**RESEARCH PROPOSAL**

**Title**: Effect of educational games on promoting achievement in mathematics among secondary school students.

 **Introduction:**

 Gamification has been shown to be beneficial in several fields such as employment, marketing, learning, and to the educational process. The process of learning is most effective when it contains elements which commonly exist within a gaming mechanic, such as rewards for achievements, leader boards and defined levels of difficulty. Computer games (henceforth called ‘games’) have become an integral part of our social and cultural environment and are particularly appealing to children and adolescents, for whom they constitute the most popular computer activity in the home. A study on 7–16 years old students in the UK showed that most of them were regular domestic game players, whereas a more recent study indicated that one of the main reasons for domestic internet use among Greek students aged 12–16 years old was online gaming. Games, thus, play a central role in young people’s lives outside school holding a special fascination and provoking a deep sense of engagement in them. Essential game characteristics that contribute to this engagement are challenge, fantasy and curiosity. Young people’s intrinsic motivation towards games contrasts with their often noted lack of interest in curricular contents. In fact, the challenging world of games shapes students’ cognitive abilities and expectations about learning, making scholastic content and practices seem tedious and meaningless, and creating a dissonance between formal education and the digital, informal learning environments that students experience outside school. How-ever, the motivation of games could be combined with curricular contents into what calls ‘education Game-Based Learning’.

Games that encompass educational objectives and subject matter are believed to hold the potential to render learning of academic

Subjects more learner-centered, easier, more enjoyable, more interesting, and, thus, more effective specifically, games constitute potentially powerful learning environments for a number of reasons:

* They can support multi-sensory, active, experiential, problem-based learning,
* They favour activation of prior knowledge given that players must
* use previously learned information in order to advance,
* They provide immediate feedback enabling players to test hypotheses and learn,
* They encompass opportunities for self-assessment through the mechanisms of scoring and reaching different levels,
* They increasingly become social environments involving communities of players.

Apart from knowledge acquisition, game playing can also favour the development of various skills, such as critical thinking and problem-solving skills.

Games are part of our contemporary culture too. Social science scholars have agreed that games are not a new phenomenon and that the diffusion of games to the masses was a result of initiatives conducted by the Department of Defense to simulate political military crises. Today, games are more than military strategy tools. They are an element of culture. Since their adoption, however, video games have both fascinated and produced fear among the public at large.

Popularity of Games: Sudden Shift in Computer Game Markets

Even though the first generation video games had adults as its main target audience, games are no longer exclusive to adults. With the introduction of Atari in the 70s and 80s and Nintendo and Sega in the 80s and 90s, the game market became focused on children. The main reason for such a shift was because the teenagers of the 70s and 80s were looking at more mature content in game playing. In the early 1990s Nintendo targeted this market by introducing the Mario series, an approach that revolutionized the industry because games looked more cartoon-like and not as violent. This was quite appealing to children and as importantly, was not intimidating for parents. The market became children oriented and parent supported. Nintendo in the 1990s was the Disney of the gaming world. In addition to its shift in market emphasis, Nintendo published Nintendo Power, which in the 90s became the biggest selling kid’s magazine in the world.

Because of the Mario series and the Nintendo Power magazine, Nintendo became a part of a child’s culture beyond games. What was an activity of adults became an activity for children. According to ESA (2010) over 70% of American homes play computer or video games, the average gamer is 37 years old and has been playing games for over a decade. Almost 30% of gamers are over the age of 50. Computer games now are not a “kid” thing or a “geek” thing but an “everybody” thing. Because of these recent findings, it seems reasonable to argue that perhaps, we should be using computer games more often to assist children with motivation and as a requisite of lower-level skills. By motivating students via computer game’s lower-level skills tasks, we could eventually use this strategy to foster higher-order thinking skills in the future.

Games have changed our society due to their impact on our economy. In the United States alone, gaming is a growing billion dollar industry. Digital games offer “a new pedagogy for the 21st century, one that has the potential to not merely fill individual minds, but empower whole persons, and to transform learning from a rote acquisitional process to a transactive one in which conceptual understandings have transformational significance. Most young people in the education system today have grown up in a world where digital games are a part of life, yet these tools are not actively embraced by school systems that are still entrenched in an antiquated model of education. However, research about the effects of games has been quite limited. Several social science researchers have called for more vigorous research involving games, due to its increasing popularity. I agree that more research in games in general is necessary. I argue, however, that more research on the impact of games on learning is more pressing.

**Need and significance of the study:**

The purpose of this study is to investigate; the educational games help secondary school students majoring in education to score higher in mathematic exams. And the goal of this study was to examine the effect of educational games in student mathematics achievement in secondary school students. Specifically, we assessed the relative effectiveness of these interventions as compared to a traditional classroom instruction.

Learning mathematics presents various challenges for many children. Mathematics is often associated as a difficult and tedious subject to learn. Educational video games have the potential of addressing these challenges. Interactive immersive games can consume students attention for hours while providing them with effective instruction and an engaging learning experience. Games have been widely used to promote students mathematics achievement in various domains including problem-solving and algebra skills, strategic and reasoning abilities, critical geometry skills and arithmetic procedures Nevertheless, National Mathematics Advisory Panel does not provide a direct recommendation for using games “as a potentially useful tool in introducing and teaching specific subject-matter content to specific populations” due to the limited number of rigorous studies exploring effects of game-based learning on math skills development and achievement. And most of the survey results reflect that students show poor performance in mathematics exams and show a negative attitude towards mathematics subject due to their lack of interest and skills. From this It shows a need for the present situation to examine the effect of educational games to promote students mathematics achievement.

**Review of related literature:**

A literature review is an evaluative report of information found in the literature related to the selected area of study. The reviewshould describe, summarise, evaluate and clarify this literature. It should give a theoretical base for the research and help to determine the nature of research. These reviews help throughout the research.

In the year 2015, effects of Game-Based Learning on Students’ Mathematics Achievement report presents findings from a meta-analysis of experimental and quasi-experimental studies investigating effects of instructional games on mathematics achievement of PreK—12th grade students compared to traditional classroom methods. School setting (PreK-5th vs. 6th-12th) and type of assessment instrument (research-made vs. standardized) were explored as potential moderators of the relationship between game-based learning and mathematics achievement. Results showed heterogeneity among studies, both in magnitude and direction. Using a random effects model, a small but marginally significant overall effect suggests that math video games might have contributed to higher learning gains as compared to traditional instructional methods. Furthermore, moderator analyses suggest that this effect does not significantly vary neither between instrument types nor between school settings.

 Jones, Dr Darrel (2013), The small study was conducted with the aim of contributing to current theories on gamification and its ability to assist with the learning experience. Specifically, a prototype of a physics-based game (Junkyard Physics) was developed to teach the basic principles of forces. The resulting prototype was tested on lay people to determine if the game improved their level of understanding of the laws of physics. Testing was conducted via a questionnaire at the Develop conference in Brighton 2013. Results indicate that the game is a good way to engage people with physics, although it is acknowledged that with only one game level completed the learning outcomes were limited. The findings indicate that gamification is a valuable educational tool, which merits further research and development.

Iowa (2009) made a study. And the study aims to investigate the cognitive and affective impact that a Web-based Flash game called “Colour in Motion,” has on teaching visual arts to elementary grade students. Pre tests and post tests, observations, recordings of on-screen game play activity, and interviews were used as the data collection instruments for this study. Pre tests and post tests were used to identify if the game had cognitive impact on learners. Observations and recordings of on-screen game play activity were utilized to inform the affective impact of gaming on students’ learning. Interviews were to understand the cognitive and affective impact of the Web-based Flash game on students’ learning. 6-to-12 year old students recruited from a Midwestern after-school club participated in this study. The findings showed students’ cognition of basic colour attributes did not have notable improvement; however, most students were able to recognize the colour symbolism after playing the Web-based Flash game. In addition, most students demonstrated engagement, expression, and exploration well while playing the game, but persistence of the game playing was lacked. Overall, all students were very positive about using the Web-based Flash game to learn the visual arts. Consequently, the findings of this study indicate that games have a promising future in teaching arts for elementary grade students

 Starkey and lisa (2013) put forward a Theses and Dissertations. This study examined data collected during a program evaluation to explore the effects of a digital game on middle school male and female students’ mathematics achievement, situational motivation, and attitudes toward mathematics. The study included data from 168 students attending a private international school in Africa, who were assigned to treatment and control groups by stratified random sampling to ensure a balance of boys and girls as well as equal representation of students from grade six, seven and eight. Achievement was measured using internal school exams based on benchmarks aligned with the National Council of Teachers of Mathematics (NCTM) standards and benchmarks. Motivation to learn mathematics was measured using the Course Interest Survey (CIS) based on Keller’s ARCS model of motivation. Mathematical attitude was measured using the Fennema-Sherman Mathematical Attitude Scales (FSMAS). A Multivariate Analysis of Covariance (MANCOVA) was performed to analyze change from pre- to post-test scores in achievement, motivation, and attitudes with the independent variables of group (control and treatment) and sex (male and female). Results showed a significant increase in mathematical achievement ,motivation to learn in math class, and attitudes toward mathematics for both boys and girls who played the digital game.

 Bert (2016), done a research project and started with the goal of investigating how game-based learning can help improve outcomes for nontraditional students in higher education. To investigate the question, he conducted focus groups and an online survey with nontraditional students, and interviewed school leaders and educators at community colleges and four-year institutions that serve them. In the focus groups, he met students who are dedicated and hardworking, but also must balance school with work and family, making them vulnerable; one family emergency can knock them off track. He found that nontraditional students are taking more online classes than other students, with those working more than 30 hours taking the most. They appreciated the flexibility that online courses provide, but worried that they might not be developing the skills they would really need for jobs and certifications. They also asked for apps that fit their lives, work on their devices, make good use of their time, and could give them great feedback even at two in the morning. There is a clear opportunity to help these students through improved digital materials, and game-based learning can be an important tool in this work. Research and meta-studies we reviewed support its effectiveness when design best practices are used.

 Osijek (2012). They have a view that Computer games meeting pedagogical criteria should become an integral part of learning. Teaching with mathematical computer games, which fulfil pedagogical criteria, influences pupils’ motivation, learning, retention and forgetting. This paper provides a review of literature in this field and determines whether the use of mathematical computer games contributes to more efficient realisation of educational goals at all level of education. Furthermore, considering prior research they have attempted to establish whether the use of mathematical games for teaching has an impact on the formation of a positive attitude of pupils of different ages toward the subject of mathematics, their motivation and knowledge acquisition when compared to learning without computer games. Finally, they have analysed different research methods concerning this issue and assessed the impact of pedagogically designed mathematical computer games on the realisation of educational goals and quality improvement of teaching and learning.

Games have been used in educational endeavors for at least a decade. There are a multitude of studies involving games for educational purposes. A large number of scholars have made theoretical remarks about games and learning. Rieber has argued that digital games assist pupils in productive play and learning though simply building micro-worlds and playing games. Prensky went further to state that developing educational games is a moral imperative because millenniums are slow to respond to traditional Socratic methods. Gee has argued that video games incorporate good learning principles supported by cognitive sciences and that assists with the “cycle of expertise”.

In a recent study, Sicart argues that video games are well suited to teaching virtue ethics. In Sicart, virtue ethics is player-centric and players should learn as active recipients of game content. In an older study, Sicart argues that “Playing is an act of judgment of the rule systems and the fictional world the player is presented with (2005, p. 16).” Therefore, game play assists with being able to judge systems. Kolson went further to state that the game SimCity “teaches” the learner that politics, ethnicity, and race are not major variables that impact urban planning. Barab, Thomas, Dodge, Newell, and Squire, (in preparation) argued in their SimCity 2000 at Boys and Girls Clubs study that students learn supply and demand relationships and taxation and its association to population growth by simply playing the game.

Most of the criticism involving games is related to violence. Gentile and Anderson argue that violent video games are a factor in children’s aggressive behaviour because repetitive tasks tend to reinforce learning patterns. According to Bushman and Anderson, children who had prior video game experience had higher levels of aggression than those who had not. Not all studies involving games had positive results. Very few scholars would disagree with this statement.

There have been too many theoretical studies concluding that games are well suited for teaching. A large amount of studies have been conducted arguing that games “teach” students to “learn” concepts while playing and connections are made just by playing a game. Scholars on the negative side of the spectrum argue that games are not good because they promote violence and reinforce negative patterns. Scholars have conducted a large number of studies examining games and violence but empirical research on games and learning is scarce. Pragmatic studies of this kind are rarely conducted. A possible reason for it is because educational game research shifts the importance to education rather than entertainment. The purpose of this study is to investigate if classroom games help freshman state college students majoring in education to score higher in factual knowledge exams.

**Statement of the Problem:**

In this study the researcher examine the effect of using educational games on secondary school students as a means to promote better learning. It is entitled as “**Effect of educational games on promoting achievement in mathematics among secondary school students.”**

**Key words:**

Effect, educational games,achievement in mathematics, secondary school students.

**Definition of keywords:**

* **Effect**: it is the result of a particular influence.

Operational definition: the result obtained by the secondary school students through educational game teaching method.

* **Educational games**:Educational games are those intentionally designed for the purpose of education, or those entertainment games that have incidental or educational values. Educational games are designed to help people understand concepts, learn domain knowledge, and develop problem solving skills as they play games. (IGI GLOBAL,2009)

Operational definition: games used to develop new [learning environments](https://en.wikipedia.org/wiki/Learning_environment), games that help students learn by integrating thinking, and learning through games.

* **Achievement in mathematics**: mathematical problems done successfully with effort, skill or courage. (Merriam Webster,2007)

Operational definition: result gained by the secondary school students in mathematics

* **Secondary school** : a school intermediate between elementary school and college and usually offering general, technical, vocational, or college- preparatory course (Merriam Webster,2005)

Operational definition:  a school for children between the ages of 12 and 16.

* **Students**: according to Cambridge Dictionary(2003), student refers to a person who is learning at a college or university.

Operational definition: the investigation conducting on secondary school aspirants who ranges between 13 to15yrs.

**Objectives:**

* To find out, the effectiveness of educational game in the achievement in mathematics.

**Hypothesis:**

* There exists no significant differences in the achievement in mathematics among secondary school students, taught using educational game and conventional method.

**Methodology:**

* Methodology is the body of the research report in the science of proper modes and order of procedure. Methodology is the systematic, theoretical analysis of the methods applied to a field of study.
* The method selected for the study is non-equivalent group,pre-test-post-test method.

**Sample:**

A sample is a small proportion of the population that is selected for observation and analysis.

In the present study, secondary school students of ninth standard from Ernakulam district of Kerala were taken as the sample size.

**Tools and techniques:**

 Appropriate tools and technique should be used for the study.

**Variables of study:**

The variables of the research are

1. Independent variables : taught using educational game.

 Taught using conventional method.

1. Dependent variables : achievement in Mathematics.

**Statistical techniques:**

The researcher use appropriate statistical techniques for analyzing the data

**Conclusion:**

The researcher examines the effect of educational games on promoting achievement in mathematics among secondary school students. Several studies are conducted to find out the effectiveness of the educational game on promoting achievements of school students. The findings would definitely help the researcher to find the effectiveness of educational game on promoting achievements of school students..

**Reference:**

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