

**UNIVERSITI TEKNOLOGI MARA**

**CORRELATIONS BETWEEN 3D ANIMATION  
TEST SCORE, SPATIAL ABILITY AND  
COMPUTER EXPERIENCES AMONGST  
MULTIMEDIA MAJOR UNIVERSITY STUDENTS**

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Thesis submitted in fulfillment  
of the requirements for the degree of  
**Doctor of Philosophy**

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## AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledgement as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduates, Universiti Teknologi MARA, regulating the conduct of my study and research.

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A handwritten signature in black ink, appearing to read 'Sharkawi', is written over a horizontal dotted line. A solid horizontal line is drawn below the dotted line, extending across the width of the signature area.

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## ABSTRACT

Deficits in spatial abilities, particularly Spatial Visualization and Spatial Rotation affect the performance of 3D Computer Animation among Multimedia major university students. Lacking of necessary spatial ability factors may affect students' performance in 3D Computer Animation. Some students experienced greater difficulties in performing a complicated visualization task required in creating three-dimensional (3D) objects and animation. The purpose of this study was to examine the relationship between Spatial Ability, Computer Experiences and the 3D Computer Animation performance among Multimedia major undergraduate students at Malaysian public university. In addition, this study also examined whether Spatial Ability could be used to predict students' performance in 3D Computer animation course. Specifically the study attempted, 1) to investigate the correlation between Spatial Rotation test score and students' performance in 3D Computer Animation test score among multimedia major undergraduate students, 2) to investigate the correlation between Spatial Visualization test score and students' performance in 3D Computer Animation test score among multimedia major undergraduate students, 3) to investigate the correlation between Computer Understanding and Experience Scale (CUE) and performance in 3D Computer Animation course among multimedia major undergraduate students, 4) to determine whether Spatial Ability is the possible predictors of successful performance of 3D Computer Animation course among multimedia major undergraduate students and, 5) to examine significant differences between Spatial Ability test score and a CUE test score based on demographics with their performance in 3D Computer Animation. The participants of this study were 188 (male = 52 and females = 136) Multimedia major students from six public universities. Five instruments were utilized in this study namely, 1) demographic questionnaire, 2) Spatial Ability psychometric test was adapted from the *Kit of Factor-Referenced Cognitive Tests (1976)*, 3) Computer Understanding and Experience Scale questionnaire, 4) 3D Computer Animation test score and, 5) *STPM* and *SPM* academic transcripts. Analyzing the data using Pearson Correlations, it was found that there was a significant relationship between Spatial Rotation and Spatial Visualization with the performance of 3D Computer Animation. The Multiple Regression analysis revealed that Spatial Ability is a significant predictor for 3D Computer Animation performances. Overall, Spatial Ability was found to be predictive of 3D Computer Animation performance among Multimedia major students. Additionally, gender, race and academic backgrounds were found to be highly significant for successful comprehension of 3D Computer Animation course. The coefficient of determination  $R^2$  of the Spatial Ability showed 47.4% of the variance in the 3D Computer Animation test score.

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# CHAPTER ONE

## INTRODUCTIONS

### 1.1 OVERVIEW

Beginning in the early 1990s, a small number of public institutions of higher learning started to introduce programmes related to Creative Multimedia, in particular, 3D Computer Animation courses. One of the main objectives of embedding this course in the existing multimedia programmes is to equip candidates with computer animation and 3D visualization skills to all multimedia graduates. Furthermore, it was hoped that this multimedia programme would help develop readiness among graduates to participate with greater confidence in the local animation industry. The levels of 3D Computer Animation performance among multimedia major students are strongly related to personal interest in the computer animation discipline, which is becoming a course that is in high demand among students in Malaysia. The statistics presented in Figure 1 outlined an increase demand of a commercial film between 2006 until 2008 that may force local and international animation and advertising production agencies to offer job opportunities for multimedia experts and animators.

An informal discussion among animation lecturers highlighted that the performance of 3D Computer Animation among students who had passed the course are inconsistent (Abdul Hassan Muthalib, 2004). Some of the students were completely de-motivated because of the complexity of computer animation techniques and some were simply unable to cope with the simultaneous thinking processes involved in building the three dimensional objects, manipulating polygons and shapes directly in virtual space. The fundamental challenge of coping with complicated tasks of spatial ability depends on an individual's capability to perform several tasks simultaneously. This task has been identified as being related to an individual's ability to navigate through a hierarchal database (Vicente, Hayes, & Williges, 1987; Butler, 1990). It is, therefore, becoming increasingly necessary to understand the basis of this individual difference (Alonso, 1998). The possible cause of a student's poor performance in a 3D Computer Animation course maybe because