Perception of Mathematics Game’s Design for Primary School: Based on Teachers’ Opinions

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Abstract. Unmistakable methods can be used for learning, and they can be looked at in a few viewpoints, particularly those identified with learning results. In this paper, we introduce an examination with a specific end goal to think about the design adequacy and development’s requirement of a game based learning (GBL) approach that is about to be used in LINUS screening for mathematics subject in primary school. The approach includes multiple interaction forms regarding addition and subtraction operation in mathematics based on LINUS constructs. Ten teachers from three different school located in Batu Pahat have participated in the study. The investigations involving survey activity by using questionnaire as the instrument. While breaking down the results, the outcomes demonstrated that the kids observed the amusement to be all the more fulfilling if there are less levels and more colours. Since the survey were conducted to a very common type of school in Malaysia, we believe game that is about to be built based on opinion gained could be utilized as an effective instrument in primary schools to strengthen pupils' lessons.

1. Introduction
Computerized strategy may not exist to totally supplant the conventional technique but rather to supplement the current technique by giving the clients convenience. Kids frequently play either separately or cooperatively for entertainment and pleasure only. Game gives way for kids to learn and investigate in a more significant manner. It might be stated, game is an autotelic and wilful act that requires regular reasons [1]. Notwithstanding, when set with regards to work or training, play is regularly observed as a trivial action. Regardless of such feedback, game was appeared to add to children's social, intellectual, and passionate improvement [2]. Also, battles that the improvisational ability of game in making people more flexible in methods for getting things done and more open to switch, together with showing alternatives practices and contemplations [3]. A decent UI outline, as it allows the client to do errands, empowers a simple, normal, and connecting with communication between a client and a framework [4].

2. Literature Review
As complex systems, games show children strategic problem solving but, even more vitally in a systemic thinking on how one individual's activities can influence the whole framework [5]. By joining instructive recreations with pre and post-tests, numerous examinations demonstrate it to be in any event as viable as different strategies for evaluation, and understudies favour them over near techniques [6]. Instructive advancements that are very much outlined could supplement and bolster the
learning condition [7]. This "21st-century preparing stage" has risen as one approach to address the numerous difficulties of instructing children [8][9][10]. With whenever, anyplace figuring, new developments might be constructed that are moderate, convenient and that can change our thoughts of data get to and learning. The significance of the component of happiness has been generally worried in learning and training. Absence of delight and weariness can be connected to withdrawal and disappointment in learning [11]. Primary school students who were presented a mobile game were discovered with eagerness contribute extra vitality clinched alongside realizing, which incited expanded learning.[12], this statement can be concluded that technologies do attract children to learn.

In concurrence with other specialists', proposal that help gave before playing a diversion may fortify learning, added to the game’s guideline videos, which kept going around 3 min each. In these videos somebody plays the game while thinking accordingly presents normally how the amusement is played and which techniques can be utilized [13]. In various conditions, remarkably in the academic setting, engagement sparklesgood enthusiastic experiences including fun, vitality, and duty in regards to persistent work [14].

Most computer games and other instructive programming now being utilized as a part of grade school Mathematics training centre around the initial two angles: number truth learning and operation aptitudes [15]. Besides, games encourage players to try, do mistakes, and after that try again without feeling ashamed [16]. Due to this harm-free condition and the quick denigration gave by the computer system, players are animated to investigate and analyse [17].

3. Method
The content of the game is based on 12 LINUS constructs used in the courses of the standard 1 until standard 3 children in Malaysia. The main objective of the developing game is to strengthen children’s knowledge regarding mathematics. In this game, the children should be able to learn about addition operation and subtraction operation. Apart from the addition and subtraction operation, the children also learn how to solve problem in mathematical expression.

Each school participating in the study was acknowledged as an instance investigation. The examination construct itself with respect to a subjective technique for it was trusted this was the most reasonable way to deal with investigate inadequately contemplated issues or issues exhibiting numerous obscure variables. Thus, it might have been attempted that 10 teachers who represented these schools stated in table 1 and answered the survey would be related to Mathematics in schools through the development of syllabus with kids in standard 1 until standard 3.

| Name of School               | Number of respondents |
|-----------------------------|-----------------------|
| Sekolah Kebangsaan Pintas Raya | 10                    |
| Sekolah Kebangsaan Pintas Puding | 10                  |
| Sekolah Kebangsaan Rejo Sari  | 10                    |

After few trials of reaching the targeted school by email, an approach was made through a meeting with its representatives. The study concentrated on Sekolah Kebangsaan because at the moment, these schools are strong expansion in context of computing according to the technologic plan.
of education and by the Ministry of Education [18]. After a few minutes of explaining the objectives of study and its aim to all teachers involved, they were given some times to ask any questions to ensure their understanding in this study. A set of questionnaire being used in this study to get the result. 10 questionnaires were distributed simultaneously to all respondents and they had taken approximately 5 to 10 minutes to finish answering all 10 questions given.

4. Result
The data for this study were then analysed using SPSS version 11.5 to get the reliability value of the questionnaire. The reliability obtained is $\alpha = 0.966$. This reliability value shows that the questionnaire is good and can be used for this study. This is because the instrument which has a coefficient value of less than 0.6 can be considered as having low value of reliability [19]. Teachers reported a multitude of fun experiences answering the questionnaire as the questions are all easy for them to understand.

The teachers would like a game that has less than 5 levels. More than 60% of them responded if there are more than 5 levels, they expected the children would be engaged to the game and given efficient effect. Another 30% think that they would be boring if there are more than 5 levels. As the pupils might be struggling to finish those levels, efficiency level might drop as well.

![Figure 1. Question 5 responses](image1)

Statement in question number 5; “Colours play important roles in educational game?” have 100% of respondents responded “Strongly Agree” and that showed they really want the game to be colourful and fun enough to be enjoyed. Almost all of the teachers suggesting a display of points gained by players as a reward for the children when they had completed a level, displaying what they had accomplished.

![Figure 2. Question 10 responses](image2)
Regarding the theme, question number 10 which is “In your opinion, if there is a game that can help the kids to enhance their numeracy skill, would you like it to be classroom-like theme or other than that?” got 96% of “Yes” answer from the respondents. This kind from claiming actual reproduction will be possibility will empower school’s environment to be joined with students’ physical, existed universe. [20]. Formative assessment and game-based learning have an inalienable suspicion of being incorporated into basic learning situation [21].

5. Discussion
A game model that can achieve a unique equilibrium is preferred during game theoretical modelling and analysis. Below is the characteristics that researchers listed based on the opinion given by the respondents:

- **Efficiency (E):** It is hard to give an exact meaning of efficiency as this requirement is related to the goals of models. This requirement can make sure that the game is designed with not only effectiveness but also high proficiency so it can be generally utilized. By only using game, teachers can generate kids’ interests towards Mathematics subject.

- **Feasibility (F):** A feasible model refers to a circumstance that the result elements of players are characterized by the possible data.

- **Scalability (SC):** This prerequisite guarantees that a composed amusement model can be broadened to an extensive scale situation with more players taking an interest in and less confinements on trial conditions. A scalable model can fit into other application scenarios easily without too much alteration. In many ways, the game could also be 2 players game which would enhance the enjoyment and increase the eagerness in players to compete with each other.

- **Individual Rationality (IR):** It is unreasonable that a player has motivation to participate in a diversion where it can just acquire negative utility. In a non-cooperative game, all players pick systems from the perspective of augmenting their own benefits, consequently this prerequisite is fulfilled in each non-helpful diversion. We say an agreeable diversion is singular reasonability when the players in fantastic coalition can acquire a larger number of benefits than it can get alone (without participation with any other person). Personally, by playing game based learning (GBL), the kid himself could be motivated to get highest points they could in the game without anyone knowing.

Other than that, we decided the game to have only 3 levels to match the respondents’ opinions. The children have to solve every questions given in every levels. Based on the answers given by the respondents, between each levels in the game, explanations should be showed, explaining the rules and goals to achieve a particular goal in the upcoming level. The game would be started with a guidance, which introduced the players and help them with clue for them to solve the problem given in next level. As in LINUS screening itself, children still need help from the teachers to guide them throughout the screening. At the age of 7 until 9 year-old children, we agreed to the fact that they still needed help and guidance to the new condition especially regarding technology use. Garris et al. suggested that the learning outcomes occur outside of the game during reflection and debriefing (figure 3) [22], showing that game’s characteristics is one of the important things in achieving the expected outcomes from certain GBL.
6. Conclusion

For future works, the study may focuses on the process to achieve learning outcomes in GBL. Besides, they might also study whether the gender and age of kid’s influences their achievements as there might be certain ages that the kids not even know how to use the game and some other ages very eager in playing game. Other subjects in primary school can also use game as a helping tool in classroom to increase the kids’ interests in learning.

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