Technology And Advanced Studies.

[3]MPT (Neuro Pediatric), (Phd), Sopt, Vels Institute of Science, Technology and Advanced Studies.

[4]MPT (Ortho), Phd, Head of The Department, Sopt, Vels Institute of Science, Technology and Advanced Studies.

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***Corresponding Author**
Maria Agnella I.
BPT IV Year, Sopt, Vels Institute of Science, Technology And Advanced Studies.

ABSTRACT

Introduction: Spatial ability is the ability to understand three dimensional structures, position and manipulation of objects. High spatial ability would build the knowledge of anatomy more easily, more accurately and easier access to it. **Objective:** This study is done to investigate the co-relation of spatial ability and anatomy knowledge between male and female college students. **Materials and Methods**: A total of 78 physiotherapy students (39-males and 39-females) are included in this study. The redrawn Vandenberg & Kuse Mental Rotation test was administered. **Result**: The mean MRT scores for males and females for each scoring criteria t-test for independent samples confined that males performed better than females. In MRT the males had stronger co-relation(r=0.48) than females(r=0.19). **Conclusion:** The results concluded that males have more spatial ability than females and in the aspect of anatomical knowledge.

KEYWORDS: Spatial ability, gender difference, mental rotation test, visual perception.

INTRODUCTON

Spatial ability has been observed to have two distinct parts: Visualisation and Orientation[1]. Visualisation has been defined as the ability to mentally rotate and manipulate 2D and 3D stimulus objects (McGee, 1979). Orientation has been found to include the comprehension of the arrangement of elements within a visual stimulus pattern, the aptitude to remain unconfused by the changing orientations in which a spatial configuration may be separated and an ability to determine spatial orientation with respect to one's body.(McGee,1979)

Spatial ability deals with individual perception and mental representation of planar and visualisation.[2] Mental imagery refers to the ability to form vivid mental representation of an object or a movement, by visualising as many details as possible, and to preserve spatial and temporal characteristics of actual movement(Guillot and Collet, 2005).

Other researches approach visuospatial cognition as developing from birth, such as language, based on inherited capabilities and experience (Marc A.T.M, 2013). Studying anatomy involves learning specimen, drawing, photographs and radiographs.[3]

The understanding of these manipulated representation is enhanced because of high spatial ability which helps them connect to prior knowledge and access context.[3] High performance on anatomy tests is positively related to spatial ability. Increased anatomical knowledge leads to higher scores of mental rotation test. Mental Rotation test is widely used to test for spatial ability.[3]

Many theories have been developed to attempt to explain the nature and origin of sex difference in visual-spatial skill. In medical field there is a need to assess sex difference in spatial ability.[3]

The need of the study is to find out spatial ability on males and females and co-relation between spatial ability and anatomy knowledge. Anatomy is the core and important subject in physiotherapy field. Enhancing the spatial ability significantly academic achievement can be gained in anatomy.

The background of the study is that the medical student studying anatomy have higher spatial ability than educational science students (Marc. A.T.M, 2013). The objective of the study is to co-relate spatial ability and mental rotation test in male and female based on anatomical knowledge on physiotherapy student.

METHODOLOGY

A total of seventy-eight physiotherapy students participated in this study (2^{nd} yr students those who finished their University Anatomy Exams), the samples are evenly divided (38 males and 38 females). Aged between 18 years to 21 years are included in this study. This study was conducted in School of physiotherapy, Vels Institute of Science, Technology and Advanced Studies (VISTAS) Chennai.

Procedure

The test was conducted on 78 physiotherapy students in quiet room. The redrawn Vandenberg & Kuse Mental rotation test was used. The instructions, recording and scoring were done according to the format given in the reference. Peters, M., Laeng, B., Latham, K., Jackson, M., Zaiyouna, R. and Richardson, C. (1995). A Redrawn Vandenberg & Kuse Mental Rotations Test: Different Versions and Factors that affect Performance. Brain and Cognition, 28, 39-58.

Students were discouraged from using a strategy that would lead to decrease in response. The score is dependent on whether they had trouble imaging the object in different position and state of motion.

The higher score indicates to have better spatial ability. The student university anatomy marks were taken to find the correlation between the spatial ability and anatomy knowledge

RESULT

The mean MRT score for males and females for each scoring criteria T-test for independent samples confirmed that the male performed better that female.

Strong correlation in males is 0.48 and Weak correlation in females is 0.19. When the significantly ($p<0.001$) different scores are were found in males (mean=6.00 and SD=2.97) and females (mean=5.13 and SD=2.46) respectively.

Table No.1: Mrt Results.

Gender	MEAN	SD	df	t-VALUE	p-VALUE
Male	6	2.97	38	12.6010	<0.0001
Female	5.13	2.46	38	13.0073	<0.0001

DISCUSSION

Reports of sex differences favouring males in spatial abilities in physiotherapy students have been found a study relating spatial abilities to three-dimensional anatomy knowledge.

The finding of the complaint reported that gender effects is lower in female scores are commonly reported (Witkin et al., 1971; Cano and Marquez, 1995; De Andres et al., 2004), due to multifaceted factors.

There was better result in male student in functional anatomy examination were as lesser success in their academic education in compared with females; this seem to be confirmed that an independent external factor would be influence performance.

The findings in the study suggest that source of the female deficit on spatial rotation task and performance task such as speed response style is lacking in female. The males constantly have done better performance in spatial ability than female under timed condition.

Hence females work more slowly on visual spatial task because of lower level of confidence and lower level of ability with time testing procedure which could underestimate their skills.

Therefore, spatial ability is important prerequisite in physiotherapy students that aim to teach spatial anatomy and technical skill. It is clear than good spatial ability beneficial for learning anatomy and benefits for student's spatial ability.

CONCLUSION

Study concluded that male have more spatial ability than females. Students on spatial aspects of anatomical knowledge would have a very well two fold effect on their learning.

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