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ScienceDirect

Procedia - Social and Behavioral Sciences 90 (2013) 340 – 343

Procedia
Social and Behavioral Sciences

6th International Conference on University Learning and Teaching (InCULT 2012)

Teaching Basic Mathematics By Using TuxMath In Primary Education

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Abstract

The purpose of the current study is to examine the usefulness of TuxMath as a teaching aid for teachers in teaching and learning process of basic mathematics in primary education. A Program Development Course was given to teachers about the TuxMath. The teachers applied the TuxMath in their classroom during their teaching and learning process of basic mathematics operation in primary education. Then the teachers were interviewed and test papers were prepared for students who learned basic mathematics operation using TuxMath and without TuxMath. The teacher's response and students marks were analysed. The result showed that TuxMath had a significant positive impact among the teachers and students, and the latter preferred TuxMath rather than using the traditional method of teaching basic mathematics operation in Level One. The findings of the current study encouraged teachers to use TuxMath in their teaching and learning process.

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Selection and/or peer-review under responsibility of the Faculty of Education, University Technology MARA, Malaysia.

TuxMath, Basic mathematics operation, Educational technology, Arcade games

1. Introduction

Mathematic is logical ideas, interconnected ideas, relationships, patterns; some include other aspects such as communication, or particular sub-sections like the appreciation of number. To teach mathematics in this 21st century we need ICT integration to make the students not to get bored in the classroom. In Level One, students start to learn basic mathematic operation in school. Most of the schools are using non digital teaching aids in classroom to teach students the basic mathematic operation. This is sometimes makes the 21st century students who are friendly with computers and mobile phones to be bored and uninterested. In this case, the teacher should find new digital teaching aids to teach the students.

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Educational technology, as the term is used in the realm of education, refers to the technical means that are used to support teaching and learning, such as computers, calculators, educational software programs, interactive media, and telecommunication systems. The use of educational technology has become increasingly popular in primary schools over the past several decades. There is little doubt that technology has become a ubiquitous tool for teaching and learning. Successful and effective use of technology for the teaching and learning of mathematics depends upon sound teaching and learning strategies that come from a thorough understanding of the effects of technology on mathematics education (Albright & Graf, 1992; Coley, Cradleer, & Engel, 2000).

2. TuxMath

Tux,of Math Command (TuxMath, for short) is an open source arcade-style video game for learning mathematics, initially created for Linux based operating system. The game-play mechanic is based loosely on that of the arcade game Missile Command, but with comets falling on cities, rather than missiles. Like Missile Command, players attempt to protect their cities, but rather than using a trackball-controlled targeting cross-hair, players solve math problems that label each comet, which causes a laser to destroy it. Since version 1.7.0 the game also includes a multiplayer mode and factor-fraction activity called Factoroids. Eventually the city imagery was replaced with igloos, to match the arctic theme of Tux, the Linux penguin, who stars in the game. This game mostly in Linux based operating system such as Edubuntu, Qimo, Uberstudent, Fedora Spin and Open SUSE. Now this game is also available for Microsoft Windows and Mac OS. It makes the teacher and students easy to make the teaching and learning process by using TuxMath in any kind of computer operating system

3. Methodology

Using a case study approach, this paper attempts to gain an insight on how to make easy and effective the students understanding of the basic mathematics operation in Level One. TuxMath was applied in Year One, Two and Three in early or basic mathematics operation. The basic operations are taught to the level one students are on addition, subtraction, multiplication and division. A short program development course was given to the Level One mathematics teachers in SJK(T) Port Dickson. Then getting reflection from the mathematic teachers and solving their problems in handling TuxMath. After the program development course, the teachers applied the TuxMath in their teaching and learning process in basic mathematics operation. The teacher gave their feedback through an interview about the effective of TuxMath in basic mathematic operation in Level One students. A test paper also was given to the students who learnt basic mathematic operation by using TuxMath and without using TuxMath. The data was collected and analysed in a table.

4. Data Collection

The data collected through from the interview of the teachers and March test papers of students. The following questions were asked to extract teacher's opinion based on their experiences in class when they taught basic mathematics operation using the TuxMath.

- 1) Did you learn how to use TuxMath?
- 2) How was the students reaction when using TuxMath in teaching and learnig process?

- 3) How many students gave positive response or commitment in class when using TuxMath?
- 4) How did TuxMath help in the teaching and learning process?
- 5) Will TuxMath be a suitable teaching aid for basic mathematic operation teaching for level one students?

5. Data Analysis

Data obtained from the test paper of students and interview with teachers.

Class	Class with TuxMath	Class Without Tuxmath
Cumulative percentage of exam	96%	74%
Number of students	68	70
Median of students marks	96/100	70/100

Table 1 : Test paper result of 2 various classes.

The Table 1 shows the result of the test paper of two classes. The class in level one (year one, two and three) where TuxMath was applied in teaching and learning process, the students got higher marks. This shows that TuxMath is more effective if compared with the traditional method in teaching basic mathematic operations. When the students play computer game in teaching in learning process, it will make them to remember for a long time. The difference between these two class shows that TuxMath is suitable for teaching basic mathematics operation in Level One.

The teachers who answered for the interview gave the same answers for all questions. The answers are as below.

- 1) Did you learn how to use TuxMath?
Yes. I learnt to use TuxMath from the program development course in school for all mathematics teachers.
- 2) How were the students reaction when using TuxMath in teaching and learning process?
The students are very excited and interested in the teaching and learning process when using TuxMath. They have never given interest such as this before I used the TuxMath in class. The courseware that is attached with textbook is also not friendly with my laptop. So, I did not use that courseware in my mathematics class. But TuxMath is easy to use in my laptop.
- 3) How many students gave positive response or commitment in class when using TuxMath?
Every student took part when I used the TuxMath. Some students who were silent in my class also started to take part and gave their answers when using TuxMath.
- 4) How does TuxMath help in teaching and learning process?

TuxMath helped me to achieve my teaching and learning process's objective easily. It made every student to take part in class and made them happy in the class when teaching and learning process is running. This also helps me to bring my class towards students centered learning.

- 5) Will TuxMath be suitable teaching aid for basic mathematic operation teaching for Level One students?

Yes. It is very suitable. It helps the students to solve the problems by using mental arithmetics in a short time. The sounds in this program also very suitable for Level One students and make them happy when they play.

6. Findings

The respondents discovered that TuxMath is useful, easy to apply, and provides a best learning outcomes. The teachers are confident in using the TuxMath in their class and ready to teach other mathematics teacher how to use TuxMath in their classrooms for Level One students. The students also got good marks in their exam in basic mathematics operations. TuxMath is also compatible with Malaysian Mathematics Curriculum which is used by every school in Malaysia. The students also can use TuxMath in their home computer and play in their home by their self without teacher guidance. The size of TuxMath is 20.5MB and does not need a large space in the computer hard disks.

7. Conclusion

The study shows that using TuxMath as an educational tool or teaching aid has a significant positive effect on students' learning and teacher's teaching. To engage the digital natives, teachers should exert effort to include TuxMath in their classroom during the teaching and learning process. The students also like to play with TuxMath than be in normal teaching and learning process.

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