Maths Games: An effective pedagogical tool to enhance learning

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Abstract 21 April, 2015

Traditional mathematics teaching in schools has fostered memorization of facts and procedures. Studies indicate that most of the students have problems learning mathematics due to lack of motivation, boredom, little encouragement for self-learning, lack of interest and proficiency in the subject, lack of continuity and focus. From the constructivist perspective, the effect of students’ active participation on maths achievement cannot be ignored. In an effort to engage children in mathematics learning, many teachers teaching primary grades use mathematical games and activities to overcome these barriers. Games have not only been employed for drill and practice but also for warm-up activities and rewards. The effectiveness of games as a pedagogical tool requires further examination if games are to be employed for the teaching of mathematical concepts. In order to bridge the achievement gaps between high and low achieving students, it is important to consider how to help students with low achievement improve their learning performance. Although there is much theoretical support for the benefits of digital games in learning and education, there is mixed empirical support. This research report provides an overview of the theoretical and empirical evidence behind the use.

Key words: Mathematics games, Digital games, technology and achievement.

INTRODUCTION

Traditional mathematics teaching, which is still the norm in schools, is an endless sequence of memorizing and forgetting facts and procedures” (Battista, 1999). Traditional mathematics instruction follows the same routine each day; this includes note taking, guided practice, and independent practice (Battista, 1999). So there is a dire need for the teachers to make learning of mathematics fun and meaningful for their students to motivate them to want to learn and study mathematics (Ahmad et al., 2009). Ahmad et al. (2009) found in their study that most of the students have problems learning mathematics for the following reasons: lack of motivation, boredom, little encouragement for self-learning and lack of continuity and focus.

Taylor (2010) while studying the causes of low maths achievement of students of the United States in comparison to students of other countries found the following two reasons: Students are becoming less interested in mathematics, and they lack proficiency in mathematics. He maintained that mathematics is a core skill necessary to live and work in society. Khan and Chishti (2011) in an attempt to study whether students’ active participation affected math achievement found that students’ active participation in the mathematics class played a tremendous role in their maths achievement.

Use of Maths Games in teaching at the primary level

In an effort to engage children in mathematics learning, many primary teachers use mathematical games and activities. Games have been employed for drill and practice, warm-up activities and rewards. The effectiveness of games as a pedagogical tool requires further examination if games are to be employed for the teaching of mathematical concepts. Recent studies conducted to study the effectiveness of maths games in learning provide us the motivation to use games including computer games in learning mathematics especially at the primary level. In order to bridge the achievement gaps between high and low achieving students, it is important to consider how to help students with low achievement improve their learning performance. For over two
decades, many stakeholders have highlighted the importance of digital technologies in the field of mathematics education.

The U.S. National Council of Teachers of Mathematics, for example, in its position statement claims that “Technology is an essential tool for learning mathematics in the 21st century, and all schools must ensure that all their students have access to technology” (NCTM, 2008). According to the POSITION PAPER, NATIONAL FOCUS GROUP ON TEACHING OF MATHEMATICS, NCERT, Mathematical games, puzzles and stories involving number are useful to enable children to make connections between the logical functioning of their everyday lives to that of mathematical thinking and to build upon their everyday understandings. Games – not to be confused with open-ended play - provide nondidactic feedback to the child, with a minimum amount of teacher intervention. They promote processes of anticipation, planning and strategy. Utilizing gaming in the mathematics classroom has many potential benefits. Mathematics games serve as an important means to increase engagement, motivation, and student learning (Clark and Ernst, 2009; Huizenga, Admiral, Akkerman, and Dam, 2009). Students using games get immense opportunities for content application in real life settings followed by positive encouragement or corrective feedback (Allsopp et al., 2007).

Incorporation of games could help teachers plan for fulfillment of the learning objectives of problem-based mathematics lesson (Van de Walle, Karp, and Bay-Williams, 2010).

Digital games in Mathematics

There is ample research evidence on the effects of electronic games on learning including video and computer games, as well as game-based simulations and quiz type games (Afari, Aldridge and Fraser, 2012).

Arbaugh et al. (2008) stressed on the need to improve mathematics education in American schools and also on improvement of students’ learning. They also stated that maximizing the use of technology in schools and classrooms could help to improve student learning. “Mathematical technologies allow the user to operate on mathematical entities . . . [and] provide people with a range of mathematical activities and forms of mathematical representations” (Arbaugh et al., 2008, p. 20). Arbaugh et al. continued, “Collaborative and communicative technologies allow users to create, manipulate, edit, communicate, and share experiences, ideas, and products using words, numbers, symbols, images, audio, and video” (p. 20). Twigg (2011) maintained on the need for integration of technology into mathematics curricula because technology is necessary for student learning in society. According to Twigg (2011) interactive software and computers are the keys to helping students learn maths by doing.

Hamilton (2007) reported that the incorporation of technology was correlated with improved student mathematics achievement. Rosen and Beck-Hill (2012) found that educational technology serves as an important means of closing the achievement gap and aids in incorporation of higher order thinking skills.

Since 2010, tablet computers like the iPad have been both the most recent and the most popular handheld game-based learning devices (Buckley, 2010; Castelluccio, 2010; Hill, 2011; Murphy, 2011; Price, 2011; Stevens, 2011). According to Mansour and El-Said (2009), the use of game-based learning as an educational tool is still in its infancy. Griffin (2007) suggested that maths teachers might connect examples to the real world through interactive games. Elementary students typically enjoyed academic games and were excited and interested about math while playing them.

CONCLUSION

Recent researches have questioned the way games are used in the teaching of mathematics. Given the large uptake of Interactive Whiteboards, computer and electronic games, it is timely that research on the use of games in the teaching of mathematics be re-examined. There appears to be little clear research evidence about how to derive effective mathematics learning from a game. Games have rarely been reported as being used as the basis of a lesson or to encourage discussion of a mathematical concept. There is little evidence as to how maths games are being used in the teaching of mathematics and the legitimacy of this approach still needs to be established.

REFERENCES


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