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Self-Learning Modules in Improving Malaysian Primary Teachers' Skills in Using Google Applications

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Abstract

This research aims to explore the usability and usefulness of Self-Learning Modules in improving teachers' skills in using five Google Apps. While these applications are widely utilized in education, previous studies have highlighted the challenges teachers face when attempting to employ them effectively. The existing modules do not adequately prioritize the utilization of Google Apps. Realising the phenomenon, a Google Literacy Module was created, incorporating the principles of Constructivism Theory. The design and development of the module integrated two instructional design models, namely the ADDIE Model and UDin Model. This study adopts a quantitative approach, leveraging a review of specific existing literature to provide support for the research. The findings indicate that the proposed module exhibits a high level of usability among its users. Therefore, it is relevant and acceptable to utilize the self-learning Google Literacy Module as a reference, enabling users to enhance their digital skills.

Keywords: Usability and Usefulness, Self-Learning Module, Teachers' Skill, Google Applications, Constructivism Theory.

Introduction

In recent years, educational technology has gained significant attention in the field of education. The integration of technology tools and applications has the potential to transform teaching and learning practices, making them more interactive, engaging, and effective. Among the wide range of educational technology tools available, Google applications have emerged as popular choices for educators due to their user-friendly interfaces and diverse functionalities. Google applications, such as Google Advanced Search, Google Scholar, Google

Translate, Google Maps, and Google Jamboard, offer valuable resources and features that can enhance instructional delivery, content exploration, collaboration, and creativity in the classroom. Hence, it is essential for educators to establish an environment that is conducive to enhance the effectiveness and efficiency of the teaching and learning process (Mulyasa, 2008). With the advancement of technology, self-learning modules have become increasingly prevalent, incorporating multimedia resources, instructional materials, assessments, and interactive activities (Wu, Tennyson, & Hsia, 2010). Consequently, self-learning modules have emerged as valuable instruments in diverse educational settings, offering learners flexible and interactive learning experiences. These modules, also referred to as online tutorials, e-learning courses, or instructional modules, offer learners the opportunity to acquire knowledge and develop skills at their own pace and convenience (Dabbagh & Bannan-Ritland, 2005). Kasih et al (2022) also supported this statement by emphasizing its effectiveness in promoting learning, offering precise guidance, and equipping students with essential skills and knowledge.

Mohtar et al (2023) suggest that educators can maximize the learning experience and enhance student outcomes by prioritizing the usability and utility of the learning module. The usability of self-learning modules plays a crucial role in their effectiveness, ensuring that learners can navigate and engage with the content easily and efficiently. Meanwhile, Cimer & Coskun (2018) stated that understanding students' existing knowledge structures in the design and development of instructional materials promote constructive learning and facilitate productive outcomes. Nevertheless, to comprehend the effects of the usability and usefulness of this learning module, it is necessary to conduct a thorough evaluation that considers factors including user-friendliness, accessibility, clarity of instructions, and overall student satisfaction (Ramos et al., 2021). By analysing these elements, educators can assess the usability and usefulness of the learning module and implement necessary enhancements to improve student learning (Fidiastuti et al., 2021).

There are several challenges addressed in this study. First, the limited knowledge and skills of teachers in effectively using five Google applications, namely Google Advanced Search, Google Scholar, Google Translate, Google Maps, and Google Jamboard at SK Kampung Fikri Sungai Tong, Setiu, Terengganu. Many teachers are unfamiliar with the functionalities and effective integration strategies of these applications, hindering their ability to maximize the potential benefits they offer in the classroom. Next, the limited access to resources, including reliable internet connectivity and appropriate devices, can further hinder teachers' ability to effectively utilize Google Apps. Additionally, integrating Google Apps into pedagogical practices can be challenging, requiring teachers to align the use of these applications with instructional goals, design meaningful learning activities, and provide support to students. Time constraints also pose a challenge, as teachers already have demanding schedules and incorporating new technologies like Google Apps requires additional time and effort. Moreover, some teachers are resistant to change and hesitate to adopt new technologies, preferring traditional teaching methods.

Another significant challenge is the lack of training and support. The existing professional development programs and training initiatives not adequately address the specific needs of teachers in terms of enhancing their skills with these Google applications. Traditional professional development approaches often lack the flexibility and personalized guidance required to support teachers in acquiring the necessary knowledge and skills independently. These challenges highlight the need for support, training, and resources to help teachers overcome barriers and fully benefit from the potential of Google Apps in their teaching

endeavours. By designing and implementing self-learning modules tailored to the needs of teachers, it is expected that teachers can develop the necessary competencies to effectively integrate these applications into their instructional practices. Therefore, this study aims to explore the usability and usefulness of self-learning module in improving teachers' skills with five Google Apps. Specifically, the study seeks to address two research questions, (1) How can the design and development of the Self-Learning Module ensure the clear and coherent presentation of information using Google Apps based on Constructivism Theory? (2) How was the Google Literacy Module developed based on the Universal Design for Agile Development Model?

Literature Review

Self-directed learning modules have emerged as a flexible and convenient option, enabling educators to engage in professional development at their preferred pace and convenience. These modules, also known as online tutorials, e-learning courses, or instructional modules, have gained popularity across diverse educational fields (Dabbagh & Bannan-Ritland, 2005). Typically, these modules comprise multimedia resources, instructional materials, assessments, and interactive activities (Wu, Tennyson, & Hsia, 2010). Research indicates that self-learning modules are effective in fostering knowledge acquisition, skills development, and self-directed learning (Hamza & Guldin, 2020). Furthermore, self-learning modules offer an additional advantage of flexibility, enabling teachers to engage in professional development at any time and from anywhere (Odabasi Cimer & Cimer, 2012) However, despite receiving training and undergoing quality assurance, the self-learning module received unfavourable informal feedback. Examples of such feedback included comments stating that the modules involved complex tasks, contained intricate vocabulary requiring memorization, and resembled passive lecture formats. Considering these criticisms, one can imagine the difficulties users faced in understanding the intended concepts (Odabasi Cimer &Cimer, 2012). The integration of technology in education has become increasingly prevalent, transforming classrooms and instructional practices. Numerous studies have highlighted the potential of technology to enhance teaching and learning outcomes (Cavanaugh, 2020; Ertmer et al., 2015). Digital tools, such as Google apps, offer teachers the opportunity to engage students, facilitate collaboration, and promote active learning (Li & Lalani, 2020). It has gained popularity in both educational and professional settings due to its user-friendly interface, accessibility, and extensive collaboration features. However, teachers' effective utilization of these tools relies on their proficiency and knowledge of the apps' functionalities. Continuous professional development is vital for teachers to adapt to the changing educational landscape and improve their instructional practices (Desimone, 2009). Traditionally, it involved workshops, seminars, and in-service training sessions. However, these traditional approaches often fail to provide personalized and just-in-time support for teachers' individual needs (Darling-Hammond, L. et al. 2017).

Constructivist learning is an adaptive, active learning process controlled by the learner and a process of building understanding so that learning and the context for learning are deeply intertwined. According to the Constructivist learning approach, relationship of the learning and learner context is the key point to motivate and engage learners in an active and constructive learning process (Driscoll, 2007: Duffy & Cunningham, 1996: Brooks & Brooks, 1993). As stated by Schunk (2012), Constructivism Theory proposes that learners actively engage in the learning process to construct their own understanding and meaning. This aligns with the principles of self-learning modules, where learners take ownership of their learning

and engage in self-directed activities. The design of self-learning modules based on Constructivism Theory involves creating opportunities for learners to explore, reflect, and construct knowledge through authentic and relevant tasks. The relationships among these three variable is the foundation of the study conceptual framework as shown in Figure 1.

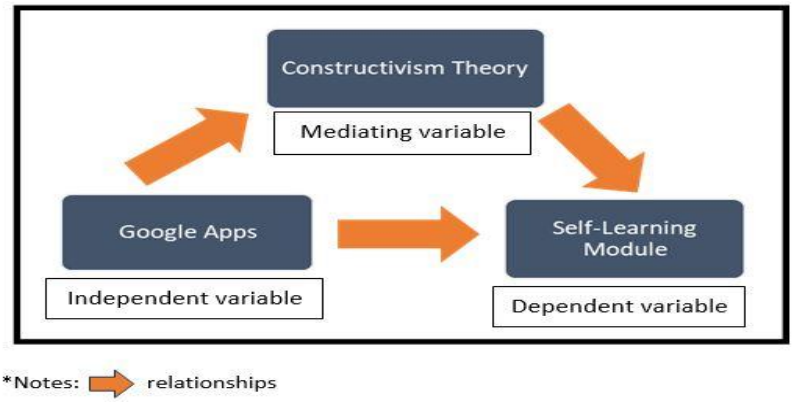


Figure 1. Proposed Conceptual Framework

Materials and Method

The purpose of developing this module is to introduce primary school teachers with the icons commonly found in Google applications and five selected Google apps, empowering them to effectively utilize these tools. This module, designed to be user-friendly, is available in a Malay version and accessible through the provided link https://anyflip.com/igkno/ikto/ as shown in Figure 2.

Figure 2. Google Literacy Module

The Google Literacy Module, designed to enhance the learning of Google Apps, was created by merging two instructional design models: ADDIE (Figure 3) and UDin (Universal Design & Agile Development Model) as in Figure 4. These models were streamlined, each contributing its own strengths. Same as UDin, ADDIE offers a systematic approach that provides a structured framework for developing effective educational products or learning resources that are easy to follow (Branch, R. M., 2009). However, ADDIE is a generic model. On the other hand, the UDin Model serves is a localized model where more that fifty modules and systems have been developed using this local model. It is suitable as a guide for any digital learning product (Din, 2016, 2020; Lubis et al., 2015).

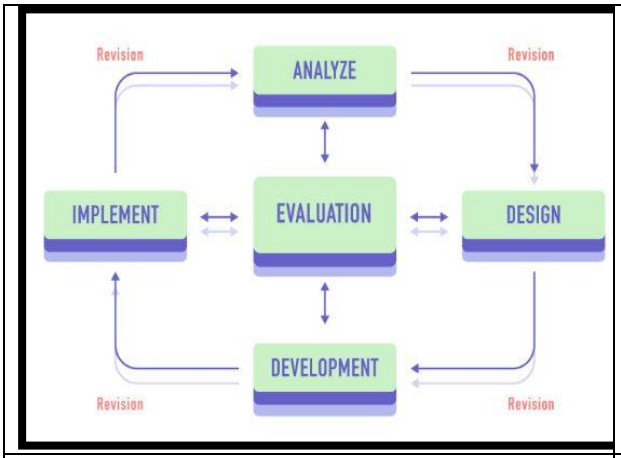


Figure 3. ADDIE Instructional Design Model source: Internet

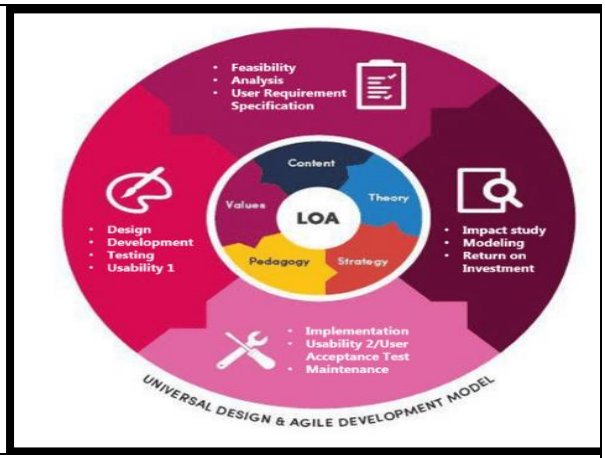


Figure 4. UDin Instructional Design Model source: Din 2016; Din 2020

ADDIE model consists of five critical phases: Analyse, Design, Develop, Implement and Evaluate. The first phase, the module development begins with analysing problem and user need of Google Literacy Module. Second phase is designing the module accomplishing the problem and user need based on initial analysis in phase one. Then on phase three, the module is developed and tested by experts and users. Next phase is the implementation of the module and last phase is evaluation to measure the effectiveness of Google Literacy Module. The UDin Model emphasizes the inclusion of input specifications related to learning theory; pedagogy; learning strategies; learning content; and values elements in digital learning products and resources. The steps are similar but elaborated in more detail with many examples done locally making it easy to replicate and problems are shared in focus groups and publications as guidance for future researchers.

Additionally, the development of this module, depicted in Figure 5, was driven by the principles of Constructivist Learning Theory and implemented through the Select-Organize-Integrate (SOI) Model (Mayer, 1999). The Constructivist Learning Theory encompasses three levels: selecting, organizing, and integrating. These levels were applied in the module's design process, including determining its format, selecting suitable icons, choosing effective wording and visual elements, incorporating graphics, animations, and examples, among other important considerations.

In terms of pedagogy aspect, researcher used QR codes, as seen in Figure 6 that can enhance the understanding of module content by providing additional resources, interactivity, and access to supplementary information. When integrated into a module, QR codes can be scanned using a smartphone or QR code reader, leading learners to relevant online content such as videos, articles, interactive simulations, or additional explanations. By scanning a QR code, learners can access multimedia materials that offer visual or auditory explanations, which can aid in comprehension and reinforce key concepts. QR codes can also link to interactive activities, quizzes, or simulations that provide hands-on learning experiences or allow learners to apply their knowledge in practical contexts. Furthermore, it offer learners the opportunity for self-paced learning. They can choose to explore additional resources or dive deeper into specific topics based on their individual interests and learning needs. This flexibility allows learners to engage with the module content in a way that aligns with their preferred learning style, leading to a better understanding and retention of the material.

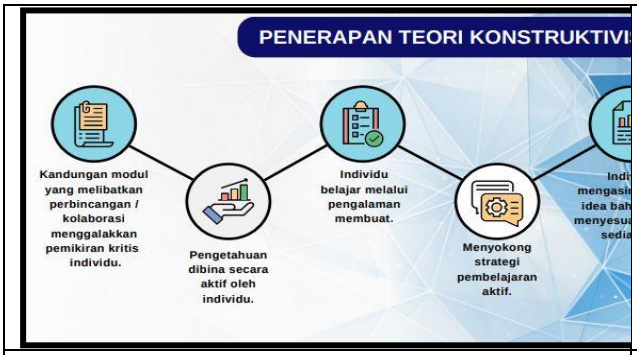


Figure 5. Constructivism Theory Application

Figure 6. QR Code application

In this study, module-based learning strategy is employed, which involves an instructional approach where learning materials are structured as modules or organized units. These modules serve as guides for users, facilitating the learning of specific topics or concepts, as depicted in Figure 7. Figure 8 illustrates the utilization of another learning strategy within this module, namely meaningful learning. Meaningful learning involves actively constructing understanding by connecting new information to pre-existing knowledge and experiences. It emphasizes the establishment of personal connections, the search for relevance, and the promotion of deeper comprehension and retention. By fostering critical thinking and the application of knowledge to real-world scenarios, meaningful learning surpasses mere memorization and cultivates transferable skills.

In order to facilitate and reinforce this learning strategy, the researchers have integrated collaborative, active, goal-oriented, authentic, and constructive elements into both individual and group activities within the Google Literacy Module. These activities center around the utilization of five Google applications: Google Advanced Search, Google Scholar, Google Translate, Google Jamboard, and Google Maps. Examples of such activities, which incorporate the elements of meaningful learning, are depicted in Figure 9 and Figure 10 within the module.

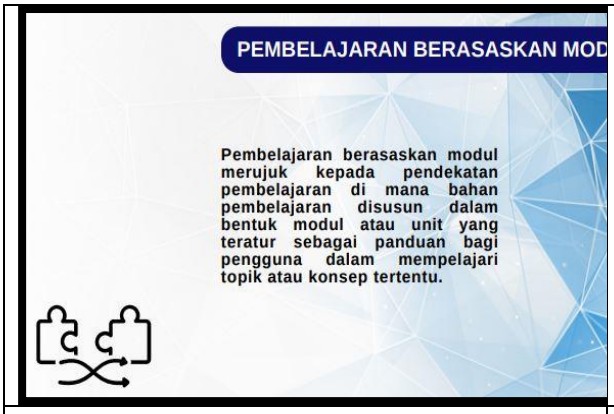


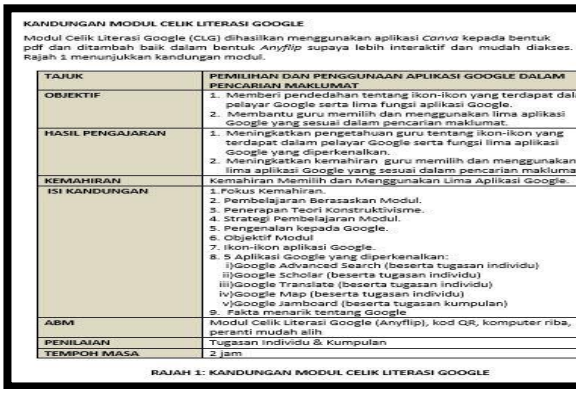
Figure 7. Modul-Based Learning Strategy

Figure 8. Meaningful Learning Strategy

Figure 9. Individual task

Figure 10. Group task

Other than that, the researcher integrated the aspect of learning content, which encompasses the information, materials, and resources employed to facilitate the learning process. This includes subject matter, concepts, facts, skills, and knowledge that learners engage with and acquire throughout their educational journey, as indicated in Figure 11 and Figure 12. Figure 13 illustrates the incorporation of value elements, which serve as the final component of the UDin Instructional Design Model. Through the integration of value elements, researcher aim to establish learning environments that nurture social awareness, empathy, and a sense of social responsibility among learners. These value elements can be woven throughout instructional materials, activities, and assessments. By integrating value elements into instructional design, the UDin Model aims to create a comprehensive learning experience that not only concentrates on knowledge and skills but also fosters ethical values and social consciousness in learners.



KANDUNGAN MODUL CELIK LITERASI GOOGLE

Modul Celik Literasi Google (CLG) dihasilkan menggunakan aplikasi *Canva* kepada bentuk pdf dan ditambah baik dalam bentuk *Anyflip* supaya lebih interaktif dan mudah diakses. Rajah 1 menunjukkan kandungan modul.

TAJUK	PEMILIHAN DAN PENGGUNAAN APLIKASI GOOGLE DALAM PENCARIAN MAKLUMAT
OBJEKTIF	1. Memberi pendedahan tentang ikon-ikon yang terdapat dal pelayar Google serta lima fungsi aplikasi Google. 2. Membantu guru memilih dan menggunakan lima aplikasi Google yang sesuai dalam pencarian maklumat.
HASIL PENGAJARAN	1. Meningkatkan pengetahuan guru tentang ikon-ikon yang terdapat dalam pelayar Google serta fungsi lima aplikasi Google yang diperkenalkan. 2. Meningkatkan kemahiran guru memilih dan menggunakan lima aplikasi Google yang sesuai dalam pencarian maklumat
KEMAHIRAN	Kemahiran Memilih dan Menggunakan Lima Aplikasi Google.
ISI KANDUNGAN	1. Fokus Kemahiran. 2. Pembelajaran Berasaskan Modul. 3. Penerapan Teori Konstruktivisme. 4. Strategi Pembelajaran Modul. 5. Pengenalan kepada Google. 6. Objektif Modul 7. Ikon-ikon aplikasi Google. 8. 5 Aplikasi Google yang diperkenalkan: i)Google Advanced Search (beserta tugasan individu) ii)Google Scholar (beserta tugasan individu) iii)Google Translate (beserta tugasan individu) iv)Google Map (beserta tugasan individu) v)Google Jamboard (beserta tugasan kumpulan) 9. Fakta menarik tentang Google
ABM	Modul Celik Literasi Google (Anyflip), kod QR, komputer riba, peranti mudah alih
PENILAIAN	Tugasan Individu & Kumpulan
TEMPOH MASA	2 jam

RAJAH 1: KANDUNGAN MODUL CELIK LITERASI GOOGLE

Figure 11. Module Content

Figure 12. Introduction to 5 Google Apps

Figure 13. Value Elements

The objective of this study is to explore the usability and usefulness of the Google Literacy Module. To achieve this, a survey method was chosen as the research design. To ensure expert validation for the design and development of the Self-Learning Module (Google Literacy Skills), a panel of 3 experts (end users) was selected to provide their input by responding to an Experts' Checklist (Usability Test 1). Before the study was conducted, the researcher distributes a questionnaire to 3 experts (end users), who were purposively selected for their expertise and knowledge in the subject matter using Google Form to obtain expert validation for the design and development of the Google Literacy Module. The questionnaires consist of 4 sections: Section A: Demographics, Section B: Learning Theory Application, Section C: Usability, and Section D: Feedback/Suggestions for Module Improvement.

In Section A, the end users of the module are requested to provide their details. In Section B, the end users are asked to answer 5 closed-ended questions related to the application of learning theories in the module. Researcher uses closed-ended questions that can only be answered by selecting from a limited number of options, usually multiple-choice questions with a single-word answer which is 'Yes' or 'No' Survey Questions because it is one of the easiest questions to answer and analyse.

As for Section C, the users are requested to respond to 20 closed-ended questions regarding the usability of the module, which consisted of 4 aspects: i) Technical (5 questions), ii) Content aspect (10 questions), iii) Language aspect (5 questions), and the final aspect, iv) Value (5 questions). Moving on to Section D, it comprised of 3 parts: a) Module strengths, b) Module weaknesses, and c) Feedback or suggestions for module improvement.

To conduct the usability survey of the Self-Learning Module, the researcher utilized Google Forms to distribute a survey questionnaire to 14 end users, specifically primary school teachers who were purposively selected for their expertise and knowledge in the subject matter. Purposive sampling involves intentionally selecting respondents who are most likely to offer valuable insights and accurate data pertaining to the research topic (Denscombe, 2010). Given the relatively homogeneous characteristics of the participant group, a sample size of as few as five is deemed appropriate for conducting usability testing, as larger numbers may result in redundant information (Barnum, 2002).

The questionnaire consisted of three sections: Section A, Section B, and Section C. Section A included respondent details. Multiple-choice questions were used in this section. In Section B, the researcher used a 5-point Likert scale with 10 questions regarding module functionality, 6 questions related to ease of learning, and 6 questions about module usefulness. The last section, Section D, consist of open-ended questions regarding i) module strengths, ii) module weaknesses, and iii) suggestions for module improvement. Prior to the actual data collection, a pilot study was conducted to ensure the finalization of the instrument and to establish the validity and reliability of the items. The data gathered will be meticulously analysed at that point.

Findings and Discussion

The findings presented in this paper address the two research questions:

How can the design and development of the Self-Learning Module (SLM) ensure a clear and coherent presentation of information using Google Apps within the framework of Constructivism Theory?

Several crucial considerations were explored to answer this question comprehensively. Firstly, the SLM was meticulously structured with a well-organized framework, enabling the logical arrangement of information, thereby facilitating seamless navigation and fostering a deeper

understanding of the interconnections between concepts. To enhance accessibility and comprehension, the incorporation of visual aids, including diagrams, charts, and multimedia elements, proved instrumental in effectively conveying complex information. The integration of interactive activities and assessments within the module served to promote active engagement among learners, reinforcing their comprehension and aligning with Constructivism Theory's emphasis on hands-on, meaningful interactions.

Moreover, to cater to diverse learning preferences, multimedia resources such as videos, audio clips, and interactive presentations were thoughtfully included, ensuring a clear and easily comprehensible presentation for all learners. In summary, the adherence to these foundational principles derived from Constructivism Theory, coupled with a cohesive content organization, positions the Google Literacy Module to efficiently facilitate learning experiences and foster meaningful engagement with the presented information, thereby contributing to the successful attainment of its educational objectives.

How was Google Literacy Module developed based on the Universal Design for Agile Development Model?

The Google Literacy Module has been developed based on UDin Model which is a guide for the development of any digital learning product (Din, 2016, 2020; Lubis et al., 2015) This model prioritizes the incorporation of input specifications related to learning theory, pedagogy, learning strategies, learning content, and values elements within digital learning resources. The design and development of this self-learning module faithfully adhered to the principles of Constructivist Learning Theory and implemented the Select-Organize-Integrate (SOI) Model, as introduced by Mayer (1999).

By aligning with Constructivist Learning Theory, the module was designed to facilitate active learning, knowledge construction, and personal relevance. The application of the SOI Model ensured a systematic approach to selecting, organizing, and integrating learning materials, resulting in a cohesive and comprehensive digital learning experience.Regarding pedagogy, QR codes were utilized to enhance the understanding of module content. These QR codes provide additional resources, interactivity, and access to supplementary information. When integrated into the module, QR codes can be scanned using a smartphone or QR code reader, allowing learners to access relevant online content such as videos, articles, interactive simulations, additional explanations and multiimedia materials that offer visual or auditory explanations, aiding comprehension and reinforcing key concepts. QR codes can also link to interactive activities, quizzes, or simulations, providing hands-on learning experiences or enabling learners to apply their knowledge in practical contexts. Moreover, QR codes offer learners the opportunity for self-paced learning, enabling them to explore additional resources or delve deeper into specific topics based on their individual interests and learning needs. This flexibility allows learners to engage with the module content in a manner that aligns with their preferred learning style, leading to better understanding and retention of the material.

In this study, a module-based learning strategy was employed, which involves structuring learning materials as modules or organized units. These modules serve as guides for users, facilitating the learning of specific topics or concepts. Another learning strategy integrated within the module is meaningful learning. Meaningful learning entails actively constructing understanding by connecting new information to pre-existing knowledge and experiences. It emphasizes establishing personal connections, seeking relevance, and promoting deeper comprehension and retention. By fostering critical thinking and the application of knowledge

to real-world scenarios, meaningful learning goes beyond mere memorization and cultivates transferable skills. To facilitate and reinforce this learning strategy, the researchers incorporated collaborative, active, goal-oriented, authentic, and constructive elements into both individual and group activities within the Google Literacy Module. These activities revolve around the utilization of five Google applications: Google Advanced Search, Google Scholar, Google Translate, Google Jamboard, and Google Maps.

Furthermore, the researcher integrated the aspect of learning content, which encompasses the information, materials, and resources employed to facilitate the learning process. This includes subject matter, concepts, facts, skills, and knowledge that learners engage with and acquire throughout their educational journey. Lastly, the incorporation of value elements serves as the final component of the UDin Instructional Design Model. Through the integration of value elements, the researcher aims to establish learning environments that foster social awareness, empathy, and a sense of social responsibility among learners. These value elements can be infused throughout instructional materials, activities, and assessments. By integrating value elements into instructional design, the UDin Model strives to create a comprehensive learning experience that not only focuses on knowledge and skills but also nurtures ethical values and social consciousness in learners.

Overall, the findings indicate that the design and development of the Google Literacy Module, guided by the UDin Model, Constructivist Learning Theory, and the SOI Model, successfully created an effective self-learning module that promoted meaningful engagement, enhanced the learning experience, and equipped learners with essential digital skills, knowledge, and ethical values.

Conclusion and Way Forward

In conclusion, the findings of this study underscore the practicality and value of self-learning modules in supporting the professional growth of teachers and enhancing instructional practices in educational settings. The Google Literacy Module serves as a supplementary resource for developing fundamental digital skills and aims to assist primary school teachers in effectively utilizing Google Apps. By integrating Constructivism Theory into the design of these modules, which emphasize active engagement and meaningful learning experiences, the potential of self-learning modules can be fully harnessed to enhance teachers' proficiency in using digital tools. Based on existing research, the effectiveness of self-learning modules relies heavily on their usability, ensuring that learners can navigate and engage with the content easily. Regular updates and gathering feedback from teachers are essential to keep the modules up-to-date, relevant, and tailored to the specific needs of teachers.

However, it is noticeable that there is a lack of recent studies that specifically investigate self-learning modules related to the use of the five Google Apps based on Constructivism Theory within the context of Malaysia. This points to a gap in our current understanding of how effective self-learning modules are in enhancing teachers' skills in utilizing these five Google Apps. Therefore, it is highly recommended that further research is conducted to gain a deeper understanding of this topic. Additionally, comparative studies can be pursued to evaluate the effectiveness of self-learning modules compared to other approaches for professional development. Furthermore, it is important to explore the long-term impact of self-learning modules on teachers' skills, instructional practices, and student learning outcomes.

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