In-Depth Exploration and Insights: Unveiling the MARK Cloud Based Learning Analysis of Interface Design

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Abstract
This study addresses the new approach on the teaching and learning mathematics for primary school students. This study applied the DDR Research Method consist of three phases. The primary focus is to evaluate the interface design of Mathematics for Rural Kids, a Cloud Based Learning (MARK CBL) platform. This platform is designed to enhance mathematics instruction for primary school students, particularly those in rural areas. MARK CBL exemplifies innovative cloud-based learning, leveraging technology's transformative power to offer an engaging, inclusive, and seamless learning experience. Created with the modern learner in mind, it offers a variety of features and capabilities that enhance accessibility, effectiveness, and enjoyment of learning. With its focus on mathematics, MARK CBL provides teachers and students with abundant resources, promoting a dynamic learning environment. A survey was conducted among 368 students and 46 teachers actively involved in the MARK tuition program funded by Maybank. The results revealed overwhelmingly positive feedback from participants. In conclusion, this study underscores the vital role of cloud-based learning in advancing mathematics education within the context of Education 4.0.
Keywords: Cloud Based Learning, Immersive Technologies, Scaffolding, Interface Design.

Introduction
        The latest digital revolution calls for the introduction of modern developments into the education sector. Changing focus to digital and online education is important. It is so because online research skill is a significant proficiency of the prosperity of the 21st century. As highlighted by Vogt and Westerlin (2021), technology integration in early elementary classrooms can foster 21st-century skills in math, literacy, and social-emotional learning. These competencies allow students to choose study materials independently, search for

proper information, possess self-learning skills, control motivation, and reflect on self-evaluation.

In addition, students being allowed to choose the best practices for how they should learn, generates more of an intrinsic motivation and assists in the creation of a digitally literate population. According to Chue (2023), perceived autonomy is the main predictor of intrinsic motivation in blended learning, while competence and relatedness are not that important. This generation that is digital-ready can drive the progress of Malaysia. Consequently, online learning is more than just an alternative; it is a must if the new generation is to be able to live in the digital era.

MARK CBL project is aimed at ensuring that all students irrespective of their socioeconomic status can learn wherever and whenever they want using any form of digital learning. This aligns with the five aspirations of the Malaysian Education Blueprint: Quality, equity, unity, effectiveness, and continuum. The project seeks to improve students' performance and motivation in learning mathematics in a method that is also entertaining.

Research Background

According to 21st-century education principles, schools should start elementary students on practices that are related to immersive technologies. According to Shvardak (2023), the use of immersive technologies at the primary level of education can improve the quality of education as it turns it into an interactive, adaptive, and attractive phenomenon for students, at the same time, stimulating their motivation, interest, and creativity.

The MARK CBL project was an innovated open learning platform that was introduced by a dynamic transformation of the national educational system in line with the rapid development of modern technology. Peer instruction and flipped classroom paradigm are the central aspects of MARK CBL that seek to promote students' critical and creative thinking, teamwork, and communication skills. It amalgamates cooperative and interactive learning with information content through creating the areas and chances for students to work in groups to solve problems, learn about new concepts, and participate in group learning.

Abid and Noori (2023), posit that class size and government intervention in mathematics negatively correlate with the interest of high school students in mathematics education. Nevertheless, instructors, students, instructional strategies, math concern and infrastructure have positive correlations. The MARK CBL project, via its digital learning platform, targets enhancing infrastructure and accessibility in line with the Malaysian Education Blueprint (MEB). It attempts to narrow the difference in educational quality between students from different socioeconomic and geographical areas, which is in support of the goal 4 (SDG4) that preaches access to high-quality education.

The project should be informed by the five principal aims of the Malaysian Education Blueprint – access, quality, equity, unity, and efficiency. Using an edutainment technique can improve the interest and performance of students in mathematics by making the learning process more interesting and fun. Affective and behavioral engagement have been found to be important predictors of mathematical achievement among secondary school students, thus emphasizing the requirement of a curriculum and activities that engender engagement, as per (Maamin et al., 2021). The systems approach that is utilized by the makers of the MARK CBL project is a student-centered approach that amalgamates the use of various digital tools for accessible, anytime, anywhere learning opportunities and therefore is inclusive of students from different socioeconomic backgrounds and geographic regions. This study seeks

to assess usability of MARK CBL relating to the influence of interface design including all multimedia components.

Through combining knowledge of both learners and educators, we wanted to make the interface of the platform suitable for all users. The development of an intuitive and friendly design is critical towards running an effective and engaging learning environment via this cloud-based solution.

Research Objectives

This research sought to understand and moderate some major issues of the MARK Cloud-Based Learning platform according to below:

1. To investigate the interface design that students would like for the MARK platform for improving their learning experience.

2. To study the interface design preference for teachers that are using the MARK platform as a teaching support.

3. To determine and compare significant differences in interface design preferences of students and instructors who use the MARK Cloud-Based Learning system.

Methodology

This study uses the Design and Development Method (Richey & Klein, 2007) to develop Mathematics for Rural Kids Cloud Based Learning (MARK CBL). The aim is to enhance mathematics teaching and learning in primary school. The research includes three phases: Phase 1: Needs Analysis, Phase 2: Design and Development, and Phase 3: Implementation and Evaluation. Nevertheless, this paper only reports the results of Phase 3. This chapter presents the research objective that was addressed the assessment of usability of MARK CBL regarding interface design. The survey provides information on the views, levels of acceptability as well as proposals for improving MARK CBL among the respondents.

Sample

This survey includes 368 students at the schools with 46 teachers joining the MARK tuition program. This program is a joint effort between Yayasan Pelajaran MARA (YPM) and the *Pejabat Pendidikan Daerah*, spanning across five different states: From Perak to Perlis, from Pahang to Sabah and Sarawak. This study is designed to investigate the efficiency of the MARK CBL that could be taken as one of the new tools in math learning. This study used a targeting sampling method to choose participants that meet certain criteria which is they must be from the B40 family and residing in the rural area.

Research Instrument

The present study focused on the respondents who were recipients of the tuition program of MARKI. It used a questionnaire to collect data. This study was aimed to obtain noteworthy data to help us assess the level of interface design usability for the Cloud-Based Learning (CBL) system of MARK. The researchers are research team, which brink together the deep insight and knowledge of teaching techniques of both educational systems and user interface designing, considered whole set of questions in this survey with great care. They decided regarding 4-point Likert scale, which is one of the best and publicly accepted tools when it comes to measuring subjective opinions and attitudes. Such implies that the entire process became easier than before, yet the report is still very useful. I designed 23 interview questions that were well-communicated, and each question was oriented to elicit information

from different components of MARK's CBL system's interface design. This systematic approach permitted to maximize the evaluation scope that was almost complete and very useful for the researchers to know how the users respond at the interface level.

Data Analysis

The data collected in Phase 1 was analyzed quantitatively using the latest SPSS software. This data was gathered from a survey of 368 students and 46 teachers, focused on evaluating the usability of MARK CBL's interface design.

Results and Discussion
MARK CBL the level of interface design preferences among the students according to the center
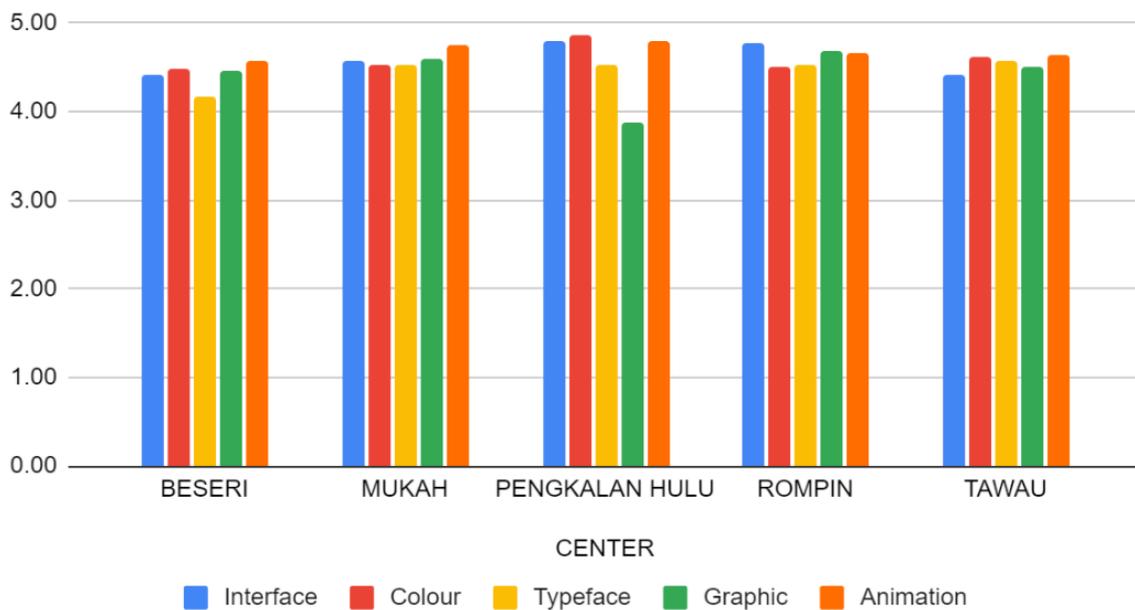

Figure 4.1: Level of interface design preferences among the students according to the center

Table 4.1
Level of interface design preferences among the students according to the center

CENTER	Interface	Colour	Typeface	Graphic	Animation
BESERI	4.41	4.48	4.17	4.45	4.57
MUKAH	4.57	4.53	4.53	4.60	4.76
PENGKALAN HULU	4.81	4.86	4.53	3.88	4.79
ROMPIN	4.78	4.52	4.52	4.68	4.66
TAWAU	4.41	4.61	4.57	4.50	4.63
Overall Mean	**4.56**	**4.58**	**4.44**	**4.44**	**4.66**

Figure 4.1 and table 4.1 showed the level of interface design preferences among the students according to the center. The highest score is on the attribute of animation which is 4.66 and the lowest score is on the attribute of typeface and graphic which is 4.44.

MARK CBL the level of interface design preferences among the students according gender comparison
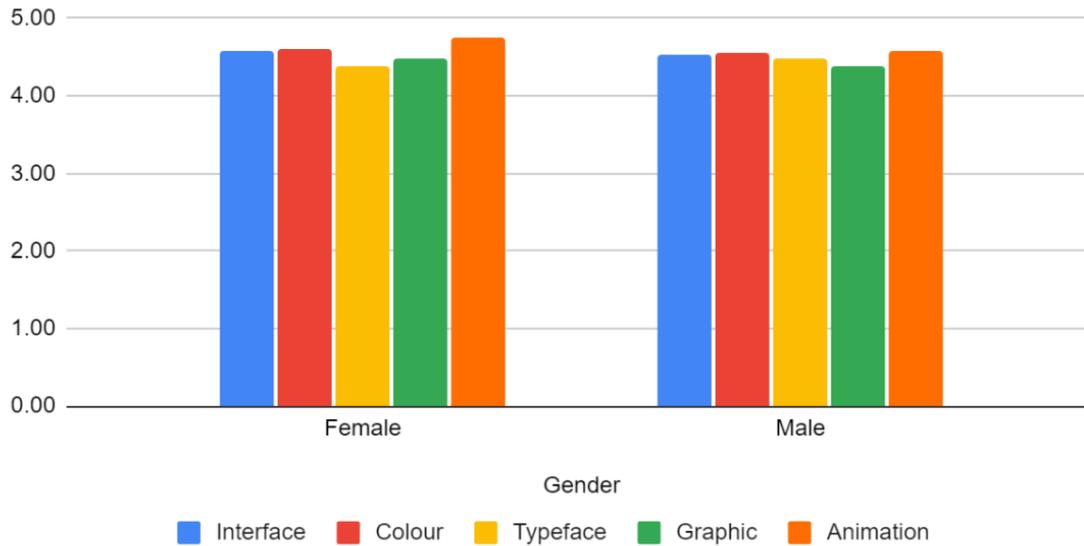

Figure 4.2: Level of interface design preferences among the students according to gender comparison

Table 4.2
Level of interface design preferences among the students according to gender comparison

GENDER	Interface	Colour	Typeface	Graphic	Animation
Female	4.59	4.60	4.39	4.49	4.75
Male	4.53	4.57	4.49	4.38	4.57
Overall Mean	**4.56**	**4.58**	**4.44**	**4.44**	**4.66**

Figure 4.2 and table 4.2 showed the level of interface design preferences among the students according to gender comparison. There is no significant difference between boys and girls on all attributes as the p-value for all attributes is more than 0.05.

MARK CBL the level of interface design preferences among the students according to the teacher's perception
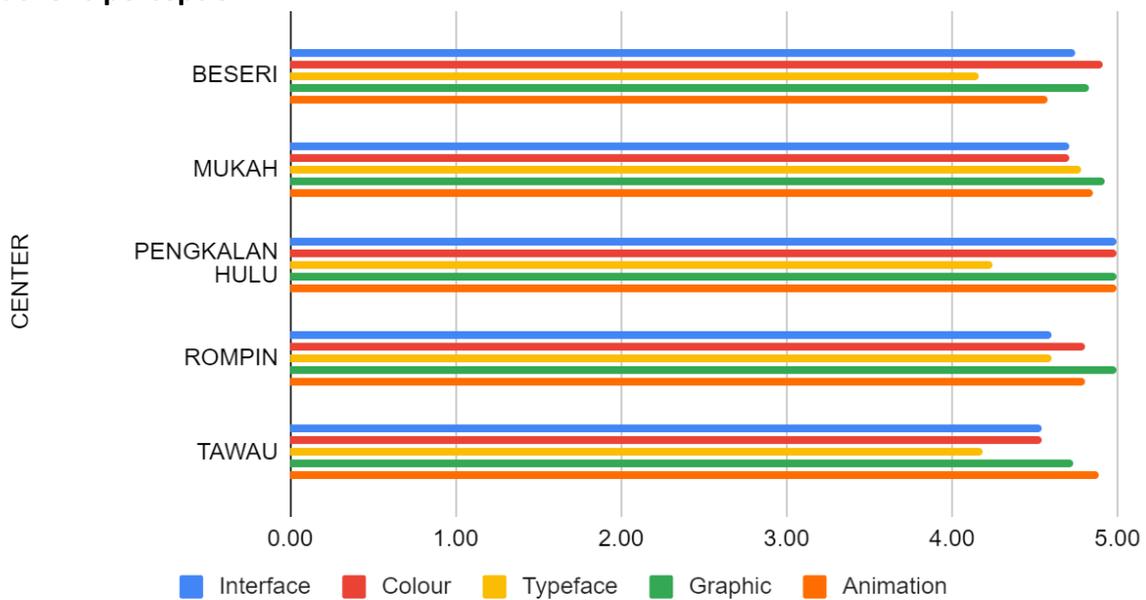

Figure 4.3: Level of interface design preferences among the students according to the teacher's perception

Table 4.3
Level of interface design preferences among the students according to the teacher's perception

CENTER	Interface	Colour	Typeface	Graphic	Animation
BESERI	4.75	4.92	4.17	4.83	4.58
MUKAH	4.71	4.71	4.79	4.93	4.86
PENGKALAN HULU	5.00	5.00	4.25	5.00	5.00
ROMPIN	4.60	4.80	4.60	5.00	4.80
TAWAU	4.55	4.55	4.18	4.73	4.89
Overall Mean	**4.70**	**4.76**	**4.41**	**4.87**	**4.80**

Figure 4.3 and table 4.3 showed the level of interface design preferences among the students according to the teacher's perception. The highest score is on the attribute of animation which is 4.80 and the lowest score is on the attribute of typeface which is 4.41.

The level of interface design preferences among students and teachers' perception of the students' interface design preferences while using MARK CBL
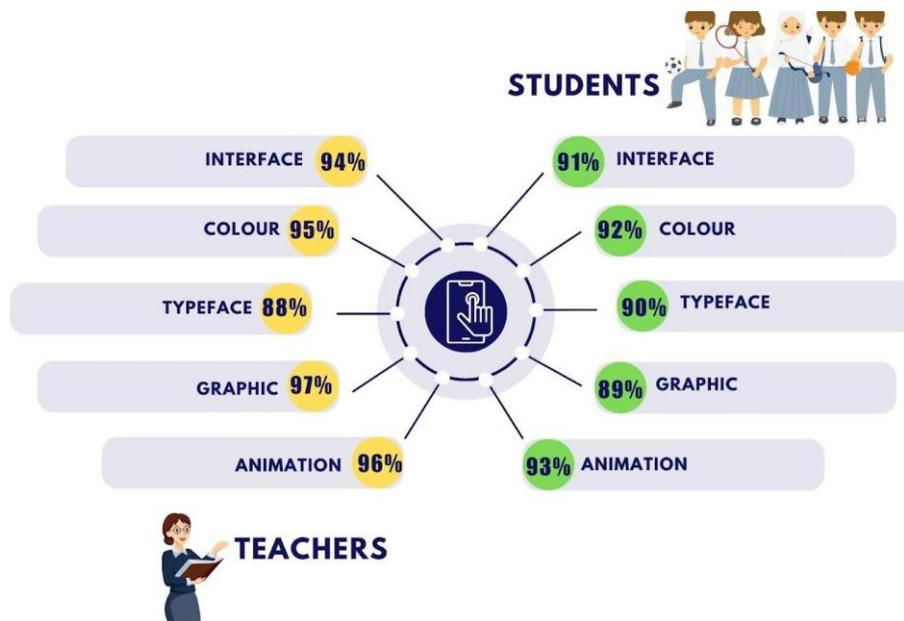

Figure 4.4: Level of interface design preferences among students and teachers' perception of the students' interface design preferences while using MARK CBL.

Figure 4.4 showed the level of interface design preferences among students and teachers' perception of the students' interface design preferences while using MARK CBL. The highest score from teachers is on the graphic attribute which is 97% and the lowest score is on the typeface attribute which is 88%. While the highest score from students is on the animation attribute which is 93% and the lowest score is on the graphic attribute which is 89%.

Discussion and Conclusion

The goal of MARK CBL education project is to construct an open educational system in which people could learn from anywhere wherever they are and at any time. It has been built for students from different socioeconomic status and geographical regions that are operating online to avail digital tools that are wide-ranging. The project's objectives align with the five goals of the Malaysian Education Blueprint: acceptance, quality, equality, unity, and convenience. By adopting an edutainment strategy, we aim to increase students' interest and performance in mathematics. The interactive online learning process is almost as interesting and entertaining as a good novel. As argued by Gandhi and Verma (2022), like interactive games, methods such as this are a cause of constructive, enlightening, and lasting learning approaches that should be part of mathematics education. They boost student abilities and make education fun. Listen to the given audio and summarize the key ideas in the subsequent paragraph. The pursuit of reform or revolutions becomes a driving force for individuals and groups who believe that change is necessary and inevitable. In such a context, dissatisfaction with the status quo leads to mobilization efforts that opposition actors can exploit.

MARK CBL work website interface has obtained positive feedback from all visitors. It is successful, practically anything related to an app is based to an extent on this factor. User, task, and environment also incorporate into the design process which consists of interface

design, construction, validation, and analysis of the mentioned data. User interface is the crucial point for determining smart TV interface control. An acceptable interface design (UI) for MARK CBL should be interactive and appealing enough to encourage users to participate. Consistency is important regarding both UI-UX and e-learning design because it organizes users' reactions and behavior collectively and helps them to predict interactions from diminishing confusion. Such a claim is buttressed by (Zardari et al., 2021). Based on there, an E-Learning Acceptance Paradigm, which is referring to the Acceptance by the UX-Based E-Learning tools, is successfully predicting students' trend to accept e-learning portals. Factors such as ease of use, functionality, self-efficacy, and social science affect the markers extensively.

This comprehensive study illustrated that when using the MARK Computer-Based Learning (CBL) system, there was a significant enhancement in the learning motivation among students. Not only did the students themselves feel more driven to learn, but their teachers also perceived a noticeable increase in their students' motivation levels. This highlights the effectiveness of the MARK CBL in stimulating a more engaging and dynamic learning environment. According to Tawfik et al (2021) Engaging effectively with the learning environment, as well as the learning space, plays a vital role in ensuring a successful learning experience. This engagement directly influences several key factors. This includes the adoption of technology, which is a key element in modern learning experiences. The cognitive load, or the amount of information that a learner can process and understand at any one time, is also heavily influenced by the quality of interaction in the learning environment and space. Lastly, usability, or how easily a learner can navigate and utilize the learning resources available to them, is also significantly impacted. Therefore, the importance of interaction within these learning spaces and environments cannot be understated. This comprehensive study has significantly contributed to the development of new delivery and teaching methods in the field of mathematics. It has successfully done so by integrating a state-of-the-art virtual learning environment, facilitated through the cutting-edge technology of MARK Cloud-Based Learning (CBL). This innovative approach has not only enhanced the teaching methods but also revolutionized the way students learn and comprehend complex mathematical concepts.

The design of MARK CBL considers consistency, up-to-date standards, and straightforward next actions to maintain user interest and breed motivation. Gamification elements, leaderboards, and status updates are part of the UI design. Such components promote a comfortable and interesting learning process. As per Jayawardena et al (2022), gamification may be analyzed for the aspect of fostering online participation in information systems, branding, and education.

CBL MARK introduces a new way of cloud-based learning solutions. This system keeps on evolving and is constantly re-engineered with technological progress which eventually results in advanced features and functionality. MARK CBL is a breakthrough in cloud-based learning systems. It's a revolutionary set of features and user-friendly interface make it a ray of hope for both educators and students. The MARK CBL's creativity dedicated to accessibility, interactivity, collaboration, and personalization should ensure a landscape of creative possibilities within the cloud-based learning industry, all based on the core of innovation.

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References
Abid, A., & Noori, A. (2023). Exploring the Influential Factors on Students' Mathematical Interest in Schools. Journal for Research in Applied Sciences and Biotechnology. https://doi.org/10.55544/jrasb.2.3.10.

Chue, K. (2023). Increasing Intrinsic Motivation in Blended Learning Through Digital Playlists. International Multidisciplinary Research Journal. https://doi.org/10.47722/imrj.2001.16.

Gandhi, S., & Verma, R. (2022). Review of various Edutainment techniques of Mathematics pedagogy. Research Journal of Engineering and Technology. https://doi.org/10.52711/2321-581x.2022.00016.

Jayawardena, N., Ross, M., Quach, S., Behl, A., Gupta, M., & Lang, L. (2022). Effective Online Engagement Strategies Through Gamification: A Systematic Literature Review and a Future Research Agenda. J. Glob. Inf. Manag., 30, 1-25. https://doi.org/10.4018/jgim.290370.

Maamin, M., Maat, S., & Iksan, Z. (2021). The Influence of Student Engagement on Mathematical Achievement among Secondary School Students. Mathematics. https://doi.org/10.3390/math10010041.

Richey, R. C., & Klein, J. D. (2007). Design and Development Research: Methods, Strategies, and Issues. United States of America: Lawrence Erlbaum Associates, Inc.

Shvardak, M. (2023). Immersive Technologies in Primary Education. Scientific Herald of Sivershchyna. Series: Education. Social and Behavioural Sciences. https://doi.org/10.32755/sjeducation.2023.02.227.

Tawfik, A., Gatewood, J., Gish-Lieberman, J., & Hampton, A. (2021). Toward a Definition of Learning Experience Design. Technology, Knowledge and Learning, 27, 309-334. https://doi.org/10.1007/s10758-020-09482-2

Vogt, S., & Westerlin, S. (2021). Technology Integration in the Early Elementary Classroom. Handbook of Research on Empowering Early Childhood Educators with Technology. https://doi.org/10.4018/978-1-7998-6888-0.ch003.

Zardari, B., Hussain, Z., Arain, A., Rizvi, W., & Vighio, M. (2021). Development and Validation of User Experience-Based E-Learning Acceptance Model for Sustainable Higher Education. Sustainability, 13, 6201. https://doi.org/10.3390/SU13116201.