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# A STUDY OF EXPLORING THE INFLUENCES OF SIMULATION GAME-BASED E-BOOKS TOWARD HIGH SCHOOL MINORITY STUDENTS' READING LITERACY

## Abstract:

This study explores the influences of simulation game-based E-books toward high school minority students' reading literacy. It is targeted in a group of 183 high school students with 115 of minority students in experimental group and 68 of Han students in control group. Simulation game-based E-books and self-design reading comprehension scale are implemented. The plot of the E-book is related to an eaglet of how it learns to fly in the sky; the little eaglet was timid and later it turned out to be a brave eagle warrior to protect its species. The purpose of using self-constructed interactive E-book is to promote higher level of reading interest. This study compares simulation and non-simulation game-based E-books; the data was analyzed according to three different levels of reading literacy and reading comprehension: access and retrieve, integrate and interpret, and reflect and evaluate. Results showed that the experimental group (simulation game-based E-books) had better reading comprehension than the control group (non-simulation game-based E-books); experimental group in the level of integrate and interpret abilities showed that female are better than male students; Minority students in the experimental group performed better in reading comprehension at all levels compared with Han students; last but not the least, experimental group of students in access and retrieve abilities showed that female performed better than male students. It is concluded that the type of simulation game-based E-books and its content have a significant influence toward Taiwan minority students.

## Keywords:

simulation digital game-based E-books, reading literacy, reading comprehension

**JEL Classification:**  I29, I24

## Introduction

Reading literacy is the foundation of learning any science. Students who learn the necessary reading techniques will gain the ability to learn independently. Therefore, reading literacy has been viewed as a basic ability in life (Castles & Coltheart, 2004). Barker (1992) believes that e-book is a term used to describe new form of books unlike traditional books on paper. Similar to paper books, e-books comprise numerous pages, but unlike traditional books, every page on an e-book was designed and contains dynamic electronic information. Waters (2011) stressed that e-books contain audio, animations, and automatic cross referencing, that they are easy to distribute, have strong functions, are flexible, immediate, and easy to access. Cummins (1986) explored the learning issues of students from ethnic minorities from the perspective of empowerment, and believed that teaching should be interactive, that students' language and culture should be integrated into courses, and that students should be given more opportunities to actively participate, think, explore, discuss, and present, transforming them from a passive and receiving role to actively thinking problem solving, so that they gain success in learning. Livo and Rietz (1986) believe that stories are daily experiences reorganized, and that stories help people to understand and remember their surrounding environment. Reading requires considerable effort, and whether students decide to read or not is determined by their motivation (Baker & Wigfield, 1999), in which the presentation and design of text plays a key role in motivating students to read. Technological development has diversified reading materials for students, and the combination of different media not only makes learning more fun, but also increases students' reading motivation. Unlike reading text, e-books combined with games make reading fun, and there have been many studies on the application of games in teaching, e.g. the John D. and Catherine T. MacArthur Foundation Reports on Digital Media and Learning, which pointed out that the interaction and participation of game-based e-books, as well as the requirement on team work in online games and social media, including design and learning principles of various games, can all be used to supplement formal school education (MacArthur Foundation, 2008). Green, Reod and Bium (1998) also pointed out that computer games are a part of youth culture. Hence, using games as a medium for education is an ideal approach. This study explores the influences of simulation game-based E-books toward high school minority students' reading literacy. It is targeted in a group of 183 high school students with 115 of minority students in experimental group and 68 of Han students in control group. Simulation game-based E-books and self-design reading comprehension scale are implemented.

**Method**

1. Research Subjects

This study focuses on high school students from ethnic minorities in Taiwan. It is targeted in a group of 183 high school students with 115 of minority students in experimental group and 68 of Han students in control group. Simulation game-based E-books and self-design reading comprehension scale are implemented.

2. Experimental Design

| Independent Variables (Form of the text) | Control Variables | Dependent Variables (Learning Results) |
|---|---|---|
| Experimental group (simulation game-based E-books) | Grade<br><br>Content of text<br><br>Reading time<br><br>Test items | Reading comprehension ability<br><br>Access and retrieval ability<br><br>Integration and interpretation ability<br><br>Reflection and evaluation ability |
| Control group (Web version e-book) | | |

3. Research Tools

a. Simulation game-based E-book

This study created the simulation game-based e-book using Adobe InDesign, the pages on the e-book have a page turning effect. Users can turn pages by clicking on their mouse or using their keyboard. The game in the e-book is designed based on the story. Besides reading the text, users can also click on the interactive animations to play the game. Music is played according to the contents of the e-book, so that users can listen to the traditional music of ethnic minorities in Taiwan while reading the e-book.

**Figure 1 shows a screenshot of the e-book**

b. Web version e-book

The web version e-book was modified from the simulation game-based e-book, but does not have the page turning effect. Background music is also played according to the contents of the e-book, so that users can listen to the traditional music of ethnic minorities in Taiwan while reading the e-book.

c. Reading Comprehension Questions

This study designs reading comprehension questions based on the contents of the e-book, in which the distribution of questions by type and level are shown in Table 1.

**Table 1 Distribution of Reading Comprehension Questions**

| | | |
|---|---|---|
| | Multiple choice | 14 questions (10 points each) |
| Type | Other | 2 questions (30 points each) |
| | Total | Pretest 100 points, posttest100 points |
| Level of reading comprehension | access and retrieve | 8 questions |
| | integrate and interpret | 6 questions |
| | reflect and evaluate | 2 questions |

# Results

1. Analysis of Reading Comprehension Test Results of the Experimental Group and

Control Group

This study conducted a pretest on the reading comprehension of students in the experimental group and control group, and performed independent sample t-test on test results to see if there was a significant difference between students' reading comprehension at each level. Results of the pretest are shown in Table 2 and indicate there is no significant difference in the reading comprehension of students in the two groups.

**Table 2 Analysis of Pretest Results**

| Variable | Experimental Group | | Control Group | | t (Degree of freedom) | p | 95% Confidence interval | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | M | SD | M | SD | | | Lower bounds | Upper bounds |
| Total | 38.74 | 12.76 | 38.35 | 16.29 | .17(170) | .86 | -4.00 | 4.78 |
| access and retrieve | 14.42 | 7.07 | 14.29 | 8.36 | .11(170) | .91 | -2.21 | 2.47 |
| integrate and interpret | 8.27 | 5.98 | 9.11 | 6.85 | -.86(170) | .39 | -2.80 | 1.10 |
| reflect and evaluate | 6.25 | 3.64 | 5.41 | 7.12 | 1.02(170) | .31 | -.790 | 2.47 |

*$p<.05$, **$p<.001$

The posttest was conducted after the two groups read the simulation game-based e-book and web version e-book. An independent sample t-test was performed for reading comprehension and each of the three levels. Results show that students in the experimental group had significantly better reading comprehension, "access and retrieve, "integrate and interpret," and "reflect and evaluate" compared with students in the control group. Results of the posttest are shown in Table 3.

**Table 3 Analysis of Posttest Results**

| Variable | Experimental Group | | Control Group | | t (Degree of freedom) | p | 95%Confidence interval | |
|---|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | | | Lower bounds | Upper bounds |
| Total | 71.01 | 13.98 | 60.90 | 14.45 | 4.58(170) | .00** | 5.75 | 14.47 |
| access and retrieve | 24.33 | 6.65 | 21.47 | 7.18 | 2.67(170) | .01* | .74 | 4.97 |
| integrate and interpret | 15.91 | 4.76 | 13.09 | 4.146 | 3.99(170) | .00** | 1.43 | 4.22 |
| reflect and evaluate | 15.24 | 7.31 | 11.57 | 8.21 | 3.06(170) | .00** | 1.30 | 6.03 |

*$p<.05$, **$p<.001$

## 2. Differences in the Reading Comprehension of Experimental Group Students by Gender

There was no significant difference in the reading comprehension of male and female students in the experimental group in the pretest at all three levels, results are shown in Table 4.

**Table 4 Analysis of Pretest Results of the Experimental Group by Gender**

| Variable | Male | | Female | | t (degree of freedom) | p | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | | | Lower Bounds | Upper Bounds |
| Total | 38.30 | 14.055 | 39.15 | 11.55 | -.33(102) | .74 | -5.84 | 4.14 |
| access and retrieve | 14.40 | 7.06 | 14.44 | 7.139 | -.03(102) | .98 | -2.81 | 2.72 |
| integrate and interpret | 8.60 | 6.39 | 7.96 | 5.62 | .54(102) | .59 | -1.70 | 2.97 |
| reflect and evaluate | 5.70 | 4.10 | 6.76 | 3.10 | -1.49(102) | .14 | -2.47 | .35 |

*$p<.05$, **$p<.001$

After the experiment reading the simulation game-based e-book, there was no significant difference between male and female students in the experimental group in terms of reading comprehension, "access and retrieve, "integrate and interpret," and "reflect and evaluate," posttest results are shown in Table 5.

**Table 5 Analysis of Posttest Results of the Experimental Group by Gender**

| Variable | Male | | Female | | t (degree of freedom) | p | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | | | Lower Bounds | Upper Bounds |
| Total | 72.98 | 14.85 | 69.192 | 13.00 | 1.39(102) | .17 | -1.62 | 9.21 |
| access and retrieve | 24.60 | 6.46 | 24.07 | 6.87 | .40(102) | .69 | -2.07 | 3.12 |
| integrate and interpret | 17.00 | 4.74 | 16.91 | 4.60 | 2.28(102) | .21 | .27 | 3.91 |
| reflect and evaluate | 14.78 | 7.90 | 15.67 | 6.76 | -.61(102) | .54 | -3.74 | 1.97 |

*$p<.05$, **$p<.001$

## Conclusion

This study targets high school students from ethnic minorities in Taiwan, and uses a simulation game-based e-book along with a reading comprehension scale developed by this study for an experiment. Contents of the e-book are related to the culture of ethnic minorities. This study examines the reading comprehension, "access and retrieve,"integrate and interpret" and "reflect and evaluate" abilities of students after reading the simulation game-based e-book and web version e-book. This study hopes that results can be provided to education institutes related to ethnic minorities of different countries.

The results show that when students of the experimental group read the simulation game-based e-book and interact with the animations, it helps students better understand abstract or more difficult parts. Interactive game elements related to the contents of the e-book not only improves students' reading comprehension, but also improves students' ability to access and retrieve information from the text. It also improves students' integration and interpretation ability. However, there was no significant difference in the reading comprehension, access and retrieve, integrate and

interpret and reflect and evaluate abilities of male and female students in the experimental group after reading the simulation game-based e-book. Hence, if there is a well-designed interactive e-book, the reading comprehension of all students from ethnic minorities can be improved.

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