

Need Analysis for Development of Kit Integrated Game-Based Learning Mathematics form One

Mohamad Faiz Farhan Abdul Rahman* & Sabarina Shafie

Faculty of Science and Mathematics, Universiti Pendidikan Sultan Idris,
35900 Tanjong Malim, Perak, Malaysia

*Corresponding author: M20211002346@siswa.upsi.edu.my

Published: 17 January 2024

To cite this article (APA): Abdul Rahman, M. F. F., & Shafie, S. (2024). Need Analysis for Development of Kit Integrated Game-Based Learning Mathematics form One. *EDUCATUM Journal of Science, Mathematics and Technology*, 11(1), 81–87. <https://doi.org/10.37134/ejsmt.vol11.1.8.2024>

To link to this article: <https://doi.org/10.37134/ejsmt.vol11.1.8.2024>

Abstract

A need analysis is carried out to identify the current needs and wants of students to develop a Game-Based Learning Kit (GBL) on Form 1 Mathematics subjects. 70 respondents involved and randomly selected as a sample of studies involving teachers that teaching secondary school Mathematics subjects throughout Malaysia. In this study, a quantitative approach was used to collect information through questionnaire method using the Need Analysis Questionnaire (SSAK) instrument. The information and data obtained are analyzed using descriptive statistics. The findings showed that 98.6% felt there was a need to develop a GBL Kit for Form 1 Mathematics. Next, 81.2% of teachers have chosen the Rational Number as the title that needs to be focused on developing the GBL Kit. In conclusion, there is a need to develop this PBP Kit for the Rational Number. As a result of the analysis, the GBL Kit to be developed should follow the characteristics of the content, activities, materials and assessment.

Keywords: Kit, Game-Based Learning, Form 1 Mathematics, Rational Number

INTRODUCTION

The Ministry of Education Malaysia has emphasized 21st Century Learning in the Malaysia Education Development Plan (MEDP) 2013-2025. According to [1], the Malaysia Education Development Plan (MEDP) emphasizes proactive steps in the education system are necessary to enhance student achievement and produce Malaysian citizens equipped with the skills required in the 21st century. There are four characteristics or concepts that can embody these 21st-century skills. These concepts are creativity, critical thinking, collaboration, and communication [2].

Game-based learning (GBL) is one of the teaching and learning methods that focuses on incorporating play elements into education. According to [3], GBL encourages students in three aspects, namely the desire to learn, imagination, and challenges. Therefore, students actively participate in the teaching and learning session as the process of exploration and self-discovery takes place, leading to the application of the concepts learned.

GBL is also one of the methods included in 21st Century Learning. This method is designed to enhance the learning environment in the classroom. GBL is an active learning method that can motivate students and stimulate their interest in learning mathematics [3]. Furthermore, children will feel enjoyment while playing, and their own experiences can be built while learning [4]. Unconsciously, the teaching and learning process can be carried out effectively without the students feeling bored or tired.

Meanwhile, student anxiety can be reduced when learning topics through the implementation of GBL [5]. According to [6], games can also boost students' enthusiasm and self-effectiveness during the teaching and learning process. According to [7], GBL can also encourage students to learn without coercion.

Furthermore, GBL can enhance students' 21st-century skills. This is crucial as it is a contemporary requirement that students need to master. According to [8], 21st Century Learning needs to emphasize several skills, including problem-solving, communication, critical thinking, and creativity.

PROBLEM STATEMENT

[9] state that low achievement quality in mathematics is one of the frequently raised issues. This is because mathematics is the least favored subject among students, and they often perceive it as a significant challenge.

According to [10], there is also a negative perception among students who express that mathematics is a difficult subject and beyond their capabilities. Furthermore, most students perceive mathematics as a subject that is beyond their abilities. As a result, the performance of the Mathematics subject in Malaysia is a cause for concern compared to other countries in international assessments [11].

According to the Programme for International Student Assessment (PISA) 2018 report released by the [12], Malaysia is one of the countries with an average score lower than the [12], which is 487. The average score set by the [12] is significantly lower than that in 2012, which was 494.

In addition, Malaysia also participates in international assessments for the subject of Mathematics, such as the Trends in International Mathematics and Science Study (TIMSS). From its participation in TIMSS from 1999 to 2015, Malaysia's results have been inconsistent [13].

Therefore, the quality of mathematics achievement is an important aspect that requires attention. To ensure effective teaching and learning, various techniques, strategies, or activities are needed to enhance the overall teaching process. Effective teaching can be measured through positive behavioral developments in students. Additionally, according to [14], effective teaching can also instill enthusiasm, motivation, and skills in students, making the learning experience enjoyable. Thus, the role of the teacher is a crucial aspect in capturing the attention of students throughout the teaching and learning sessions until the end.

OBJECTIVES

The objective of the study is to analyze the need for developing a Game-Based Learning Kit Mathematics for Form 1.

METHODOLOGY

Research Design

The quantitative approach is used in this research method. A survey questionnaire is utilized among secondary school Mathematics teachers throughout Malaysia as the study respondents. The data obtained through this survey will determine the need for a GBL Kit for Mathematics Form 1.

Research Sample

The respondents for this study are secondary school mathematics teachers in Malaysia, randomly selected from several schools involving three states: Kedah, Perak, and the Federal Territory of Kuala Lumpur. A total of 70 teachers responded to the online survey questionnaire. Purposeful sampling was conducted to meet the characteristics and focus of the study. The respondents are secondary school Mathematics teachers.

Research Instrument

The research instrument used is the Needs Analysis LeTTRaN Kit Questionnaire. This instrument is adapted from the Needs Analysis for Developing Challenge-Based Learning Modules in Learning Mathematics for Form 4 students [15].

The survey method conducted by the researcher will assist in measuring current preferences and needs regarding the content, activities, materials, and assessment of the study to be examined. The questionnaire instrument consists of two main sections: background information of the respondents and the needs for the development of the Game-Based Learning Kit, which includes needs, topic relevance, and aspects of content, activities, assessment, and necessary materials.

Data Analysis

Data analysis is a crucial stage conducted after successfully collecting data. In this needs analysis study, the data is analysed using descriptive statistics. [16] state that descriptive statistics involve measuring values such as minimum, mode, median, percentages, frequency, standard deviation, variance, and others.

FINDINGS

The survey questionnaire was attended by 70 respondents. Based on the data analysis from this survey, the study findings are as follows:

Needs

Figure 1 indicates that 98.6% of teachers agree that there is a need to develop a GBL Kit for Form 1 students.

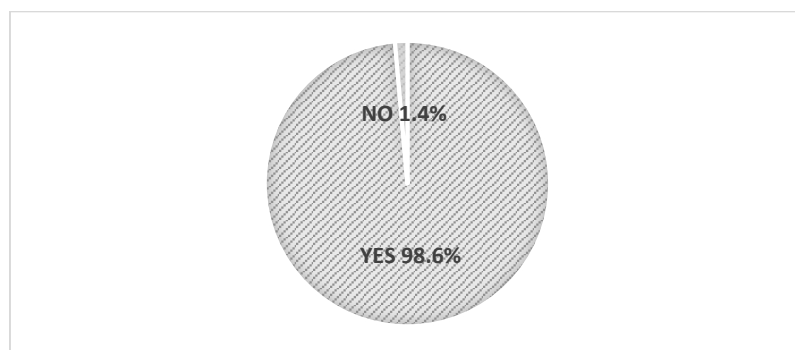


Figure 1. Survey of the need to develop a Game-Based Learning Kit.

Relevance of Topics

Figure 2 illustrates that 81.2% of teachers have chosen the topic of Rational Numbers. The topic of Rational Numbers obtains the highest percentage compared to other topics, indicating the need for a GBL Kit in Mathematics for Form 1 students.

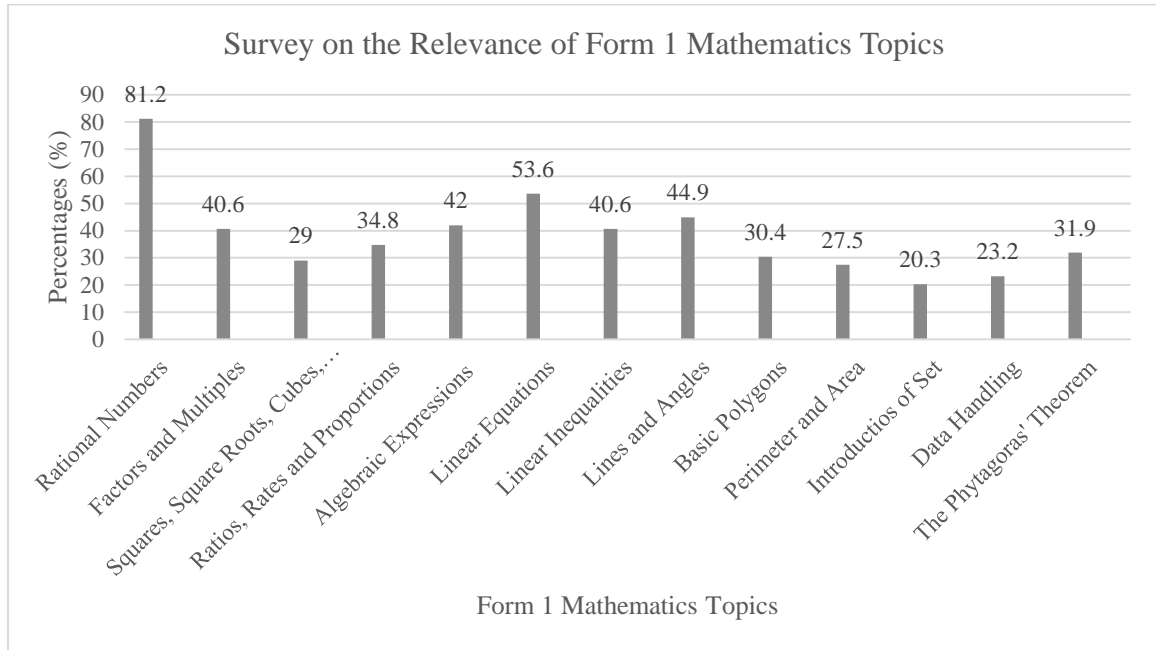


Figure 2. Survey on the Relevance of Form 1 Mathematics Topics

Content

Table 1 shows the content aspects of the GBL Kit. In the table, 62.9% of teachers agree that there should be a user guide for reference. Additionally, 60% of teachers agree to suggest the inclusion of usage objectives for the kit, and 44.3% of teachers feel the need for teaching and learning guidelines using the GBL method, including student worksheets. 37.1% of teachers believe the kit should have a specified activity duration, and 34.3% suggest including step-by-step instructions.

Furthermore, 32.9% of teachers express the need for a classroom implementation guide for GBL. Some teachers also believe that the kit should be attached to the daily lesson plan and include guidelines for assessing GBL outcomes, with approval percentages of 27.1% and 21.4%, respectively.

Table 1 Content Aspects of the Game-Based Learning Kit

No	Teaching Approach	Percentages (%)
1	There is an objective of kit development.	60.0
2	There is a kit usage guide.	62.9
3	There is a teaching and learning guide using the Game-Based Learning method.	44.3
4	There is a Daily Lesson Plan (DLP).	27.1
5	Have steps of teaching and learning work using the Game-Based Learning method.	34.3
6	Have a period of time for Game-Based Learning activities.	37.1
7	Have a pupil worksheet.	44.3
8	Provided with classroom guidance on the implementation of Game-Based Learning,	32.9
9	There is a scoring guide on Game-Based Based Learning outcomes.	21.4

Activity

Table 2 shows the activity aspects of the GBL Kit. A total of 62.9% of teachers require students to carry out group activities (collaborate) for the activities given. 50% of teachers require students to solve problems in the form of games. 48.6% of teachers state the need for students to present and share their learning outcomes, while 42.9% of teachers require students to engage in activities aligned with PAK21. 37.1% of

teachers agree that students should engage in brainstorming activities before playing. Additionally, 30% of teachers believe students should gather information in the form of brief notes, 25.7% of teachers require students to conduct assessments through group presentations, and 12.9% of teachers state that students should engage in community interview activities inside and outside the classroom.

Table 2 Activity Aspects of the Game-Based Learning Kit

No	Teaching Approach	Percentages (%)
1	Students carry out group activities (collaborate) for the activities given.	62.9
2	Pupils interview the community inside and outside the classroom.	12.9
3	Pupils do brainstorm activities before playing.	37.1
4	Pupils solve problems in the form of games.	50.0
5	Pupils collect information in the form of note.	30.0
6	Pupils perform assessments in the form of group presentations.	25.7
7	Pupils present and share learning outcomes.	48.6
8	Activities in the form of 21st Century Learning.	42.9

Assessment

Table 3 shows the assessment aspects of the GBL Kit. A total of 64.3% of teachers agree that classroom assessment should be conducted individually or in groups. Furthermore, 52.9% of teachers require assessments to be done through observation methods. 47.1% of teachers prefer non-exam-based assessments, and 40% of teachers require assessments to be conducted orally.

Table 3 Assessment Aspects of the Game-Based Learning Kit

No	Teaching Approach	Percentages (%)
1	Assessment is not in the form of a full-fledged exam.	47.1
2	Assessment is carried out through the method of observation.	52.9
3	Assessment is carried out orally.	40.0
4	Classroom Assessment is done individually or groups.	64.3

Materials

Table 4 shows the material aspects of the GBL Kit. A total of 67.1% of teachers require the use of interactive media materials. Additionally, 62.9% of teachers need electronic media materials such as projectors, videos, slides, and others, while 47.1% of teachers require non-electronic media materials such as books, charts, flashcards, and others. Finally, 38.6% of teachers desire experiential materials such as field trips, projects, exhibitions, and others.

Table 4 Material Aspects of the Game-Based Learning Kit

No	Teaching Approach	Percentages (%)
1	Electronic media materials such as projectors, videos, slides and others.	62.9
2	Non-electronic media materials such as books, charts, scan cards and others.	47.1
3	Experiential materials such as field trips, projects, exhibitions and others.	38.6
4	Use of interactive media materials.	67.1

CONCLUSION

The proposal to develop this GBL Kit is seen as a crucial step based on the findings of the needs analysis conducted. The results of the analysis indicate that teachers require the GBL Kit to meet current needs during teaching and learning sessions in the classroom. The GBL Kit has the potential to assist students in exploring and experiencing learning independently [4]. This will create a student-centered learning environment that is more engaging and can achieve the goals of 21st-century skills. The topic of Rational Numbers was chosen by respondents as a subject that deserves attention in developing the learning kit.

In addition, the needs for the content, activities, materials, or assessments for the kit to be developed were also analyzed based on the responses provided by teachers. In terms of the content aspect of the GBL Kit, teachers agree that there should be a guide for using the kit as a reference. Regarding the activity aspect of the kit, teachers require students to engage in group activities (collaboration) for assigned tasks. Furthermore, in the assessment aspect of the GBL Kit, teachers agree that classroom assessment should be conducted individually or in groups. Lastly, concerning the material aspect of the GBL Kit, teachers require the use of interactive media materials.

Therefore, the development of the GBL Kit for Form 1 is deemed necessary. This is attributed to the challenges faced by teachers and the fulfillment of their needs [17]. Furthermore, the increasing concern about the mastery of Pedagogical Content Knowledge among mathematics teachers is noteworthy [18]. Hence, the GBL Kit is expected to assist teachers in fulfilling their roles more effectively. According to Mamat and Abdul Wahab (2022), teachers play a crucial responsibility in creating a comfortable learning atmosphere within the classroom.

ACKNOWLEDGMENT

The author would like to express gratitude to Universiti Pendidikan Sultan Idris (UPSI) for the financial support provided to conduct the research under the University Research Grant for Education-Based Research (Research Code: 2022-0136-107-01).

RERERENCES

- [1] Radin, M., & Yasin, M. A. M. Z. (2018). Pelaksanaan pendidikan abad ke-21 di Malaysia: Satu tinjauan awal. *Sains Humanika*, 10(3-2).
- [2] Kementerian Pelajaran Malaysia. (2015). *Pelan Pembangunan Pendidikan Malaysia 2013-2025 (Bil.4)*. Kuala Lumpur: Kementerian Pelajaran Malaysia.
- [3] Lau Li Min, T., & Maat, S. M. (2022). Penerimaan Murid terhadap Pembelajaran Berasaskan Permainan dalam Matematik: Tinjauan Literatur Bersistematik. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, 7(12), e001962. <https://doi.org/10.47405/mjssh.v7i12.1962>.
- [4] Mohamad, S., Hamzah, M. A., & Osman, F.(2020). Persepsi pelajar terhadap manfaat dan keinginan menggunakan snake & ladder digital game board dalam pembelajaran berasaskan permainan. *Jurnal Dunia Pendidikan*, 2(3), 126-134.
- [5] Che Abd Aziz, N. A. M., Adenan, N. H., Abd Karim, N. S., Tarmizi, R. A., Abd Latib, L., & Mashuri, A. (2021). Penerimaan murid tingkatan satu terhadap pembelajaran topik operasi asas aritmetik melibatkan integer menggunakan permainan damath. *Jurnal Pendidikan Bitaraa UPSI*, 14, 51-59.
- [6] Juric, P., Bakaric, M. B., & Matetic, M. (2021). Cognitive predispositions of students for STEM success and differences in solving problems in the computer game for learning mathematics. *International Journal of Engineering Pedagogy (Ijep)*, 11(4), 81-95.
- [7] Nurdiyana, T., Muaz, M. H., & Hazwani, A. B. (2021). Permainan interaktif membantu pembelajaran matematik awal kanak-kanak empat tahun. *Jurnal Kesidang*, 6, 62-68.
- [8] Siong, W. W., & Osman, K. (2018). Pembelajaran berasaskan permainan dalam pendidikan STEM dan penguasaan kemahiran abad ke-21. *Politeknik & Kolej Komuniti Journal of Social Sciences and Humanities*, 3(1), 121-135.
- [9] Abu, N. E., & Leong, K. E. (2017). Hubungan Antara Sikap, Minat, Guru Dan Pengaruh Rakan Sebaya Terhadap Pencapaian Matematik Tambahan Tingkatan 4. *Jurnal Kurikulum & Pengajaran Asia Pasifik*, 2(1), 1-10. <https://juku.um.edu.my/article/view/8058>.

- [10] Rohmat, A. N., & Lestari, W. (2019). Pengaruh konsep diri dan percaya diri terhadap kemampuan kemampuan berpikir kritis matematis. *JKPM (Jurnal Kajian Pendidikan Matematika)*, 5(1), 73-84.
- [11] Kementerian Pendidikan Malaysia. (2019). TIMSS 2019 Laporan Kebangsaan. <https://www.moe.gov.my/en/muat-turun/penerbitan-dan-jurnal/rujukan-akademik/3918-buku-laporan-timss-2019/file>.
- [12] OECD. (2018). Organisation for Economic Co-operation and Development. Programme for International Study Assesment. Dicapai daripada <https://www.oecd.org/pisa/publications/pisa-2018-results.htm>.
- [13] Yee, C. S., Tze, W. J., & Abdullah, A. H. (2018). Pencapaian Matematik TIMSS 1999, 2003, 2007, 2011 dan 2015: Di Mana Kedudukan Malaysia Dalam Kalangan Negara Asia Tenggara?. *Malaysian Journal of Higher Order Thinking Skills In Education*, 2(3).
- [14] Sukri, N. S. C. M., & Rahman, M. H. A. (2022). Permainan berkomputer mata pelajaran matematik dalam tajuk operasi asas. *Journal of Engineering, Technology, and Applied Science*, 4(2), 55-66.
- [15] Ramli, M. S., & Mohd Tajudin, N. (2021). Analisis keperluan untuk membangunkan Modul Pembelajaran Berasaskan Challenge dalam Mempelajari Matematik bagi murid tingkatan 4. *Jurnal Pendidikan Sains Dan Matematik Malaysia*, 11(5), 50-58.
- [16] Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2012). How to design and evaluate research in education 7, 429. New York: McGraw-Hill.
- [17] Aliza, A. & Zamri, M. (2017). Analisis keperluan terhadap pengguna sasaran modul pendekatan berasaskan bermain bagi pengajaran dan pembelajaran kemahiran bahasa kanak-kanak prasekolah. *Jurnal Kurikulum & Pengajaran Asia Pasifik*, 3(1), 1-8.
- [18] William, S. K., & Maat, S. M. (2020). Sorotan literatur bersistematik terhadap pengetahuan pedagogi isi kandungan guru matematik. *Jurnal Dunia Pendidikan*, 2(3), 82-94.