Message from the editor-in-chief

Malaysian Online Journal of Educational Technology (MOJET) highlights the current issues in educational technology. MOJET is an international, professional refereed journal in the interdisciplinary fields sponsored by Faculty of Education, University of Malaya. This journal serves as a platform for presenting and discussing the emerging issues on educational technology for readers who share common interests in understanding the developments of the integration of technology in education. The journal is committed to providing access to quality researches raging from original research, theoretical articles and concept papers in educational technology.

In order to produce high quality journal, extensive effort has been put in selecting valuable researches that contribute to the journal. I would like to take this opportunity to express my appreciation to editorial board, reviewers and researchers for their valuable contributions to make this journal a reality.

Professor Dr. Saedah Siraj
July 2016
Editor in chief

Message from the editor

The Malaysian Online Journal of Educational Technology (MOJET) is aimed at using technology in online teaching and learning through diffusing information from a community of researchers and scholars. The journal is published electronically four times a year.

The journal welcomes the original and qualified researches on all aspects of educational technology. Topics may include, but not limited to: use of multimedia to improve online learning; collaborative learning in online learning environment, innovative online teaching and learning; instructional design theory and application; use of technology in instruction; instructional design theory, evaluation of instructional design, and future development of instructional technology.

As editor of the journal, it is a great pleasure to see the success of this journal publication. On behalf of the editorial team of The Malaysian Online Journal of Educational Technology (MOJET), we would like to thank to all the authors and editors for their contribution to the development of the journal.

Assoc. Prof. Dr. Norlidah Alias & Assist. Prof. Dr. Onur İŞBULAN
July 2016
Editors
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Comparative Effectiveness of Animated Drawings and Selected Instructional Strategies on Students’ Performance in Creative Arts in Nigeria

Aiyedun Emmanuel Olugbenga [1]

ABSTRACT

Creative Arts is a core and compulsory subject in Nigerian upper basic classes, but the students’ performance over the years indicated high failure. Instructional strategies play a pivotal role in improving students’ performance. Computer-based instructions such as animated drawings could be a possible solution. This research adopted the design and development type. The between groups repeated measure design compared pretest and post-test scores of participants to identify differences after treatment. To validate the instruments, test re-test method was used; Pearson product moment correlation coefficient yielded a reliability value of .94. Also, 674 upper basic school students consisting of 387 public and 287 private schools students, 338 males, and 336 females were involved in the study. Seven research questions and seven corresponding hypotheses were raised and tested respectively. ANOVA and t-test were used for hypotheses testing. Findings of the study showed that computer-based animated drawings instruction enhanced performance. It was recommended among others that the classroom teacher should embrace the strategy for Creative Arts classes; authors and curriculum planners should create more opportunities for computer-based animated drawing in explaining procedures for instruction to enhance learning and improve performance.

Keywords: Comparative Effectiveness, Animated Drawings, Instructional Strategies, Creative Arts.

INTRODUCTION

Creative arts is an all-encompassing name used to describe the subject area that includes drama or theater, music, film, drawing, painting, creative writing, graphic design, photography and sculpture, among others (Zimmerman, 2009). Creative arts often defy definition following its varying sections that employ different media as forms of expression. Effort to define creative arts leaves writers simply describing the various constituents obtained in the discipline and ending up with claims that it is a skill employed to produce an aesthetic result (Elliot, 2004). Despite strong evidence for the support of creative arts in the Nigerian curriculum particularly in preparing students to participate effectively as global citizens, not much has been done for its advancement and skill acquisition that could enhance student performance (Ewing, 2010). Student performance in Creative arts over the years indicated much room for improvement. Evidence exists that Creative arts has not been adequately taught in upper basic schools (Enanejor, 2005). Computer-based instructions such as animated drawings are transforming instruction and students’ performance, hence might be a solution to the problem. This study filled a gap in the literature by comparing the effectiveness of computer-based animated drawings and two selected instructional strategies on upper basic students’ performance in Creative Arts in Nigeria. The purpose of this study was to find out the comparative effectiveness of computer-based animated drawings and selected instructional strategies on upper basic...
students’ performance in Creative arts. The outcome of this study would benefit stakeholders such as curriculum designers, developers, students and teachers in adapting the modality in Creative arts lessons for upper basic school students to improve performance.

**Research Questions**

This research sought answers to the following questions:

1. What is the comparative effectiveness of upper basic students’ performance in Creative arts on computer-based animated drawing, demonstration and group participation instructional strategies?
2. Is there any difference in upper basic students’ performance in Creative arts in public and private schools when they are using computer-based animated drawing instructional strategy?
3. Does gender influence upper basic students’ performance in Creative arts when taught using computer-based animated drawing instructional strategy?
4. Is there any difference between upper basic students’ performance in Creative arts in public and private schools when taught using demonstration instructional strategy?
5. What is the difference between the performance of male and female Creative arts when they are taught using demonstration instructional strategy?
6. Do upper basic students’ performances in Creative arts differ between public and private schools when taught using group participation instructional strategy?
7. Is there any difference between the performance of male and female upper basic students in Creative arts when taught using group participation instructional strategy?

**Research Hypotheses**

The following hypotheses were tested:

**H01:** There is no significant difference in the performance of upper basic students taught Creative Arts using computer-based animated drawing, demonstration, and group participation instructional strategies.

**H02:** Significant difference will not occur between the performance of upper basic students taught Creative arts using computer-based animated drawing instructional strategy in public and private schools.

**H03:** No significant difference will be obtained between the performance in Creative arts of male and female upper basic students when they are taught using computer-based animated drawing instructional strategy.

**H04:** There is no significant difference between the performance of upper basic students in Creative arts in public and private schools when they are taught using demonstration instructional strategy.

**H05:** There is no significant difference noticeable in male and female upper basic students’ performance in Creative arts when they are taught using demonstration instructional strategy.

**H06:** No significant difference will occur between public and private upper basic students’ performance in Creative arts when they are taught using group participation instructional strategy.

**H07:** Significant difference will not result between male and female upper basic students’ performance in Creative arts when taught using group participation instructional strategy.

**METHODOLOGY**

This research adopted the design and development type. The between groups repeated measures design compared scores of participants on pretest and post-test to check differences due to treatment. The learning contents of the computer-based animated instruction package were limited to upper basic 8 (JSS II) Creative arts topics: drawing and painting. The two experimental contents (i) drawing (ii) painting were derived from the topics. The contents require learners’ engagement in practical tasks of drawing and making
color application on paintings and designs and have been selected for this study because drawing and painting have been identified as the nucleus of Creative arts engagement in the curriculum (Arthur & Kallen, 2010; Nilson, 2011) and because of students' poor performance in Creative arts in upper basic examinations. Three each of upper basic 8 public and private schools offering Creative arts were engaged for this study, all restricted to the geographical scope of Kabba town, in Kogi State, Nigeria. A total of 674 respondents were involved, consisting of 387 public and 287 private, school upper basic students (314 males and 360 females). Intact upper basic 8 classes were involved, with six class teachers assisting as instructors in the respective classes. The reliability of the instrument used in this study was achieved using test-retest method in an interval of 2 weeks whereby the instruments were administered to 30 Creative arts students in Upper basic class and Pearson product-moment correlation coefficient yielded a reliability value of 0.94 in the pilot study. The data obtained were analyzed using descriptive statistics (mean and standard deviation) to answer the seven research questions with their corresponding research hypothesis. Research hypothesis 1 was tested using ANOVA, while research hypotheses 2 to 7 were tested using t-test each. These analyses were carried out using SPSS Version 19.

REVIEW OF RELATED LITERATURE

The effectiveness of computer-based animation in education has been pointed out by several authors such as Lih-Juan (2002) and Schnottz and Rasch (2005). By creating a mixture of different learning opportunities, teachers can help students to encounter new information, develop skills, try out ideas, build knowledge and improve on their performance. This is the reason for trying out a variety of instructional strategies especially as they relate to new development in order to give the students added opportunity in employing new discoveries to learn and increase performance (Douglas, 2011). Many instructional strategies provide small windows of opportunity to teach students effectively. Some of the commonest instructional strategies often employed by seasoned art teachers, as indicated by Instructional Strategies Online, by Saskatoon Public Schools (2009), include demonstration and group participation, among others.

The Nigerian National curriculum for upper basic school Creative arts indicates that the purpose was to provide opportunity for students to develop a language for expressing ideas, feelings, emotions and moods through a variety of art experiences (Nigerian Education Research & Development Council, 2007). According to Kafir (2007) the past fifty years has witnessed a gap in the educational achievement of males and females, but which gender has been disadvantaged has fluctuated over the years. In the 1970s and 1980s Nigeria had girls well behind boys in academic performance test scores in science and mathematics, but in the last twenty years the general trend shows girls outperforming boys in academic achievement in terms of class grades across all subjects and college graduation rates, but boys scoring higher on standardized tests.

Animation is a compelling and attractive graphic device, effective in expressing processes, appropriate for explaining concepts and complex systems (Betrancourt & Tversky, 2000). Many studies conducted on animated instructions have indicated varying outcomes. Some research findings on animated instructional strategies indicated positive performance among participants when animation was employed over various formal instructional strategies (Tversky, Morrison, & Bétrancourt, 2002). The observation agrees with several other literature discourse stating empirical observations that animation instructional strategy has potential to increase learning capacity in several fields. Other studies, however, indicated negative outcomes after employing animation instructional strategies, as compared with student performance after employing static graphics. It was observed that animated instructional strategies appeared to have distracted the participants’ attention. Where voice accompanied the animation presentations, the participants seemed unable to coordinate the two, and consequently performed poorer (Schnotz & Rasch, 2005). Novices found it difficult and confusing, especially when animation is accompanied with voice direction of activities (ChanLin, 2001).

Elvis (2013) conducted a study to investigate the differential effectiveness of teaching strategies on students’ academic performance in South Africa, with a sample of 109 students. Employing three instructional strategies namely, teacher-student interactive strategy, student-centered strategy and teacher-centered approach, and using analysis of variance (ANOVA) on the data, the study revealed that all three strategies improved performance. The teacher-student interactive strategy was the most effective, followed
by the student-centered strategy, and lastly the teacher-centered approach. It is evident that instructional strategies improve students’ performance, but with varying effectiveness. According to Marzano (2001) instructional strategies have potential to improve student performance when used appropriately.

The fact that no significant difference is noticed on gender is supported by Onasanya Daramola, and Asuquo (2006) whose assertion was based on the effectiveness of computer-assisted instruction packages employed in getting performance data of Secondary School Students in Introductory Technology in Ilorin, Kwara State, Nigeria. In Introductory Physics, Kost, Pollock, and Finkelstein (2009) also discovered that male and female had identical scores in the pre-test and also in the post-test. Hence gender did not indicate any significant difference in terms of performance. Fajola (2000) found that male students taught using computer-assisted instruction performed better than their female counterparts, but Olson (2002) found that female students performed better than male students. Wang, Liu, and Lin (2009), and Ding and Harskamp (2006) found that male students significantly performed better than their female counterparts. According to Peterson and Laudet (2006), when student self-reports are taken into consideration private schools had higher effects than their public counterparts. Goldhaber (1996) examined 3000 students’ data in both mathematics and reading. After controlling for the fact that private school students come from affluent backgrounds, he found no achievement advantage in private schools; rather the public and private school students ran at par in performance in the two subjects. Taking into account what the National Association of Independent Schools (2006) called “longitudinal data” that addressed issues of self-report, achievement in high school, civic-mindedness, job satisfaction and educational attainment, the study found that the average private school student outperformed public school students on all of these measures.

The animated drawing was created with the following graphics design software: Adobe Photoshop CS6 and Adobe After effects CS 6. The software is included in the Adobe Creative Suite 6, a collection of design tools created by Adobe Systems, a software company based in the United States of America. Adobe Photoshop is a photo editing and manipulating tool used for adding effects to static images. Some of the animated video elements were edited using Adobe Photoshop. For instance the images of the students that slide in at the end of each lesson were resized and retouched with Adobe Photoshop. It was also used for animating all the transitions seen in the animated video; transparency transitions, the moving pencil, the simulation of drawing, blending in and out of scenes in the animated video were all created with Adobe After-effects CS6. Since the software is a subset of the Adobe Creative Suite 6, they can interoperable with one another thereby facilitating the production process. Files used in Adobe Photoshop can easily be exported using some predefined file formats and then imported into Adobe After-effects without any loss of information in the file. Students can also rely on other resources for instruction on animation. For example, Wikihow shows step by step on how to draw a cube as an animated drawing (How to draw a cube, n.d.), which could be relevant on learning toward this end.

Olumorin (2000) stated that the approach and strategies used in carrying out practical art work could be vital in either teaching or acquiring the appropriate desired knowledge or skill to affect students’ performance. The demonstration instructional strategy involves demonstrating by personal example how and what the students are expected to execute in creative art class. It is particularly suitable for studies such as painting and designing.

Heather (2012) claims that the demonstration instructional strategy shows learners how to do a task using sequential instructions aimed at having learners perform the task independently. In the demonstration instructional strategy, the teacher, or some other expert on the topic being taught, is expected to perform the task so that learners will eventually be able to complete the same task independently. The eventual goal is for learners to not only duplicate the task, but to recognize how to problem-solve when unexpected obstacles or problems arise. After performing the demonstration, the teacher’s role becomes supporting students in their attempts, providing guidance and feedback, and suggesting alternative approaches.

Harris (2003) refers to Group participation instructional strategy as cooperative learning in which the students are put in small groups to work together. The advantage is that students can work together and learn from one another. Students are often more capable of being in confusion than most instructors often realize, but when they work in groups such tendencies are minimized.

Animation technology has been widely proposed as a major technological advancement that has
potential to support education in all disciplines, especially with its success in television cartoons, advertisements and associated programs. The type of activities supported by this technology promote current educational thinking that students are better able to master, retain and generalize new knowledge when they are actively involved in constructing that knowledge in a hands-on learning environment (Hancock & Dunham, 2005).

The following Figure 1 illustrates how, in this study, drawing and painting will be taught by animated drawings instructional strategy, demonstration instructional strategy and group participation instructional strategy and how the use of these strategies will be studied according to gender and school type.

![Figure 1](image)

Figure 1. The modality of specification employed in the study.

**Hypotheses Testing**

To test the hypothesis, ANOVA was used for hypothesis one while $t$-test was employed to test for hypothesis two to seven.

$H_{01}$: There is no significant difference in the performance of upper basic students taught Creative Arts using computer-based animated drawing, demonstration, and group participation instructional strategies.
Table 2  Mean Scores of Upper Basic Students’ Performance by Strategy

<table>
<thead>
<tr>
<th>Instructional Strategy</th>
<th>Number</th>
<th>Mean Deviation</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animated Drawings</td>
<td>212</td>
<td>78.42</td>
<td>7.30</td>
</tr>
<tr>
<td>Demonstration</td>
<td>198</td>
<td>73.45</td>
<td>7.17</td>
</tr>
<tr>
<td>Group Participation</td>
<td>264</td>
<td>61.44</td>
<td>10.26</td>
</tr>
</tbody>
</table>

Note. Number of participants, mean scores and standard deviation between computer-based animated drawings, demonstration and group participation instructional strategies

Table 3  ANOVA Test of Comparative Effectiveness of Strategies

<table>
<thead>
<tr>
<th>Sources of Variance</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test Between Groups</td>
<td>4.426</td>
<td>2</td>
<td>4.416</td>
<td>.777</td>
<td>.378</td>
</tr>
<tr>
<td>Within Groups</td>
<td>3819.424</td>
<td>671</td>
<td>5.684</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3823.840</td>
<td>674</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-test Between Groups</td>
<td>2889.139</td>
<td>2</td>
<td>2889.132</td>
<td>23.473</td>
<td>.000*</td>
</tr>
<tr>
<td>Within Groups</td>
<td>162.915</td>
<td>671</td>
<td>123.084</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>85601.810</td>
<td>674</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Students’ performance between computer-based animated drawing, demonstration and group participation instructional strategies employed.

Table 2 shows that there was a significant comparative effectiveness of upper basic students’ performance in creative art between computer-based animated drawing, demonstration and group participation instructional strategies. The analysis in Table 3 reveals $F (2, 671) = 0.777, p > 0.05$ for upper basic students’ performance in pre-test scores. The result shows that comparative effectiveness of upper basic students’ performance in creative arts between computer-based animated drawing, demonstration and group participation instructional strategies were significant. The post-test scores revealed the comparative effectiveness of the strategies on upper basic students’ performance in creative arts $F (2, 671) = 23.473, p < 0.05$. The mean scores in Table 3 confirmed the comparative effectiveness with computer-based animated drawing being the most effective with the highest mean score of 78.42, the demonstration instructional strategy being more effective with higher mean score of 73.45, while group participation showed the least effectiveness with a mean score of 61.44 for the performance of upper basic students in creative arts. The null hypothesis was thus rejected.

$H_{02}$: Significant difference will not occur between the performance of upper basic students taught Creative arts using computer-based animated drawing instructional strategy in public and private schools.
Table 4 Mean Scores and t-Test of UBS Performance by School Type with Computer-Based Animated Drawings

<table>
<thead>
<tr>
<th>School</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>Sig (2tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>152</td>
<td>77.59</td>
<td>7.61</td>
<td>125.766</td>
<td>151</td>
<td>.000</td>
</tr>
<tr>
<td>Private</td>
<td>60</td>
<td>80.53</td>
<td>6.02</td>
<td>103.653</td>
<td>59</td>
<td>.000</td>
</tr>
</tbody>
</table>

Note. Performance between public and private schools students with CBAD employed.

Table 4 shows that there was a significant comparative effectiveness of computer-based animated drawing on upper basic students’ performance in creative art between public and private schools. Computer-based animated drawing was effective in both school types with public school, \( t(151) = 125.766, p < .05 \) and private school \( t(59) = 103.653, p < .05 \) respectively. However computer-based animated drawing was more effective in the private school for the performance of upper basic students in creative art with a mean score of 80.53 than the public school with a mean score of 77.59. The null hypothesis was therefore rejected.

Ho3: No significant difference will be obtained between the performance in Creative arts of male and female upper basic students when they are taught using computer-based animated drawing instructional strategy.

Table 5  Mean Scores and t-Test of UBS Performance by Gender with CBAD

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>Sig (2tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>152</td>
<td>79.87</td>
<td>7.41</td>
<td>110.220</td>
<td>156</td>
<td>.000</td>
</tr>
<tr>
<td>Female</td>
<td>60</td>
<td>73.56</td>
<td>6.74</td>
<td>80.970</td>
<td>54</td>
<td>.000</td>
</tr>
</tbody>
</table>

Note. Performance between male and female students with Computer Based Animated Drawing.

Table 5 indicates that there was a significant comparative effectiveness of computer-based animated drawing on upper basic students’ performance in creative arts between male \( [t(156) = 110.220, p < .05] \) and female \( [t(54) = 80.970, p < .05] \). Although computer-based animated drawing was effective for the performance of upper basic students in creative arts, it was more effective for the male upper basic students’ performance in creative arts with a higher mean score of 79.87 than for female upper basic students’ performance in creative arts with a lower mean score of 73.56. Hence the null hypothesis was rejected.

Ho4: There will not be occurrence of significant difference between the performance of upper basic students in Creative arts in public and private schools when they are taught using demonstration instructional strategy.
Table 6 Mean scores and t-test of UBS performance by school type with Demonstration Instructional Strategy

<table>
<thead>
<tr>
<th>School</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>Sig (2tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>153</td>
<td>73.63</td>
<td>7.08</td>
<td>128.625</td>
<td>152</td>
<td>.000</td>
</tr>
<tr>
<td>Private</td>
<td>45</td>
<td>72.82</td>
<td>7.32</td>
<td>66.779</td>
<td>44</td>
<td>.000</td>
</tr>
</tbody>
</table>

Note. Performance between public and private schools students with DIS employed.

Table 6 reveals that demonstration instructional strategy was significantly effective for upper basic students’ performance in creative arts in both public and private schools with public school $t(152)=128.625, p<.05$ and private $t(44)=66.779, p<.05$ respectively. However the mean scores show that demonstration instructional strategy did not impact any comparative significant difference on its effectiveness for the performance of upper basic students in creative arts between public school with a mean score of 73.63 and private school with a mean score of 72.82. The null hypothesis was therefore accepted.

$\textbf{H}_{05}$: There is no significant difference noticeable in male and female upper basic students’ performance in Creative arts when they are taught using demonstration instructional strategy.

Table 7 Mean Score and t-Test of UBS Performance by Gender with Demonstration Instructional Strategy

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>Sig (2tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>106</td>
<td>73.72</td>
<td>6.92</td>
<td>100.661</td>
<td>105</td>
<td>.000</td>
</tr>
<tr>
<td>Female</td>
<td>92</td>
<td>73.14</td>
<td>7.38</td>
<td>95.090</td>
<td>91</td>
<td>.000</td>
</tr>
</tbody>
</table>

Note. Performance between male and female students with DIS employed.

Table 7 shows that demonstration instructional strategy was also significantly effective for the performance of both male and female upper basic students in creative arts with $t(105)=109.661$, and $t(91)=95.091, p<.05$ respectively. However, there was no comparative significant difference on its effectiveness on both male upper basic students with a mean score of 73.72 and female upper basic students, mean score of 73.14. The null hypothesis was also not rejected.

$\textbf{H}_{06}$: No significant difference will occur between public and private upper basic students’ performance in Creative arts when they are taught using group participation instructional strategy.
Table 8 Mean Scores and t-Test of UBS Performance by School Type for Group Participation Strategy

<table>
<thead>
<tr>
<th>School</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>Sig (2tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>82</td>
<td>58.42</td>
<td>9.60</td>
<td>55.090</td>
<td>81</td>
<td>.000</td>
</tr>
<tr>
<td>Private</td>
<td>182</td>
<td>62.80</td>
<td>10.2</td>
<td>882.406</td>
<td>181</td>
<td>.000</td>
</tr>
</tbody>
</table>

*Note.* Performance between public and private schools students with Group Participation employed.

Table 8 reveals that there was a comparative significant effectiveness of group participation on upper basic students’ performance in creative arts between public and private schools with \( t(81) = 55.090, p < .05 \) and \( t(181) = 82.406, p < .05 \) respectively. The mean score of upper basic students in private school was higher with 62.80 than in public school having a mean score of 58.42. The null hypothesis was thus rejected.

**H0**: Significant difference will not result between male and female upper basic students’ performance in Creative arts when taught using group participation instructional strategy.

Table 9 Mean Score and t-Test of UBS Performance by Gender for Group Participation Strategy

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>t</th>
<th>df</th>
<th>Sig (2tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>80</td>
<td>59.00</td>
<td>9.54</td>
<td>55.323</td>
<td>79</td>
<td>.000</td>
</tr>
<tr>
<td>Female</td>
<td>184</td>
<td>62.50</td>
<td>10.4</td>
<td>181.468</td>
<td>183</td>
<td>.000</td>
</tr>
</tbody>
</table>

*Note.* Performance between male and female students with Group Participation employed.

Table 9 shows that group participation was significantly effective for the performance of upper basic students in creative arts with \( t(79) = 55.323, p < .05 \) and \( t(183) = 81.468, p < .05 \) for both male and female students respectively. The comparative significant effectiveness of group participation on upper basic students’ performance in creative arts shows that the female students performed better with a mean score of 62.50 than their male counterparts with a mean score of 59.00. The hypothesis of no comparative significant effectiveness was therefore rejected.

**DISCUSSION**

From the findings in this study, the mean scores difference showed that computer-based animated drawing was most effective; demonstration instructional strategy was more effective and group participation was least effective on the performance of upper basic students in creative arts. The finding is in line with the result of Elvis (2013) showing that all engaged instructional strategies enhancing students’ performance, which was from research on 109 students in South Africa, using three instructional strategies (teacher-centered, student-centered and teacher-student interactive), and using analysis of variance (ANOVA) for data analysis. The finding also agrees with the assertion of Marzano (2001) that instructional strategies used appropriately have potential to improve student achievement across all content areas and all grade levels. The finding is not supported by that of ChanLin (2001) whose assertion was that learners who are not acquainted with animated drawings, especially when it is accompanied with voice direction, find it difficult
to interpret and by consequence may not contribute to improved performance.

The mean scores and t-test of upper basic school performance by school type showed that computer-based animated drawing was more effective in private school with the upper basic students having a higher mean score in creative art than the public school students. The finding on the effectiveness of computer-based animated drawing in public and private upper basic schools is in line with the recommendation of Snhnotz and Rasch (2005) that animation is excellent for a learning module; and that in particular, identifying manipulated animations and simulated animations is crucial. It is also in line with Tversky et al. (2000) who stated that research shows positive result for animation impact on learner performance. The better performance of the private over public school is in line with the finding of the National Association of Independent Schools (2005) that addressed issues of self-report, achievement in high school, civic-mindedness, job satisfaction and educational attainment and found that the average private school student outperformed the public school student on all of the measures identified. The finding is also supported by Peterson and Laudet (2006) who found that private school students do better in Mathematics. The finding negates that of ChanLin (2001) who believes novices find interpreting animated drawings difficult, especially when accompanied with voice direction, and thus may not contribute to improved performance. It also negates the findings of Goldhaber (1996) who examined 3000 students’ data in both mathematics and reading and found no achievement advantage in either public or private schools.

The mean scores and t-test of upper basic students’ performance by gender with computer-based animated drawing indicates that computer-based animated drawing was more effective on the performance of upper basic male students in Creative arts than for upper basic female students. The research hypothesis which stated that there is no significant difference in comparative effectiveness of upper basic students’ performance in Creative arts between male and female in computer-based animated drawing instructional strategy was rejected; in fact a significant comparative effectiveness of computer-based animated drawing on upper basic students’ performance in Creative arts existed between male and female. This finding supported findings by Fajola (2000) who found that male students taught using computer-assisted instruction performed better than their female counterparts. The finding is similarly supported by Ding and Harskamp (2006) who found that male students significantly outperformed female students. However the finding is not in agreement with Olson (2002) who found that female students performed better than male students. Findings of the study are different from those of Onasanya et al. (2006) who identified no significant gender difference in effectiveness of computer-assisted instruction packages in performance of secondary school students in Introductory Technology in Ilorin, Kwara State, Nigeria.

It can be concluded from the study that Computer-based animated drawing is most effective, while demonstration instructional strategy was more effective and group participation less effective. Computer-based animated drawing was more effective for upper basic students in private school for their performance in creative art. Computer-based animated drawing instructional strategy was more effective for male upper basic students than for their female counterparts, while demonstration instructional strategy showed equal effectiveness on upper basic students’ performance in Creative Arts in both public and private schools. Demonstration instructional strategy did not discriminate between male upper basic students’ performance and female upper basic students’ performance in Creative Arts. Group participation instructional strategy was more effective on upper basic students’ performance in Creative Arts in private schools than in public schools. Group participation instructional strategy was more effective on performance of upper basic female students than for upper basic male students.
RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made:

1. The classroom teacher should embrace computer-based animated drawing instructional strategy for creative arts painting classes in upper basic schools.

2. Creative arts authors and curriculum planners should give more places for computer-based animated drawing in explaining procedures, especially in painting, in instructing the students which could give better learning opportunity and improved performance by implication. This was underscored by the fact that images presented students with the ease of learning lacking in the other instructional strategies. There might not be a replacement for good examples, and surely, animated drawing instructional strategy provided one.

3. Animated drawing packages could be developed for teacher and student usage.

4. Creative arts teachers should endeavor to develop students’ competence in using technological applications, such as computer-based animated drawing, that are meant for learning. This will further increase their knowledge of new research and innovations in computer-based instructional strategies.

5. Students could equally endeavor to explore the opportunities offered by computer-based animated drawing packages for improving their individual learning and revision.

6. Government and appropriate school authorities could equally embrace and support the use of computer-based animated drawing strategy in schools as this would improve students’ performance in creative arts.

7. The teachers need to be trained in computer based innovation and be always updated on new developments in instructional technology.

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Connoisseurship Evaluation In Digital Painting Among Art Teachers In Malaysian Secondary School

Azimah A. Samah [1], Zaharah Hussin [2], Abu Talib Putih [3]

ABSTRACT

Connoisseurship evaluation is a form of evaluation and educational inquiry having qualitative characteristics. In this study, these skills are seen among Malaysian art teachers in secondary schools. Quality assessment depends on the evaluator who has the ability of some aspects. Among these are qualitative nuances experiences as well as ability to judge the goodness of the quality artwork. This study aims to look at the quality and evaluation skills of art teachers in Malaysia. The quality of the work will be seen on school students’ digital painting. The evaluation includes composition elements, color, interpretation and creativity of the digital painting. This study employed a quasi-experimental methodology with a single-group design to examine the digital painting among 53 students selected from schools in two districts of Selangor. The paintings were examined by two teachers in art and design education. The group’s production of painting was analyzed using Manova repeated measures to determine the skills of evaluating among the art teachers. There was a similarity in marks given among the teachers in four aspects of productive dimensions: composition, color manipulation, interpretation and creativity. This indicated that teachers were able to evaluate according to their expertise in art and design. This study offered a means to assist teachers with appropriate evaluation strategies in digital painting. In theory, this study will add to the understanding of cognitive systems and human information processing that relate to visual imagery system and skill of evaluation.

Keywords: Connoisseurship Evaluation; Digital Painting; Art Teachers

INTRODUCTION

Connoisseurship evaluation is a form of evaluation and educational inquiry having qualitative characteristics. In this study, these skills are seen among Malaysian art teachers in secondary schools. Quality assessment depends on the evaluator who has the ability of some aspects. Among these are qualitative nuances experiences as well as ability to judge the goodness of the quality artwork. This study aims to look at the quality and evaluation skills of art teachers in Malaysia. The quality of the work will be seen on school students’ digital painting. The evaluation includes composition elements, color, interpretation and creativity of the digital painting. This study employed a quasi-experimental methodology with a single-group design to examine the digital painting among 53 students selected from schools in two districts of Selangor. The paintings were examined by two teachers in art and design education. The group’s production of painting was analyzed using Manova repeated measures to determine the skills of evaluating among the art teachers. There was a similarity in marks given among the teachers in four aspects of productive dimensions: composition, color manipulation, interpretation and creativity. This indicated that teachers were able to evaluate according to their expertise in art and design. This study offered a means to assist teachers with appropriate evaluation strategies in digital painting. In theory, this study will add to the understanding of cognitive systems and human information processing that relate to visual imagery system and skill of evaluation.
evaluation.

Evaluation is defined as a qualitative judgment of specified value. Assessment generally involves measurement form and is usually expressed in quantitative statement. Assessment is useful because it not only provides information but enables one to see the effectiveness of teaching and learning by variable degrees of accuracy (Banks, 2012). Among the questions arising in the assessment of art is to which extent the needs of assessment? How should the aesthetic quality and creativity be measured? Do measurement processes restrict or impede the quality in art judgment (Taylor & Nolen, 2008; Vickerman, 1986).

Rating a painting is part of art and design evaluation that is considered too diverse and tends to be individual. It is a student’s personal activity that does not need to be assessed as assessment in math and science. Subjects such as science and mathematics are governed by a set of rules that provide consistent results. Therefore, assessment of student ability can be objectively implemented. Art and design is not related to the detailed solution of a problem. It is more about looking at diversity issues of the artwork. Therefore the quality assessment in art and design education is not subject to a set of common rules of governance. The main justification for the arts subject’s position in the curriculum is more of opportunity to develop the mindset and skills as well as ability and self-expression (Allison, 1986; Hackett, 2016).

The issue of objectivity in art is the possibility of making an assessment of skills, knowledge, values and attitudes. This output is calculated as important in education. This requires the evaluator to make the specification of performance at various levels of student progress and explain the art assessment criteria. Objectivity is typically used in extracurricular activities that lead to the facts and evidence (Aspin, 1986; Guskey & Lee, 2013).

Connoisseurship Evaluation in Art Education

Connoisseurship evaluation is a form of educational inquiry, which had the characteristics of qualitative evaluation. It refers to one’s expertise in terms of “sense” evaluation in form of art criticism such as literature, theater, film, music and visual arts. Evaluator in the term of connoisseur is a competent appraiser to make a critical assessment based on knowledge (Funk & Wagnalls, 1984). The ability to make refinements in the discrimination between complexity and fine quality are examples of so-called connoisseurship. Connoisseurship is the art of appreciation.

The qualitative mode stand at the end of the assessment formulation. It is from the meaning the student achieved. Artwork is seen entirely qualitatively. This includes performing arts such as symphony, poetry, ballet and visual arts as well. It is subject to the capacity that evokes the perceptive power of one’s intelligence experience that leads to the artwork. Connoisseurship is a manifestation of the experience perception. It serves as a transaction between the quality of the environment and what we bring to the quality. This experience character is influenced by our ability to differentiate between the qualities that are seen (Stufflebeam, 1981).

The ability to make refinements and discrimination between complexity and fine quality are examples of so-called connoisseurship. Connoisseurship is the art of appreciation. Connoisseurship is also a process. How to understand connoisseurs? It is a matter of recognition (Barnett, 1994). This recognition or identification requires perceptive power or the ability to differentiate and experiencing connection. For example the quality of the tongue sensation in enjoying a variety of drinks. It is the interplay of experience in qualitative connection (Eisner, 1998a).

Connoisseurship requires sense of concern, awareness and the quality of appearance. In this study context, the quality of the painting appearance is the most dominant in determining the evaluation (Ebitz, 1988). Among these are compositions, color and textures on the painting. All of these qualities along with other criteria, forms the appearance of a painting which provides potential experience. Experiencing this transaction is a manifestation of the evaluator’s qualitative intelligence. Connoisseurship relies on high level of qualitative intelligence in the domain of operation. In this context it refers to the domain of art appreciation which is one of the criteria of painting evaluation (Eisner, 2003; Maginnis, 1990).

Connoisseurship also depends on the ability to experience and feel the quality of a sample from a larger set of quality. It is not as easy as an aspect of the senses alone. Perception is one of the focus sensing
quality aspects besides the overall of quality available. Evaluators may feel the effect later through different
talented quality artwork and link it with their quality of experience. Students’ artwork even students
themselves, are never the same. The evaluator can determine the grade of each painting and assign it into a
rating class (Stokrocki, 1991). In order to determine it into the correct rating class, it should be within the
scope of perception. This includes considering the difference between the perception details. Therefore
reference memory faculties of perception are needed. It refers to the concept of composition, color, texture
and creativity (Eisner, 2002).

Prior Knowledge Usefulness (antecedent) In Connoisseurship

The evaluation connoisseurship is more than the ability to distinguish subtle and complex quality in
painting. It is not just about differentiating another painting into sensory memory, but also influence the
evaluator’s understanding of the conditions that may trigger such quality. It contributes to the ability to feel
the experience. Each painting itself is a manifestation of the design principles. Knowledge of the design
principles gives the ability to experience the quality of the painting to be evaluated (Stokrocki, 1991).

Prior knowledge factors or antecedent factors are relevant to feel the painting quality. Knowledge of
antecedent factors can provide guidance in finding quality and assessing the painting. Furthermore
connoisseurship allows adjustment in the evaluation process based on guesses (Eisner, 1998b).

Quality assessment depends on the evaluator who has the ability of some aspects. Among these are
qualitative nuances experiences as well as ability to judge the goodness of the artwork quality. At the end of
the process, the qualitative experience is a quality of measurement rather than a formula. Paintings do not
come in standard form. Color values and their nature are varied. The difference in raw materials such as
canvas and color pigments should be taken into account in determining the quality of a painting (Sanders &
Davidson, 2003).

Epistemic Vision.

Connoisseurship process can be understood as an example of epistemic vision. Episteme refers to
knowledge and epistemic vision is a storage form of epistemic knowledge acquired through vision. In this
case, vision refers to quality that requires sensory sensitivity thus assessment and evaluation of works begin
from one’s sight. Hence there must be an awareness of the quality of the artwork before judgment is done.
The evaluator sensitivity on the quality of art and painting design principles would provide knowledge on
the quality of painting itself and also the overall quality of the paintings to be evaluated (Eisner, 1998).

Primary epistemic vision depends on a vision awareness upon certain criteria of an art work. Secondary
epistemic vision refers the criteria as a part from a larger set. Obviously artwork evaluations, especially
painting should be viewed as a whole rather than a separate unit. Connoisseurship is acquiring visual meaning
through complicated, nuanced and subtle aspects in a field of interest (Freedberg, 2006).

Connoisseurship is art appreciation. To appreciate a work of art means one must feel the quality that
formed the artwork and understand its contents. It includes judging the value contained in it. Connoisseurship as
an appreciation not only requires a positive aspect alone. What is desired is a complex experience, smooth and informative. The evaluator can assist individuals to scrutinize something that cannot be detected by the individual. In this process, it increases the level of connoisseurship. Connoisseurship mode is considering the quality of value. It is clear judgment on the quality of painting and depends on the experience of the evaluators. In addition the appropriate application and criteria from the essence of the design principle itself is also important (Freedberg, 2006; Sanders & Davidson, 2003).

Expressive Evaluation Criteria

The assessment should be done expressively similar to the art work as well. Student artwork should
be viewed in terms of communicating meaning. What is the message behind the art production? Does self-
expression significantly visualize? This refers to their understanding of the main theme. Students’ self
communication should consider on mood, feeling or whatever they want to express. In approaching art, the
composition or arrangement should display confidence and freedom. This can be detected through the
efficiency and certainty in dealing with the main subject and the medium. The lines must be clear and
decisive, accurate according to size, smooth, flowing and seamless. However, it must be composed with
feeling that showed the artists know what they are doing. Compositions lacking in confidence and competence portray an imitation, mimicry and stereotype (Michael, 1980; Stufflebeam, 1981).

In addition, the evaluator should also examine the aesthetic sensitivity and harmony composite organization. This requires a deep knowledge of art. Basic aspects of aesthetic consideration is the perfect arrangement, unity and consistency. The structure includes not only the look and shape but also the color, texture and other elements in the arrangement. Students will prepare and it is composed in a different way and there is not one artwork done in the same way (Parsons, 1996; Sinclair, 2015).

Something that should not be ignored is the element of creativity, uniqueness and authenticity of the artwork being assessed. Various colors irregularities, shape, configuration, composition and genuineness of the study subjects and media applications are indicators to the authenticity and personal statement. Expertise and experience of evaluators is essential in identifying these elements. The evaluator should also be proficient in detecting students’ skills in using the art medium and appropriate processes in order to disclose self-expression in their artwork (Dorn, Deja, & Sabol, 2004).

In addition, the involvement of students in enjoying their experience should be taken into account. It means the students’ attitudes toward their artwork. Normally their deep involvement can be traced on the sincerity of expression and excellent technique implemented in such works. Individuals who enjoy art work tend to portray the subject of their art work and media with Gestalt theory. There is a remarkable achievement for a given time and the effortness to complete the work (Hergenhahn & Olson, 2005; Wachowiak & Clements, 2001).

All of these discussed attributes prove the cognitive skills, affective and psychomotor with tendency to be developed through a creative art process. Hence the evaluators should have a high level of ability to see those elements in the student’s artwork. Evaluators should be able to identify important aspects such as communication, expression, self-confidence, perceptual sensitivity, consistent aesthetic arrangement, creativity, painting skills, enjoyment and satisfaction in students’ work. This experience was the highest point of the basic human development capacity of thoughts, feelings and observations. Aesthetic experience is the integration and a value-added during artwork production (Michael, 1980; Nimkulrat, Niederrer, & Evan, 2015).

Artwork observation and assessment based on Artistic Value and Aesthetic Emotions

Art is different compared to science in terms of methods, experience and observation from a psychological standpoint. It refers to a way of thinking and perception. Based on the theory of artistic, artwork can be considered as a phenomenon or idea to be observed just like other images and create new meaning concept. It is not visible to the naked eye to be interpreted. Artwork in the form of an image can be regarded as an allegory that uses the symbol in delivering a deep understanding. Overall psychological effect of a work of art is indirect (Vygotsky, 1971).

Art requires intellectual touch. Artwork is either invention or evaluating, it is often accompanied with deep emotion even though it is a marginal phenomenon and not part of the art process. Understanding of these observations allow some ideas to be understood. In addition, the pleasure of feeling and soul from the observation is an artistic pleasure. Visual artwork particularly painting comes from the mind training and feelings. There is no other way to deliver the external meaning in order to explore this element because it can only be obtained when an individual includes the whole feelings together. A painter is able to produce perfect lines sparked by the strength of feeling.

If the characteristics of artwork are based on form, so emotion too is a form required in artistic expression. This emotion process is governed by formula from image to the idea, and from idea to emotion. During the image observation, emotion process develop from an emotion form to the next sequel. A good artwork can encourage us to appreciate it and transform it to a better life emotion. Thus the art appraiser must have a sensitivity quality of aesthetic emotion and artistic expression (Bell, 1988; Howard, 1977).

Creativity Evaluation In Painting

Creativity is a natural instinct and human desire. Creativity is the ability to create new ideas and symbolism and update existing symbolism. Creativity refers to the ability to make a restructuring of existing
organizations by consolidating previous ideas to new ideas. Obviously creativity is the ability to create new ideas with improvements and improvisations (Csikszentmihalyi, 1996).

According to Khatena (1999), quoting from Albert Einstein, imagination is most useful in the formation of knowledge and creativity. Imagination is the breath of life to acquire knowledge, to give form and shape. Imagination shapes the life energy derived from the cosmos to the vision, action and expression of creativity. Normal level of creativity happens when imagination leans to the mental and emotional operation. The information processing depends on individual creative action.

Arts education fosters creativity by promoting higher order thinking process, such as a creative imagination. This thinking process encourage creative imagination. Student creatively come out with different elements and material with stylish bold attempt. It is a satisfaction to explore ambiguity and also the ability to recognize a variety of perspectives. In this context evaluators need to acquire the desire that intends to transform ideas, images and feelings in the form of art (Wachowiak & Clements, 2001).

Creativity Nurturing Approach and Expression in Painting Production

In this phase of creative expression development, students focus on creative problem solving and participate in the process of producing original artwork. They develop a natural ability to learn visual art elements such as line, shape, color and begin to organize these elements according to design principles such as balance, contrast and emphasis. Students gain confidence in interpreting the concept and idea when they apply the skills, techniques and methods as an individual expression through a variety of art forms. Hence they develop the flexibility and sensitivity when they understand self-expression as well as the work of others. The role of the evaluator is to detect insights and have art communications digested in their works through the reflection of the theme, mood and feelings (Gee, 2000).

Artworks produced by students are objects that have meaning, display the reflection of artistic and aesthetic value of sensory perception and appreciation. They involve elements of motivation and interaction between students and their environment (Dorn, Deja, & Sabol, 2004).

Creative Expression of Painting

Artists expressions are rather complex because they portray individual situations from different projected view angle, the interpretation and unique personal feelings, thoughts and perceptions about something. In art, this projection is displayed in a visual form. This will be a creative expression as each individual is unique and different. Individual hand work results are different and each has its own uniqueness. Aesthetic value presented here is sensitivity to color, shape, line, texture, movement and value.

This element is neatly arranged and composed together. It evokes the feeling of presence, self-perfection and consolidation of the artist in the work. Art principles such as balance, rhythm, contrast, diversity and consistency bring to the level of perfect order or higher order. At this perfect level, humans are more sensitive and use the natural functions of thinking, feeling and perception to express themselves aesthetically. At this stage there is a quality absorbed in the experience of art (Michael, 1980; Schonau, 1996).

The Relation of Artistic Expression and Artwork Authenticity

This artistic expression enable the evaluator to feel the artists’ sensation through their work. They can understand the connection between taste and common interest and the presence of feeling in their artwork. Artwork production, especially painting is becoming more individualistic and imaginative. Evaluators need to be more sensitive to personal choice based on the acquisition of skills and expertise through the various approaches. This aspect highlights the originality or the genuine work.

In this study, it refers to the artistic value in compositions, colors and textures. This is the beginning of the art appreciation in historical and cultural context for the art creation besides increasing public awareness. However, humans may have different merits assessment of this art form. In the theory of expression, an original work of art is an artifact that expresses experiences beside evoking and maintaining the aesthetic experience (Gardner, 1973; Khatena, 1999; Michael, 1980; Osborne, 1988).

Mental Processes and Creativity

Creativity is also based on the use of metaphor and analogy and the ability of individuals in processing
the visual experience and creating a transformation through art (Nasir Hassan Ibrahim & Iberahim Hassan, 2003). This success stems from the perception interpreting skills. In this context, the observations provide visual experience. Individuals understand visual information in various ways. Perception and kinesthetic push, psychological character, is important in the visual process and these determine how we receive and interpret visual messages. This visual literacy development helps visual intelligence to develop creativity. This is because the visual representation of the environment can be replicated and modified in the artwork (Dondis, 1975).

Perception Role and Memory in Visual Imagery

Observation, perception and memory are clearly related since they share common elements. It should be seen together with other topics to get a clear understanding. The fact is that observation is a result of various variables input. A perception study is an attitude more towards behavior study. In the study of perception, the stimulus focus aspect implicitly produce and evoke individual sensory response. Theorists said that stimuli experienced coding, analysis, conversion, storage and reinstatement. This implies an information processing (Dick, 1971). So when an evaluator is given a pictorial stimulus for assessment through painting production, there will be valid observation and by their perception, the information is processed into visual imagery. Visual imagery as a mental process operates based on Gestalt psychology. This process in turn leads to a movement direction of the brain psychomotor translated into evaluating the digital painting.

OBJECTIVES

This study aims at investigating the quality and evaluation skills of art teachers in Malaysia on digital paintings produced by Form Four students in secondary school. The quality of the work will be seen in school students’ digital painting. The evaluation includes composition elements, color, interpretation and creativity of the digital painting. The research objectives are:

1. To examine the art teachers’ visual imagery in evaluating digital paintings that cover aspects of composition, color, interpretation and creativity.
2. To examine the art teachers’ consistency in judging digital painting.

Connoisseurship evaluation is a form of evaluation and educational inquiry, which have qualitative characteristics. In this study, these skills are seen among Malaysian art teachers in secondary schools. Quality assessment depends on the evaluator who has the ability of some aspects. Among these are qualitative nuances experiences as well as ability to judge the goodness of the quality artwork.

Method and methodology procedure

This study employed a quasi-experimental single-group design to examine the digital painting among 53 students selected from schools in two districts of Selangor. All respondents were given a treatment of using digital media in their production of paintings. The paintings were examined by two teachers. The group’s production of painting was analyzed using Manova repeated measurement.

Studies were conducted on two evaluators who are secondary school art teachers. Both of them evaluated the work of digital paintings of 53 Form Four students. Each student produced two digital paintings. This means that the evaluators will assess a total of 106 paintings. Judgements focus on four aspects of composition, color, interpretation and creativity. Data on the four aspects were collected from two works of digital paintings produced by each student. In this study, the independent variable is the evaluator. The dependent variables were student achievement through four aspects, that is composition, color, interpretation and creativity and measured using interval scale. This study aims at analyzing the difference of the scores given by the two evaluators or the art teacher. Data were collected from painting 1 or pre-test and painting 2 or post test. The statistical test used was one-way Manova test.

This study collected data from student involvement in the experimental group. The design carried out was the treatment group from intact group to study the effect of dependent variables (Stanley & Campbell, 1966). The study was conducted using a sample of all students in a class. The paintings were made before
Results and Analysis

Objective 1

To examine the art teachers’ visual imagery in the evaluation of digital paintings that cover aspects of composition, color, interpretation and creativity.

Table 1 Evaluator Mean in Painting 1 / Pre Test

<table>
<thead>
<tr>
<th>Painting 1/ Pre test</th>
<th>Evaluator</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>1</td>
<td>8.4528</td>
<td>2.21504</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>7.9434</td>
<td>1.81251</td>
</tr>
<tr>
<td>Color</td>
<td>1</td>
<td>8.6038</td>
<td>2.07864</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>7.8113</td>
<td>1.96172</td>
</tr>
<tr>
<td>Interpretation</td>
<td>1</td>
<td>5.2075</td>
<td>1.06263</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>4.8302</td>
<td>1.01405</td>
</tr>
<tr>
<td>Creativity</td>
<td>1</td>
<td>5.0377</td>
<td>.87623</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>4.6604</td>
<td>1.01798</td>
</tr>
</tbody>
</table>

Referring to the mean value of each independent variable between the scores given by both evaluators, the evaluation showed that the mean area is close. The difference is quite small (mean score: evaluator 1 = 8.45, evaluator 2 = 7.94). Similarly, in color, the mean difference between the two evaluators was not significant (mean score: evaluator 1 = 8.60, evaluator 2 = 7.81). There is very little difference in terms of interpretation (mean score: evaluator 1 = 5.20, evaluator 2 = 4.83). The fourth aspect of creativity also recorded a marginal difference (mean score: evaluator 1 = 5.04, evaluator 2 = 4.66).

Table 2 Manova Pre test / Painting 1 Multivariate Tests

<table>
<thead>
<tr>
<th>Effect</th>
<th>Value</th>
<th>F</th>
<th>Hypothesis df</th>
<th>Error df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluator</td>
<td>Pillai’s Trace</td>
<td>.080</td>
<td>2.183&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.000</td>
<td>101.000</td>
</tr>
<tr>
<td></td>
<td>Wilks’ Lambda</td>
<td>.920</td>
<td>2.183&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.000</td>
<td>101.000</td>
</tr>
<tr>
<td></td>
<td>Hotelling’s Trace</td>
<td>.086</td>
<td>2.183&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.000</td>
<td>101.000</td>
</tr>
<tr>
<td></td>
<td>Roy’s Largest Root</td>
<td>.086</td>
<td>2.183&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.000</td>
<td>101.000</td>
</tr>
</tbody>
</table>

Overall, the results of Pillai’s Trace Multivariate tests showed that there is no significant main effect of independent variables for the evaluator category \( F(4, 101) = 2.18, p > .05 \) on the four dependent variables. Based on the results of this analysis, clearly proven there is no score difference was given by the two art teachers.
Table 3 The results of Manova Painting 2 / post test

<table>
<thead>
<tr>
<th>Painting 2/ Post test</th>
<th>Evaluator</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>1</td>
<td>9.7358</td>
<td>2.07690</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>9.2830</td>
<td>1.98434</td>
</tr>
<tr>
<td>Color</td>
<td>1</td>
<td>9.9811</td>
<td>2.17052</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>9.4906</td>
<td>2.17169</td>
</tr>
<tr>
<td>Interpretation</td>
<td>1</td>
<td>5.8868</td>
<td>1.48920</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>5.7547</td>
<td>1.41293</td>
</tr>
<tr>
<td>Creativity</td>
<td>1</td>
<td>5.5283</td>
<td>1.43586</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>5.6226</td>
<td>1.28940</td>
</tr>
</tbody>
</table>

Table 3 shows a relatively small difference in mean value for the composition skill aspect (mean score: evaluator 1 = 9.74, evaluator 2 = 9.28). Similarly, in color, the mean difference between the two evaluators was not significant (mean score: evaluator 1 = 9.98, evaluator2 = 9.49). There is very little difference in terms of interpretation (mean score: evaluator 1 = 5.89, evaluator 2 = 5.76). The fourth aspect of creativity also recorded a marginal difference (mean score: evaluator 1 = 5.53, evaluator 2 = 5.62).

Table 4 The Results of Manova Painting 2 / post test - Tests of Between-Subjects Effects

<table>
<thead>
<tr>
<th>Source</th>
<th>Dependent Variable</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Composition</td>
<td>5.434</td>
<td>1</td>
<td>5.434</td>
<td>1.317</td>
<td>.254</td>
</tr>
<tr>
<td></td>
<td>Color</td>
<td>6.377</td>
<td>1</td>
<td>6.377</td>
<td>1.353</td>
<td>.247</td>
</tr>
<tr>
<td></td>
<td>Interpretation</td>
<td>.462</td>
<td>1</td>
<td>.462</td>
<td>.219</td>
<td>.640</td>
</tr>
<tr>
<td></td>
<td>Creativity</td>
<td>.236</td>
<td>1</td>
<td>.236</td>
<td>.127</td>
<td>.723</td>
</tr>
<tr>
<td></td>
<td>Composition</td>
<td>429.057</td>
<td>104</td>
<td>4.126</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Color</td>
<td>490.226</td>
<td>104</td>
<td>4.714</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interpretation</td>
<td>219.132</td>
<td>104</td>
<td>2.107</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Creativity</td>
<td>193.660</td>
<td>104</td>
<td>1.862</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Composition</td>
<td>10020.000</td>
<td>106</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Color</td>
<td>10544.000</td>
<td>106</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interpretation</td>
<td>3811.000</td>
<td>106</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Creativity</td>
<td>3489.000</td>
<td>106</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Composition</td>
<td>434.491</td>
<td>105</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Color</td>
<td>496.604</td>
<td>105</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interpretation</td>
<td>219.594</td>
<td>105</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Creativity</td>
<td>193.896</td>
<td>105</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. R Squared = .013 (Adjusted R Squared = .003)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. R Squared = .013 (Adjusted R Squared = .003)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. R Squared = .002 (Adjusted R Squared = .007)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. R Squared = .001 (Adjusted R Squared = .008)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of the analysis in Test of Between-Subject Effects in Table 4 showed there is no effect of evaluators category on the dependent variable in the study of the composition assessment color, interpretation and creativity. Results of the analysis prove there is no significant effect of the evaluator category on the composition $[F(1, 104) = 1.32, p > .05]$ and color $[F(1, 104) = 1.35, p > .05]$. Similarly, there were no significant effects for the interpretation assessment $[F(1, 104) = .219, p > .05]$ and evaluation of creativity $[F(1, 104) = .127, p > .05]$ among evaluators in this study. The results showed there was no significant effect of evaluator category of all dependent variables of the four assessment aspects in this second digital painting.
Objective 2
To examine the art teachers’ consistency in judging digital painting.

**Figure 1.** Mean difference graph lines for Painting 1 / Pre-Test.

Lines in Figure 1 show the differences of the mean values are quite small between the two evaluators for the four aspects of composition, color, interpretation and creativity. For composition and color, at one point the line is crossed. It shows the similarity in values given by the two evaluators in terms of composition and color in digital painting. There is a somewhat flat line graph for interpretation and creativity aspect. Parallel line graph shows consistency in giving scores between the two evaluators.

**Figure 2.** Line graph for mean difference in Painting 2 / Post-Test.

Lines in Figure 2 show the differences of the mean values are quite small between the two evaluators for the four aspects of composition, color, interpretation and creativity. For composition and color, the lines
are parallel. It shows consistency in the valuation given by the two evaluators in terms of composition and color in digital painting. The line graph is somewhat flat for interpretation and creativity aspect. It shows the differences in the mean value are very small between the two evaluators.

RESEARCH FINDING

There was a similarity in marks given among the teachers in four aspects of productive dimensions: composition, color manipulation, interpretation and creativity. This was to indicate that teachers were able to evaluate according to their expertise in art and design and painting as well. This study offered a means to look at and compare teachers’ appropriate evaluation strategies in digital painting (Shinkfield & Stufflebeam, 1995).

In theory, this study will add to the understanding of cognitive systems and human information processing that relate to visual imagery system and skill of evaluation. The main point here is the perception and interpretation of the evaluator in an assessment situation is influenced by the relevant knowledge scope. The relevant knowledge of detailed assessment scope are not necessarily limited to the knowledge of mere observation only. In addition, the evaluator’s understanding of the theory of teaching and learning as well as sensitivity to the demands of the educational process, needs to be seen and interpreted (Dunleavy, 2005; Foss, 2005).

Knowledge relevant to the observation in this evaluation situation arises from a general knowledge regarding the theory of education and specific knowledge of visual art itself. In general, knowledge domain widened the concern on the assessment situation. Therefore an experience will increase differently. Knowledge is relevant to the situation which provided new insights that can be reviewed. Knowledge can also be a limit to evaluators’ perceiving in certain situations. Hence the evaluators must be among specialists in visual arts, especially painting (Denton 2005; Eisner, 2002).

The antecedent knowledge provided useful indications and gave shape to perception and evaluation. What is observed is normally influenced by this knowledge (Dake, 2005).

From one perspective, the assessment of connoisseurship dimension aimed at testing students to ensure their academic achievements. It appeared as a possible way to identify student skill in producing painting. Connoisseurship evaluation is practical and in line with the school teaching and learning methods (Barry, 2005).

REFERENCES


ABSTRACT

The integration of technology in mathematics instruction is an important step in the 21st century learning style. At the primary level, some studies have explored how technology could help in mathematics learning. The purpose of this study is to determine the effect of using Logo on pupils’ learning of the properties of two-dimensional shapes. A total of 36 mixed ability Year 4 pupils from a primary school in Pahang, Malaysia participated in this study using the quasi experimental research design. The experimental group was taught using Logo while the control group was taught with the traditional method. The difference in achievement between the experimental group and control group was measured by pre-test and post-test. Results showed that the experimental group students performed better than the control group. Pupils’ perception toward using Logo was measured by using a questionnaire with close-ended items. The findings of this study indicated that using Logo improved pupils’ understanding of two-dimensional shapes. In addition, pupils have positive perception toward learning the properties of two-dimensional shapes using Logo.

Keywords: Logo; effect; properties; two-dimensional shape; primary mathematics

INTRODUCTION

In 21st century learning, technology integration in the teaching and learning process is essential as it stimulates the critical and logical thinking capabilities of pupils (Idris, 2006). Technology use in the teaching and learning process will help pupils learn at their own pace, with teachers acting as facilitators rather than direct content providers (Ministry of Education, 2000). According to Noeth and Volkov (2004) pupils learn faster with greater retention using current technology. However, without the use of technology this could affect students learning and achievement in the classroom (Al-Bataineh & Brooks, 2014).

Technology should be a tool to help educators meet the educational needs of all children. The idea that technology is an essential tool for teaching and learning mathematics has also been supported by the National Council of Teachers of Mathematics (2000). Educators also play a significant role in facing the enormous challenges in mathematics education especially in integrating the useful dynamic educational software into the teaching and learning process to help provide useful learning resources to pupils. The challenge is even more complex in the teaching and learning of disciplines such as mathematics, where teachers have to balance the use of mental, paper-and-pencil and digital tools in both teaching and assessing activities involving abstract mathematical concepts, often difficult to understand for pupils (Prieto, Juanena, & Star, 2014). Some examples of dynamic educational software used in mathematics instruction include Geometers Sketchpad (GSP), TinkerPlots, Logo Programming Language, GeoGebra, graphic calculator and so on. Further, Noraini Idris (2006) also stated that in mathematics, most topics would need to be aligned to
new technologies and innovations so that the pupils can function with optimal advantage with their surroundings. The use of dynamic educational software will change how students learn and teachers teach in the mathematics classroom.

Recently, the usage of Logo has created additional challenges and opportunities in the mathematics classroom. Research has shown that the programming language, Logo, originally was developed as a conceptual framework for understanding children’s construction of knowledge about mathematics and problem solving (Clements & Meredith, 1992; Liu & Cummings, 2008; Papert, 1980). According to Papert (1980), Logo offers an easy entry into programming since it provides a concrete and meaningful idea for children to construct systems with thinking about geometry. Clements and Meredith (1997) also determined that Logo could be an effective means of learning mathematics and is able to promote higher order thinking, creativity and social-emotional development. Furthermore, Logo increases the sophistication of children’s thinking about geometric concepts and facilitates meaningful learning about mathematics (Liu & Cummings, 2008).

The study of geometry is important as it has been recognized as a basic subject area of school mathematics (NCTM, 2000) and it is important to learn the properties and relationship between shapes (Ministry of Education, 2013). For example, pupils learning the properties of two to three-dimensional and the relation with geometric shapes are the most important part of geometric thinking (NCTM, 2000). It is essential for pupils to be able to imagine, construct and understand construction of shapes in order to connect them with related facts (Shadaan & Leong, 2013) especially in geometry.

**Need of Study**

Geometry is an important topic in the primary mathematics curriculum in Malaysia (Ministry of Education, 2003). Despite knowing its importance, primary pupils still performed poorly on the geometry questions in the public examination (Malaysian Examinations Syndicate, 2013). In the preliminary report of Malaysia (Executive Summary Malaysia Education Blueprint 2013-2025), research had shown that when Malaysia first participated in TIMSS in 1999, its average pupils score was higher than the international average in both Mathematics and Science. But further research done in 2007 found the pupils’ performance had slipped to below the international average in both subjects.

In addition, Malaysian Year 4 pupils (10-year-old pupils who are in the primary level) had performed poorly in geometry and failed to meet the minimum proficiency levels in Mathematics and Science in 2007. The research also reported that Malaysian students were identified as possessing only limited mastery of basic mathematical and scientific concepts. The rankings in TIMSS 1999, 2007 and 2013 indirectly reflected the lack of geometric understanding among the Malaysian students (Chew & Noraini Idris, 2012). In addressing this concern, it is important that primary pupils are provided with a firm foundation of geometry concepts in order to develop their geometric thinking (Chew & Lim, 2013). Hence, Year 4 pupils and the Geometry topic were selected for this study.

Research has shown that phase-based instruction using Logo could help to enhance pupils’ understanding of concepts, relations and calculations in mathematics (Khasawneh, 2009; Liu & Cummings, 1997; Liu & Kaino, 2007; Stagerz, 1997). More specifically, research also has shown that the effectiveness of using Logo based on van-Hiele theory of geometric thinking could significantly improve pupils’ geometric thinking (Clements & Meredith, 1997). Van Hiele (1986) proved that Logo activities facilitate pupils’ progression to higher levels in the van-Hiele hierarchy of geometric thinking. Research by Liu and Cummings (1997) showed that phase-based instruction using Logo could enhance pupils’ van Hiele levels of geometric thinking about shapes such as equilateral triangle and right-angled square. Unfortunately, research is still lacking that specifically examines if Logo has potential for enhancing primary pupils’ understanding of two-dimensional shapes properties based on the van Hiele theory of geometric thinking.

**Significance of Study**

The finding of the study would contribute to all primary teachers when looking at the effect of utilizing technology for teaching mathematics, especially geometry. This study would also provide information to teachers about students’ understanding and learning processes when using the Logo software in relation to the geometry topic in mathematics. The findings also reveal that Logo is one of the dynamic educational
software which can be used for teaching and learning mathematics. However, the potential of using Logo in primary school has not yet been achieved in Malaysia. The result of this research would be very useful for our Malaysia Ministry of Education in order to implement or recommend the use of Logo in all primary schools in future. Besides that, the study also showed how learners of different abilities would utilize the technology and their perception when interacting with the task using Logo. This information would be very useful to teachers or researchers who had the intention to do experimental research or an intervention to enhance pupils’ understanding about geometric thinking.

**Objectives of Study**

The main objectives of this study are:

1. To investigate the effect of using Logo on pupils’ understanding in properties of two-dimensional shapes.
2. To gather pupils’ perception in learning the properties of two-dimensional shapes using Logo.

The study aimed at addressing the following research questions:

1. What is the effect of using Logo on pupils’ understanding in properties of two-dimensional shapes between the experimental and control group?
2. What are the perceptions of pupils toward using Logo in learning the properties of two-dimensional shapes?

**Theoretical Framework**

Battista (2002) stated that van Hiele theory of geometric thinking best describes pupils’ thinking about two-dimensional shapes. According to Van Hiele (1986), there are five sequential and hierarchy levels such as, level 1 (recognition), Level 2 (analysis), Level 3 (ordering), Level 4 (deduction) and Level 5 (rigor). Clements and Battista (1992) also proposed the existence of Level 0, which is called pre-recognition. However, according to the Malaysian Ministry of Education (2003), the topic of geometry content of the Year 4 mathematics syllabus is only up to Level 2 which is also stated in the research of Chew and Lim (2013). Therefore, only level 0 until level 2 will be discussed in this study.

**Level 0: Pre-recognition**

Pupils are able to notice the visual characteristics of shapes.

**Level 1: Recognition**

Pupils are able to recognize the figures and name the properties of geometric figures. But, they still do not see the relationships between these geometric figures.

**Level 2: Analysis**

Pupils are able to identify the relationship between properties and different geometric figures. At this level, students are also able to give meaningful definitions and justify their reasoning for each figure given
Literature Review

As our society becomes more dependent on technology and employment shifts from manual to automated positions, there is an increasing need to raise the quality of mathematics teaching and learning around the world (Verhoef, Coenders, Pieters, Smaalen, & Tall, 2015). The National Council of Teachers of Mathematics (NCTM) Principles and Standards for School Mathematics (PSSM) technology principle stated that “technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances pupils’ learning” (NCTM, 2000, p. 24). Through the last decades, many different types of dynamic educational software have been developed for use in teaching and learning mathematics. One of the important characteristics of dynamic educational software is that users would be able to interact with the software in a way that makes it possible to get an immediate feedback on their work (Mehanovic, 2011).

Khasawned (2009) found that teaching geometry using Logo programming language could help to enhance pupils’ learning and develop problem-solving processes. According to Clements and Meredith (1992), Logo programming language was originally developed as a conceptual framework for understanding children’s construction of knowledge about mathematics and problem solving. By using Logo, pupils were able to build on their creative ideas about paths that may help them develop their ideas of two-dimensional shapes. The results had shown that Logo can help children develop higher levels of geometric thinking through van-Hiele’s theory of geometrical thinking.

Ratcliff and Anderson (2011) conducted a case study with a group of nine 4th grade children with the use of Logo programming language. The study demonstrated that a classic version of Logo captured the pupils’ interest. The results of this study showed that Logo had provided pupils with a great deal of pride, intrinsic reward, enjoyment and the sense of ownership of learning. Furthermore, the study also concluded that pupils were able to use basic commands, applying their knowledge of geometry to make procedures. Hoyles and Noss (1987) asserted that when a positive learning effect had taken place, this accessible Logo programming language should be integrated into the mathematics curriculum. This is because its systematic writing basic command should be developed throughout the school experience between programming and paper-pencil activities in the process of teaching and learning mathematics.

Liu and Kaino (2007) conducted a study comparing the use of Logo and Geometer’s Sketchpad in mathematics classroom instruction. The findings showed that both software were able to enhance pupils’ competencies of constructing rotational symmetry figures and allowed pupils to implement their understanding of mathematical concepts. In this case, the researchers also found that the concepts, relation, and calculations are reflected in the procedures when using Logo. However, Logo requires the pupil to construct the figure first followed by the discovery of the properties of the shapes. This study concluded that both software can be used to achieve the same objectives. The comparison between Logo and Geometer’s Sketchpad found that pupils using Logo require more thinking skills during the writing of the syntax commands whereas pupils using Geometer’s Sketchpad only need to click and drag the correct functions.

METHODOLOGY

Research Design

The research design of this study is a non-equivalent quasi-experimental research. Pupils were from two mixed ability classrooms. One classroom was assigned as the (1) experimental group while the other classroom was the (2) control group. The experimental group learned the properties of two-dimensional shapes using Logo programming language software while the control group learned the properties of two-dimensional shapes using traditional method, “paper-and-pencil” without using Logo programming language software.

Participants

Participants for this study were Year 4 (10 years old) students from a primary school in Pahang, Malaysia. A total of 36 pupils were selected for this study from a population of 61 pupils. Both experimental group and control group consists of 18 mixed ability pupils. The participants consist of equal number of boys and girls and their mathematics achievement was based on their final examination marks. The researcher
taught both the groups for two weeks.

Table 1. Participant’s mathematics achievement

<table>
<thead>
<tr>
<th>Group</th>
<th>High</th>
<th>Average</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>9</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>Control</td>
<td>13</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>22</td>
<td>14</td>
<td>36</td>
</tr>
</tbody>
</table>

Instruments and Data Collection

This study used two instruments for the purpose of data collection. The first instrument was the achievement tests containing the: (1) pre-test and (2) post-test. The second instrument was a survey questionnaire.

(a) Achievement test

The purpose of conducting the achievement tests is to identify pupils’ understanding in learning the properties of two-dimensional shapes. At the beginning of the study, both experimental group and control group took a pre-test to test their understanding of geometric shapes. The pre-test and post-test consists of similar items. At the end of the treatment, both the experimental group and control group took a post-test to test their understanding on the properties of two-dimensional shapes. The Cronbach alpha value is .71 indicating that the reliability of the achievement test is appropriate.

(b) Survey Questionnaire

The survey questionnaire was used in this study to elicit pupils’ perception on using Logo in the learning of two-dimensional shapes. This questionnaire consists of 10 dichotomous items. At the end of the treatment, pupils in the experimental group completed the questionnaire.

Procedures

This study used the instructional activities that integrates the Logo programming language software to help pupils’ learning on the properties of the two-dimensional shapes. The experimental group pupils were exposed to the construction of the two-dimensional shapes by writing the basic commands in Logo. Therefore, pupils must be able to write the Logo commands so that the turtle moves.

Data Analysis

The Statistical Packages for the Social Sciences (SPSS) software version 18 was used to analyze the data of this study. For the first research question, independent t-test was used to analyze the significant difference in student achievement between the experimental group and control group on the properties of two-dimensional shapes. Descriptive statistics were used to analyze pupils’ perception of using Logo in learning the properties of two-dimensional shapes.

RESULTS

Research question 1: What is the effect of using Logo on pupils’ understanding on the properties two-dimensional shapes between the experimental and control group?

To answer the first research question, an independent samples t-test was conducted to determine whether the mean score of the pre-test differed between the control and experimental group. Review of the Shapiro-Wilk test of normality ($S-W = .96, df = 36, p = .19$) and skewness (-.61) and kurtosis (-.17) indicated that normality assumption was reasonably met.
Table 2. Results of the independent t-test on the pre-test of both groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>t-value</th>
<th>Sig (2 tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental (n=18)</td>
<td>54.28</td>
<td>5.42</td>
<td>-1.72</td>
<td>0.09</td>
</tr>
<tr>
<td>Control (n=18)</td>
<td>57.17</td>
<td>4.66</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\( t \)-value significant at \( p < 0.05 \)

Table 2 shows that experimental group obtained a lower mean score \((M = 54.28, SD=5.42)\) but larger data spread when compared with the control group \((M = 57.17, SD=4.66)\). The independent t-test indicated that the pre-test mean scores were not statistically significant for the control and experimental group, \(t(34) = -1.72, p = .09\). Thus the null hypothesis that the pre-test mean scores were the same cannot be rejected.

The results showed that pupils in experimental group and control group having similar achievement in two-dimensional shapes before the treatment was conducted.

Table 3. Results of the independent t-test on the post test of both groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
<th>t-value</th>
<th>Sig (2 tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental (n=18)</td>
<td>73.28</td>
<td>5.92</td>
<td>6.23</td>
<td>0.00*</td>
</tr>
<tr>
<td>Control (n=18)</td>
<td>60.06</td>
<td>6.23</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\( t \)-value significant at \( p < 0.05 \)

The independent samples \( t \)-test determined whether the post test mean score differed between control and experimental groups. The Shapiro-Wilk test of normality (\(S-W = .98, df = 36, p = .78\)) and skewness (-.31) and kurtosis (.35) indicated that normality assumptions were adequately met. Table 3 shows that the experimental group had a higher mean score \((M = 73.28, SD = 5.92)\) and smaller data spread than the control \((M = 60.06, SD = 6.23)\). The independent \( t \)-test found statistically significant difference in post-test mean scores between the control and experimental group, \(t(34) = 6.23, p < .05\). Thus the null hypothesis that the post-test mean scores were not different can be rejected; pupils in the experimental group performed better than the control group. This suggests that Logo had a positive effect on learning two-dimensional shapes for the experimental group. Using Cohen’s (1988) criteria, the effect size (2.17) is large since the difference between means exceeds one standard deviation.

Research question 2: What are the perceptions of pupils towards the use of Logo in learning the properties of two-dimensional shapes?

Frequency table and bar chart were used to answer second research question.
Table 4. Student perceptions of Logo

<table>
<thead>
<tr>
<th></th>
<th>Y</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I was so happy when using Logo.</td>
<td>16 (88.9%)</td>
<td>2 (11.1%)</td>
</tr>
<tr>
<td>2. I was able to understand the properties of 2D shapes using Logo.</td>
<td>16 (88.9%)</td>
<td>2 (11.1%)</td>
</tr>
<tr>
<td>3. I was able to think creatively when constructing the 2D shapes using Logo.</td>
<td>13 (72.2%)</td>
<td>5 (27.8%)</td>
</tr>
<tr>
<td>4. I was able to visualize the image when writing the commands using Logo.</td>
<td>15 (83.3%)</td>
<td>3 (16.7%)</td>
</tr>
<tr>
<td>5. I could share my ideas with friends in a group discussion when using Logo.</td>
<td>14 (77.8%)</td>
<td>4 (22.2%)</td>
</tr>
<tr>
<td>6. I wanted to learn Logo more than other subjects.</td>
<td>15 (83.3%)</td>
<td>3 (16.7%)</td>
</tr>
<tr>
<td>7. I was confident in learning the properties of 2D shapes using Logo.</td>
<td>14 (77.8%)</td>
<td>4 (22.2%)</td>
</tr>
<tr>
<td>8. I could learn independently when doing construction using Logo.</td>
<td>10 (55.6%)</td>
<td>8 (44.4%)</td>
</tr>
<tr>
<td>9. I found it takes a longer time to construct 2D shapes using Logo.</td>
<td>5 (27.8%)</td>
<td>13 (72.2%)</td>
</tr>
<tr>
<td>10. I was excited to explore other mathematical concepts using Logo.</td>
<td>9 (50.0%)</td>
<td>9 (50.0%)</td>
</tr>
</tbody>
</table>

The result from Table 4 showed that generally pupils from the experimental group gave positive feedback toward the use of Logo. Majority of pupils (88.9%) showed that they were very happy when using Logo and were also able to understand the properties of 2D shapes using Logo. About 72.2% of pupils agreed that they were able to think creatively when constructing the 2D shapes using Logo. In addition, 77.8% of pupils were able to share their ideas with friends in a group discussion when using Logo while 88.3% of pupils wanted to learn Logo more than other subjects. They were also confident in learning the properties of 2D shapes using Logo. About 50% of pupils were excited to explore other mathematical concepts using Logo. However, some pupils reported that it took a longer time to construct the 2D shapes when using Logo.

DISCUSSION

From the results, the pupils in the experimental group showed improved achievement in learning the properties of 2D shapes using Logo. Several explanations can be discussed in this study. One of the use of instructional activities was conducted based on van Hiele Theory. During the activities conducted, the participants named the figures and recognized all the shapes given. Next, they need to think how to write commands to make the turtle move or turn. Then, pupils observed the properties of 2D shapes in Guided Orientation. During the stage of Explication, pupils were given opportunity to present their ideas about the properties of 2D shapes in front of the class. Pupils also gave feedback to their friends and discussed alternative ways to make the turtle move quickly. In the Free Orientation stage, pupils constructed any models involving the properties of 2D shapes. Finally, they had to summarize the properties of all 2D shapes in the stage of Integration. In a nutshell, after undergoing treatment the experimental group students showed confidence in using Logo and were able to perform better in the post-test. This result also indicated the effectiveness of Logo for enhancing pupils’ understanding in learning the properties of 2D shapes.

Results from the questionnaire suggest the conclusion that pupils’ perception toward the use of Logo in learning the properties of two-dimensional shapes was positive. The result indicated that pupils enjoyed using Logo to construct 2D shapes and gained better understanding about their properties. Besides that, children can use Logo as a design environment for teaching others mathematical concepts (Stagerz, 1997).
Some pupils claimed they would like to explore other mathematical concepts using Logo. This result had clearly shown that pupils would like to challenge themselves when using Logo to construct geometric figures. However, due to the short period in learning new innovation like Logo, pupils took a longer time to think and write down the commands. When they understand the properties of 2D shape, they would be able to write the commands quickly and construct a proper 2D shape.

CONCLUSION

From the results and discussion, it could be concluded that the effectiveness of using Logo could enhance pupils’ understanding of 2D shape properties. Using Logo improves pupils’ perception in learning the properties of 2D shapes. According to Liu and Cummings (2001), when children are required to provide instructions to the Logo turtle to draw the figure, they must think about how to identify and execute the sequence of small steps necessary to solve the larger problem. Logo requires pupils to think creatively and promotes higher order thinking skills (NCTM, 2000) in order to help them interact with their partner in a group discussion and explain the reasoning of mathematical ideas with positive learning attitude.

The findings of this study have brought some implications for teachers and pupils as well. Teachers could explore innovative technology to teach mathematics concepts in the classroom. When teachers master the Logo programming language, they could guide pupils to think creatively to visualize the mathematical concepts in an alternative way. Besides that, teachers could save time in preparing the teaching aids. Teacher could use Logo as a teaching tool to create a meaningful lesson for pupils and also design instructional activities using Logo to increase pupils’ interest in learning mathematical concepts. In other words, the pupils who are the future leaders are ready to integrate technology in their education if they find that the software is beneficial for them and it has the potential to enhance their knowledge and skill as well (Rajagopal, Ismail, Ali, & Sulaiman, 2015). Logo could be an effective tool to help pupils learn independently by exploring, analyzing and creating mathematical ideas. However, pupils should be given more time to experience learning mathematics with the use of Logo.

It is recommended that more study on integrating Logo turtle into primary school especially in Malaysia should be carried out in future. It should provide encouragement and support primary teachers who had negative perception toward the use of Logo in school as it is necessary and important to explore a new innovation like Logo to improve primary school mathematics teaching and learning. Logo could give primary school teachers opportunity to observe how pupils integrate mathematical exploration with ICT tools; students may learn and develop new strategies to enhance geometric thinking with the use of Logo.

REFERENCES


Emotional Design in Multimedia: Does Gender and Academic Achievement Influence Learning Outcomes?

Jeya Amantha Kumar [1], Balakrishnan Muniandy [2], Wan Ahmad Jaafar Wan Yahaya [3]

ABSTRACT

This study was designed as a preliminary study (N = 33) to explore the effects of gender and academic achievement (Cumulative Grade Point Average - CGPA) on polytechnic students’ learning outcomes when exposed to Multimedia Learning Environments (MLE) designed to induce emotions. Three designs namely positive (PosD), neutral (NeuD) and negative (NegD) had similar contents and narrations but differed visually based on colors, images and font (size and style) in depicting the intended emotions. The learning outcomes evaluated are learning achievement, perceived intrinsic motivation and satisfaction. Overall, there was no significant difference between gender and CGPA when students were exposed to the emotionally designed MLE. However, male students were significantly more motivated and satisfied with the NegD design compared to the female students. A significant positive relationship was observed between intrinsic motivation and satisfaction and between gender and design. In addition, female students were found to prefer PosD design and male students, NegD design. Users of PosD and NegD design showed strong relationship between perceived intrinsic motivation and satisfaction. For learning achievement, high academic achievers performed better in the PosD design compared to other designs. No significant relationships were found between any of the variables for the NeuD design.

Keywords: Emotional design, gender, academic achievement, learning outcomes

INTRODUCTION

Multimedia elements are integrated in instructional tools to engage users and fulfill pedagogical needs. They have a distinct role in increasing aesthetic appeal as design attractiveness can influence user engagement, satisfaction and motivation in using e-learning systems (Dong, 2010). Aesthetics and emotions go hand in hand; to design for emotion is also to design for aesthetics. It has been found that “emotions connect a multimedia design to multimedia learning and also the designer to the user” (Dong, 2007, p.125). However, a person’s perception of aesthetics is also influenced by how they relate and bond their emotions to a prior experience related to the objects’ appeal. As an example, the color black is associated with death and some might say it is a color of sophistication. What is important is to understand how users experience these elements and design in accordance to their needs and promote positive interaction.

Multimedia-based learning that manipulates the influence of aesthetics of essential multimedia instruction is defined as emotional design in multimedia learning. This field of study is fairly new and is related to the design and integration of emotional factors to promote positive learning by exploring user experience.
In this study, two main aspects that diversify users were selected; gender and academic achievement. The focus is to identify if these user characteristics influence how emotional design is perceived. Firstly, gender is referred to as sexual identity that defines an individual’s masculinity or femininity (Leblanc, 2012). According to Sánchez-Núñez, Fernández-Berrocal, Montañés, and Latorre (2008), the influence of gender on perception is not really apparent for “digital natives” as education and culture has played a great role on generalizing this generation. However, how true is this especially for an Asian country were cultural and gender segregation is still apparent? In addition, research on gender influence on emotional design in multimedia learning is still scarce. Secondly, academic achievement is usually linked with emotional competence in handling negative emotions while learning. Positive relationship was also found between academic achievement and emotions (Fayombo, 2012) because academic achievement relates to how individuals manage their emotions and simultaneously identify with their emotional intelligence (EI) while learning (Stamatopoulou, Kargakou, Konstantarogianni, & Prezerakos, 2015). Therefore, persons with high academic achievement could be perceived as emotionally sensitive to their environment and therefore the researcher questions if it influences how they perceive an emotionally designed MLE.

Literature Review

Students experience a variety of emotions ranging from positive to negative emotions (Pekrun, Götz, Titz, & Perry, 2002). Emotions can be defined based on valence (positive, neutral and negative), activation (excited, neutral and calm) or dominance (weak, neutral and strong) (Yan, Bracewell, & Ren, 2008). The most common method used for educational based studies are by using valence (Park, 2004). Positive emotions are emotional states such as enjoyment, pride and satisfaction whereas negative emotions are emotional states such as anger, anxiety and frustration (Pekrun, 2011). Positive emotions creates curiosity, creativity and improves learning however, it could also deter focus (Um, 2008). On the other hand, negative emotions although thought to be detrimental to learning could actually aid in focusing the mind (Norman, 2004). Thus, it can be concluded that emotion irrespective of its valence is important in learning (Moridis & Economides, 2008) and if neglected the outcome could be disadvantageous to the whole learning process itself (Hinton, Miyamoto, & Della-Chiesa, 2008).

In e-learning, emotions can be induced or integrated through multimedia (Knautz, 2012). Martinez (2002) claims that e-learning tool design influences users’ motivation, satisfaction, and how they emotionally feel toward the tool. However, multimedia elements have different emotional impact on different users because emotions are formed based on individual perception or appraisal (Nezlek, Vansteelandt, Van Mechelen, & Kuppens, 2008). By appraising, a person defines if they like or dislike an object thus emphasizing why aesthetics is important. Aesthetics defines how we perceive our environment through our senses (Anderson, 2011). According to Norman (2004), any aesthetically pleasing design could change an emotional state, perception and how one relates to the product.

By understanding the interrelationship between emotion and design, designers will be empowered to influence the user’s emotional state (Miller, Veletsianos, & Hooper, 2006) which will subsequently influence their interaction. Dong (2010) explained that the interface design of an e-learning system can induce emotions and activate cognitive activities. Dong suggested the use of multimedia aesthetics such as by integrating colour, graphics, text, audio, and video to induce positive emotion in e-learning. As emotions and cognition are closely associated (Norman, 2004), empirical research in emotion design in multimedia learning seeks to redefine this relationship (Dong, 2010; Ghali & Frasson, 2010). The theory that defines this relationship is called emotional design.

Emotional design is based on Donald Norman’s theory claiming that pleasing designs are designs that can influence the user based on the visceral, behavioural, and reflective levels (Norman, 2004). The visceral level is the first impression the user has on the physical attributes of the product such as color and smoothness (Ho & Siu, 2009). Behavioural level is based on the product’s usability and efficiency and lastly the reflective level is based on how the user relates to a product. Emotional design implementation in multimedia learning is not about adding new decorative elements to the learning tool to persuade the user, but to redesign essential multimedia elements such as color or images to create positive interaction (Heidig, Müller, & Reichelt, 2015) that promotes generative processing (Mayer & Estrella, 2014).
A study done by Um, Plass, Hayward, and Homer (2012) reported that designing a Multimedia Learning Environment (MLE) to induce positive emotion increased understanding and knowledge transfer. Their study compared two design types; positive and neutral. Positive designs are designs that induce positive emotions such as happiness and joy. Negative designs are designs that portray negative emotions such as sadness and dullness, whereas, neutral designs are designs that induce neither positive nor negative emotions. The question raised here is whether induced negative emotion through multimedia elements could have significant positive impact on learning. According to Moridis and Economides (2008), negative emotion has a positive quality that could improve learning. Dong (2007) and Tractinsky (2013) also expressed a need to investigate the impact of visual aesthetics especially online.

Haron, Mustafa, and Alias (2010) claim that emotion regulation is different between genders. Simultaneously, in e-learning, the difference between genders in how they perceive colours or visual stimuli is physiological and believed to be shaped by their culture (Plass, Heidig, Hayward, Homer, & Um, 2013). Thus, based on these identifications, user preference of aesthetics in a product can be defined by their cultural acceptance of what defines their sexuality. For instance, female users prefer colourful, female-designed websites and aesthetics above usability (Leblanc, 2012). Bright and warm colours such as yellow and orange are much preferred by female users whereas male users prefer cool dark colours such as grey and blue (Ellis & Ficek, 2001; Mahzari & Ahmazadeh, 2013). However, empirical research found these preferences are predictable as some colours can induce the same response regardless of culture or society (King, 2005; Mahzari & Ahmazadeh, 2013). For example, warm bright colours usually create a sense of happiness and are not perceived as sad or dull. Conversely, male students have also been found to benefit the most from e-learning compared to female students with regard to test achievement (Rodgers, 2008).

Test achievement differs from academic achievement where academic achievement is the overall achievement in the whole course or program and is cumulated throughout the semester. Academic achievement is defined as Cumulative Grade Point Average (CGPA) (Fayombo, 2012) in this study. Jasper et al. (2012) claimed that high achievers (CGPA > 3.0) performed better than low achievers (CGPA < 3.0) in e-learning environment due to higher confidence and motivation. However, in the context of emotional design, are high achievers partial to a certain kind of design? Do they prefer more aesthetically pleasing design as it has an emotionally relationship with satisfaction? Hence, based on these statements it can be suggested that there might be a relationship between gender, academic achievement and emotion in the e-learning environment. Thus, in this study we will investigate the effect and relationship between gender and CGPA on learning outcomes when induced with positive, neutral and negative emotion through multimedia.

The learning outcomes measure will consist of learning achievement, perceived intrinsic motivation and satisfaction. According to the Commonwealth Educational Media Centre for Asia it is important to evaluate learning achievements to measure success of the learning activity (Naidu, 2006). Motivation and satisfaction are another two factors that should be considered as they relate to the concept of emotional design (Norman, 2004) and are relevant to emotion integration in an e-learning environment (Martinez, 2002). Which conforms to the fact that intrinsically motivated students will be able to learn based on their own satisfaction and enthusiasm irrespective of any grade or reward (Jung & Lim, 2009).
RESEARCH OBJECTIVE

The purpose of this study is to investigate the effect of gender and academic achievement on student learning outcome (achievement, perceived intrinsic motivation and perceived satisfaction) when exposed to a Multimedia Learning Environment (MLE) that was designed to induce either positive, neutral or negative emotions. This study also explores the relationship between these variables.

Research Questions

This study plans to answer the following research questions:

1. What is the difference between gender on student learning outcomes when students are exposed to a MLE designed to induce positive, neutral or negative emotions?
2. What is the difference between levels of CGPA on students learning outcomes when students are exposed to a MLE designed to induce positive, neutral or negative emotions?
3. What is the relationship between gender on students learning outcomes when students are exposed to a MLE designed to induce positive, neutral or negative emotions?
4. What is the relationship between levels of CGPA on students learning outcome when students are exposed to a MLE designed to induce positive, neutral or negative emotions?

METHODOLOGY

Design and development of the MLE

The designs are categorized as Positive (PosD), Neutral (NeuD) and Negative (NegD) Design. The PosD was developed to induce positive emotion (happiness, joy, etc.), thus the multimedia elements (color, font and images) were developed to portray such emotion. The NegD was developed to induce emotions such as sadness and dullness. Lastly, the NeuD was designed as a neutral design (neither positive nor negative); where the color choices were limited to neutral type of colors such as black, white and gray scale. Selection of these multimedia elements are aligned with empirical studies on emotional design in multimedia learning done by Dong (2010), Mayer and Estrella (2014), Plass et al. (2013) and Um and Plass (2009). However, their studies explored the difference between positive and neutral design whereas this study will include the negative perspective. The designs of colours are based on the findings by Tharangie, Kumara, Jayasinghe, Marasinghe, and Yamada (2008) and Zettl (2010). For fonts, the font type and size were used to establish differences between the designs. For the PosD - Kristen ITC (15-24 pt); NeuD– Arial (14pt) and NegD – Impact (10-13pt and >24pt) which is based on the findings by Dong (2010), Shaikh (2007), Tsonos and Kouroupetroglou (2011) and Zettl (2010). Lastly, images and graphics which are also related to their colors and affect are based on the studies by Dong (2010), Wang and Yu, (2005), Knautz (2012) and Um (2008). It is important to highlight that the use of these multimedia elements is also based on the commonly used elements for e-learning for the sample.

In all cases the target is still to create a positive learning environment cognitively and affectively as per the definition of emotional design in multimedia learning described by (Heidig et al., 2015). The PosD and NegD multimedia learning system was found to reduce negative affect scores based on the Positive and Negative Affective Schedule (PANAS) significantly in e-learning (Kumar, Muniandy, & Wan Ahmad Jaafar, 2014). All three designs have the same content and were developed based on the Malaysian Polytechnic syllabus of EE503: IC Fabrication and Packaging Technology for the topic of silicon fabrication. The screenshots for the designs are represented in Figure 1.
In this study, four instruments were used to identify students’ demographic profile and learning outcomes. Student demographic profile was collected based on information such as student identification number, age, gender and Cumulative Grade Point Average (CGPA). The instruments used to evaluate the learning outcomes are the Pre and Posttest learning achievement test, Post-Experimental Intrinsic Motivation Inventory (IMI) and E-Learning Satisfaction (ELS) Inventory.

The Pre and Posttest measured the difference between student learning achievement before and after the intervention. The items were developed based on the objectives of the IC Fabrication and Packaging Technology (EE503) syllabus from the Department of Polytechnic Education of Malaysia. Twenty (20) objective questions were developed for the pre and posttest measurement. The second instrument measured the perceived intrinsic motivation through the Post-Experimental Intrinsic Motivation Inventory (IMI). The instrument has a reliability value of .71 (Manal Mohammad Asif, 2011). The last instrument measured the students’ perceived satisfaction by implementing the E-Learning Satisfaction (ELS) Inventory developed by Wang Yi-Shun (Wang, 2003) to measure satisfaction based on interface design and content of an e-learning environment. Prasanna Ramakrisnan, Azizah Jaafar, and Noor Faezah Mohd Yatim (2013) found the ELS to have a reliability value of .92 based on their study involving 86 undergraduate students of Universiti Teknologi MARA (UiTM). All instruments used in this study excluding the pre and posttest are measured based on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The categorization is based on the mean score, where students scoring below the calculated mean will be classified as “Low” and those scoring above will be classified as “High”.

**Participants and Procedures**

As this is a preliminary study, 33 students from the Diploma of Electronic Engineering course at a polytechnic in the northern region of Malaysia were selected. These students were enrolled in the EE503: IC Fabrication and Packaging Technology course. Before being exposed to the MLE, the students were required...
to answer 20 objective questions (pretest questions). After completing the test, students randomly selected their stations before being exposed to the type of MLE designs (positive, neutral or negative design). They were allocated 45 minutes to go through the MLE. After the intervention, students were given the Post-Experimental Intrinsic Motivation Inventory, E-Learning Satisfaction (ELS) Inventory followed by posttest questions. Lastly, students were thanked for their co-operation.

**FINDINGS**

Based on the findings, 63.6% of the respondents were male and 36.4% were female students. Some 72.7% of students were between 18-20 years old and the remaining were between 21-25 years old. The highest percentage of students based on CGPA possessed points between 2.50 to 2.99 (60.6%) followed by 3.00 to 3.49 (27.3%), 2.00 to 2.49 (9.1%) and lastly below 2.00 (3%). There were no students in the 3.50 to 4.00 point category. As students were categorized based on High CGPA (>3.0) and Low CGPA (<3.0), 72.7% of the students were in the Low CGPA group.

Overall, male students were more intrinsically motivated (Mean = 5.46, \(SD = .36\)) than female students (Mean = 5.35, \(SD = .39\)) to use the MLE irrespective of design type. They were also more satisfied (Mean = 6.20, \(SD = .39\)) to use the MLE compared to the female students (Mean = 5.97, \(SD = .55\)). However, female students had slightly higher learning achievement scores (mean = 3.09, \(SD = 2.70\)) compared to male student (Mean = 3.05, \(SD = 2.30\)). Nevertheless, based on an independent-sample \(t\)-test conducted no significant difference was found between gender and all learning outcomes and the results were similar for high and low CGPA groups.

However, to understand the effect of emotional design in multimedia learning on gender, an independent \(t\)-test was performed to differentiate the results of the learning outcomes on the courseware designed to either induce positive, neutral or negative emotion. Gender distribution for each design (PosD, NeuD and NegD) is shown in Table 1. As this study was designed as a quasi-experiment; there was no control on the number of male and female students in each group. For perceived intrinsic motivation, significant difference between male (Mean=5.63, \(SD = .27\)) and female (Mean = 5.00, \(SD = .34\)) students based on the conditions; \(t(9) = 2.92, \ p = .02, \ d = .32\) were observed. Whereas, for perceived satisfaction, significant difference in the score between male (Mean = 6.35, \(SD = .33\)) and female (Mean = 5.42, \(SD = .60\)) students were based on the conditions; \(t(9) = 3.24, \ p = .01, \ d = .45\).

**Table 1: Percentage of Male and Female Students based on Design Type**

<table>
<thead>
<tr>
<th>Design Type</th>
<th>Male (%)</th>
<th>Female (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PosD</td>
<td>36.4</td>
<td>63.6</td>
</tr>
<tr>
<td>NeuD</td>
<td>72.7</td>
<td>27.3</td>
</tr>
<tr>
<td>NegD</td>
<td>81.8</td>
<td>18.2</td>
</tr>
</tbody>
</table>

In the context of analyzing the students based on CGPA; it was found that there was a significant difference between CGPA groups for PosD design for learning gain based on the conditions of \(t(9) = 2.76, \ p = .02, \ d = 2.06\). Overall, students with high CGPA (Mean = 4.33, \(SD = 1.53\)) achieved higher scores than students with low CGPA (Mean = 1.38, \(SD = 1.60\)). No other significant relationships were found in other designs.

According to Pallet (2007), small sample have low chances of fulfilling statistical significance standard value of \(p < .05\). Tong and Klecun (2004) suggested using correlation as a method of observing gender differences as a means to understand how gender influences a variable. Thus, it was suggested to report the strength of the relationship to further understand it. A Pearson correlation analysis was performed between gender, CGPA, learning outcomes and design type. Table 2 shows the strength of the correlation between the variables. Two significant correlations were found; (i) perceived intrinsic motivation and perceived satisfaction \(r = .56, \ p = .00\) (ii) gender and design type \(r = -.39, \ p = 0.03\). The results indicated that female students showed preference for positive design and male students showed preference for negative design. Other factors were not affected by the increase and decrease of other variables.
Table 2 Means, Standard Deviation, and Correlations between Variables

<table>
<thead>
<tr>
<th>Factors</th>
<th>Mean</th>
<th>SD</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gender</td>
<td>.33</td>
<td>- .39*</td>
<td>.02</td>
<td>-.15</td>
<td>-.21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. CGPA</td>
<td>-</td>
<td>.24</td>
<td>.12</td>
<td>.08</td>
<td>.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Design type</td>
<td>-</td>
<td>.30</td>
<td>.14</td>
<td>.04</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Learning achievement</td>
<td>2.76</td>
<td>2.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Perceived intrinsic motivation</td>
<td>5.41</td>
<td>.36</td>
<td></td>
<td></td>
<td></td>
<td>.56*</td>
<td></td>
</tr>
<tr>
<td>6. Perceived satisfaction</td>
<td>6.00</td>
<td>.64</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. SD = standard deviation, CGPA = cumulative gross point average. * = p < .05.

The analysis was further directed toward the effects of different design types (PosD, NeuD and NegD) on other variables. Table 3 portrays the strength of the relationship between genders, CGPA, the learning outcomes for the PosD design. There was a significant, positive relationship between CGPA and learning achievement ($r = .68$, $n = 11$, $p = .02$) and there was a strong positive relationship between perceived intrinsic motivation and satisfaction ($r = .80$, $n = 11$, $p = 0.01$). Whereas, for the neutral design, no significant relationship were found in all conditions (Table 4). Lastly, for the NegD, three significant relationships were found from the analysis (Table 5). Student’s gender seems to have a negative relationship with perceived intrinsic motivation ($r = -.70$, $n = 11$, $p = 0.02$) and satisfaction ($r = -.73$, $n = 11$, $p = 0.01$). A strong positive relationship was found between perceived intrinsic motivation and satisfaction ($r = .79$, $n = 11$, $p = 0.01$) was also found in the NegD design.

Table 3 Means, Standard Deviation, and Correlations between Variables for the PosD design

<table>
<thead>
<tr>
<th>Factors</th>
<th>Mean</th>
<th>SD</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gender</td>
<td>- .04</td>
<td>.07</td>
<td>.18</td>
<td>.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. CGPA</td>
<td>3.18</td>
<td>.60</td>
<td>-</td>
<td>.68*</td>
<td>.23</td>
<td>.24</td>
</tr>
<tr>
<td>3. Learning achievement</td>
<td>2.18</td>
<td>2.04</td>
<td>-</td>
<td>.33</td>
<td>-.30</td>
<td></td>
</tr>
<tr>
<td>4. Perceived intrinsic motivation</td>
<td>5.40</td>
<td>.38</td>
<td></td>
<td>-</td>
<td>.80*</td>
<td></td>
</tr>
<tr>
<td>5. Perceived satisfaction</td>
<td>6.12</td>
<td>.43</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. SD = standard deviation, CGPA = Cumulative Grade Point Average. * = p < .05.

Table 4 Means, Standard Deviation, and Correlations between Variables for the NeuD design

<table>
<thead>
<tr>
<th>Factors</th>
<th>Mean</th>
<th>SD</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gender</td>
<td>- .39</td>
<td>.07</td>
<td>.01</td>
<td>-.30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. CGPA</td>
<td>3.27</td>
<td>.65</td>
<td>-</td>
<td>.15</td>
<td>.27</td>
<td>.06</td>
</tr>
<tr>
<td>3. Learning achievement</td>
<td>2.09</td>
<td>2.21</td>
<td>-</td>
<td>-.21</td>
<td>.28</td>
<td></td>
</tr>
<tr>
<td>4. Perceived intrinsic motivation</td>
<td>5.32</td>
<td>.33</td>
<td></td>
<td>-</td>
<td>.29</td>
<td></td>
</tr>
<tr>
<td>5. Perceived satisfaction</td>
<td>5.68</td>
<td>.84</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. SD = standard deviation, CGPA = Cumulative Grade Point Average.

Table 5 Means, Standard Deviation, and Correlations between Variables for the NegD design

<table>
<thead>
<tr>
<th>Factors</th>
<th>Mean</th>
<th>SD</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gender</td>
<td>- .39</td>
<td>.26</td>
<td>-.70*</td>
<td>-.73*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. CGPA</td>
<td>4.00</td>
<td>2.90</td>
<td>-</td>
<td>-.17</td>
<td>-.18</td>
<td>-.18</td>
</tr>
<tr>
<td>3. Learning achievement</td>
<td>2.09</td>
<td>2.21</td>
<td>-</td>
<td>.32</td>
<td>-.03</td>
<td></td>
</tr>
<tr>
<td>4. Perceived intrinsic motivation</td>
<td>5.52</td>
<td>.37</td>
<td></td>
<td>-</td>
<td>.79**</td>
<td></td>
</tr>
<tr>
<td>5. Perceived satisfaction</td>
<td>6.19</td>
<td>.51</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. SD = standard deviation, CGPA = Cumulative Grade Point Average. * = p < .05.
DISCUSSION

Overall, based on the findings, it can be deduced that multimedia-based learning outcome is not differentiated by gender or academic achievement. According to Yukselturk and Bulut (2009), there is no significant difference in gender when users interact with an e-learning environment. Similar findings were also found for online interaction (Miche & Noirhomme-Fraiture, 2009) or in e-learning in higher learning institutions (Macharia & Nyakwende, 2011). Bruestle et al. (2009) and Suri and Sharma (2013) claimed that gender does not affect e-learning as both female and male students’ perception and attitude towards e-learning are almost similar in this aspect. In addition, Yukselturk and Bulut claimed that male and female students have the same motivational beliefs and level of achievement where e-learning is concerned. However, Bruestle et al., (2009), added that in e-learning gender plays an important role especially when students assess their e-learning competence.

When students perceive e-learning as a beneficial tool for teaching and learning, their attitude and requirement to fulfil the ‘technology gap’ matures. Kumar, Muniandy, and Wan Ahmad Jaafar Wan Yahaya (2012) found that polytechnic students in Malaysia found learning with computers to be beneficial regardless of gender and CGPA level. However, there are concerns if e-learning is only beneficial to certain groups of achievers. A study done on 110 undergraduates in Malaysia revealed that there is no relationship between e-learning achievement and CGPA levels (Jasper et al., 2012) and this fact is also true in this study. Thus, there is no difference between groups of CGPA in the context of e-learning outcome.

Nevertheless, to further understand the relationship of these variables, the correlation analysis revealed the following:-

i. There is a relationship between gender and design type

Female students’ preferred PosD design and male students preferred NegD design. According to Passig and Levin (2000), the relationship between gender and satisfaction of using an e-learning tool is dependent on the interface and Leblanc (2012) described the main differentiating factor between genders are their colour preferences. As the colours used in the PosD design were warm colours, the female students’ preferences are justified by Ellis and Ficek (2001). According to them, male undergraduates prefer cool colours (NegD) whereas female students prefer warmer colours such as yellow and red which were used in the PosD design.

ii. There is a relationship between perceived intrinsic motivation and perceived satisfaction

According to Jung and Lim (2009), high levels of intrinsic motivation encourage students to learn to fulfil their satisfaction and interest. Intrinsic motivation and satisfaction are found to be co-dependent factors in the learning process, even in e-learning. The positive relationships between perceived intrinsic motivation and perceived satisfaction were also extended when students were exposed to the PosD and NegD but not the NeuD design.

Findings also revealed that male students were more satisfied and motivated with the NegD design compared to female students and this was educationally significant (Wolf, 1986). According to Mahzari and Ahmadzadeh (2013), the gender difference in the context of online aesthetics is not differentiated by aspects such as font or shapes but by the colours applied. In addition, the difference between genders could also be determined by preference between warm or cool colours (Ellis & Ficek, 2001). It has been reported that female online users prefer colourful interface whereas male users favour less saturated colours (Harrison, Reinecke, & Chang, 2015). Leblanc (2012) described adult male computer users are more prone to colours portraying professionalism such as dark, cool colours; in contrast, female users prefer more vibrant colours of yellow or pink. Nevertheless, a review done by Miche and Noirhomme-Fraiture (2009) on online preferences of user interface elements based on gender revealed that the relationship between colour and gender could be dominated by their psychological characteristics as determined by the femininity or masculinity.

Students that used the PosD and NegD designs confirmed that there is a relationship between satisfaction and intrinsic motivation; concluding that both genders were equally satisfied and motivated by the emotionally designed MLE. It was also found that students having high levels of CGPA achieved better
score through PosD design compared to other designs and the findings had a large practical effect in education research (Wolf, 1986). This is supported by a study conducted on Malaysian polytechnic students by Kumar et al., (2012) that concluded that high CGPA students have positive perception when dealing with computers. Fayombo (2012) claims that academic achievement is positively correlated with positive expressivity and in this study it was portrayed in the PosD design.

However everything comes back to the question: is it important to design for gender differences? The perception of undergraduates on e-learning design has been found to be unrelated to the gender, age, computer skills nor education levels (Parizotto-Ribeiro & Hammond, 2005). According to Leblanc (2012), to design a neutral user experience for human computer interaction is to most probably design based age groups because the design for “digital natives” is not affected by gender but by their culture and technology transformation. In addition, Rodgers (2008) doubted if higher learning institutions could implement e-learning technology that caters to different characteristics of students simultaneously. Nevertheless, by understanding how users experience a system and clustering the designs based on user groups’ personality might potentially be a design solution. In addition, much more research on emotional design in multimedia learning that reflects on the use of Cognitive and Affective Theory of Learning with Media also emphasizes exploring motivational and metacognition aspects of the user. As this was just a preliminary study with small sample size, further research on this area might shed some light on designing e-learning that has the maximum positive impact cognitively and emotionally.

CONCLUSION

Overall, there was no difference between gender and CGPA groups on the learning outcomes. However, significant differences emerged in some learning outcomes when students were exposed to different types of designs. It was found that female students preferred PosD compared to the male students. Male students were more motivated and satisfied with the NegD design. In both emotionally designed MLE (PosD and NegD) there seem to be a strong relationship between intrinsic motivation and satisfaction. With regard to CGPA, students with high CGPA performed better in the PosD design; no difference, however, was found in the NeuD and NegD design for other learning outcomes.

One of the major limitations of this study is that participants were engineering students and were limited to 33 respondents. The personality and preference of engineering students might skew toward negative design as it accommodates their introvert personality (Kirkham, Farkas, & Lidstrom, 2006) or it can always be that male students prefer more dark or cool colours for MLE. Nevertheless, it was observed that gender does play a role in how students perceive their e-learning environment affectively but it did not affect their learning achievement. Broadening the study to cover a more general topic might portray different findings on how emotional design could influence learning outcomes where gender is concerned.
REFERENCES


ABSTRACT

The main goal of this research was to investigate the readiness of art students in applying e-learning. This study adopted a survey research design. From three public Iranian Universities (Alzahra, Tarbiat Modares, and Tehran), 347 students were selected by multistage cluster sampling and via Morgan Table. Their readiness for E-learning application was assessed by a self-developed questionnaire. Data analysis was done by indexes of descriptive statistics and one sample t-test. Analysis of results found a significant relationship between the readiness of undergraduate students, graduate students, and post-graduate students to apply E-learning, but there was no significant relationship between students’ readiness and gender, university, and subject. Results revealed that Art students were in a moderate level of readiness for applying E-learning.

Keywords: e-learning Implementation, Students’ Readiness, Art students

INTRODUCTION

Access to high-quality and rich education is the main goal of any education system. One of the important objectives of higher education is to provide a quality education. Quality of higher education means to fulfill the expectations of individuals and society (Quality Centre of Tehran University, 2011). According to the results of research conducted in the field, e-learning training is a suitable strategy for improving the teaching-learning process quality (Golzari, Kiamanesh, Ghoorchian & Jafari, 2010). This type of education uses of the power of computer networks, Internet technologies, satellite and digital sciences.

E-Learning is not just a new tool. This method of teaching changes our experience and view of learning and is an impressive way of learning in higher education (Garrison & Anderson, 2005). In fact, e-learning is an educational system that provides access to higher education over the past, regarding quantity and quality, for volunteers (Seraji, 2013).

In e-learning, the teacher-centered has changed to a student-centered approach. It also provides great flexibility in teaching methodology, content management, a synchronous and asynchronous interaction between teachers and students, organizing and structure of courses, educational projects and finally student assessment. In this type of training, the teaching-learning process transcends the class boundaries. Therefore, the physical limits of education are overcome, and learning is possible any time anywhere (Okhovati, Sharifpoor Ghahestani, Islami Nejad, Hamzezadeh Marzooni, & Motamed Jahroomi, 2005).

In Iran, many universities present virtual courses alongside the traditional education, and many other universities are entering this field (Latifnejad Roudsari, Jafari, Hosseini & Esfalani, 2011). However, virtual learning in universities and art colleges of Iran and outside Iran is new, such that its establishment requires development and research. For successful e-learning implementation in art courses, it is necessary to identify...
and evaluate the factors affecting successful implementation.

Therefore, a study of the factors influencing success with suitable and original drawing could prevent failure in implementing e-learning systems for art majors in Iran. Readiness is a powerful factor in successful e-learning implementation (Mosadegh, Kharazi, & Bazargan, 2011). Readiness of students, professors and technology, is the most significant readiness aspect in this context. Also, the attitude of the people, especially students, is a key factor determining e-learning success or failure (Hussein, 2010).

Hence, according to the role of specifications of learners in success or failure of E-learning courses, this investigation is going to assess the required skills of students of these majors firstly before implementing e-learning in universities of Iran for art majors. "E-readiness means the ability of organisations and capacity of education stakeholders (management, key personnel, teachers and students) to participate in an electronic environment." (Khan, 2005).

Asian Pacific Economic Cooperation and McConnell have defined electronic readiness as "The level of community readiness to participate in the networked world" (Darab & Montazer, 2010).

Several studies on e-learning readiness have been conducted in Iran and outside Iran. Those studies can be divided into three groups; some are looking to provide a useful model for e-learning readiness assessment (Mosadegh, Kharazi, & Bazargan, 2011). Some consider a certain pattern to study on readiness level of organizations or universities in all aspects (Ouma, Awuor & Kyambo, 2013; Rahimidoost & Razavi, 2012; Aydin & Tasci, 2005). A group of researchers consider a particular aspect of e-learning readiness (Okhovati, Sharifpoor Ghahestani, Islami Nejad, Hamzezadeh Marzooni, & Motamed Jahroomi, 2005; Nasiri, Ghanbari, Ardalan, & Karimi, 2014; Mahdiuon, Ghahramani, Farasatkhah, & Abolghasemi, 2011); Sadik, 2007; Jariangprasert, 2007).

In many of these patterns, human resource readiness was considered. The four main components of human resources include learners (students), faculty, staff and planners (Darab & Montazer, 2010). Many studies have assessed student readiness (Ak aslan & Law, 2011; Tubaishat & Lansari, 2011). In all of these studies, a variety of sizes and patterns were used to assess readiness, but it is impractical to obtain a consistent pattern to measure student readiness for e-learning.

Additionally, various investigations have been done to identify specifications of successful virtual learners (Dabbagh, 2007; Palloff, & Pratt, 2005, Piskurich,2003; Rhode, 2004; Santy & Smith, 2007; Seraji & Yar Mohammadi, 2010; Singh, 2004; Tronsen, 2004; Watkins, 2004; Yukselturk & Bulut, 2007).

Seraji and Yar Mohammadi (2010) obtained a learner readiness assessment tool for entering e-learning courses in their investigation. Based on their findings, the learner applicants to e-learning courses must have five core competencies namely metacognitive skills, cognitive skills, self-navigation skills, communication skills and collaborative skills to work with computers and Internet access.

Assessing the readiness of art and non-art students to use virtual training has a similar pattern because this type of training requires skills that depend on the characteristics of e-learning, and not just a particular discipline, as a questionnaire is used to evaluate the different majors in a university.

Pingle (2011) observed no significant difference between the readiness of art students and business and science students on assessing the readiness of virtual training students. Maleki Marasht, Ghalai, and Mousavi (2012) investigated readiness level of students in different fields of study at Orumiyeh University to participate in e-learning. They used a questionnaire for this purpose.

No research has been done to identify skills and e-learning readiness assessment for art students in Iran. Outside Iran, only a few research studies on the subject exist.
The art education process is influenced by several variables, including students, faculty, field of education, teaching methods, educational resources, and growing art software trend. Art courses at the same position in an extensive collection of "art" are very diverse, but as creation is the main feature of "art", all the external manifestations of emotion are called as art. Majors related to art are called art majors.

The unique characteristics of art include being improvised and flexibility in determining the goals and directions, creativity and exploration, individual's vigilance and sensitivity to the phenomenon, being self-critical and self-seeking. These characteristics of an artist result in creating immortal artwork.

Artists interest from the fellowship of these habits all that may be filled with the imagery and attitudes, and enrich themselves with all the excellent habits of thinking and skilfulness to draw them by setting the rhythm (contact significant relationship). In the same rhythm is that the artist's work will be an original creation. As an artwork (problem solving) is generated using certain concepts (hypotheses) (creation), creation of the artwork itself is a reason to learn the concepts.

Artists make alive phantasm of a perception using the Visual Arts. In particular, art educators provide opportunities for artists to create an artistic work by observing or making contact with previous perceptions and what is now perceived. In other words, through the reconstruction of the outside world (outside integration), they change previous cognitive structures (inside Integration) (Sharafi, 2007). With this definition of art and the creation of art, it is claimed that in creating an artwork some features are emphasized that are similar to constructivism approach. Constructivism is in the field of learning and cognitive psychology. The main idea of constructivism is that learners make new knowledge based on previous training. This theory rests on the belief that the individuals construct knowledge. In other words, individuals interpret the new situation based on their previous experience and knowledge and finally form interaction with the new knowledge environment (Seif, 2005).

In today’s new world, artistic ideas and creating artworks has accelerated more than in the past. Art tools and equipment and software, such as art software, music, painting, simulations, are presented to market at high speed, and artists use them. But unfortunately, transformation in teaching art is overdue in the art world. Transformation is needed due to the changes in the means and methods of artworks; art education could not quickly make changes in line with new technological developments. In art education, teachers expect students to create their artworks before they are taught how to use ideas. Most artists try to copy other's works. Mostly, teachers encourage students to do artworks, but they are rarely taught how to accomplish an artwork successfully (Gaudelius & Speirs, 2011). So, finding an educational system that provides attainment situation for art students to its original purpose (the creation of artistic ideas) would be necessary.

Besides that, the goals of the educational system have been changed compared to the past. The goal of education should be developing critical thinking and self-learning ability so that students become lifelong learners. It has now been transformed into a symbol of the Information Age (Garrison & Anderson, 2004). Given the satisfactory results of scientific research conducted on e-learning system in other countries, policymakers are encouraged to continue and extend this kind of education. Research on "Virtual Learning from Iowa State University students' perspective" by Wilhelm (2003) shows that most students have a positive experience of virtual classrooms. They expressed that they learned more things in virtual classes than in face to face classes. Also, some research has been done on the effective use of ICT in the arts (Ho, 2007; Nancy, 2003).

Therefore, e-learning and providing a model for the art majors through virtual learning will be a suitable solution to change educational practices in Iran. The principal aim of art e-learning is simply providing a new type of training or replacing traditional art academic education. However, we must realize that using this learning can fill gaps in arts education, and this type of training provides art amenities and facilities to university art education.

According to constructivist features of art, as previously described, the learner-centered approach was used for this research. In the learner-centered approach, the focus is on the learners’ needs and interest and the use of communication and interactive tools (Seraji, 2011). This approach is rooted in the theory of constructivism. By emphasising the active role of learners in the learning process, constructivism considered
some principles necessary, such as social interaction and discussion; participation in activities of genuine learning, self-navigation in learning, and engagement, providing problematic situations in making the individual knowledge (Johnson, Patton, Bimber, Almeroth & Dwayne, 2004; Dwayne, 2006, cited in Nasaji, 2011). Paying attention to human infrastructure through e-learning system is very important in successful implementing of arts education. Identifying the infrastructure helps virtual education designers to make the right decisions about each element of education. The main research question of the current research was whether the skills of students are enough to make possible implementation of virtual art education. Another issue is whether the system can be applied to respond to which graduation levels, which fields of study and which gender.

Gender is one of the factors considered in effective adoption and use of e-learning systems; so researchers should consider it in developing and testing e-learning theories (Abadi, 2009). Knowledge of the relationship between gender, educational level, the field of study and degree of readiness, is effective in selecting art students to participate in e-learning and greater success of these groups. The study sought to answer the question as what is the readiness of art students to participate in e-learning. Review and response to the main issue are obtained through subquestions as follows:

1. Are the art students ready to participate in e-learning in aspects of collaborative communication skills, cognitive skills, and skills in working with computers and internet access, cognitive skills and leadership skills?
2. Is readiness of students to participate in e-learning different?
3. Is the readiness of art students different to take part in e-learning according to their education degree level?
4. Is the readiness of art students different to take part in e-learning according to their gender?

The current study is designed to assess the students' readiness of art students from AlZahra University, Tarbiyat Modares University, Academy of Art University and Tehran University, to participate in an e-learning system.

METHODOLOGY

This research is quantitative and based on a survey. Four universities of Iran with arts majors were selected. The population of this research included 8103 students of Alzahra University, Tarbiyat Modares University, Tehran University, and Honor University. The sample size was 347 people. Demographic specifications and descriptive statistics of variables of research are provided in Table 1. A questionnaire based on a five-point Likert scale was the instrument used in the investigation. It was previously used by Seraji and Yarmohammadi (2010). The instrument included five factors for readiness test of the learner to electronic courses. These factors include:

1. Communication and participatory skills,
2. Meta-cognitive skills,
3. Access level and skill to work with computer and the internet,
4. Cognitive skills, and
5. Self-direction.

Experts confirmed these five factors. Reliability of this questionnaire was confirmed by Masters of Arts degree and three experts in e-learning. The questionnaire consisted of 45 questions, with the whole five-point Likert scale including three types of questions. The first group is to determine demographic specifications of a statistical sample: gender, educational level, and university venue. The second group includes questions relate to major. The third group includes readiness level of students to take part in electronic learning categorized into five factors.
The first factor with five questions, second factor with five questions, third factor with eleven questions, fourth factor with six questions, fifth factor with five questions was measured. Cronbach alpha was used to determine the questionnaire validity. Results presented in Table 2 indicate the acceptable validity of the questionnaire.

Table 1. Demographic characteristics of the study sample

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>112</td>
<td>32.28</td>
</tr>
<tr>
<td>Female</td>
<td>235</td>
<td>67.72</td>
</tr>
</tbody>
</table>

Table 2. Cronbach's alpha of e-learning readiness assessment in each factor of Research

<table>
<thead>
<tr>
<th>Factors</th>
<th>Factor1</th>
<th>Factor2</th>
<th>Factor3</th>
<th>Factor4</th>
<th>Factor5</th>
<th>Total tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>reliability</td>
<td>.70</td>
<td>.71</td>
<td>.87</td>
<td>.79</td>
<td>.75</td>
<td>.9</td>
</tr>
</tbody>
</table>

In collecting data, after the number of students of each university was determined, the questionnaires were distributed among students. They were asked to answer the questionnaire. Their responses to the questionnaire were used as quantitative data. Descriptive statistics (frequency table, histogram, mean and standard deviation) and inferential statistics (one-sample t-test) were used. In this method, the frequency of responses to each of the questions was multiplied in the factor of interest (a lot = 5, 4 = high, 3 = average, low and very low = 2 = 1). Then a score was calculated for each question given the number of questions related to the research questions; the scores were added together, and then the mean and other statistical parameters were calculated. According to the results of the survey, research questions were addressed.

RESULT

Demographic factors of the respondents

The first section of the questionnaire included questions about demographic characteristics of respondents. A total of 347 art students participated in this study; the number of female students involved in the study was more than the number of males (67.72% female (235), and 32.28% male). Education level is another demographic variable of investigation with 198 people (57.1%) studying in bachelor grade, 133 studying in M.A. grade (38.33%), 16 people in Ph.D grade (4.71%).

The first research question: are the art students ready to participate in e-learning in collaborative communication skills, cognitive skills, skills for working with computers and Internet access, cognitive skills, self-direction skills?

Questionnaire responses were analyzed about these skills. Student readiness for e-learning is rated in a range from one (low) to five (very high). Quantitative spectrum could be changed to quality spectrum in four levels as High Readiness Level (4.2-5), average fitness level (3.4-4.2), lack of preparation (2.6-3.4), lack of readiness is a very high degree (1-2.6) to have criteria for judgment. According to the considered scores (1 to 5) to measure, the boundary between the readiness and unpreparedness of students for electronic learning is a score of 3.4. Because by dividing the number of intervals on the scale number, a distance of .80 is achieved. Using descriptive statistics, each of these factors was evaluated, and factors mean, and the standard deviation was calculated. According to the averages obtained on the five factors in comparison with the classification, given preparedness, readiness and its level are determined.

Communication and collaboration skills needed for electronic learning are the first factors. This factor was evaluated with five questions and with an average of 4.3 represents an average preparedness regarding
"communication and collaborative skills" for e-learning of students. Meta-cognitive skills are the second factor, evaluated with five questions. "Metacognitive skills," with an average of 4.3 indicates readiness to receive meta-cognitive skills regarding e-learning skills in students. The third factor examined is the availability and skills with computers and the Internet with eleven questions. The average of "The availability and skill to work with computers and the Internet" is 3.63 represents the average readiness in the availability and skill to work with computers and the Internet for electronic learning in students.

Cognitive skills (fourth factor), were examined by six questions. "Cognitive skills," with an average of 3.66 indicates average readiness regarding cognitive skills for e-learning in students.

The fifth factor was examined as self-leading with five questions. The mean of "self-leading" is 3.6 and it represents the average readiness regarding self-leading to receive e-learning in students.

According to the descriptive data as well as concerning the classification of e-learning readiness of art students to participate in e-learning, with an average of 3.54 is above average level.

Question Two: Is the readiness to participate in e-learning of students of various majors different?

ANOVA parametric test was used to answer question 2 of this research. According to the results in Table 3, as the sig value is 0.29, there is no significant difference in student readiness for e-learning between the courses of study. As seen in the table, there is no significant difference in average of readiness of students of different majors. Thus, according to the results of this test, it is claimed that readiness of students, regarding their major, does not differ significantly.

Table 3. Results of Analysis of Variance to Investigate the differences in students' readiness based on their major

<table>
<thead>
<tr>
<th>Major</th>
<th>Mean</th>
<th>Test amount</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Print</td>
<td>103.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Textile Design</td>
<td>103.60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repair</td>
<td>105.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Painting</td>
<td>108.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Music</td>
<td>109.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design Scene</td>
<td>109.66</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Photography</td>
<td>110.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performing arts and cinema</td>
<td>110.41</td>
<td>1.16</td>
<td>0.29</td>
</tr>
<tr>
<td>Sculpture</td>
<td>113.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moving Pictures</td>
<td>113.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Islamic art</td>
<td>113.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Video communications</td>
<td>113.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Handicrafts</td>
<td>114.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Architecture</td>
<td>116.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial Design</td>
<td>116.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Art research</td>
<td>117.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carpet</td>
<td>119.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Question 3: Is the readiness of art students different to participate in e-learning according to their educational degree?

Table 4 gives the results of ANOVA analysis to investigate the differences in students’ readiness based on educational degree.

Table 4: Results of ANOVA to investigate the differences in students' readiness based on educational degree

<table>
<thead>
<tr>
<th>Education level</th>
<th>Mean</th>
<th>Test amount</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor</td>
<td>111.49</td>
<td>5.89</td>
<td>0.01</td>
</tr>
<tr>
<td>Master</td>
<td>115.53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ph.D.</td>
<td>125.94</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ANOVA test and Scheffe’s test were used to test the hypothesis. According to results as displayed in Table 4, as the p value is 0.01, there is a significant difference between educational levels in the readiness level of students. According to results of Scheffe’s test and comparing mean of three educational levels, there is a significant difference among students of three educational levels of bachelor, master and Ph.D to participate in electronic learning. According to the results, readiness level of Ph.D students (mean 125.94) is more than students of Master (mean 113.53) and students of bachelor (mean 111.49).

Question 4: Is the art students' readiness different to participate in e-learning according to their gender?

To test whether readiness for e-learning differs by gender, the independent samples t-parametric tests were used. Table 5 gives the result of independent samples t-test for mean difference by gender.

Table 5: Results of Independent Samples t-Test of Mean Differences Among Students' Readiness Based on Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Mean</th>
<th>Test amount</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>112.28</td>
<td>1.06</td>
<td>0.288</td>
</tr>
<tr>
<td>Female</td>
<td>114.31</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to results of Table 5, the p-value obtained is 0.28, suggesting that there is no significant difference between the readiness of male and female students for e-learning.

DISCUSSION

E-learning studies have shown that the main elements of success in e-learning are as followed: access to computers and the Internet, search skills, classification and data analysis, effective use of the tools, familiarity with communication methods, planning skills and learning methods (Rhode, 2004; Pallof & Pratt, 2003; Watkins, Leigh, & Triner, 2004; Seraji, 2010)

Analyzing results of studying readiness level of art students to participate in e-learning courses indicate that readiness mean of students studied in 5 factors as 3.54 out of 5 hence indicating the average readiness of art students to participate in e-learning. In this section, we will present the details of student readiness according to the five different factors; Communicative and Collaborative Skills, Meta-cognitive skills, Technology availability and skills, Cognitive skills, and Self-directed learning.
The first factor is communicative and collaborative skills. This factor with a mean of 3.4 indicates average readiness. Abilities of art students must be improved in using tools before implementing the e-learning system because weak interaction is one of the significant problems in e-learning. Collaborative and interactional capability of e-learning and internet must be considered significantly to implement e-learning systems. According to Garrison, participation, engagement and dialogue are essential in the e-learning curriculum. In this type of learning, "authority-based interaction patterns" are replaced by "group-interaction based patterns." Therefore, in this study, the readiness of students for interaction and group discussion was assessed (Kamaliyan & Fazal, 2009).

Regarding the metacognitive skills; the mean of this factor is 3.4 indicating average readiness in metacognitive skills in art students. One of the main problems of education (especially e-learning) is that students must learn how to learn, how to remember and how to solve problems (Belmont, 1998). Cognitive and metacognitive strategies are the most powerful influence on learning. A significant relationship exists between learning method and educational progress in university (Meece, Bluemenfeld & Hoyle, 1998; Yang, 2005).

Shih, Ingebritsen, Pleasants, Flickinger and Brown (1998) investigated the importance of the relationship between advances in the online education fields, motivation and cognitive and metacognitive strategies. According to their results, people who use metacognitive strategies are more successful than people who use these strategies less. Metacognition is the learner's ability to understand the cognitive capabilities and application of these capabilities to learning. It is critical for remote learners because they do learning assignments individually. Since the relationship between use of cognitive and metacognitive strategies with students' progress in virtual education is significant, teaching these strategies before starting e-learning can improve student performance significantly. Metacognitive skill refers to knowledge and awareness about one’s cognitive strengths and weaknesses and trying to fix or improve them. Therefore, study skills such as planning and goal setting, forecasting and determining the exact time of study, self-control and monitoring progress and self-regulation can be considered as metacognitive skills in learning.

Technology availability and skills represent the average total 3.63 (average readiness) in student' readiness in skills of working with computers and Internet access. In the virtual learning environment, students need access to educational content, do learning activities, participate in synchronous and asynchronous discussions and need tools and computer software and should also have access to these tools, and have the skills to work with them.

Chan, Jones, Eileen, and Richard (2006) in their investigation found that students with high keyboard skill can perform technology-based learning activities better than other students. Babin, Tricot, and Mariné (2009) observed that students with essential knowledge and skills in tools and internet software had more efficiency than other groups in virtual learning courses (Seraji, 2013).

Cognitive skills with the total mean of 3.66 represent average readiness and the ability of art students in cognitive skills. They relate to methods that increase interpretation, understanding, and information acquisition abilities. Cognitive skills strengthen thinking process and “are helpful to achieve goals such as comprehension and memorization” (Schleifer & Dull, 2009). Cognitive strategies include rehearsal, elaboration, and organizational strategies, and are widely accepted as important cognitive strategies for facilitating the encoding, storage and retrieval processes (Pintrich, 2003).

To make better use of the e-learning resources, learners must identify their learning needs and information and classify, analyze and interpret data to use accessible data in e-learning resources to improve their knowledge and skills. So e-learning participants should benefit from scientific thinking skills and application of the scientific method to classify information and analysis, and then by interpreting data, provide new solutions to problems (Huang, 2010). Hence, problem-solving skill and critical thinking power are considered as required skills for readiness for e-learning.

Self-directed learning, with the total mean of 3.6 represents average readiness and the ability of art students in self-directedness. Self-directedness is defined as skills collection that persons use to identify their learning needs, accept responsibility for the learning process, followed by their intrinsic motivation.

Chu and Tsai (2009) investigated ten important factors of adult success in the Virtual Learning
Environment. Based on their results, self-directedness skill is the most important success factor in virtual courses. In this environment students need independence in decision making, and skills in writing, production, modification, collaboration, search, data collection, storage and monitoring.

As e-learning environment involves self-study, and access to various sources, a variety of selections, and time of the study, and multi-media format, self-directedness is essential. Students who have enough self-motivation and responsibility for learning are needed in this learning system (Seraji, 2013).

Birch (2001) claims that self-directedness is one of the specifications of successful learners. So about the first question, results revealed that Art students have a moderate level of readiness for applying e-learning. In similar research, the Students E-readiness in many Universities in Iran had a good level such as Zanjan Medical Science (Mousavi, Maleki, Faghihzadeh, Ojaghloo & Noroozi, 2016), Isfahan University (Changi, Haghani, & Nowroozi, 2013). In some studies, the level of readiness for applying e-learning was found moderate (Maleki Marasht, Ghalai, & Mousavi, 2012; Okhovati, Sharifpoor Ghahestani, Islami Nejad, Hamzezadeh Marzooni & Motamed Jahromi, 2015). About the third and fourth questions, there is not a significant difference between fields of study, gender, and readiness level. Results are consistent with Soydal, Ünal, and Alır (2011), and Maleki Marasht et al. (2012), but are contrary to results of Pingle (2011). Hence, a coordinated plan could be used to implement electronic learning in various fields of study.

As for the third research question, the preparedness of Ph.D students is more than the e-learning readiness of graduate and undergraduate students. The readiness of Ph.D students is more due to nature of their lessons that is more research-based and requires scientific methods more. Besides that, they show greater use of computers and the Internet for implementing projects. The significant difference is promising in some cases. That means, if the university students are encouraged to carry out research projects, they are motivated to search information broadly, and their skill required for participating in e-learning is increased. Lack of significant difference among academic disciplines and schools of art shows uniform policy for investing in e-learning training for all majors of art.

In a study conducted to assess the student’s attitudes and knowledge on e-learning in Mashhad University of Medical Sciences, a similar outcome was obtained for the lack of significant difference between the field of study and attitude between required knowledge and field of study.

The lack of significant differences in the areas of art and e-learning, despite considerable differences like art majors, shows the ignorance and lack of awareness in schools of art to e-learning. Inadequate skills result from the low formal art education system (in both universities and vocational institutions in Iran). Despite changes in the field of art and plans implemented, the Iranian educational system has failed to meet the student needs and the teaching method in the arts is still traditional teaching (Sarsangi, 2014).

Low level of students' skills on computer and the Internet are due to the following: Lack or inadequacy of information technology courses in the curriculum of arts, lack of electronic courses in art schools, little facilities and computers and Internet usage, and lack of academic staff knowledge and skills on e-learning, and Internet skills.

RECOMMENDATIONS

As the findings of this study show, the readiness of art students to participate in e-learning is relatively moderate, but improvement and the preparation of students in many ways is essential to implement an e-learning system.

One of the appropriate approaches to success in implementing this system includes familiarizing students with the concept of e-learning and the advantages and disadvantages of this type of learning before they enter the e-learning system.

Many students entering e-learning know little of the requirements to get into this area. There is a significant relationship between the uses of cognitive and metacognitive strategies and students’ progress in virtual learning. Teaching these strategies, from the start, of course, can influence student performance. The promotion of written verbal skills is an example of it. Cooperative learning and group assignments will provide
another way to enhance collaborative learning interaction skills of students.

Introduction to e-Learning courses and other courses, Introduction to the Internet and computer skills courses for art students to participate in e-learning development skills are required. The readiness of art students as one of the important factors in implementing e-learning has been assessed in this investigation.

Other factors and readiness of faculty members of art school are the basis for future investigations. More recent research can identify issues such as the need to study art students' learning styles and adapt them to the characteristics of the electronic learning environment, to guarantee successful e-learning implementation among them. Also, identifying the strengths and weaknesses of art education at universities in Iran and matching these with the strengths and weaknesses of virtual art education will lead to better understanding of threats and opportunities in implementing e-learning for art education in universities.

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