Requirement Analysis and Expectations of Learning Numeration Problem Solving Use Technology for Primary Education Children

Nor Azizah Tahir[1], Helmi Norman[1,*], Norazah Nordin[1], Fatin Nabilah Wahid[2] & Rohani Aziz[3]

[1]Faculty of Education, Universiti Kebangsaan Malaysia, Malaysia

[2]Academy of Contemporary Islamic Studies, Universiti Teknologi MARA, Shah Alam, Malaysia

[3]Malaysia Examinations Council, Ministry of Education Malaysia, Malaysia

* Correspondence: Faculty of Education, Universiti Kebangsaan Malaysia, Malaysia. E-mail: afatinna@uitm.edu.my

Received: March 22, 2023 Accepted: July 8, 2023 Online Published: October 7, 2023

doi:10.5430/wjss.v10n1p1 URL: https://doi.org/10.5430/wjss.v10n1p1

Abstract

Basic numeracy abilities are crucial for elementary school kids because they provide a foundation for grasping mathematical concepts. By studying and mastering certain concepts for solving mathematical problems, students in basic education can continue to comprehend ideas that are more challenging to utilise in learning mathematics. In order to determine whether 115 year 1 to year 3 pupils across the nation agreed with the following constructs, a needs analysis survey was provided to them. The three subjects covered in this essay are as follows: 1. The learning of math problem-solving skills for primary school students; 2. The tendency to learn using technology; and 3. The propensity of primary school students in Malaysia towards technology devices. Descriptive analysis was used to analyze the survey results. The findings indicate that respondents support the use of augmented reality in the teaching of numeracy to primary school students, and a sizable percentage of respondents also support technology-based learning and perception. However, there is very little trend for education students to use technology. The debate, conclusions, and suggested next steps are covered in the document.

Keywords: technology, learning numeracy, early numeracy, problem solving, primary education

1. Introduction

The United Nations Educational, Scientific, and Cultural Organisation (UNESCO) 2017 report at the Asia Pacific Regional Policy Seminar states that countries need to take into account the issue of investment in the Internet and information technology and communication (ICT) in the ongoing development and training in science, technology, and engineering (STeM). (Owens, 2017; Edwards & Okitsu, 2018).

It is vital to provide fresh learning tools or materials because students have a variety of learning options depending on their present competency level. In general, technological advancements can be advantageous for various learning methods (Lee, 2012). (2015) (Norman, Nordin, Din, Ally, Dogan, & Norman, et al., 2022) Nordin, N., Norman, & Embi, M. A. The Curriculum and Education Division's modules, publications available on the market, and textbooks are not the only sources of guidance for it.

The necessary modifications are discussed in several abstracts of academic research on 21st-century teaching and learning approaches. Ibharim, LFM, Yatim, MHM, and Masran, MN (2015) state that one of the 21st century skills that must be developed to fulfil future needs is the use of communication and information technology. Although traditional teaching and learning methods can no longer satisfy needs (Panagiotidis, P., 2013), the field of education is still falling behind in recognising the influence of new learning strategies and the evolving modern learning environment of the digital era (Lee, K.2011).

1.1 Basic Numeracy

The evolution of numbers starting at zero is the foundation of numeration. It is a new global agenda that includes the organisation responsible for the key mathematical assessments, Trends in International Mathematics and Science Studies, and Education Achievement Evaluation (IEA). (Mullis, IV; Martin, MO; Foy; & Arora, 2012) TIMSS 2011.

According to Atweh, Arindam, Graven, Jayasree, and Venkat (2014) and Mullis, Martin, Foy, and Arora (2012), good basic numeracy skills are a prerequisite for future mathematical proficiency. The focus on mastering the fundamentals of numeracy is the key to mastering future mathematical skills, according to many research studies (Harun, Ghazali, Hamid, & Nasir, 2017; Ayub, Ghazali, & Othman, 2013; Munirah, Ayminsyadora, & Abdul Razak, 2013). In order to ensure that children have a firm grasp of the fundamentals of numeracy, it is crucial to prepare and provide suitable content (Ghazali, 2015).

LINUS (Literacy and Numeracy Screening), a national programme, introduced the term numeracy into Malaysian education in 2010. This programme seeks to help typical primary school students in Years 1 through 3 understand the fundamentals of literacy and numeracy. The fundamentals of numeracy, which are defined as "the ability to perform basic mathematical operations, understand simple mathematical ideas, and apply mathematical knowledge and skills in daily life" (MOE, 2021), can be attained through the LINUS Programme. A new programme, called Classroom Assessment (PBD), has taken the place of the LINUS Programme, according to the Release Letter of the Ministry of Education Malaysia Number 14 Year 2018 (MOE, 2018).

PBD was created with the intention of holistically evaluating and tracking a student's learning progress. After a lesson in class, pupils are subjected to PBD, a measurement tool. This assessment is broken down into six mastery levels: Mastery Level 1 (TP1), Know, Mastery Level 2, Know and Understand, Mastery Level 3, Know, Understand, and Can Do, Mastery Level 4, Know, Understand, and Can Do with Respect, Proficiency Level 5, Admirable Civility, and Proficiency Level 6, and Know, Understand, and Can Do with Beradap Mithali (Ministry of Education Malaysia, 2019). In order to promote student learning at Level 1 by mastering the fundamentals of numeracy in particular and mathematical skills in general, a new mechanism in education needs to be planned.

1.2 Potential Technology-Based Learning

In Malaysia's educational institutions, particularly those that offer higher education, technology-based learning has long been practised in order to keep pace with the expansion of information technology and the globalisation of education. As governments work to promote a culture of lifelong learning, the need for technology-based education is anticipated to rise (Burke, PF; Schuck, S.; Aubusson, P.; Kearney, M.; & Frischknecht, B. (2018)). With the use of technology, students can now learn at any time and from any location (Sithole & Onyari, 2012; Abaidoo & Arkorful 2014; Bano, Zowghi, Kearney, Schuck, & Aubusson, 2018). Technology-based learning allows students from various cultural backgrounds to select efficient learning strategies in accordance with their preferences and needs, which can boost student engagement and encourage continued use of the method (Joshua, Nehemiah, & Ernest, 2015). Additionally, the utilisation of technology resources combined with teacher learning results in an impact of effective learning on students (Phon, Ali, & Halim, 2014).

2. Research Methodology

The purpose of this study is to analyse user satisfaction with technology-based learning while also examining students' perceptions of their numeracy skills and technology-use abilities. 115 primary school children in Standard 1 (Year 1) participated in the poll. There are two sections to the questionnaire. The first section looks into the respondents' racial, ethnic, gender, age, parental employment status, and access to ICT at home demographic data. Components A, B, and C make up the second of the questionnaire's three components. The requirement for the Numeracy Problem Module for Primary Education Children is examined in Part A, while the tendency to learn using technology and perception interest are examined in Part B. Part C, on the other hand, looks into Malaysia's elementary school children's propensity for using technology. According to the respondents' cognitive abilities, binary scales were used in this study on Level 1 primary school pupils. The survey's results were examined using descriptive analysis.

3. Research Findings

3.1 Demographical Findings

The 76 respondents throughout Malaysia who answered the needs analysis instrument provided, consisting of children aged 7 to 9 years.

Table 1. Demographic Analysis of Respondents

Bil	Content	Quantity	Percentage
	Location		
1	a) City	39	51.3
	b) Rural	37	48.7
	Gender		
2	a) Male	41	53.9
	b) Female	35	46.1
3	Age		
	a) 7 years old	17	22.4
	b) 8 years old	27	35.5
	c) 9 years old	32	42.1
4	Parents occupation		
	a) Government	46	60.5
	b) Private	7	9.2
	c) Self-employed	22	28.9
	d) Unemployed	1	1.3

According to Table 1, urban respondents make up 51.3% of the total, while rural respondents make up 48.7%. 53.9% of the respondents are men and 46.1% are women, according to their gender. Responses from respondents aged 7 to 9 have an age distribution of 22.4%, 35.5%, and 42.1%, respectively. The public sector accounted for the biggest percentage of carer employment (60.5%), followed by the private sector (9.2%), the self-employed (28.1%), and the jobless (1.3%). According to an analysis of the ICT facilities in the respondents' homes, smartphones account for the largest percentage (88.2%), followed by computers, laptops, netbooks, iPads, regular mobile phones, and none.

3.2 Needs analysis of the Numeracy Problem Solving Module of Primary Education Children

For Part A, participants' perceptions for learning using modules and technology was investigated.

Table 2. Perception of Child Numeracy Problem Solving Module Primary Education

Item		Percentage (%)	
		Agree	Not Agree
A1	I like learning to use modules.	82.9	17.1
A2	I can answer questions well without teacher guidance.	28.9	71.1
A3	I like to answer questions by the teacher during the Teaching & Learning sessions in the classroom.	82.9	17.1
A4	I can do my own Mathematic exercise at home.	48.7	57.3
A5	I would love to be able to answer Mathematic questions with the help of technological tools. (example: computer / laptop / mobile phone)	90.8	9.2

Results showed that item A5, "I would be happy to be able to answer mathematical questions with the help of technological tools," had the highest rating. As many as 90.8% of respondents concurred (example: PC, laptop, or mobile phone). I can answer the question properly without the help of the teacher; item A2 was the item on which the least number of respondents (28.9%) agreed.

This survey's Part B was designed to discover more about people's attitudes, preferences, and propensities towards learning with technology. To get the data, a total of nine items were administered.

Table 3. Perceptions, Interests and Tendencies Towards Learning Using Technology

	Item	Percentage (%)	
		Agree	Not Agree
B6	I used to learn using technology-based materials.	85.5	14.5
B7	I always learn to use technology -based materials in my spare time.	55.3	44.7
B8	I enjoy learning using technology-based materials.	90.8	9.2
B9	I understand learning by using technology-based materials.	81.6	18.4
B10	I can review learning using technology-based materials.	80.3	19.7
B11	I learned using technology-based materials on smartphones / computers / laptops.	69.7	30.3
B12	I really like learning by using technology-based materials.	86.8	13.2
B13	I learned a lot using technology-based materials over the past four weeks.	48.7	51.3
B14	Learning by using technology-based materials enhances my understanding.	83.9	17.1
B15	I will continue to learn using technology-based materials in the future.	88.2	11.8

A descriptive analysis of the views, interests, and dispositions of Level 1 students towards using technology to learn is shown in Table 3. According to research on Level 1 students' perspectives, interests, and tendencies towards learning with technology, item B8, "I enjoy learning with technology-based materials," received the highest number of yes responses (90.8%). I particularly enjoy using technology-based resources to master item B12, which came in second with 86.8%. However, only 48.7% of respondents said they agreed with the statement, "I learned a lot by using technology-based materials in the last four weeks."

The purpose of Part C of this survey is to learn more about people's attitudes, preferences, and dispositions towards technological devices.

Table 4. Perceptions, Interests and Tendencies Towards Technological Devices

	Item	Percentage (%)	
		Agree	Not Agree
C16	Using technological devices tools (cell-phones, computers) is a good thing.	80.3	19.7
C17	Using technological devices (mobile phones / computers) makes work/life more interesting.	86.8	13.2
C18	Using technological devices (cell phones / computers) is fun.	94.7	5.3
C19	I like to use technological devices (mobile phones / computers) in daily life.	85.5	14.5
C20	I hope to be able to use technological devices (mobile / computers) in learning activities.	88.2	11.8

Table 4 shows attitudes, preferences, and trends towards technical toolkits. According to a review of the data gathered, more than 80% of respondents support the use of technology as a learning aid. The largest percentage of people who use technology (computers and smartphones) for leisure is 94.7% in item C18.

4.3 Elements of Technology in the Numeracy Problem Solving Module for Primary Education Children

From traditional schooling to virtual education, the Malaysian educational system has undergone numerous transformations. The education system of the twenty-first century faces significant challenges from the effects of the nation's liberalisation and globalisation, as well as from the quickening pace of technological and ICT growth (Halili & Suguneswary, 2017). Whether a group of students is in an urban or rural setting, computer-assisted teaching techniques have a highly positive impact on student accomplishment.

Additionally, e-learning is used by students as a learning tool to replace the conventional methods employed by teachers. It is a procedure that incorporates all educational technologies utilised in environments where teaching and learning take place online (Sabah, 2013). In light of the previous situation, few educators or teachers are able to create their own lesson plans that incorporate technology and multimedia. But today, the MOE has developed a prototype 21st century learning initiative in 2014 and deployed it across the country starting in 2015 (PPPM 2013-2025) to assist

teachers in understanding and being prepared to make adjustments in PnP in accordance with the ambitions of transformation. Many educators and teachers are already adept at creating their own lesson plans using multimedia and technology.

There are 5 expected items of learning methods using the platform formally. Experts agree to agree to only accept google classroom and reject 4 other items namely Moodle, Edmodo, Schoology and MOOC. Out of the 5 expected items of learning methods using the informally listed platform, expert consent has received 2 items namely Youtube and Blog. While 3 items namely Facebook, Instagram and Wikipedia have been rejected and 2 items namely Telegram and Whatsapp have been added. 4 items have been listed for expected learning methods using technology applications. The expert consent has accepted all the items listed and added one item which is Artificial Intelligence (AI). As for the expected items of suitability of technological elements in numeracy problem solving skills, namely text, video, audio, animation and graphics, experts agree to accept all the items listed.

5. Discussion and Conclusions

Descriptive data is being used in this investigation. It was not intended to be a controlled trial that could be instantly generalised, despite the fact that it featured numerous youngsters. We can deduce certain aspects of children's internal representations from the external representations they make. Still at the exploratory stage and not yet exposed to reliability or validity assessments among different researchers. It is important to notice that the researcher talks about how youngsters naturally respond to technology when studying numeracy problem solving.

The needs analysis carried out shows that the majority of respondents strongly agree and are positive towards the constructed constructs namely: 1. Primary Education Numeracy Problem Solving Module (Burke, Schuck, Aubusson, Kearney, & Frischknecht, 2018), 2. Tendency to learning using technology and Perception, interest (Lee, 2012) and 3. The tendency towards technology devices for primary education students throughout Malaysia (Bano, Zowghi, Kearney, Schuck, & Aubusson, 2018). The findings of the analysis show that the average respondent agrees with the production of the Primary Education Children's Numeracy Problem Solving Module is 75%. The average tendency towards learning using technology, perception and interest is 76.98%. While the average propensity for technological devices of primary education students is 87.1%. This shows the level of acceptance of technology-based learning required among Level 1 students to meet the demands of current learning.

Findings of needs analysis and expectations of suitability analysis of technological elements in learning confirms the importance of technology applications such as the desire to transform Education, the Malaysian education system to change starting with traditional advocates to virtual learning. MOE launched a pilot 21st century learning initiative in 2014 and implemented in schools nationwide starting in 2015 (PPPM 2013-2025). This study is timely and appropriate to be implemented to meet the needs of education in line with the implementation of education policy, namely; students need to master the skills in learning according to a certain level of mastery and ensure that students in Level 1 can learn using technology-based modules. Based on the results of the questionnaire, the researcher hypothesises that in order to improve students' understanding of numeracy problem-solving, technology needs to be used (Norman, Nordin, Din, Ally, Dogan, & Norman, et al., 2022).

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Acknowledgments

This research is supported by the Academy of Contemporary Islamic Studies (ACIS). The author wish to thank ACIS UiTM Shah Alam for facilitating the writing publication and hands on workshop Pre-Synergy.

Authors contributions

Not applicable.

Funding

Not applicable.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Sciedu Press.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.