TUTOR4MATH MOBILE APP: A TUTOR FINDER APPLICATION FOR ADDITIONAL MATHEMATIC SUBJECT

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LAPORAN PROJEK TAHUN AKHIR DIKEMUKAKAN BAGI MEMENUHI SYARAT UNTUK MEMPEROLEH IJAZAH SARJANA MUDA PENDIDIKAN (KEJURUTERAAN PERISIAN) DENGAN KEPUJIAN

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ABSTRAK

Bagi kanak-kanak yang memerlukan sokongan akademik tambahan dalam pengajian mereka, terutamanya di peringkat pendidikan rendah dan menengah, perkhidmatan tunjuk ajar adalah penting. Pelajar sering menghadapi masalah memilih tutor yang sesuai untuk mereka dan yang menepati citarasa mereka. Aplikasi web semasa hanya menawarkan borang untuk mencari tutor, jadi mereka kekurangan komponen responsif pada masa ini. Begitu juga dengan tuisyen, yang memerlukan pelajar mengembara dari satu tapak ke tapak lain untuk mencari pusat tuisyen. Tujuan kajian ini adalah untuk menangani masalah yang wujud dalam memadankan pelajar dan guru dengan tutor yang sesuai, khususnya bagi topik Matematik Tambahan. Memandangkan kesilapan konsep dan kesilapan transformasi dalam Matematik Tambahan dan Matematik Moden, masing-masing, adalah berbeza dengan ketara merentas tahap prestasi, ia boleh disimpulkan daripada dapatan SF Fuzi, WH Hassan, SN Zainudin, dan SR Jama, 2020. Kesilapan konsep dan transformasi adalah lebih ketara dalam kalangan pelajar yang berprestasi lemah. Tetapi terdapat jumlah kefahaman bacaan, operasi nombor dan ralat pemfaktoran yang hampir sama antara tahap prestasi Matematik Tambahan dan Matematik Moden. Kaedah aplikasi Mudah Alih Tutor4Math disyorkan untuk pelajar sekolah menengah, terutamanya calon SPM. Bagi membina dan membangunkan sistem, kajian ini memudahkan dan menyesuaikan pendekatan Kitaran Hayat Pembangunan Sistem ke dalam model Lingkaran. Perancangan, reka bentuk, pelaksanaan, ujian dan penggunaan adalah langkah-langkahnya. Untuk mencapai matlamat kajian ini dan menyampaikan penyelesaian yang dicadangkan dengan betul, setiap fasa memerlukan tugas tertentu.

TUTOR4MATH MOBILE APP: A TUTOR FINDER APPLICATION FOR ADDITIONAL MATHEMATIC SUBJECT

ABSTRACT

For children who need extra academic support in their study, particularly at the primary and secondary education levels, tutoring services are crucial. Students frequently have trouble selecting tutors who are suited for them and who fit their tastes. The current web applications simply offer a form to search for tutors, so they currently lack responsive components. The same is true of tuition, which required students to travel from one site to another in search of a tuition centre. The purpose of this study is to address the inherent problem of matching students and teachers with appropriate tutors, particularly for Additional Mathematic topics. Since concept mistakes and transformation errors in Additional Mathematics and Modern Mathematics, respectively, were significantly different across performance levels, it may be inferred from the findings of SF Fuzi, WH Hassan, SN Zainudin, and SR Jama, 2020. Conceptual and transformational errors were more pronounced among students who were performing poorly. But there were nearly equal amounts of reading comprehension, number operation, and factoring errors between the Additional Mathematics and Modern Mathematics performance levels. The Tutor4Math Mobile app method is recommended for secondary school students, particularly SPM aspirants. In order to build and develop the system, this study simplifies and adapts the System Development Life Cycle approach into a Spiral model. Planning, design, implementation, testing, and deployment are the steps. To achieve the goal of this study and properly deliver the suggested solution, each phase entails certain tasks.

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ABBREVIATIONS

SPM	Sijil Pelajaran Malaysia
SUS	System Usability Score

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A	SRS
B	SDD
C	STD

CHAPTER 1

1.0   Introduction

This research paper covers several parts that will be explained such as the background of the study, the problem of the study, the research question, the objective of the study, the statement of the problem, the objective of the study, the significant scope of the study, the definition of concepts and operations, and finally the conclusion. Therefore, all descriptions of each subtopic of the study will be described in more detail. This is said to be so because the focus of the study will be to examine a tutor finder application for Additional Mathematic subjects.

1.1   Background of Research

Tutor is an interactive tool for expanding one's vocabulary that creates dynamic content for study purposes. The tutor tailors the lessons to the needs of each student. However, tutor applications refer to a technology that enables real-time collaboration, creation, and presentations to melt together on a digital whiteboard, making it ideal for sharing with colleagues or students. The focus is on applications that any "tutor" in general–ranging from classroom teachers to professional tutoring organizations–can use to augment student learning (Staff, 2018). These applications are available on mobile devices, for example.

Mathematics, in the eyes of a great number of students, is an activity that is on par with the activity of a demon. When students first read their mathematics book, a

significant number of them immediately begin to feel tired. Their performance in maths was quite poor. They merely give up and admit that they are unable to complete the task. Unfortunately, avoiding math leads to lower levels of ability, fewer exposure to mathematics, and less practice with mathematics (Mahapatra, 2020). As a result, kids become more nervous and are mathematically unprepared to achieve their learning goals. This leads to a fear of mathematics.

For students seeking higher education in the fields of science and technology, management sciences, and social sciences, it is especially important that they are proficient in mathematics. Some students commonly make mathematical mistakes when attempting to solve mathematical issues. Despite receiving early instruction in fundamental mathematics in school, this issue only appears to occur at the tertiary level. One of the subjects for Sijil Pelajaran Malaysia (SPM) is additional mathematics. A passing grade in the subject is crucial because it is a prerequisite for continuing one's studies in postsecondary school.

Hence, the problems for this research are finding tutors is challenging for students since they must travel between locations, which takes time; students struggle to find tutors that fit their preferences and skill set; and most students have difficulty with problem-solving skills in Pre-calculus, Calculus I, and differentiation subtopics. These problem statements are to be said because most students have the effect of maintaining their score during exams. The objective of this research paper is to create a mechanism that can enable class outside of class without consuming a lot of time by allowing students to use a mobile application to find tutors outside of the classroom for the subjects they need extra help with. As so, this is the reason why this mobile app is

being proposed because to evaluate if the Tutor4math mobile application's features are beneficial to other users based on the ratings and reviews of the students who have used it.

This development is focused at offering flexible learning possibilities in learning and teaching services. Tutor4math mobile applications offer alternative learning possibilities for the individuals with special needs with additional mathematics subjects and individuals who want to increase their income. Students will be able to find a good tutor for themselves and master additional mathematic subject efficiently. While, the tutor gets to improve their skill of teaching by performing more varieties of problem solving methods.

1.2   Problem Statement

Based on the findings, there are few problems that have been found. Firstly, finding tutors is challenging for students since they must travel between locations, which takes time. Next, students struggle to find tutors that fit their preferences and skill set and lastly, most students have difficulty in problem solving skills in Pre-calculus, Calculus I and differentiation sub topic.

Finding a tutor is challenging for students since they must travel between locations, which takes time. The learning process necessitates a certain amount of adversity. This seems to be especially true for the learning of difficult concepts. When class sizes are growing and technology is being used more often, it is more difficult for

teachers to offer students with tailored feedback and support to help them overcome their obstacles in the learning process. As a student, many face a variety of challenges in responding to student issues and uncertainty, including the difficulty of providing individual feedback in big classrooms and online situations.

Students struggle to find tutors that fit their preferences and skill set. Despite evidence showing a wide range of attitudes and actions are equally crucial to students' long-term success, research has primarily focused on how teachers affect students' performance on exams (Hanushek & Rivkin, 2010; Todd & Wolpin, 2003). It is challenging for students to locate a suitable teacher using the current methods of locating tutors or private tuition because the majority of other applications or websites do not encourage talent or knowledge, they only push educational training with a predetermined price and online idea. The same is true for manual searching, which requires students to independently locate tutors or tuition who simply supply information on pricing and subject.

Students have difficulty in problem solving skills for pre-calculus, calculus I and differentiation sub topics. One of the main obstacles that students must overcome is the complexity of mathematics, such as Calculus. One of the most challenging subjects for kids to comprehend and do well in is differentiation, according to research. Therefore, it is not unexpected that many of them have trouble and frequently get things wrong while trying to solve simple differentiation issues. Both students and teachers find it frustrating when such errors occur frequently. As was already said, some students find it challenging to grasp and perform well on the topic of differentiation in calculus. The

subject frequently involves the use of symbolic artefacts in communication. These include mathematical symbols, notations, rules, and formulas.

1.3   Research Objective

This study aims to:

a) To create a mechanism that can enable class outside of class without consuming a lot of time

b) To create a platform that allows students to use a mobile application to find tutors outside of the classroom for the subjects they need extra help with

c) To evaluate if the Tutor4math mobile application's features are beneficial to other users based on the ratings and reviews of the students who have used it.

1.4   Research Questions

The research questions are as follows:

a) What method can enable class outside of class without taking up a lot of time?

    1. What are the most common methods for users to find extra class without wasting time?

b) How do you build a platform that allows students to use a mobile app to find tutors outside of the classroom for subjects where they need extra help?

1. How can we create a mobile app that allows students to find tutors outside of the classroom?

c) How can the effectiveness of Tutor4math features and its usability by users be evaluated?

1. Is this application having any effect on students and tutors?

1.5 Theoretical and Conceptual Framework of the Study

Students are given rich, meaningful tasks as part of a coherent curriculum in mathematics classrooms that are in line with the reform vision outlined in the National Council of Teachers of Mathematics' Standards documents (NCTM, 1989, 1991, 1995, 2000). Teachers use students' thinking, which is shared orally and in writing, to direct the classroom community's exploration of key mathematical ideas. There is still a lot of controversy regarding the type and degree of influence that teacher education generally has on teacher learning, despite the fact that there is a sizable body of literature on teacher education and learning to teach (Boaler, 2000; Frykholm, 1998, 1999; Glickman and Bey, 1990; Grossman et al., 2000; Lampert, 2001; Zeichner and Tabachnick, 1981; Zeichner et al., 1987). Some detractors have questioned whether instructors receive any worthwhile training during their programmes for becoming teachers (e.g., Conant, 1963, Kramer, 1991). Others have asserted that as instructors enter the more traditional environment of the school, the results of their education are "washed out" (e.g., Zeichner and Tabachnick, 1981). Additionally, a number of academics have cautioned that experiences related to teacher education can have both beneficial and harmful effects on future educators (Feiman-Nemser and Buchmann, 1985; Zeichner, 1985).
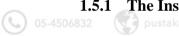
Two linked assumptions form the basis of this approach. First, learning is situated, meaning that how someone acquires a particular set of knowledge and abilities as well as the context in which they do so are key components of what they learn (Greeno et al., 1996). Second, claim that historical, social, and political factors interact with instructors' knowledge and beliefs to produce the circumstances in which teaching learning takes place. Thus, in order to examine the process of learning to teach, this framework adapts an existing perspective on learning. This viewpoint states that "teacher learning is appropriately seen as a process of increased participation in the practice of teaching, and through this participation, a process of becoming informed in and about teaching" (Adler, 2000, p. 37).

1.5.1 The Instructional-Design Theory

According to Reigeluth's (1999) instructional design theory (IDT), the overall goal of learning depends on the decision and needs of the learner. It is a theory that outlines the ideal way to assist people in learning and acquiring new abilities. The IDT highlights four key characteristics, including;

I.   It focuses on design and provides the specifics needed for mastery and extensive application.

II.   It detects and describes instructional strategies—systems that support and promote learning—as well as the situations in which they should and shouldn't be used.

III. Teaching strategies can be broken down into a number of distinct composite techniques for instructional design theories, which helps educators understand

how to incorporate them for different learners and the standards upon which their use is based.

The provision of recommendations for practitioners is one of the main contributions of instructional-design theory. The goal of this research is to improve how we support learning. Although the user may have the assistance and guidance of the electronic tutor, the user must practise it alone in order to benefit from this work's encouragement of cognitive learning and development. Users in this study are recommended to be in a positive emotional state in order to achieve the stated goal; for instance, a student who is crying or unhappy will not be able to follow instructions adequately.

1.5.2 Community of Inquiry Theory (CIT)

The CIT is an instructional paradigm created by Garrison, Anderson, and Archer in 2000 that can be used in an online learning environment (Randy, Terry & Walter, 2000). It is built on three distinctive characteristics: learning, social interaction, and cognition. The approach considers the overlap between the three elements and uses it to assist the digital classroom.
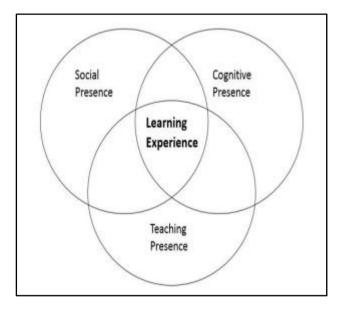
Figure 1.5.2: Features of IDT

[Adapted from Randy at el 2000]

One of the most widely used models for online and mixed courses is now this idea. This lends support to the project because it links to the three key elements of community

inquiry theory. According to this notion, users are dependent on teachers and students exchanging concepts for alternative extra mathematical answers.

1.5.3　Social Learning Theory (SLT)

The social learning theory (STL) was developed by Bandura (1977), and it is based on the classical operant and conditioning theories of behaviourist learning.

  I.   Processes that intervene take place in between stimuli and reactions.

 II.   Behavior is learned from the environment via the observational learning method.

Albert Bandura's social learning theory proposed that learning is aided by imitation, replication, and observation. Since it explains how learning is related to concentration, memory, and motivation, it is frequently seen as the theoretical bridge between behaviourist and cognitive learning theories. Bandura claims that imitation also includes

the true production of observed motor behaviours. (1977 Bandura). According to the social learning theory, which explains how learning and social behaviour are related, current behaviours can be acquired by observing and imitating others. The Four Cornerstones of Social Learning by Bandura Four guidelines derived from Bandura's research are listed below.

I.   Attention

This speaks of mental focus and alertness. If we lose focus on the learning activity, no significant learning can ever occur. When something stimulates us, whether socially or cognitively, we get focused on it. These perceptions can be strengthened in social contexts.

II.   Retention time

The ability to memorise information so that it may be quickly called up and used in a setting comparable to where the memorization process took place or for which it was memorised facilitates retention.

III.   Reproduction

This level comprises the blatant demonstration of the newly acquired behaviour. When necessary, previously learned information (behaviours, skills, and knowledge) is replicated.

IV.   Motivation

Humans naturally require incentive to behave, which typically comes from occurrences that may be observed as rewarding or punishing. Thus, being aware of reward or penalty encourages us to act in particular ways and avoid doing others (Wheeler, 2020).

1.6   Significance Of Study

This development is focused at offering flexible learning possibilities in learning and teaching services. Tutor4math mobile applications offer alternative learning possibilities for the individuals with special needs with additional mathematics subjects and individuals who want to increase their income. As mentioned before, this study focusing on two subjects as follow

a) Student

   Will be able to find a good tutor for themselves and master additional mathematic subject efficiently.

b) Tutor

   Will improve their skill of teaching by performing more varieties of problem solving methods.

1.7   Limitations of Study

This research for Tutor4math mobile application was restricted to a tutor finder app and limited to Tanjung Malim students and teachers and nearby areas. It encompasses the mode of learning and finding private tutor based on students preference and focusing on Additional Mathematics subjects especially differentiation and calculus topics. Tutor4math mobile app will be compatible only for Android devices.