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Reconnoitering Innovative Ideas in Postnormal Times

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iTAC 2023
INTERNATIONAL TEACHING AID COMPETITION
E-PROCEEDINGS

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29. **INNOVATION OF BABY FOOD PACKAGING USING THE IMPLEMENTATION DESIGN WITH AUGMENTED REALITY TECHNOLOGY AND QR CODE** 201
Muhammad Harrith Iqmal Bin Md Razak, Ts. Mastura Omar, Dr. Shalida Rosnan, Aezzaddin Aisyah Zainuddin, Ts. Nur Aniza Mohd Lazim
30. **MARI BELAJAR MENGURUS MASA DAN WANG (MBMMW) COURSEWARE FOR TABIKA KEMAS** 207
Nurul Aqilah Jasni, Wan Safra Diyana Wan Abdul Ghani
31. **LESSON GOING DIGITAL: E-CONTENT OF THE CURRENT INITIATIVES IN ENVIRONMENTAL-RELATED MANAGEMENT ACCOUNTING** 217
Farra Azureen Binti Johari, Aina Najwa Binti Ahmad Sapari, Fatin Afrina Binti Mohamad Ishak, Siti Noor Azmawaty Binti Abd Razak
32. **CHROMOLEAF KIT MINI KROMATOGRAFI** 221
Habibah Mohamad Rejab, Husni Din, Khairul Anida Omar, Tamilarasi Rajaram, Zakiah Rashid
33. **IREFLECT V1: EMBRACING TECHNOLOGY TO GET LEARNERS' REFLECTIVE FORMATIVE FEEDBACK AFTER FACE-TO-FACE CLASS** 228
Nur Farah Fadhliah binti Mahmud, Noor Fadhleen binti Mahmud, Siti Huzaimah Sahari
34. **UI DESIGN REVAMP OF DEWAN FILHARMONIK PETRONAS (DFP) ONLINE PAYMENT WEB PAGES - POSITIVE OR NEGATIVE EMOTION?** 233
Muhammad Hariz Bin Hasnan, Loh Wai Xin (Estella), Lau Chewvy, Ling Qian Ping, Wong Si Ying
35. **GO FALQUIZZI : PERMAINAN INTERAKTIF PENGUSAAN TERMINOLOGI** 240
Noor Syahidah Binti Mohamad Akhir (Dr), Syaimak Binti Ismail (Dr)
36. **INNOVATION OF SLEEVE PACKAGING WITH CARRIER IN FOOD INDUSTRY** 249
Nurul Fatin Alia Binti Borhan, Ts. Mastura Omar, Dr. Shalida Rosnan, Jamil Iswan Bin Abu Daud, Muhammad Yusuf Bin Masod

PREFACE

iTAC or International Teaching Aid Competition 2023 was a venue for academicians, researchers, industries, junior and young inventors to showcase their innovative ideas not only in the teaching and learning sphere but also in other numerous disciplines of study. This competition was organised by the Special Interest Group, Public Interest Centre of Excellence (SIG PICE) UiTM Kedah Branch, Malaysia. Its main aim was to promote the production of innovative ideas among academicians, students and also the public at large.

In accordance with the theme "Reconnoitering Innovative Ideas in Post-normal Times", the development of novel ideas from the perspectives of interdisciplinary innovations is more compelling today, especially in the post-covid 19 times. Post-pandemic initiatives are the most relevant in the current world to adapt to new ways of doing things and all these surely require networking and collaboration. Rising to the occasion, iTAC 2023 has managed to attract more than 267 participations for all categories. The staggering number of submissions has proven the relevance of this competition to the academic world and beyond in urging the culture of innovating ideas.

iTAC 2023 committee would like to thank all creative participants for showcasing their innovative ideas with us. As expected in any competition, there will be those who win and those who lose. Congratulations to all the award recipients (Diamond, Gold, Silver and Bronze) for their winning entries. Those who did not make the cut this year can always improve and join us again later.

It is hoped that iTAC 2023 has been a worthy platform for all participating innovators who have shown ingenious efforts in their products and ideas. This compilation of extended abstracts published as iTAC 2023 E-Proceedings contains insights into what current researchers, both experienced and novice, find important and relevant in the post-normal times.

Best regards,

iTAC 2023 Committee
Special Interest Group, Public Interest Centre of Excellence (SIG PICE)
UiTM Kedah Branch
Malaysia

MARI BELAJAR MENGURUS MASA DAN WANG (MBMMW) COURSEWARE FOR TABIKA KEMAS

Nurul Aqilah Jasni

Kolej Pengajian Pengkomputeran, Informatik dan Media, Universiti Teknologi MARA
Cawangan Terengganu Kampus Kuala Terengganu
nurul.aqilah091120@gmail.com

Wan Safra Diyana Wan Abdul Ghani

Kolej Pengajian Pengkomputeran, Informatik dan Media, Universiti Teknologi MARA
Cawangan Terengganu Kampus Kuala Terengganu
wsdiyana@uitm.edu.my

ABSTRACT

Nowadays, the use of multimedia courseware encompasses all learning stages, especially among children. Money and time are the common topics to be taught to young kindergartners for igniting their basic real-life skills. As an effort to assist teachers in providing good educational materials, Mari Belajar Mengurus Masa dan Wang (MBMMW) courseware is developed based on Tabika KEMAS kindergarten core syllabus for mathematics focusing on money and time management. Proper interactive contents that include various activities and videos are provided in the courseware as the teaching and learning aid for teachers, parents and students. Since there are limitations of current educational materials on money and time in Tabika KEMAS, MBMMW course is developed to assist both teachers and students in providing impactful teaching and learning experience. This could later boost the students' understanding and learning performance while allowing students to have meaningful activities with teachers and parents. By implementing cognitive theory of multimedia learning (CTML) and user experience (UX) recommendations, MBMMW courseware was carefully developed via ADDIE Model which include phases of analysis, design, development, implementation and evaluation. Functional tests have been conducted to ensure the navigability and functionality of the menu, buttons and links displayed in the courseware. Moreover, user evaluation for MBMMW has also been performed towards understanding the initial acceptance of MBMMW courseware among the users. Results have mostly shown positive reactions from the users, thus acknowledging the usability of MBMMW as an interesting and fun teaching and learning aid for presenting fundamental knowledge about money and time.

Keywords: multimedia, courseware, kindergarten, cognitive theory of multimedia learning, animation

INTRODUCTION

Tabika KEMAS is an Early Childhood Education Program coordinated and managed by the Early Childhood Education Division under the Ministry of Education Malaysia (MOE). The

kindergarten's teaching method is built around games, singing, practical learning activities like drawing, and social interaction. Students are expected to gain significant knowledge during their early childhood based on the course curriculum provided by MOE. Mathematics is one of the courses that are being emphasized to be mastered among the young children as it is related to basic real-life skills. Among the topics that are encouraged to be learnt are time and money. It is important for the students to grasp the fundamentals of time and money whereas the knowledge can be applied throughout their lifetime, thus encouraging more interesting teaching and learning (T&L) resources to be created.

As a fun institution of learning for kids, Tabika KEMAS needs to improvise their T&L resources to align with the current technological changes. A good multimedia courseware is deemed to be appropriate as one of learning tools for students since it incorporates interactivity between the user and the embedded modules. The current practice at Tabika KEMAS involves the use of books and papers for T&L process. This traditional T&L method has yielded teachers to spend money on printing the learning materials, as well as other learning resources. Figure 1 shows an example of printed learning material.



Figure 1 Example of printed learning material

Moreover, the current syllabus for time and money used in Tabika KEMAS mathematic book is quite limited in terms of providing interactive activities for better learning experiences. To encourage a fun and valuable T&L process, the current syllabus should integrate with other attractive T&L aids that are suitable for both teachers and students. On the other hand, the use of multimedia such as video has been proven to boost student's engagement, learning

performance and positive attitude among young children (Martzoukou, 2022). At the same time, United Nations International Children's Emergency Fund (UNICEF) has also promoted the uses of digital learning to ensure the prosperous future for all children around the world (UNICEF, 2021).

Therefore, this study intends to develop a multimedia courseware called Mari Belajar Mengurus Masa dan Wang (MBMMW) that focuses on the topic of money and time based on Tabika KEMAS syllabus. By acknowledging the cognitive abilities of students, the courseware is developed by using the fundamentals of cognitive theory of multimedia learning (CTML) and user experience (UX) recommendations through ADDIE Model.

COGNITIVE THEORY OF MULTIMEDIA LEARNING (CTML)

Multimedia offers various opportunities in T&L environment due to its interesting features. In understanding the uses of multimedia in learning, Mayer (2009) had suggested combining several multimedia elements for better learning experience among users. This is to prevent cognitive overload among learners whilst only one multimedia element is used. For example, it is better to combine text and graphics in the multimedia learning environment instead of using only text to convey the message to learners.

According to Theimer (2019), the Mayer's principles include:

- “coherence principle: eliminate extraneous words, pictures, and sounds;
- signaling principle: add cues that highlight the organization of the essential material;
- redundancy principle: graphics and narration are more effective than graphics, narration and on-screen text;
- spatial contiguity principle: corresponding words and pictures should be presented near to each other on the page or screen;
- temporal contiguity principle: corresponding words and pictures should be presented simultaneously rather than successively;
- pre-training principle: people learn better when they know the primary names and concepts;
- multimedia principle: people learn better from text and pictures than from text alone; and
- segmenting principle: present multimedia lessons in user-paced segments rather than as a continuous unit.”

USER EXPERIENCE (UX) DESIGN

User Experience (UX) is defined as a person's perceptions and responses resulting from the

use and/or anticipated use of a product, system, or service (Díaz-Oreiro et al., 2019). From the planning session to the evaluation session of product development, users must be able to see the benefits, so an attractive appearance and design are necessary. As it will affect how the general public gain experiences while using the multimedia content, visual design is crucial in terms of the aesthetic dimensions utilized for graphics and other multimedia components. From the other perspective, UX focuses on the interaction and communication that users would have with a website or software application in order to make it exciting and fun. According to Interaction Design Foundation (2021), there are seven factors that can influence user experience (UX):

- Useful - The product or content must be original and fulfill a need of user.
- Usable – The courseware must be easy to use.
- Desirable – Images, logo, identity and other design elements are used in the content to evoke the emotion of user.
- Findable – The content needs to be navigable and locatable onsite and offsite.
- Accessible – Content needs to be accessible to people with disabilities.
- Credible – Users must trust and believe of the content.
- Valuable – The product must deliver value to business.

DEVELOPMENT

By using ADDIE Model as the reference, the development of MBMMW courseware has been successfully implemented. The abbreviation ADDIE stands for "analyze, design, develop, implement, and evaluate" (Moradmand Nasrin et al., 2014). Each phase of this model has a separate objective that must be completed throughout the development of a web-based multimedia application. This model is used because it is frequently used as a foundation for other instructional design models. Figure 2 shows the phases of ADDIE model for instructional design.



Figure 2. ADDIE Model Phases

Table 1 describes the use of ADDIE Model as the methodology for MBMMW courseware development based on each phase.

Table 1. MBMMW Courseware Development Methodology via ADDIE Model

Phases	Activity	Tools	Outcome
Analysis	<ul style="list-style-type: none"> Determine the current situation and problem statement. Identify the project's target user, difficulties, challenges and goal. Planning the project's requirement content. 	<ul style="list-style-type: none"> Interview Research Observation 	<ul style="list-style-type: none"> The problem statement has been identified. The target user, difficulties, challenges and goal of this project has been identified. The content of the courseware has been finalized.
Design	<ul style="list-style-type: none"> Design the storyboard, navigation maps and flow of the courseware. 	<ul style="list-style-type: none"> Microsoft Word Microsoft PowerPoint 	<ul style="list-style-type: none"> Storyboard User interface Navigation map
Develop	<ul style="list-style-type: none"> Develop the web-based multimedia courseware based on the requirement of the project. Create the animation, text, video, audio and graphic. 	<ul style="list-style-type: none"> Adobe Illustrator Adobe Animate CC Adobe Character Animator 	<ul style="list-style-type: none"> Multimedia elements are created. Interactivity and links are created.
Implement	<ul style="list-style-type: none"> Project implementation. Changes are being made on a continuous basis if needed. 	<ul style="list-style-type: none"> Web-based multimedia 	<ul style="list-style-type: none"> MBMMW Courseware implementation.
Evaluation	<ul style="list-style-type: none"> Test the usability of the courseware. 	<ul style="list-style-type: none"> Questionnaire 	<ul style="list-style-type: none"> Usability evaluation result.

STORYBOARD

Table 2 shows the storyboard of MBMMW courseware along with the description.

Table 2. MBMMW Courseware Storyboard

Storyboard	Description
	<p>Start</p> <p>This is the first page of MBMMW Courseware. This page will show the title of the courseware and user need to click on “Mula” button to go to the homepage.</p>





	<p>Main page</p> <p>This is the main page of MBMMW and it consist of the topics and quiz button. This page also has “Exit” button to allow user to exit from the courseware and “Home” button will bring user to previous page which is start page.</p>
	<p>1.0</p> <p>This page will show as user click on “Wang” button on previous page. This page has five buttons that user can use to start their lesson. The “Exit” button to allow user to exit from the courseware and “Home” button will bring user to start page. The “Previous” button will bring user to main page.</p>
	<p>1.1</p> <p>This is the lesson page and will show as user click on “Mengenali Wang” button on previous page. There are notes and lesson on this page. The “Exit” button to allow user to exit from the courseware and “Home” button will bring user to start page. The “Previous” button will bring user to 1.0 page.</p>

Table 2. MBMMW Courseware Storyboard (Continued)

	<p>2.0</p> <p>This page will show as user click on “Masa” button on main page. This page has four buttons that user can use to start their lesson. The “Exit” button to allow user to exit from the courseware and “Home” button will bring user to start page. The “Previous” button will bring user to main page.</p>
	<p>2.1</p> <p>This is the lesson page and will show as user click on “Mengenali Jam dan Waktu” button on previous page. There are notes and lesson on this page. The “Exit” button to allow user to exit from the courseware and “Home” button will bring user to start page. The “Previous” button will bring user to 2.0 page.</p>
	<p>3.0</p> <p>This page will show as user click on “Kuiz” button on main page. This page has four buttons that user can use to start their quizzes. The “Exit” button to allow user to exit from the courseware and “Home” button will bring user to start page. The “Previous” button will bring user to main page.</p>

USER EVALUATION RESULTS

The results of evaluation process have been obtained based on the questionnaire that was given to 30 respondents. The survey was split into two sections, part A - the demographics of the respondents and part B - user perception (usability, multimedia elements, navigation and contents). Five-point Likert scale ranging from 1 = strongly disagree to 5 =strongly agree was used to measure the user perception.

Majority of respondents are female (53.3%) compared to male (46.7%). As for range of age, most of respondents are in the age range of 19 to 22 years old with 15 respondents (50%). The

rest are 12 respondents (40%) in the age range of 23-26 years old and 3 respondents (10%) in the range age of under 18 years old. Furthermore, most respondents have children aged 4 to 6 years at home (66.7%) compared to (33.3%) who have not.

For measuring perception of user about MBMMW usability, the mean and standard deviation ranges are 4.23 to 4.5 and 0.66 to 0.77. This suggests most respondents agree with the usability of the courseware.

In terms of MBMMW multimedia elements, the obtained mean and standard deviation ranges are 4.23 to 4.56 and 0.55 to 0.71. This indicates most respondents agree and are satisfied with the multimedia elements presented in the courseware.

To measure the user's perception on navigation features in MBMMW, the mean and standard deviation ranges are 4.36 to 4.63 and 0.49 to 0.68. This result shows the majority of respondents are satisfied with navigation features in the courseware.

Finally, on the contents of MBMMW, the mean and standard deviation results are 4.26 to 4.6 and 0.62 to 0.74. This indicates most respondents agree and are satisfied with the contents of the courseware.

RECOMMENDATIONS AND CONCLUSION

There are some recommendations for future enhancement of MBMMW courseware. The recommendations are:

- Provide more interactive sound elements in the activity section.
- Provide more questions and exercise in the courseware.
- Provide more creative video to enhance the understanding of children about the contents.

MBMMW courseware is developed based on CTML and UX suggestions as an extra teaching and learning resources for parents and kindergarten teachers. Parents and teachers can use this courseware to introduce the fundamentals of time and money management to children in order to encourage their good habits in the future. In addition, the children could learn how to manage time and money via the multimedia elements presented in this courseware, thus stimulating their minds to be more creative. In all, as the courseware is web-based and accessible regardless of time and location, it can attract the T&L process among Tabika KEMAS teachers, parents and children.

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