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DISSERTATION PRESENTED TO QUALIFY FOR A
MASTER'S DEGREE IN EDUCATION (MATHEMATICS)
(RESEARCH AND COURSEWORK MODE)

FACULTY OF SCIENCE AND MATHEMATICS
SULTAN IDRIS EDUCATION UNIVERSITY

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09.01.2024
Date

ASSOC. PROF. DR. MAZLINI ADNAN
Department of Mathematics
Faculty of Science and Mathematics
Universiti Pendidikan Sultan Idris
35900 Tanjong Malim, Perak
Malaysia

Signature of the Supervisor

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ABSTRACT

This study aims to develop a valid STEAM (Science, Technology, Engineering, Arts and Mathematics) textbook integrating character education with local wisdom themes for primary school students. The usability of STEAM textbooks in terms of formats and content suitability, objective accessibility teaching and learning process feasibility, and the teacher's satisfaction was also studied. Design and Development Research (DDR) was used as the research design based on the ADDIE model as a development model. Three experts were consulted to validate the STEAM textbook and 58 mathematics teachers from the Perak Tengah district participated in the usability survey. The instruments used in this study are the validation form and usability questionnaire. The data were analysed descriptively with percentage, mean and standard deviation. The results show the STEAM textbook has excellent validity with 90% agreement from the experts. The usability of a STEAM textbook was good with a mean of 4.21 (SD = 0.45). The results of this study show that the STEAM textbook can be used as an alternative teaching material for teachers to improve student' understanding especially in the mathematics content areas of measurement and geometry that integrates character education with local wisdom themes for primary school students. As a conclusion, this indicates that the STEAM textbook has a high level of validity and usability in terms of suitability, accessibility, feasibility, and satisfaction. The study's implications is to provide new exposure to the field of education, particularly in mathematics. The quality of education has been improved by combining STEAM elements and integrating character education with a local wisdom theme. This research not only improves the quality of mathematics education, but it also prepares students to apply their knowledge in the real world.

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PEMBANGUNAN DAN PENILAIAN KEBOLEHGUNAAN BUKU TEKS STEAM PENDIDIKAN KARAKTER DENGAN TEMA KEBIJAKSANAAN TEMPATAN MURID TAHUN EMPAT

ABSTRAK

Kajian ini bertujuan untuk membangunkan buku teks pembelajaran berasaskan projek Sains, Teknologi, Kejuruteraan, Seni dan Matematik (STEAM) yang mengintegrasikan pendidikan karakter dengan tema kebijaksanaan tempatan untuk murid Tahun Empat. Kebolehgunaan buku teks STEAM dari aspek kesesuaian format, kandungan, kebolehlaksanaan proses pengajaran dan pembelajaran, kebolehcapaian objektif dan kepuasan guru juga dikaji. Reka Bentuk dan Pembangunan Penyelidikan (DDR) telah digunakan sebagai reka bentuk penyelidikan berdasarkan model ADDIE sebagai model pembangunan. Tiga orang pakar telah mengesahkan buku teks STEAM dan seramai 58 orang guru matematik sekolah rendah dari daerah Perak Tengah merupakan responden untuk soal selidik kebolehgunaan. Instrumen yang digunakan dalam kajian ini iaitu borang kesahan dan soal selidik kebolehgunaan. Data dianalisis secara deskriptif dengan peratusan, min dan sisihan piawai. Dapatan kajian menunjukkan buku teks STEAM mempunyai kesahan yang tinggi dengan persetujuan 90% daripada pakar. Seterusnya, kebolehgunaan buku teks STEAM yang dibangunkan adalah baik dan menunjukkan bahawa buku teks STEAM boleh digunakan sebagai bahan pengajaran alternatif untuk guru meningkatkan pemahaman murid terutamanya dalam bidang sukatan dan geometri yang mengintegrasikan pendidikan karakter dengan tema kebijaksanaan tempatan untuk murid Tahun Empat. Kesimpulannya, ini menunjukkan bahawa buku teks STEAM mempunyai tahap kesahan dan kebolehgunaan yang tinggi. Implikasi kajian ini adalah buku teks STEAM merupakan satu alternatif dalam mengintegrasikan elemen STEAM yang menerapkan pendidikan karakter dengan tema kebijaksanaan tempatan dalam pengajaran dan pembelajaran Matematik.

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LIST OF ABBREVIATIONS

CLA	Culture Learning Alliance
DDR	Design and Development Research
DSKP	Standard Curriculum and Assessment Document
EPRD	Education Policy Planning and Research Division
KSSR	Standard Elementary School Curriculum
MOE	Ministry of Education
PBL	Project-based learning
PISA	Programme for International Student Assessment
PPPM	Malaysia Education Blueprint
STEAM	Science, Technology, Engineering, Arts and Mathematics
STEM	Science, Technology, Engineering and Mathematics
TIMSS	Trends in International Mathematics and Science Study
UPSI	Universiti Pendidikan Sultan Idris
UPSR	Primary School Achievement Test

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CHAPTER 1

INTRODUCTION

1.1 Introduction

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Industrial Revolution 4.0 is a rapidly growing technological world industry in science and technology that can make Malaysia a developed and competitive nation in the global market. The Ministry of Education has made various efforts to address this revolutionary challenge. The Malaysia Blueprint (PPPM) 2013-2025 emphasises the development of creative and innovative human capital to meet the country's needs in the 21st century. It emphasises that every student should equip themselves with basic life skills by cultivating student values and acquiring knowledge in other areas such as art, music, and sports. Creativity and innovation-based activities are important to encourage them to think about problem-solving and create career opportunities (Ministry of Education [MOE], 2018).

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This industry has spawned a new pedagogy STEAM education (Science, Technology, Engineering, Arts and Mathematics), i.e., STEAM education with the addition of art to STEM subjects (Science, Technology, Engineering, and Mathematics). STEAM education is the new state of STEM education. Syafrida, Sahyar and Nurdin (2019) summarise that the STEM approach is easier to understand, teach, apply, and explore concepts in daily life, while the STEAM approach focuses more on exploring students' creativity and artistic nature. This new pedagogy is a driving force for tribal economies to connect disciplinary domains,thus impacting developed countries (Colucci-Gray, Burnard, Gray & Cooke, 2019). This pedagogy also states that the arts restore the goals and purpose of education that go beyond economic growth, for example, by incorporating social inclusion, community participation, or sustainability agendas (Colucci-Gray et al., 2019). Art refers to fields of knowledge such as humanities and social science disciplines, to the different ways of knowing and experiencing the world, which are made possible by specific art forms, training, or even pedagogy. On the other hand, STEAM connects a variety of social actions that pursue intersecting discourses and potentially conflicting agendas (MacDonald & Wise, 2018).

Colucci-Grey et al. (2019) found that young people should be more capable and confident in STEM subjects by identifying a perceived economic imperative to provide for a STEM-educated workforce. STEAM with arts subjects brings new evidence to improve cognitive scores in mathematics and literacy (Cultural Learning Alliance [CLA], 2014). CLA (2014) found that STEAM improved Programme for International Student Assessment (PISA) rankings by including problem-solving elements alongside English, math, and science. The improvement shows that STEAM contributes to creativity and innovation because of the synergistic interactions between thinking in

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the arts and science. According to Livingstone and Hope (2011), the arts provide a context for good teamwork, change management, cross-cultural communication, improved observational skills, and adaptability as aspects of expert employability. Therefore, as the main driving force in implementing STEAM, teachers should ensure the students' success by preparing them to think innovatively (Grinnell & Angal, 2016).

According to Oktoriyadi (2020), the curriculum requires the teachers' creativity in using local resources as a medium for integrated thematic learning STEAM. Local resources in learning are the result of works of art, cultural traditions, human resources, products or other works that are of regional uniqueness. The local potential is a specific resource that helps students understand to the concept correctly and contextually (Laurens, Laamena & Matitaputty, 2014). The research findings by Yakman (2012), have discovered that the STEAM framework leads to functional competence, which can help students think across the spectrum and make multidisciplinary connections. In addition, students are able to understand people and things that are rooted in other disciplines, perspectives, and other cultures so that they can collaborate and communicate and maintain their self-identity (Yakman, 2012). Thus, the framework of STEAM helps develop local wisdom that shapes the students' character.

1.2 Problem Statement

The field of science and technology has indeed grown rapidly as a result of the Industrial Revolution 4.0. According to a report by the Chartered Institute of Personnel and Development (2019), the shortage of skilled workers is a stumbling block for the

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country to become the seventh-largest economy by 2035. Amirah, Mohd Jasmy, Siti Adilah, Noraina Ayu, and Norkamaliah (2018) have stated that this competence of workers is not mastered in soft skills, which include aspects of life skills, problem identification, problem-solving, knowledge, and building good personality, especially among the graduates. To meet these requirements, the government focuses on and encourages students to engage in science, technology, engineering and mathematics in class and learning. This is one of the measures that can help the country to meet future workforce needs (Amirah et al., 2018).

The Higher Education Development Plan 2015-2025 states that the government is making various efforts to prepare the younger generation for the Industrial Revolution 4.0. The Ministry of Education is also trying to recruit students for STEM and meet the 60:40 ratio, i.e., between science and arts subjects. Only 44% of the candidates who took the Form Three Assessment (PT3) in 2018 had enrolledin the science stream class, compared to 49% of PT3 candidates in 2012 (MOE, 2019). STEM Education has made its way into all school curricula. The inclusion of the arts in STEAM education emphasises that STEM is based on skills that often use the left brain and are processed logically. The combination of STEM education and arts education (STEAM) will provide a curriculum that offers good opportunities for the new economy (Ahn & Kwon, 2017). According to Brock, Dunifon, and Nagel (2016), all projects that combine art with scientific inquiry are compatible and require students to think critically and creatively. STEAM plays a role in visualising real-world applications of mathematics and science and helps students to think strategically (Wynn & Harris, 2012).

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In general, students believe that science and mathematics subjects are difficult to learn. This perception comes from the fact that many students have learning difficulties and perform poorly in science and mathematics. Malaysia's results in the Trends in International Mathematics and Science Study (TIMSS) 1999, 2003, 2007, 2011, 2015, and 2019 for mathematics show that Malaysia's average score is volatile. Although there was an increase in TIMSS 2015, the mean score in TIMSS 2019 continued to decline and did not reach the mean score of 500 points as in TIMSS 1999. According to Mohd Faizal Nizam Lee, and Leow (2017), the most common problems students face are poor understanding of science and mathematics concepts, weaknesses in mastering science and mathematics, and difficulties in building and mastering science concepts. Glass and Wilson (2016) noted that STEAM programmes focus on project-based learning (PBL), which supports students in creative and collaborative problem-solving. STEAM also provides opportunities for students to work together through conversations and constructive criticism among peers to find a solution, as in teamwork (Ghanbari, 2015).

In STEAM students learn and were trained to improve their creative thinking skills. According to Syafrida, Sahyar and Nurdin (2019), this creativity is needed to become reliable human resources in today's industry, and where good character is needed to keep the virtual world balanced in the long run. In this context, as a game model in school, teachers need to integrate the students' good character traits into the learning process; teachers need to know how to integrate good character traits into their learning. They should be well prepared to ensure that the students not only think creatively but also have good character. As such, education is not only about the students' academic achievement, but also about the quality of their personality.

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Technology and digital are interrelated, which enables discovery, accessibility, usability and the exploration of various information, both in digital technology and through internet networks (Syafrida, Sahyar & Nurdin, 2019). Students as an asset to the country can easily be influenced by the effects of globalisation through the current access to technological advances. In line with the development that the world brings, every nation and country must be prepared to face all sorts of risks, one of which is the transformation of human identity (Jasanoff, 2016). Globalisation has not only expanded students' access to technological advances, but it has also increased their exposure to diverse cultures and ideas. This exposure can lead to a transformation in their understanding of human identity as they are exposed to different perspectives and ways of life from around the world. It causes a lack of affection for the country among teens owing to the influence of cultures other than the countries. Thus, local wisdoms are parts of the local culture that can be understood as human effort through their cognition to act and behave. Mohd Jirey et al. (2015) described that local wisdom can be nurtured by inculcating local and cultural values through education. Hence, it assists to enrich knowledge and enables the development of the students' character (Purwati & Tuti, 2017).

In short, the focus of the study is to develop a STEAM textbook by integrating character education with local wisdom themes for primary school students i.e., the STEAM textbook as a learning resource to transport and implement the subject of art. TIMSS 2011 data have stated that textbooks are the most important learning resource in mathematics instruction for elementary teachers (Mullis, Martin, Foy & Arora, 2012). According to Aminah (2020), STEAM is more comprehensive and provides a good foundation for future careers. Integrating character education into

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the textbook will serve to support students' character development from a young age. The theme of local wisdom will also be used as a learning resource within STEAM to the strengthen students' love of the nation. The Kutai House, a traditional house in Pasir Salak, is used to preserve the existence of local wisdom. The uniqueness of its design and structure will play an important role in instilling love for the nation. The developed textbook will be inserted into the teachers' guide, which can be used as a supplementary book. In addition, the content of the textbook is developed for level 2 students in elementary school, especially for grade 4. Level 2 students are suitable for this research because the goals of this level of education are to build understanding, mathematical skills, and more complex applications that can be usedto effectively cope with the challenges in daily life. It is one of the STEAM approaches to exploring daily life.

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The learning areas focus on measurement and geometry, which correspond to the local wisdom of the Kutai House. These learning areas are important in thesubject of mathematics. Based on the data analysed by the researcher, there are 17 topics (33%) out of 52 topics (100%) for the learning areas of measurement and geometry. If that is not enough, the Elementary School Achievement Test (UPSR) 2017-2019 shows that the scores for these learning areas in Paper 1 and Paper 2 account for half of the total score. According to Kupasan Mutu Jawapan Matematics UPSR in 2013, 2014 and 2016, the Ministry had recommended for candidates to focus on strengthening the learning areas of measurement and geometry. On the other hand, the Measurement topic had been chosen because it takes a longer time compared to the other subjects in ‘Measurement’ and ‘Geometry’. Its learning duration is 6 weeks, which is a good treatment duration.

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1.3 Research Objective

There are three objectives in this study:

1) Identify the need to develop a STEAM textbook integrated character education with local wisdom themes for primary school students for a mathematics topic.
2) Develop a valid STEAM textbook integrated character education with local wisdom themes for primary school students.
3) Analysing the usability of STEAM textbook integrated character education with local wisdom themes for primary school students.

1.4 Research Question

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The research questions are:

1) Is there a need to develop a STEAM textbook integrated character education with local wisdom themes for primary school students for a mathematics topic?
2) What is a valid STEAM textbook integrated character education with local wisdom themes for primary school students?
3) What is the usability of a STEAM textbook integrated character education with local wisdom themes for primary school students?

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1.5 Conceptual Framework

Figure 1.1 shows that the conceptual framework for this study. The purpose of this study is to develop a STEAM textbook that combines character education with the topicof local wisdom for elementary students. Character education should be taught at an early age to develop the students' personalities at a young age. The theme of local wisdom included in this textbook is intended to strengthen the students' love for the motherland. The historical element to be used is the unique design and structure of Kutai House in Pasir Salak. The textbook will be developed using Design and Development Research (DDR) which includes three phases, namely phase I: needs analysis, phase II:design and development using the ADDIE model (validation and reliability) and finally phase III: evaluation (usability of the textbook).

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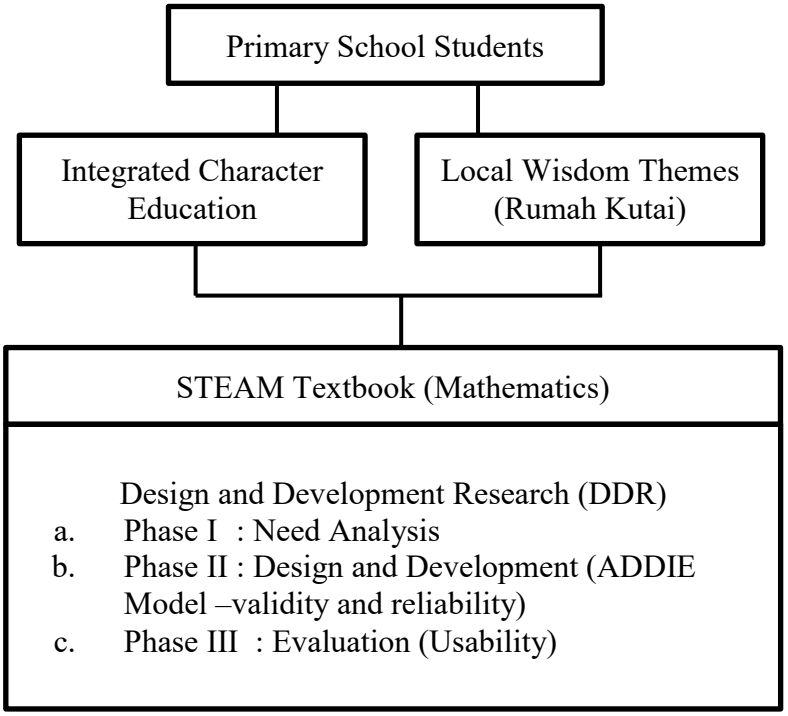


Figure 1.1. Conceptual Framework

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1.6 Importance of Research

This study states a few benefits to the Ministry of Education, schools, teachers, students and researchers.

1.6.1 Ministry of Education

Through this study, the development of a textbook as a complementary textbook assists to enhance critical and creative thinking skills for students in facing the competition in future industries. Critical and creative thinking skills can be built because of the element of STEAM and the project based-learning as an approach to learning in this textbook. Moreover, integrating character education in the textbook is also capable to inculcate student personalities from a young age. It is because project based-learning helps students to follow the instructions or rules to complete the task. Through completing the process, a few good values will come out along the learning process. Next, the local wisdom theme is implemented in the textbook. It instils love for the nation through the history and structure of Kutai House. This cab achieve the aspiration of the PPPM 2013-2025 which is to produce creative and innovative human modules to meet the needs of the country in the 21st century. In addition, the quality of education can be enhanced through this developed STEAM textbook.

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1.6.2 School

As a supplementary book in school the textbook can foster students who have 21st century skills such as critical thinking, problem-solving, creativity, communication skills, and the ability to use information technology. Moreover, all students have a high level of discipline to follow school rules, thus, this can be perceived that the character education that is integrated into them is successful. Indeed, the school produces students who have an identity of which they can be proud of.

1.6.3 Teachers

The textbook is a guide for teachers in the learning process. Teachers can think creatively, be active and innovative in the learning process. The reason is that this developed textbook provides a view of the STEAM approach. It enables the teachers to teach more creatively and with more fun. Teachers directly know how to teach students about good character and how to teach them about the history of the country.

1.6.4 Students

Through this developed textbook, students have creative and fun learning. It encourages them to improve their knowledge, skills, and attitudes that are necessary for their future careers. They are also able to compete in the industry and be a good generation despite the advanced technology and influence of cultures beyond the nation's borders. In

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addition, local wisdom helps to promote the spirit of nationalism among the students. This is an important aspect of safeguarding the country's sovereignty.

1.6.5 Other Researchers

This study also helps other researchers as a reference for the next study and as a guide for writing another STEAM textbook. In fact, other researchers are able to apply and conduct advanced studies better than this study. Moreover, other researchers can improve on this study to make the quality of education more effective.

1.7 Study Limitations

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There are several limitations in the study:

1) This study develops a textbook for primary school students. Primary school students are at a young age where they can easily be moulded and nurtured with good character. Accordingly, an integrated character education is able to preserve the local culture and potential if it is taught at the early stages.
2) Only local wisdom themes are instilled in developing this textbook. This local wisdom theme is one of the best themes in developing the student’s character. This theme increases the love for the nation despite the rapid advancement of developing technologies.

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1.8 Operational Definition

Here are some operational definitions that are used in this study:

1.8.1 Textbook

According to Sievert, Ham, Niedermeyer and Heinze (2019), a textbook is a learning resource that is important for mathematics instructions for the students' learning. The content of a textbook contains certain pedagogical, cultural and sociological aspect. In this study, the use of textbook terms applies to consensus in the Frontier Research Grant. This research grant is a joint collaboration with two universities in Indonesia. The purpose of using textbook terms in the Frontier Research Grant is to ensure a standardized and unified understanding of mathematical concepts among researchers from both universities. By incorporating these terms as a supplement to the existing mathematics textbook, the grant aims to facilitate effective communication and knowledge sharing between researchers involved in the collaboration. Furthermore, this development textbook is based on the Standard Curriculum and Assessment Documentary. This ensures that the researchers are adhering to established educational standards and practices. It only covered one learning area, which is measurement and geometry, and one learning topic, which is measurement.

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1.8.2 STEAM

STEAM is integrated thematic learning based on local wisdom and is a learning approach that combines learning themes with the fields of science, technology, engineering, arts, and mathematics based on the content and the context of local wisdom (Oktoriyadi, 2020).

1.8.3 Integrated Character Education

Integration means connecting or merging between one and the other (Yuni Eka Putri & Reno Fernandes, 2019) while character education is the process of creating good character values which includes knowledge, awareness, willingness and the action that takes to instil daily life values (Mailita, 2017). Based on this study, integrated character education refers to the merging of character education through the learning activities that are carried out. Therefore, good values are formed and applied through these activities.

1.8.4 Local Wisdom

Local wisdom is formed by the cultural superiority of the local and geographical community in a broad sense and places more emphasis on place and locality (Njatrijani, 2018). It encompasses the collective knowledge, values, beliefs, and practices that have been passed down through generations within a specific community. By drawing upon local wisdom, communities can develop innovative solutions to address environmental

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challenges and promote social cohesion. Additionally, local wisdom plays a crucial role in maintaining cultural diversity and fostering a sense of identity among community members. Local wisdom is deeply rooted in the unique experiences and understanding of the people living in a particular area, making it an invaluable resource for sustainable development and the preservation of cultural heritage.

Local wisdom in this study is defined as the Kutai house, which is located in the Perak Tengah District (Pasir Salak). The Kutai house, a prime example of local wisdom, showcases the unique architectural style and traditional craftsmanship of the Perak Tengah District. It serves as a tangible representation of the community's rich cultural heritage and deep connection to their surroundings. The Kutai house is a historical element whose uniqueness is that it was built without using nails (design and structure). The absence of nails in the design and structure of the Kutai house is a testament to the ingenuity and skill of the local craftsmen. Instead, traditional joinery techniques are employed, using interlocking wooden beams and intricate carvings to create a sturdy and durable structure. This architectural marvel not only reflects the resourcefulness of the community but also highlights their commitment to preserving their cultural traditions for future generations.

Thus, the next generation should be nurtured with local wisdom, such as Kutai House, to ensure the continuation of these valuable traditions. By teaching younger generations about the significance and techniques of traditional joinery and intricate carvings, they can carry on the legacy of their ancestors and contribute to the preservation of their cultural heritage. By passing down the knowledge and techniques used in constructing Kutai House, the younger generation can continue to uphold the

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legacy of their ancestors and ensure that their cultural heritage remains alive. This will not only instill a sense of pride and identity but also inspire them to innovate and adapt these traditional practices to meet the needs of a modern world.

1.9 Summary

Malaysia shows a lack of skilled workers who are ready to work with various competencies to meet the needs of being the seventh largest economy in the world by 2035. Besides competence, Malaysia also needs workers who have good characters and who are able to preserve and develop the Malaysian culture and local potential. As such, education plays an important role in establishing quality human resources from an early age, especially in improving the education system in accordance with industry needs and technological development. Correspondingly, STEAM education is a complex and contested concept, as there is the addition of the arts recovery of educational aims and purposes that exceed economic growth, for example, by embracing social inclusion, community participation, or sustainability agendas (Colucci-Gray et al., 2019). Therefore, this research will develop a STEAM textbook for primary school students through integrated character education in order to develop student personality from an early age. In addition, the local wisdom theme will be used to increase the students' patriotic feelings through the use of the Kutai House. In this research, the Kutai house in Pasir Salak is a historical element where the uniqueness of the house is that it has been built without the use of nails.

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CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

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This chapter discusses several studies that are related to Science, Technology, Engineering, Arts, and Mathematics (STEAM), character education, the Kutai House local wisdom, measurements and geometry topics, the ADDIE Model, project-based learning as a teaching tool, the constructivism theory used, and previous research that is relevant to this study.

2.2 STEAM

Definition of STEAM is an educational approach that integrates the subjects of science, technology, engineering, arts, and mathematics. It emphasizes the importance of interdisciplinary learning and encourages students to think critically and creatively. By incorporating artistic elements into traditional STEM subjects, STEAM aims to foster

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innovation and problem-solving skills in students. This approach recognizes the interconnectedness of these disciplines and prepares students for the demands of a rapidly evolving world. Globalisation that is based on science and technology will inevitably necessitate a generation that is capable of leading that era globally. The PPPM 2013–2025 states thatone of the requirements that the students must meet in order to be competitive in this phase is the ability to think. Students are able to gain a broad range of knowledge through lifelong learning and curiosity. This thinking ability, which includes critical, creative, and innovative skills, receives less attention in learning, resulting in the students lacking knowledge outside of the academic context. According to Nurhikmayati (2019), STEAM is an approach to exploring and problem-solving these thinking skills. STEAM education combines art, creativity, and innovation in science, technology, engineering, and mathematics to develop the skills of today's generation. With thefocus on STEAM, education can create an environment where students are given the opportunity to develop lifelong learning and curiosity.

STEAM education is an extension of STEM (Science, Technology, Engineering, and Mathematics) education that incorporates artistic elements. It makes learning outcomes more interesting and optimistic (Nurhikmayati, 2019). STEAM is the next level of STEM, which allows the students to connect their learning in the STEM critical areas with STEAM's arts practices, elements, design principles, and the standards in order to gain a comprehensive learning experience (Institute for Arts Integration and STEAM, 2020). It also replaces constraints with wonder, critique, inquiry, and innovation. Students are able to create and produce products with creativity and improve their problem-solving skills as learning outcomes (Buinicontro, 2018).

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STEAM is a more complex approach that encourages student's creativity and artistic nature. It is an advancement of the STEM approach, which focuses on making concepts more understandable and applicable in everyday life. STEAM, according to Henriksen (2014), supports students' learning across all disciplines and allows them to investigate the connections between art, music, science, and other fields. As a result, the teachers must be creative, active, and innovative in the classroom. This makes learning more creative and enjoyable for the students. STEAM education prepares students to develop the knowledge, skills, and attitudes that are required by employers. Accordingly, the learning strategy can be practised to improve creative thinking abilities.

According to Syafrida, Sahyar and Nurdin (2021), the high quality of the STEAM approach includes a few aspects such as (a) integrated technology and engineering in science and mathematics, (b) structure of scientific research and engineering design in science and mathematics, (c) collaborative approach learning, connecting students and teachers, (d) provide a global and multi-perspective, and (e) combine strategies such as project-based learning (PBL) and provide formal or informal assessment. STEAM combines traditional science, technology, engineering, and mathematics (STEM) elements with art and design to provide students with a holistic learning experience.

Yakman (2010) has classified the finer educational division within each silo; the following classifications are the result of that investigation:

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1. Sciences (mixed): biology, biochemistry, chemistry, geology, inquiry, physics, and space, as well as biotechnology and biomedicine.
2. Technology includes agriculture, construction, communication, information, manufacturing, medical, power and energy, production, and transportation. These classifications, while initially abstract in concept, each covers a wide range of practical applications.
3. Engineering: aeronautics, agricultural, architectural, chemical, civil, computer, electrical, environmental, fluid, industrial and systems, materials, mechanical, naval, and ocean. These categories of engineering allow for the research, design, and creation of materials and products that are used in daily life.
4. Mathematics: Algebra, Calculus, Communication, Data Analysis and Probability, Geometry, Numbers and Operations, Problem Solving, Reason and Proof, Theory, and Trigonometry. Mathematics also serves as a foundation for many of the principles that are used in engineering.
5. Arts: fine, language and liberal, motor, and physical (including education, history, philosophy, politics, psychology, sociology, and theology). The combination of mathematics and the arts is essential to the practise of engineering, as they serve to provide the technical skills that are necessary for research and design, as well as the ability to communicate with others in a meaningful way.

In short, STEAM education is an evolution of STEM (science, technology, engineering, and mathematics) education that incorporates elements of art. By adding the ‘A’ for art, STEAM education encourages the integration of creativity and design in the study of these subjects. STEAM education helps to develop the skills of today's

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generation. These skills are vital for preparing today's youth to be successful in their future careers. The learning strategy can be honed to improve creative thinkingabilities. It aims to provide students with a holistic learning experience by taking a global and multi-perspective approach.

According to the Institute for Arts Integration and STEAM (2020), STEAM seems interesting, but it can also be dangerous without understanding what STEAM actually means in its purpose and execution (components). Like its STEM predecessor, STEAM can fall short of its best manifestation without several core components:

1. STEAM is an integrated learning approach that necessitates a deliberate link between standards, assessments, and lesson design and implementation. To ensure the success of STEAM, the emphasis should be on a strong, interdisciplinary approach to problem-solving.
2. True STEAM experiences involve the teaching and assessment of two or more standards from Science, Technology, Engineering, Mathematics, and the Arts in and through each other. Lessons should be designed to foster genuine collaborationacross the disciplines, with a focus on developing meaningful and innovative solutions to real-world problems.
3. The STEAM approach is based on inquiry, collaboration, and an emphasis on process-based learning. When faced with a problem, this approach encourages the students to draw from a variety of backgrounds and skill-sets, which strengthens critical thinking and creative problem-solving abilities.
4. An authentic STEAM initiative must use and leverage the integrity of the arts themselves. Teachers can create meaningful learning experiences in which

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students can explore topics on a deeper level by combining sciences, technology, engineering, the arts, and mathematics.

2.3 STEM to STEAM

The global education system moved quickly and fostered creative thinking, cultural diversity, and interdisciplinary learning. A few countries are carrying out various initiatives in line with global education, particularly STEAM. Although the world recognises STEM education, STEAM education remains difficult to implement. In STEAM education, there is still a lack of understanding of the specified art elements.

STEAM has been integrated into the arts in South Korea, including fine arts, language, liberal arts, and physical arts. According to Kang (2019), STEAM has been integrated into all school programmes. The South Korean curriculum has implemented the STEAM programmes for elementary and secondary students as initiatives. For elementary students, the curriculum is thematically integrated with subjects such as science, technology, mathematics, language arts, social studies, and fine arts. At the secondary level, all subjects must be included in the mandatory curriculum. STEAM requires the technology curriculum and individual subjects for secondary students. Thereby, the teachers play an important role in this situation because they must teach a specific subject and have a focus in their subject area. All elementary school teachers in South Korea are prepared to teach all subjects. Withthe addition of creative experiences programmes, the subject-specific curriculum has changed slightly. These programmes are intended to provide students with interdisciplinary knowledge and

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skills. These programmes were created by the teachers, who also provided career exploration and club activities.

In line with South Korea, Taiwan has taken the lead in aesthetic education, which is a method of teaching and learning in which students learn through exploration, questioning, writing, and artistic creation. According to Lin, Huang, and Lin (2021), Taiwan has launched the aesthetic education programme to cultivate the students' general education through aesthetics, established a support system for aesthetic education, and strengthened the educators' aesthetic knowledge. Hence, STEAM education can help to bridge the gap that exists in Taiwan; the lack of women in STEM disciplines provides solutions to new problems that are caused by low mathematical confidence. STEM education has revealed that women enrol inthese disciplines at a lower rate than men, which has a negative economic impact. Fortunately, STEAM provides a solution to these gender gaps in 2017 with the launch of the Gender in Science and Technology Project, which aims to raise the awareness of gender biases and to promote synergy between them and science through the use of gender board games. This initiative contributes to closing the gender gap.

What happens to education in Vietnam then? According to Nguyen, Nguyen, and Tran (2020), high school students lack practical problem-solving skills in real-world contexts. As a result, STEM education must be improved in order to compete with the necessary industry. In high school, Vietnam must provide students with the ability to evaluate their careers, interests, opportunities, and development in the context of history- present and future through STEAM education. To improve STEM education, all national education programmes in Vietnam must investigate the arts. Teachers and

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students share a positive perspective, believing that art is important in STEAM education. However, some barriers to STEAM education exist in Vietnam. As the teachers struggle to organise learning contents and topics, they are unable to track the evolution of STEAM. Moreover, they are afraid to introduce interdisciplinary teaching in these subjects.

2.4 Character Education

In this subtopic, the discussion is about the overall view of character education and its concept. Character education is a term that has received a lot of attention in the development of the revolutionary industry 4.0 generation, because it is necessary for the development of a strong moral and ethical character.

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2.4.1 Overview of Character Education

Character education is known by various names, including moral education (in Malaysia and the United States) and values education (in the United Kingdom), though character education is more well-known and widely used in Asian countries. Today's technological advancements and changes have an impact on interpersonal relationships. When a person engages in immoral behaviour, this interpersonal problem arises. Character reflects a person's moral behaviour, whether positive or negative. Parents should instil good character in their children from an early age to ensure that they exhibit positive moral behaviour as the next generation. According to Yolcu and Sari

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(2018), character education is important for the development of a democratic society because it teaches people to respect others, uphold justice, and to care for others.

Significantly, education is critical for integrating character development. It emphasises character development (moral, social, and physical) in addition to academic education (Rukiyati & Andriani, 2017). According to Yasaroglu (2014), the interpretation of elementary school teachers plays an important role in the character education of the students at a young age. This is an excellent opportunityfor them to learn what is right and wrong, which demonstrates that they are easy to teach at this young age and to accept a new process through school experience. Thereby, the most important pillar in developing moral behaviour is character education.

According to Abna Hidayati, Alwen Bentri, and Fetri Yeni (2019), personal character is developed through an interdisciplinary approach of STEM in content- based courses in order to arouse the students' interest in instant culture, especially in information seeking. Students practise critical, creative, and careful thinking skills through character education. The 2013 curriculum emphasises the implementation of character-based education. According to Achmad Sultoni (2016), character education in Indonesia is more systematic, complex, and diverse. Character education is integrated in Indonesia through learning areas, extracurricular activities, and the development of a school culture. Before character education were fully implemented, all of the elements of it listed in the 2013 curriculum were designed (Abna Hidayati, Alwen Bentri & Fetri Yeni, 2019). Despite the fact that character-based education was initially perceived as not being fully observed by the teachers and students, its design was adopted during the learning process. Hidayati, Zaim, Darmansyah, and Rukun

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(2014) believe that character education should be taught optimally and that a character curriculum should be developed to guide teachers inthe classroom.

To summarise, education is critical for character development. Character development should be an integral part of the educational process as it reflects a person's moral behaviour, regardless of whether it is positive or negative. Education should emphasise the development of ethical values and moral principles as the foundation for character development. Parents, as their children's primary educators, should instil good character in them from a young age, mainly when they are at home.Teachers, as a second set of parents, help to develop good character in the classroom. As such, these character-building activities are essential for the children's development as they grow into responsible and respectable adults.

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2.4.2 Concept of Character Education

The Education Act of 1996, as the national curriculum, is a type of education that emphasises curriculum and co-curriculum activities that include knowledge, skills, norms, values, and cultural elements and beliefs to promote the students' physical, spiritual, mental, and emotional development. This Act also ensures that students receive a well-rounded education by incorporating subjects such as mathematics, science, language arts, and social studies into the curriculum. Additionally, it promotes inclusivity by providing equal educational opportunities for students of all backgrounds and abilities. While imparting knowledge, this curriculum also implements and reinforces the student's moral values. Since 1983, ‘morals and values education’ has

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been used to refer to specific subjects, namely, ‘moral education’ (Pendidikan Moral) for non-Muslim students and ‘Islamic religious education’ (Pendidikan Islam) for Muslim students (Augustinus, 2020). As one of the 11 transformation shifts of the PPPM 2013–2025, the emphasis is on strengthening Islamic religious education and moral education to promote students’ unity and mutual understanding (MOE, 2018). Students in each subject have been directly linked to the development of educational values and morals.

However, the concept of character education is not well understood in Malaysia, and the teachers' understanding of it is still hazy. Character education is only used in a few subjects, including Islamic education, moral education, history, political education, and citizenship (Sitti Hasnah, Mohd Mahzan & Abdul Razak, 2017). Instead, it is not integrated with other subjects (Sukestiyamo, Cahyono & Pradnya, 2019). According to Achmad Sultoni (2016), character education in Malaysia is classified as a simple programme or learning area with no variations, such as direct learning and memorisation. The importance of this character originates from the Malaysian society's social diversity, which includes ethnicity, religion and belief, and educational laws. This demonstrates that teachers should emphasise character education, particularly among primary school students.

Character education should begin at a young age to instil positive character traits (Eksi & Katilmis, 2011). Teachers, as role models for the students in elementary school, should set good examples by modelling moral values and practicing compassion and empathy. This is the guiding principle in the formation of moral values. The teachers as professional and personal development experts contribute significantly to

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the development of the students' personalities. However, according to Jeynes (2019), one of the factors limiting the development of character education is the role of the families who do not participate in their children's education due to a heavy workload. Indeed, character development in the younger generation is a concern, and the moral decay of society has had a negative impact on the development of character education.

2.5 Local Wisdom

Cultural diversity is one of the factors that distinguishes and revitalises a location or country (Flavier, 1995). Cultural diversity offers a wide range of perspectives, values, and knowledge that can be applied to finding new and innovative solutions to existing problems. Culture influences the development of the students' personalities and identities. It gives them a shared set of beliefs and values, which can help them feel a sense of belonging and community. Students benefit from a high level of understanding and tolerance that are fostered by culture. Recognising cultural differences among students can help educators to create an inclusive learning environment in which all students feel respected and supported. Notably, a place or country has cultural diversity and values local wisdom.

According to Njatrijani (2018), ‘local wisdom’ refers to a place where ‘wisdom’ is a reliability that is passed down from generation to generation. Local wisdom is the perspective on life and knowledge of life strategies that exist as a result of the local community's activities in meeting the needs of the community. To truly capitalise on this diversity, educators must recognise the value of local wisdom. A location has

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ethnic, social, cultural, and historical significance. These values are carried by the wisdom of the local community, and educators must strive to understand them. This local nature is a type of wisdom based on the values of consistent kindness that is practised and maintained by the local community.

2.6 Kutai House

The researcher describes the history of the Kutai house, a traditional house in Pasir Salak, in this subtopic. The Kutai house refers to traditional knowledge that has been passed down through generations; this building has ethnic, social, cultural, and historical significance. Based on the study's discussion of the unique design and structure of the Kutai houses, history and knowledge of historical figures demonstrate that the generation has developed a love for the motherland and uses it as a lesson to be better in life. This demonstrates that the Kutai house is more than just a structure; it represents a way of being.

2.6.1 History of the Kutai House

The Kutai House is a traditional Perak house. It was constructed during the Sultanate of Malacca and Perak. The Kutai house is still in Perak, and the building structure is still stable and long-lasting. Kutai means ‘ancient’ (Sabrizaa, Kartina, Mohd Nurfaisal & Iryani, 2019). Kutai House has locations in Kuala Kangsar, Manong, Parit, Bota, Pasir Salak, Kampung Gajah, and Teluk Intan, all along the Perak River. The Kutai

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House is a significant symbol of Malay culture and heritage, having withstood the passage of time and still remains standing today.

Furthermore, the Kutai House is a well-known historical site in Pasir Salak with a bloody history. On November 2, 1875, the first British resident, James Wheeler Woodford Birch, was murdered. In Malaysian history, this location was known as Pasir Salak. Birch's assassination marked the pinnacle of Malay resistance to British colonial rule in Perak. In 1946, the Malay resistance sparked a wave of nationalism against the Malay Union. The nationalist spirit persisted until the country's independence on August 31, 1957. The assassination of Birch in 1875 bythe Malay warrior Maharaja Lela marked a turning point in Malaysian history.

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2.6.2 Structure of Kutai House

The Kutai house is divided into two types: Kutai Tiang 12 and Kutai Tiang 16. The structure of these two houses is the same, but the number of erected columns (*tiang*) differs. The plans for Kutai Tiang 16 (a) and Kutai Tiang 12 (b) are depicted in Figure 2.1. The *rumah ibu*, the main house (*ruang serambi*, *ruang tengah*, and *bilik*), and the staircase comprise the Kutai house (*rumah tangga*). An unroofed room separates the kitchen area. The Kutai house has a long traditional roof (*bumbung panjang*). Each Kutai roof corner has an angle of 50 to 60 degrees (Mohd Noor & Annuar, 2005). *Rumbia* is used for the roof, and shell or bleached bamboo is used for the walls. The majority of the house structures are made of natural materials that are found in the village, such as wood and bamboo (Yazid, Mohmadisa, Hanifah & Nasir, 2018).

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Furthermore, this typeof structure is extremely durable and can withstand the test of time.

These two types of houses have floors that are five to six feet above the ground. Kutai Tiang 16's structure is made up of 16 columns, eight of which are long columns (*tiang pajang*) and eight of which have an ascending porch (*tiang serambi naik*). The arrangement of these columns creates a house square. The Kutai Tiang 12is made up of six long columns and six columns of serambi naik. This 12-story house has a rectangular foundation. Hardwood is used as pillars to support the house's heavy load. The Kutai house's construction is distinguished because it does not use nails and instead relies solely on pegs (*pasak*). The house is stable and can withstand natural disasters such as floods and typhoons due to the sturdiness of its hardwood pillars. The Kutai house is a marvel of traditional construction techniques, relyingon the carpenters' and craftsmen's skill and expertise to create a secure, stable structure without the use of modern materials such as nails.

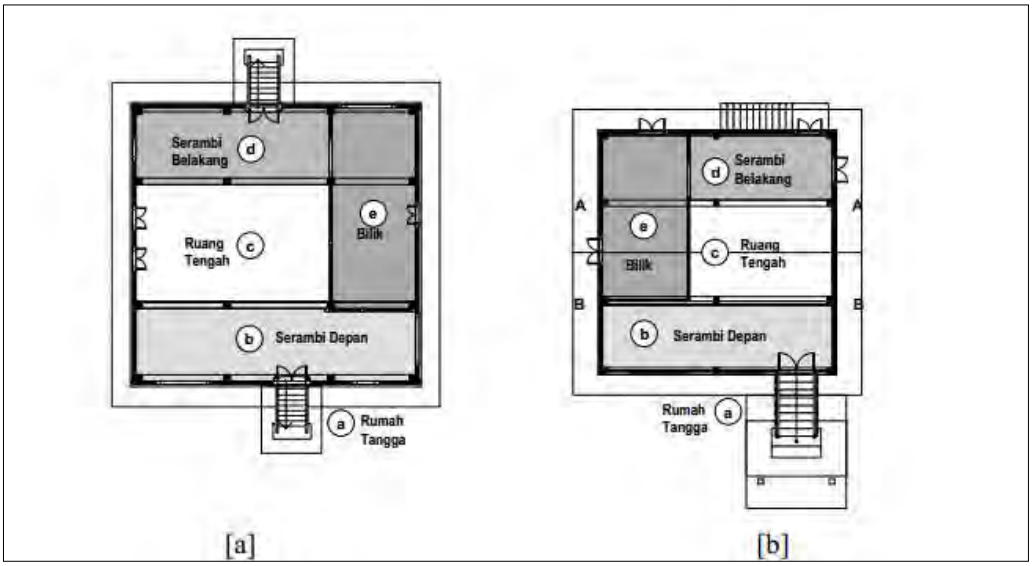


Figure 2.1. Plan of Kutai House. *Note,* Anuar Talib & Mohd Noor Ariffin, 2004.

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2.7 Measurement and Geometry

The researcher discusses the mathematics curriculum for primary schools, which is divided into two levels in this subtopic. Level 1 is for students in Year 1-3, while Level 2 is for students in Year 4-6. This subtopic also summarises the measurement and geometry topics that compare level 1 and level 2. This study looks at the primary school mathematics curriculum, focusing on Levels 1 and 2, which correspond to Year 1-3 and 4-6, respectively.

2.7.1 Mathematics Curriculum

Mathematics is a branch of knowledge that teaches the mind to solve problems and make decisions (MOE, 2018). Noraini (2001) asserts that mathematics also encompasses data processing, simulation, decision-making, and communication in addition to computation. However, the standard elementary school curriculum (KSSR) allows the students' thinking to extend to other activities such as computing, measuring, building, handling, and interpreting data, arithmetic manipulation, algebraic manipulation, using algorithms, mathematical tools, as well as information and communication technology (MOE, 2018).

In Malaysia, primary school mathematics provides students with the opportunity to learn for six years. While Level 1 is important for developing understanding, mathematical skills, and basic applications, according to the Standard Curriculum and Assessment Document (DSKP), Level 2 is important for developing understanding, mathematical skills, and more complex applications that can be used

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to effectively address challenges in daily life. Accordingly, the KSSR covers four learning areas: numbers and operations, measurement and geometry, relations and algebra, and statistics and probability (MOE, 2018). Figure 2.2 depicts a summary of the KSSR Mathematics content.

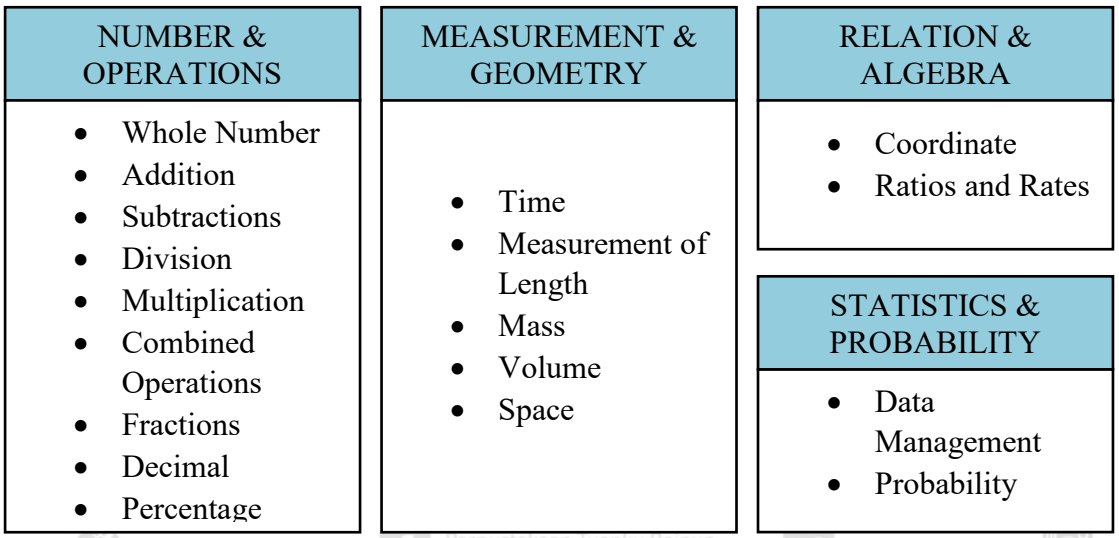


Figure 2.2. Summary of Mathematics KSSR Content

Attitude and value are two designs of the mathematics curriculum. These attitudes and values aid in the development of mathematical reasoning (MOE, 2018). They are included in the mathematics curriculum to produce competent and noble individuals. In mathematics, attitude refers to affective aspects, whereas values include personal, interpersonal, procedural, and intrinsic aspects of learning mathematics. Notably, students must master values in order to be competent in life and work in the 21st century. The Ministry of Education has identified the values that every student must possess in order to develop a noble character that is capableof making decisions and carrying out actions in order to fulfil their responsibilities to family, society, and country.

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The values of the 21st century include spirituality, humanity, patriotism, integrity, responsibility, and solidarity. These values have the potential to shape our world's future by encouraging greater understanding and compassion among people of all backgrounds. These attitudes and values should be considered and planned in relation to the context of the lesson content. To ensure the successful integration of these values into the curriculum, engaging and involving teaching methods must be used. According to MOE (2018), historical, patriotic, environmental, and scientific elements are used to provide students with an understanding of the subject based on the appropriateness of the mathematics topic. Furthermore, students are given the opportunity to interact with the material in an engaging way by using creative teaching approaches such as drama, music, art, and visual techniques. Historicalelements are associated with a specific event, such as the life of a mathematician ora brief history of a concept or symbol (MOE, 2018). Additionally, patriotic elements serve to create a sense of identity in the students.

2.7.2 Unit of Measurement and Geometry

One of the areas or units of mathematics learning in primary school is measurement and geometry. Table 2.1 depicts a summary of the measurement and geometry learning areas based on Level 1 and Level 2. In general, the mathematical topics of the measurement area are time, measures, length, mass, and volume, whereas the mathematical topic of geometry is space. However, the space topic also includes calculations, such as the perimeter and area topics. This is due to the fact that all calculations involve units of measurement (Abdul Razak & Kevin, 2011).

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Geometry contributes to the students' understanding of a feature, an appearance, and a shape. Geometry can be found in art and architecture, as well as space exploration, housing design, fashion, and vehicle design (Mohd Faizal Nizam Lee & Leow, 2017). Geometry requires the students to imagine, build, and comprehend the construction of shapes by connecting them to relevant facts (Praveen & Leong, 2013). At the lower level, the students' ability to recognise geometric shapes and understand the properties and relationships between strong geometric features helps them to learn more difficult geometric concepts at the secondary level.

Table 2.1

Summary of Measurement and Geometry Learning Areas

LEVEL 1			**LEVEL 2**		
YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
• **Time** (days, months, reading of clocks) • **Measurement** (length, mass, volume) • **Space** (3 dimension, 2 dimension)	• **Time** (hours, minutes) • **Measurement** (length, mass, volume) • **Space** (3 dimension, 2 dimension)	• **Time** (hours, minutes, relations of time, calendar, combined operation of times) • **Measurement** (length, mass, volume) • **Space** (3 dimension, 2 dimension)	• **Time** (12-hour system, 24-hour system, duration of times, estimation of times, relation of times, basic operation of times) • **Measurement** (length, mass, volume, millilitre, litre) • **Space** (angles, parallel lines, perpendicular line, perimeter, area, solid geometry)	• **Time** (duration of times, estimation of times, relation of times, basic operation of times) • **Measurement** (length, mass, volume, millilitre, litre) • **Space** (regular polygon, angle, perimeter, area, solid geometry)	• **Time** (24-system, duration of times) • **Length, Mass and Volume** (solving problem) • **Space** (3 dimension, 2 dimension)

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2.8 Instructional Model (ID)

The instructional models include ADDIE, ASSURE, Hannafin and Peck, and Dick and Carey (ID). These models provide an overall framework for instructional design, development, and distribution. The ASSURE model is a systematic process that ensures effective instruction by incorporating various elements such as analyzing learners, setting objectives, selecting methods and media, utilizing resources, requiring learner participation, and evaluating the results. It is similar to the ADDIE model in that it emphasizes the importance of evaluation in the instructional design process. However, the ASSURE model places a particular emphasis on learner analysis and the use of various instructional resources to enhance learning outcomes.

Additionally, the Hannafin and Peck model focuses on problem-solving and inquiry-based learning. This model encourages learners to actively engage in critical thinking and problem-solving activities, promoting a deeper understanding of the content. It also emphasizes the use of technology as a tool to support inquiry-based learning, allowing learners to explore and discover knowledge on their own. Overall, the Hannafin and Peck model provides a framework for designing instruction that promotes active learning and fosters independent thinking skills.

While the Dick and Carey (ID) model emphasizes a systematic approach to instructional design through its nine-step process. This model also places a strong emphasis on learner assessment and evaluation. It ensures that instructional materials are effectively aligned with desired learning outcomes and provides a clear roadmap for instructional designers to follow. By incorporating feedback loops and iterative design,

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the Dick and Carey model promotes continuous improvement in the instructional design process. Both models offer valuable frameworks for instructional design, but they differ in their approach and focus, allowing designers to choose the most suitable model based on their specific needs and goals.

Thus, in this study the ADDIE model was used as an instructional model for textbook development. The ADDIE model is a systematic approach that consists of five phases: analysis, design, development, implementation, and evaluation. It provides a structured framework for instructional designers to follow, ensuring that all necessary steps are taken to create effective and engaging instructional materials. By using the ADDIE model for textbook development, the authors were able to ensure that the content was well-organized, aligned with learning objectives, and supported by appropriate instructional strategies. Additionally, the evaluation phase allowed for feedback from both students and educators.

2.8.1 ADDIE Model

The ADDIE model describes the five stages in the development of effective training and support tools for instructional design. The phases are analysed, design, develop, implement, and evaluate. In a design system, these stages do not necessarily follow a sequential pattern, but the output of one stage is an input for the next stage (McGriff, 2000). As a result, an effective instructional design system should include all five phases to ensure that the training or support tools that are produced are appropriate and

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effective. According to Ummu Nasibah, Muhammad Izuan and Nazipah (2015), the model is considered good because it has a systematic and thorough stage.

1. Analysis: The analysis phase is the first stage in the ADDIE models. It is an important phase before moving to another phase of ADDIE. According to Nada (2015), there are four things to analyse: analysing learners (where they are, their abilities, and their needs), developing an instructional analysis (to providethe necessary steps and present opportunities for learning and applying new information in a lesson), and creating instructional objectives and learning goal analyses. In this case, the researcher has used the need survey to determine (i) which topic should be chosen, (ii) what grade of student should be picked for this study, and (iii) the minimum time for each mathematics topic that is suitable to be chosen and developed in this study.
2. Design: In this phase, the researcher must apply the instructions that are already received in the analysis phase. The researcher must develop the strategies and ensure that the results of the research objective are consistent with the instructional design. The teaching and learning process is more effective when the textbook is based on the correct approach and theory. This is due to the fact that the teaching process necessitates the teacher's knowledge of and application of relevant strategies, methods, and theories to ensure that the objectives are met. As a result of this clear and systematic design phase, the researcher is assisted and guided in accelerating the textbook development.
3. Development: In this phase, researchers must determine the teaching and learning background. The teaching and learning background need to be considered carefully in order to gain an understanding of the current knowledge

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and skills that are possessed by the students. Furthermore, the details of the textbook development are determined. The researcher must identify and implement textbook development such as topics, texts, exercises or projects that are included, theories, and activities. In this phase of the textbook development, the researcher must take into consideration the learning background of their intended audience.

4. Implementation: The process of textbook development and design to fulfil the study's objectives is referred to as implementation. The implementation process is a crucial stage of textbook development, as it ensures that the textbook fulfils the objectives of the study. In this context, the textbook's implementation should include teaching procedures that are appropriate for the teacher and that correlate to the students' level of understanding. This phase also provides solutions to problems that emerge throughout the design process. The implementation phase is an important one, as it brings the teacher and student together and allows the teacher to gauge the effectiveness of the textbook and to make modifications where necessary.
5. Evaluation: The ADDIE model's final phase is evaluation. Evaluation is an important component of the ADDIE model because it allows for feedback on the process and product of instructional design, allowing for any necessary improvements to be made. At this stage, the researchers assess the product's validity, reliability, usability, or effectiveness. Evaluators use a variety of strategies, such as focus groups, surveys, interviews, or task performance data, to ensure that the instructional design is meeting its objectives. In the context of this study, the researcher evaluates the validity of the textbook content and instrument reliability using a survey form. This evaluation will provide insights

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into the quality of the materials, along with any potential issues that need to be addressed.

As a conclusion, the ADDIE model represents a dynamic, flexible framework for developing successful education and performance tools. The steps in this sequence, however, do not have to be followed in a strict linear order. As a result,this model is beneficial since it provides a clearly defined framework for the implementation of successful tools.

2.9 Project-Based Learning

Project-based learning (PBL) is a teaching method that involves using a project or activity as a learning tool to help students develop 21st-century skills such as communication, cooperation, and teamwork (Kokotsaki, Menzies, & Wiggins, 2016). PBL enables students to actively participate in their own education, encouraging their creativity, critical thinking, and problem-solving abilities. Ciptro (2018) asserts that PBL makes use of active learning, involves students in comprehensive curriculum-based tasks, difficult questions or problems, involves critical thinking and creative skills, communication and collaboration, teamwork, information management, problem-solving, making decisions, and self-assessment. Students work together to understand the concept of the topic that is presented through the project in both their individual and group learning.

This type of learning also allows the students to gain hands-on experience with the subject that they are studying. Based on the processes of learning

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implementation, the PBL has proven to be effective in strengthening the students' characters. This is because the project is authentic, and project-based learning provides engaging and fruitful learning opportunities. PBL allows the students to develop and refine their skills by encouraging them to participate actively in their own education. PBL encourages the students to take ownership of their own learning and allows them to participate in the teaching-learning process more actively.

Furthermore, the PBL approach is student-centered because the 21st century skills are taught through projects and activities (Stanley, 2018). It demonstrates that the PBL approach has a significant impact on the student's performance and fosters important skills such as problem-solving, collaboration, communication, and creativity. This allows the students to practise these skills in real-world situations, fostering a deeper understanding of the topics and developing their critical and independent thinking abilities. PBL is thus an effective teaching method that benefits students in a variety of ways.

2.10 Theory of Learning

Learning theories is essential for understanding how individuals acquire knowledge and develop skills. It provides insight into the different processes and factors that influence learning, such as behavior, cognition, and motivation. Additionally, studying learning theories can help educators design effective instructional strategies and create supportive learning environments that cater to diverse learners' needs. A few learning theories are cognitive, behaviorism, and constructivism. These learning theories are

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essential to understanding how individuals acquire knowledge and develop skills. Each of these theories offers a unique perspective on the learning process and emphasizes different factors contributing to learning. Understanding these theories can provide valuable insights into how individuals learn and inform instructional practices in various educational settings.

Cognitive theory focuses on mental processes such as perception, memory, and problem-solving, emphasizing the importance of active thinking and information processing. It is based on the idea that learning is a result of how individuals interpret and organize information in their minds. This theory suggests that learners construct their understanding of the world by actively engaging with new information and connecting it to their existing knowledge. Additionally, cognitive theory highlights the role of motivation and self-regulation in learning, suggesting that learners are more likely to engage in meaningful learning experiences when they are motivated and have control over their learning process. For example, student engagement and motivation can be fostered by providing them with opportunities for choice and autonomy in their learning, such as allowing them to select topics or projects that align with their interests. Furthermore, cognitive theory emphasizes the importance of metacognition, or the ability to reflect on and monitor one's own thinking processes. By encouraging students to think about their thinking, educators can help them become more aware of their learning strategies and make adjustments as needed.

Behaviorism focuses on observable behaviors and the influence of external stimuli in shaping learning outcomes. Behaviorism suggests that learning is a result of conditioning, where individuals respond to stimuli in their environment through

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reinforcement or punishment. This theory emphasizes the importance of repetition and practice in order to strengthen desired behaviors and eliminate unwanted ones. For example, students in a class that follows a behaviorist approach may receive rewards or praise for correct answers and be reprimanded or receive negative consequences for incorrect answers. This constant reinforcement helps to shape their behavior and improve their learning outcomes. Additionally, behaviorism suggests that the learning environment should be structured and organized, with clear expectations and guidelines, to provide a sense of stability and predictability for students.

Lastly, constructivism theory suggests that students construct their own knowledge and understanding through active engagement with the learning material (Bereiter, 1994). This approach emphasizes hands-on activities, problem-solving, and critical thinking, allowing students to develop a deeper understanding of the subject matter. By promoting active learning and student-centered instruction, constructivism can foster a sense of ownership and autonomy in students, enhancing their motivation and engagement in the learning process. For example, teachers may provide students with open-ended projects or real-world scenarios that require them to apply their knowledge and skills in creative ways. This allows students to take ownership of their learning and encourages them to think critically and independently. Additionally, constructivist approaches often involve collaborative learning experiences (Muhajirah, 2020), where students work together in groups to solve problems or complete tasks. This not only enhances their understanding of the material but also develops important social and communication skills.

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2.11 Theory of Constructivism

Constructivism theory is a learning approach in which new knowledge is built on the foundation of existing knowledge (Piaget, 1960). Constructivism emphasises the importance of a student's prior knowledge and experiences in the learning process. A new understanding is built in the context of learning through the experiences that the students have. Constructivism proposes that knowledge is an active process in which students actively participate in the construction of their own knowledge and meaning rather than being passive recipients of information. Actively involving students in the teaching and learning process, according to Mahamsiatus and Rabahyah (2022), can help students better understand the concepts that they learn. This demonstrates how effective teaching and learning methods in the classroom can help make learning more meaningful.

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As a result, this study employs constructivism theory, in which new knowledge is built upon the students' existing knowledge to complete the mini-project in this textbook. It is expected that by implementing this project, students will be able to better understand the concepts that they have learned and apply them effectively in real-life situations. This STEAM textbook's STEAM mini-project is student-centered. Students can gain new knowledge and improve their knowledge by completing the assigned tasks. Furthermore, a two-way interaction assists the students in integrating new and existing ideas. Students will be encouraged to be independent and creative as they explore and design projects based on their own ideas and experiences as part of the STEAM mini-project.

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2.12 5E Model

The 5E model is a learning framework that is commonly used in education. It stands for engage, explore, explain, elaborate, and evaluate. This model provides a structured approach to teaching and learning, allowing students to actively engage with the content through hands-on activities and experiments. The 5E model promotes critical thinking skills and encourages students to make connections between new information and their prior knowledge. By incorporating all five stages of the model, educators can create a comprehensive and effective learning experience for their students.

Engage brings students into the lesson by capturing their attention and sparking their curiosity. This stage often involves a hook or an intriguing question that motivates students to want to learn more. It sets the stage for the rest of the lesson and creates a sense of excitement and anticipation. The engage stage can include activities such as brainstorming, group discussions, or multimedia presentations to pique students' interest and activate their prior knowledge. By starting with an engaging activity, educators can create a positive and receptive learning environment for their students.

Explore is the next stage in the lesson, where students are given the opportunity to delve deeper into the topic. This stage allows students to actively participate in hands-on activities, conduct experiments, or analyze real-life examples related to the subject matter. It encourages critical thinking and problem-solving skills as students explore different perspectives and gather information to expand their understanding. The explore stage promotes active learning and encourages students to take ownership of their education by actively engaging with the content.

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Next, explain. This is the stage where students are provided with clear explanations and demonstrations of the concepts or theories being taught. This stage helps students make connections between their hands-on experiences and the underlying principles. It allows for the clarification of any misconceptions and provides a solid foundation for further learning. The explain stage also involves the use of visuals, diagrams, or multimedia resources to enhance understanding and facilitate comprehension.

While elaborating on the concepts or theories being taught, educators may also encourage students to ask questions and engage in discussions to deepen their understanding. This stage promotes active learning and encourages critical thinking as students actively participate in the learning process. Additionally, educators may provide real-life examples or relate the concepts to practical applications to make them more relatable and meaningful for students.

The last is evaluation. During the evaluation stage, educators assess students' understanding and mastery of the concepts or theories taught. This can be done through various methods, such as quizzes, tests, projects, or class presentations. The evaluation stage allows educators to gauge the effectiveness of their teaching methods and identify areas where students may need additional support or clarification. It also provides students with feedback on their progress and helps them identify areas for improvement.

Thus, 5E is an effective instructional model that promotes active learning and critical thinking skills. By incorporating hands-on activities and real-world examples,

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students are able to engage with the material in a meaningful way. This approach not only enhances their understanding of the subject matter but also fosters a deeper level of retention and application of knowledge. Overall, the 5E model provides a comprehensive framework for educators to guide their instruction and ensure that students are actively involved in the learning process.

2.13 Previous Research

Education is one of the efforts to improve the quality of human resources to ensure the development of a nation (Kusjuriansah & Yulianto, 2019). Education with STEAM learning can be an alternative to prepare students to compete in the 21st century (Syafrida, Sahyar and Nurdin, 2020). A textbook is one of the teaching materials as well as a device that helps the teachers to carry out the learning process. Depdiknas (2008) has stated thattextbooks have four categories, namely: (1) printed textbooks, for example, handouts, modules, books, student worksheets, brochures, and pamphlets; (2) audio textbooks, for instance, cassettes, radios, vinyl records, and audio compact discs; (3) audio-visual textbooks, for example, video compact discs and films; and (4) interactive textbooks, for instance, compact disc interaction. Therefore, textbooks can be used as one of the most effective strategies to enhance the students' knowledge and skills in order to ensure that they can compete with other students in the 21st century.

Risma Gita and Mohammad Asikin (2021) sought to assess the quality of STEAM integrated teaching materials based on their suitability in terms of characteristics, validity, and readability. The STEAM textbook was developed using

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the modified Sugiyono method of development as a research method. The following stages are included in a modified version of the Sugiyono's development method: potential and problem identification (interviews with teachers), data collection, product design, design validation, product testing (realibility test), and the final product. This modified method is an excellent choice for developing a STEAM textbook because it provides a complete cycle that ensures that the product is of high quality and is fit for use.

The survey method's validity was tested by six experts. Postgraduate students, teachers, and mathematics lecturers are among the experts that are involved. To add more perspectives to the validity test, experts with professional backgrounds were recruited. The different perspectives provided by each expert add an extra layer of review to the validity test, giving this study a higher level of reliability and depth. While the readability test was given to 26 secondary school students. The amount for readability is sufficient to provide a clear understanding of how the respondents would understand the language in the study.

According to the data, the readability test of the STEAM integrated statistics textbook aims to determine whether the textbook is practical. The readability test results have a percentage value of 80.62%, and its level of ease of understanding will affect the readers by increasing their interest in learning and memory or by making it easier for the students to understand. The percentage for the validity test was 88.99%, indicating that the teaching materials had met the suitability criteria, however, some revisions were still needed. In meeting the use criteria, the textbook is of high quality.

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The questionnaire form was used to collect the data; as it is a convenient way of collecting data, the form is one of the most commonly used methods.

There have also been studies that look into the presence of the STEAMelements in books. Syafrida, Sahyar, and Nurdin (2021) investigated this aspect of STEAM in five physics textbooks. The study was carried out to assess the quality of secondary school physics teaching books that were related to science, technology, engineering, art, and mathematics (STEAM). The research is was descriptive and qualitative in nature. The research paper does not specify the study design that is used in this study. This makes it difficult to determine the exact methods to used to collect and analyse data, as well as whether or not the research findings are reliable. This study could be improved to clarify the study design.

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This study employed the sampling method, with students serving as respondents to an instrument questionnaire containing 20 statements that were related to each STEAM indicator component. According to the findings of this study, as a sample the students were not suitable survey form respondents. This study should choose physics experts to participate in its research, such as physics teachers or lecturers. Using experts as respondents would have resulted in more reliable results. As a result, it is recommended that future research in this field includes experienced professionals in order to obtain more accurate results and to provide a more comprehensive understanding of how teaching books shape the student's learning.

The findings have revealed that all of the STEAM components in the physics teaching book under consideration are in the low category. The findings have also

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revealed that all books (i) lack a science component because the entire teaching book does not integrate various science knowledge, (ii) do not expose what technology is used to obtain a type of information, (iii) lack engineering components because students are not exposed to project completion techniques, (iv) lack a history component. the proclivity of teaching books to display only images without leading students to a clue, such as viewing a video at a specific URL or triggering student creativity in designing projects and mathematics that are the formulas, calculations, or built spaces that students use during learning activities, and (v) although the components of mathematics are very well presented, students are forced to memorise various formulas, are pressed to achieve a specific target number, and are only taught through one-way lectures. The study's findings indicate a greater emphasis on incorporating science, engineering, and history components into textbooks.

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A prototype of an Islamic STEAM Activity Storybook was developed as a result of the study by Metafisika, Azizah, and Fitriyah (2022). A storybook, for example, is one of the printed textbook categories (Depdiknas, 2008). This storybook was developed to integrate science concepts and Islamic content using a project- based learning (PjBL) approach. Using the Plomp model and a design research approach, the researcher only includes a preliminary investigation phase, a design phase, and a construction phase. The researchers are not conducting a phase oftesting, evaluation, and revision, which is followed by a phase of implementation. The storybook's potential effectiveness in terms of relevance to students, suitability for use in instruction, and overall impact on student learning is limited by the lack of steps in the process.

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In the preliminary investigation phase, a quantitative descriptive method was used to assess the teachers' understanding of STEAM learning implementation. The data was collected using a questionnaire with a Guttman scale and the validity value of each item. Using data analysis, the researchers designed and mapped the STEAM elements to the book. A brainstorming process, storyboard development, illustrations, and graphic design were all parts of the Islamic STEAM Activity Storybook for Early Childhood. Finally, the first prototype was created. The researchers did not conduct a study to validate their product after designing the initial prototype. It was an intriguing storybook because it provided an innovative approach to developing early childhood science, technology, engineering, arts, and mathematics learning skills. It is hoped that a future research of this study can be seen in the evaluation and implementation phase to verify the validity and effectiveness of the content.

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2.14 Summary

Summatively, this literature review cites credible sources for information on the research topics. The sources were chosen for their relevance to the research topics as well as their accuracy. The information in this literature review assists researchers to analyse and consider aspects such as the relevant research methods, previous research studies, and basic information about quantitative instruments. Researchers will benefit from this literature review because it provides an up-to-date and comprehensive review of current research topics. In fact, this literature review assists reviewers in developing concepts for textbook design and structure. Furthermore, by identifying gaps in the

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current literature and presenting potential areas of future exploration, this literature review serves as a foundation for future research.

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CHAPTER 3

METHODOLOGY

3.1 Introduction

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A good study is one that performs its methodological process accurately and correctly. This methodological process includes systematic procedures in a study. In this chapter, the methodology of the study that has been used is discussed. The aspects that will be discussed are the research design, location, selection of population and sample, research instrument that relates to the validity, reliability, and usability of the textbook, the method that is used to analyse data, and the research procedure.

3.2 Research Design

This study aims to develop a STEAM textbook that integrates character education with local wisdom for primary school students. A systematic approach is required to develop a textbook as a teaching material. Design and development research (DDR) is one type

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of design that can assist the researchers in developing STEAM textbooks. The three phases of the DDR approach make it easier for the researchers to create systematic STEAM textbooks. DDR necessitates analysis, design, development, and testing. Correspondingly, needs analysis assists in determining the specific requirements and functionalities that the DDR phase should possess. This involves conducting surveys and observations to gather information from potential users and stakeholders. Additionally, needs analysis helps in identifying any potential challenges or constraints that may arise during the development process, ensuring that the final DDR system meets the desired objectives and addresses the identified needs effectively. The design phase focuses on the textbook's structure and content and employs techniques such as concept mapping, task analysis, storyboarding, and visual mapping. These techniques help in organizing the information and determining the best way to present it to the users. Furthermore, user testing and feedback are crucial during the design phase to ensure that the DDR phase is intuitive and user-friendly. Finally, the evaluation phase determines whether the textbook was successful in meeting its objectives. During the evaluation phase, data is collected and analyzed to assess the usability of the textbook in achieving its intended goals. This may involve conducting surveys to gauge perceptions. The findings from this evaluation phase can then be used to make improvements and revisions to the textbook for future iterations.

The ADDIE model serves as a guideline for the design, development, implementation, and evaluation of STEAM textbooks in order to design and develop STEAM textbooks. The ADDIE model (Analyse, Design, Develop, Implement, and Evaluate) is an instructional design process that provides a solid basis for developing successful STEAM textbooks. This entire process concludes in the development ofa

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successful STEAM textbook. Last but not least, the STEAM textbook's design method should be creative and innovative, utilising cutting-edge technologies to enhance its visual aspects and appeal to the target group.

This model is conducted for the purpose of developing a product, namely,a textbook. This approach includes three main phases in the development of a textbook: phase I: needs analysis; phase II: design and development; and phase III: evaluation. Phase I is a needs analysis that includes preliminary surveys on a topic. Preliminary surveys had been conducted by the researcher through the distribution of questionnaires. The researcher conducted a survey to determine the suitability of the topic of mathematics in this study. Phase II is the textbook design and development phase, which involves a systematic process through the implementation of the ADDIE model. During this phase, researcher work closely with subject matter experts to gather all necessary content and materials. They then analyze and organize the information to create a comprehensive and cohesive textbook. Additionally, the ADDIE model helps ensure that the textbook is aligned with the desired learning outcomes and incorporates effective instructional strategies.

Based on Figure 3.1, this shows the ADDIE development stage. There are five stages to it. In the analysis stage, the researcher conducted observations to determine the actual condition. The observations are related to the analysis of the user background, identifying objectives and goals, and identifying the target group. The analysis stage also involves gathering and analyzing data to identify any gaps or issues that need to be addressed. This information is crucial for designing effective solutions and ensuring they meet the needs of the users and align with the project objectives. Additionally, the

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analysis stage helps identify any potential constraints or challenges that may arise during the development process. The design specifications are established during the development stage, which also makes adjustments to the design to make it compatible with the activities in the textbook (in the technical aspects such as colour, text type, and text size) and adapts the design to the compatibility of the activities in the textbook. In addition, the implementation stage also includes the actual delivery of the instructional materials and activities to the learners. This stage ensures that the content is presented in a clear and organized manner, allowing for effective learning and understanding. The notes, exercises, and projects that are provided in the textbook flow. The validity and reliability tests are part of the ADDIE model's evaluation.

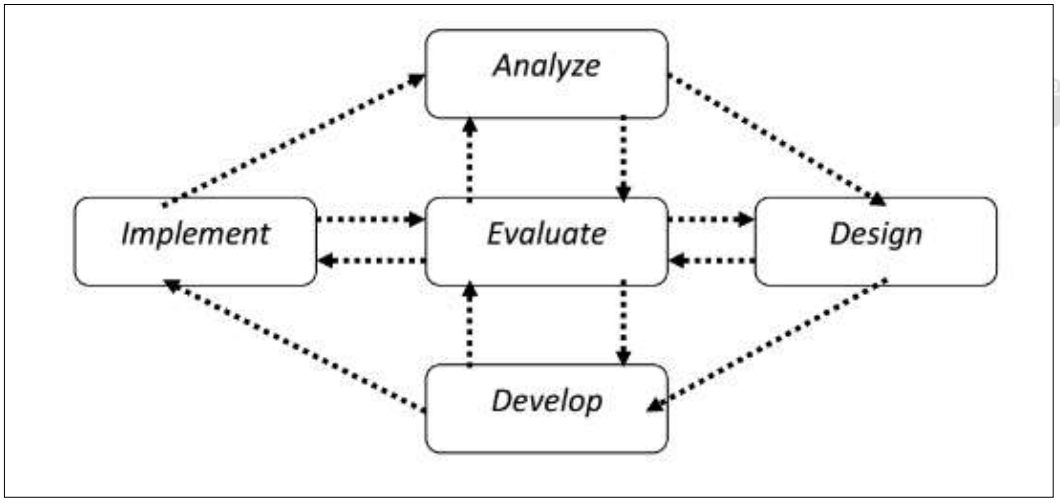


Figure 3.1. ADDIE Development Stage. *Note,* Tegeh & Kirna, 2013.

The researcher evaluates the usability of the textbook in Phase III (evaluation) of the design and development research approach. The textbook's usability is a survey that focuses on the respondents' perspectives on the textbook's development.

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3.3 Location

This study covers all primary schools in the Perak Tengah district. One of the criteria for selecting a study site is that the study population meets all of the study's requirements. The researcher chose these locations because it met the purpose of the study based on purposive sampling. Pasir Salak is one of the historical sites in the district of Perak Tengah that is relevant to this study's theme of local wisdom.

3.4 Population and Sample

According to Noraini (2013), the population was the group that drew researchers' attention, allowing the researcher to generalise her findings. All primary school mathematics teachers in the Perak Tengah district are included in the study, with 232 of them teaching level 2 mathematics (Year 4, 5, and 6). The study population must meet all of the requirements of the objective study, which is one of the criteria for selecting the studysite. According to the local wisdom themes provided in a STEAM textbook, this population knows more about the history of Kutai House, which is located in Pasir Salak, than other districts in Perak. As a result, the primary school mathematics teachers in the Perak Tengah district are an ideal population for the objective investigation of local wisdom themes in Kutai House. Furthermore, by choosing Perak Tengah as the study location, a large population of primary school mathematics teachers can be reached in order to obtain a representative sample size for the objective study.

A sample is a subset of the population studied by researchers to generalise the population. The district of Perak Tengah has 58 primary schools. Therefore, 58

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mathematics teachers who teach Year 4 students were chosen to participate in the usability survey as a sample study. The sample was chosen using purposive sampling. The purposive sampling method, which considers particular aspects of data collection, was used to select the schools (Sugiyono, 2017). Purposive sampling is used to ensure that specific characteristics or attributes of the population are represented in the sample. In the case of Perak Tengah, researcher considered factors such as location when selecting the primary schools for this study. This method allows for a targeted and focused approach to data collection, increasing the likelihood of obtaining relevant and meaningful results. Purposive sampling is a non-random sampling technique that involves selecting participants based on specific criteria that align with the research objectives. This approach ensures that the selected sample accurately represents the population of interest and allows for an in-depth analysis of the research topic. By using purposive sampling, the researchers can gather valuable insights from experienced mathematics teachers who are directly involved in teaching Year 4 students, enhancing the validity and reliability of the study's findings.

3.5 Research Instrument

In a study, the instrument is the data collection tool. Three instruments were created for this study- a need analysis form, a validity questionnaire, and a usability questionnaire (Appendix A). The instrument that has been used in this study is a questionnaire. Before the actual study, all instruments were validated to ensure that the instrument was appropriate and that each statement was clearly and easily understood by the

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respondents (Rossalmi, 2016).It is also to ensure that the study's objectives have been met with the appropriate instruments.

3.5.1 Need Analysis Instrument

The needs analysis phase is the first stage of the research approach to design and develop. The instrument for need analysis was adapted from the questionnaire by Sazilah Sam (2017). The survey was divided into two sections that are demographic data (Part A) and topic selection (Part B). This questionnaire was distributed to 15 randomly selected primary school mathematics teachers. Part A contains the respondents' demographic information, such as gender, race, and teaching experience. Part B is a survey of the teachers' preferences and opinions on various topics related to primary school mathematics education. Part B requests that the respondents rate the topics on a scale of 1 to 4. Based on the study's purpose, topics are prioritised from highest (scale 1) to lowest (scale 4). This questionnaire also includes detailed research information.

3.5.2 Content Validation Instrument

The ability of the measurements to evaluate the actual concept is defined as validity. The questionnaire instrument was adapted from the questionnaires of Siti Nasuha (2021) and Siti Rohaida (2017). The questionnaire is divided into two parts-face validity (Part A) and textbook content validity (Part B). Part A contains seven questions, while Part B contains twenty-seven questions. Part B defines the following 5 terms: textbook

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content, exercises, projects, presentations, language, and terms. The questionnaire employed a five-point Likert scale with the following responses: (1) disagree at all, (2) disagree, (3) unsure, (4) agree, and (5) strongly agree. The questionnaire was designed to assess the suitability of a textbook for actual study.

3.5.3 Usability Instrument

The questionnaire instrument was based on Ismail Sulaiman (2018) questionnaires. There are 38 questions in total. Part A (respondent demographic data) and Part B (questionnaire content) comprise the questionnaire (usability of textbook development). In Part A, the researcher inquired about respondents' demographic information, such as gender, race, and mathematics education experience. Part B refers to a usability questionnaire that includes five terms: formats, content, objective accessibility, teaching and learning feasibility, and satisfaction with the developed textbook. Part B focuses on the respondents' perceptions of the textbook's usability. Thequestionnaire employed a five-point Likert scale with the following responses: (1) disagree at all, (2) disagree, (3) unsure, (4) agree, and (5) strongly agree.

3.6 Validation of Instruments

The validators assessed the instruments based on their functionality, reliability, and overall performance. They provided valuable feedback and recommendations for improvement to ensure the instruments met the required standards. All instruments (a need analysis form, a validity questionnaire, and a usability questionnaire) were

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evaluated by two validators. Accordingly, mathematics lecturers who specialized in mathematics education served as the validators. The researcher distributed the instruments, as well as the declaration form checking instruments and a drafting textbook, to the validators. Two validators' expertise in mathematics education ensured the accuracy and relevance of the evaluation process. Their agreement on 97% of the instruments demonstrates a high level of consensus regarding the adequacy of the instruments. The minor spelling corrections needed can easily be addressed to further improve the instrument's quality.

3.7 Validation of Textbook

According to Rubio et al. (2003), the selection of professionals is based on their field of expertise, number of publications, or professional experience. As a result, the researcher chooses three professional experts. Lynn (1986) suggested that at least three field experts be appointed to assess the content's validity in order to ensure accuracy and quality. The sample consists of two Universiti Pendidikan Sultan Idris (UPSI) lecturers who are involved in the STEM module and mathematics education publication. Another is a mathematics teacher with over ten years of experience in the classroom and has experience working with the Curriculum Development Division in developing STEM modules.

The textbook’s validation instrument refers to its content. The textbook had been validated by experts who rate its compatibility on a five-point Likert scale with the following responses: (1) disagree at all, (2) disagree, (3) unsure, (4) agree, and (5)

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strongly agree. All the experts were provided a questionnaire and aSTEAM textbook for evaluation within one week by the researcher. There are 34 questions in total. The questionnaire is divided into two parts: face validity (Part A) and textbook content validity (Part B). Part A contains seven questions, while Part B contains twenty-seven questions. Part B defines the following five terms: textbook content, exercises, projects, presentations, language, and terms. The questions in Part A of the questionnaire focus on assessing the overall validity of the content presented in the textbook. These questions aim to evaluate if the textbook adequately covers the subject matter and if it is relevant to the intended audience. In contrast, Part B delves deeper into specific aspects of textbook content validity by examining how well it incorporates exercises, projects, presentations, language usage, and key terms.

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3.8 Pilot Test

Prior to conducting the main studies, a pilot study should be carried out. Noraini (2013) claims that it aims to gather opposing information about the instrument being used, such as timing, understanding of the questions, and language usage. To participate in this pilotstudy, 10 mathematics teachers from Perak Tengah district's elementary schools were chosen through simple random sampling. This pilot study's sample selection is adequate to becarried out. Mohammad Najib (1999) asserts that a sample size of 6–10 people is appropriate for thepilot study. Furthermore, none of the samples that were used in this pilot study came from actual research.

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Pilot studies are used to conduct reliability tests and determine the feasibility of the research design. To determine the item reliability, the data from this pilot study was further analysed using IBM SPSS Statistics 20 software. The alpha Cronbach values for the pilot studies are shown in Table 3.1. According to this analysis, the instrument's overall reliability value is 0.99. This interperformance value indicates that the item is excellent, effective, and consistent. This demonstrates the importance of this trust for further research study.

Table 3.1

Pilot Study on Alpha Cronbach Values

Cronbach's Alpha	No of Items
0.99	38

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Reliability is a measurement tool that is used to check the accuracy and precision of anitem statement (Mohd Majid, 2005). The reliability of the study will be tested in the pilot study. After the pilot study is completed, the data obtained will be analysed, and the value of the Cronbach's alpha will be measured. An interpretation table for Cronbach's alpha values from Bond and Fox (2015) is shown in Table 3.2. When the value of the Cronbach's alpha approaches 1.0, the consistency's reliability, quality, and effectiveness improve. The textbook usability questionnaire demonstrates that the items are appropriate for use in the current study using this reliability value.

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Table 3.2

The Interpretation of Cronbach's Alpha Value

Cronbach's Alpha Value	Reliability
0.8-1.0	Very good and effective with a high level of consistency
0.7-0.8	Good and is acceptable
0.6-0.7	Acceptable
< 0.6	The item needs refinement
< 0.5	The item needs to be discarded

3.9 Data Analysis Procedure

The collected data will be processed and analysed using Microsoft Excel and the IBM SPSS Statistics 20 software. The data analysis is purely descriptive. Table 3.3 summarises the analysis that has been performed to answer the study question.

Table 3.3

Analyzing Data for Study Questions

Research Questions	Data Analyse
Is there a need to develop a STEAM textbook integrated character education with local wisdom themes for primary school students for a mathematics topic?	Frequency
What is a valid STEAM textbook integrated character education with local wisdom themes for primary school students?	Percentage of content validation
What is the usability of STEAM textbook integrated character education with local wisdom themes for primary school students?	Mean and standard deviation

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3.9.1 Validity of Textbook

The validity of the textbook by the subject matter experts is evaluated using the percentage of comparison methods presented by Norlia and Faizah (2016). The determination of good content validation is based on a percentage above 70%, which is considered a high level of performance and appropriate for use in the study (Norlia & Faizah, 2016). If the percentage achieved is below 70%, then the textbook does not have good validity and needs to be revised in terms of its content and learning objectives. Here is the formula for comparing the percentages:

$$\frac{\text{Total score of Experts}}{\text{Maximum score}} \times 100\% = \text{Percentage of content validation} \qquad (3.1)$$

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3.9.2 Usability of Textbook

The degree of usefulness of a textbook in achieving learning objectives from the teacher's perspective after reviewing the textbook is referred to as textbook usefulness. This type of evaluation allows the teacher to determine whether the textbook material is adequately preparing their students to understand the subject matter. Table 3.4 shows the interpretation of the mean value for the usability of the textbook. It shows that the mean score is suggested by Hamidah, Jamal and Khalid (2015). If the mean score for the usability of the textbook approaches the score of 5.00, then the usability is perceived as good by the respondents.

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Table 3.4

The Mean Score of Usability

Mean Score	Level
3.68-5.00	High
2.34-3.67	Medium
1.00-2.33	Low

3.10 Research Procedure

Figure 3.2 shows the several procedures to ensure the quality of the results. Begin by writing a proposal and developing a draft version of the STEAM textbook and instruments to be used. After the defence proposal was approved, all instrument items were validated by experts, and the STEAM textbook took a year to develop from April 2021 to April 2022.Throughout this process, the researcher received guidance from a supervisor, lecturers with experience in publishing modules, previous research (STEM modules), and mathematics teachers.

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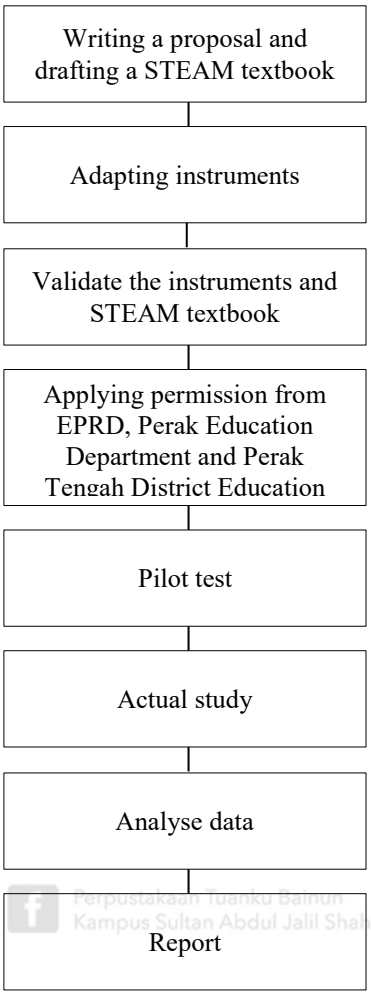


Figure 3.2. Research procedure

Following the completion of the STEAM textbook, the researcher requested permission from the Ministry of Education through the Education Policy Planning and Research Division (EPRD) in Appendix C. Before conducting school-based research, researchers must obtain permission from the EPRD. After receiving approval from the EPRD, researcher must also obtain permission from the Perak Education Department (Appendix D) and the Perak Tengah District Education Office (Appendix E). Towards that end, researcher must submit a research proposal to the department and district, outlining about their goals and objectives as well as any research methodologies those who intend to employ. Furthermore, the researcher invited the validator instruments and textbook content experts to participate in this study through email.

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Following the establishment of the validation instrument, the researcher conducted a pilot study to assess the reliability of the study instrument.

At this point, only the needs assessment and instrument validation processes for the COVID-19 pandemic had been addressed. The researcher took the necessary actions to ensure that the survey process continued. The researcher had emailed the instruments to the validators in order to obtain their approval, and a STEAM textbook had also been sent to them in the form of a digital document. In Appendix F,validators received a letter appointing an expert in instrument validity. The form had taken both parties a week to complete.

To ensure the quality of the data, questionnaires are used. The researcher must follow research ethics while collecting the data. The ethics of this research necessitate the use of an appropriate approach that allows the respondents to provide useful feedback without imposing upon the research studies. The textbook content experts had completed their evaluation of the instrument within a week. While the data for usability from the Perak Tengah district mathematics teachers had been worked out through a workshop that was organised by the Perak Tengah District Education Office (PPD) on June 30th, 2022. The workshop lasted for two hours and was held at Al-Biruni Hall, PPD Perak Tengah. The workshop's goal is more of a sharing session about the research, the STEAM textbook that is developed, and the collection of usability data for Year 4 mathematics teachers. Respondents completed the questionnaire in 20-30 minutes. During the collection of this data, there were no problems faced by the researcher. The data obtained are then collected and analyzed. Next, the final report is the last process that the researcher needs to perform.

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3.11 Summary

This study is used in the design and development research (DDR) methodology. The textbook has been created using the ADDIE development model. In this chapter, the researcher has provided additional details about the ADDIE development model, as well as some justifications. The study's focus is on the primary schools in the Perak Tengah district, and it includes several expert panels and teachers as respondents. Questionnaire instruments were used to assess the textbook's needs analysis, validity, reliability, and usability in this study. Conducting pilot studies for this instrument is also discussed in order to ensure that the determined reliability value can be compared to the actual study. This chapter also describes the method that has been used to analyse the data. Descriptive statistics are used in the data analysis, which includes frequency, percentage of textbook content, mean, and standard deviation. The overall research procedure is organised in a systematic manner from the beginning to the end.

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CHAPTER 4

ADDIE MODEL

4.1 Introduction

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The researcher discusses the design and development of a STEAM textbook for primary school students that integrates character education with local wisdom themes. This is a supplemental textbook that is designed for teachers to use in project-based learning (PBL) to apply STEAM elements, integrate character education, and implement local wisdom themes for students. This textbook will be developed through the Design and Development (DDR) study, where Phases I (needs analysis), II (design and development), and III (evaluation) of DDR are used. In general, the ADDIE model is used to develop the textbook during the II (design and development) phase. In the development of learning material, the ADDIE model has five stages.

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4.2 Textbook Design

Choosing the best model development design is critical for framework implementation. This option is critical for assisting the researcher in the design and systematic development of the learning material. Accordingly, the ADDIE development model has been chosen as a reference for the development of the learning material in this study. It is a systematic model for developing learning materials that consists of five phases- analysis, design, development, implementation, and evaluation. Thus, the ADDIE development model is used. It is one of the systematic learning design models, and is chosen because it is developed systematically and is based on the theoretical foundation of learning design (Widyastuti & Susiana, 2019). The ADDIE model enables a thorough approach to the development of the learning materials.

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4.3 Phase I (Needs Analysis)

The needs analysis is the first phase of the DDR approach. In this phase, the researcher distributes the needs assessment and analyzes some documents. The researcher discusses the analysis obtained from the Standard Curriculum and Assessment Document (DSKP) document, analyzes the topic content for the primary school mathematics subject, and analyzes the Kupasan Mutu Jawapan Matematik UPSR document in this subtopic. The analysis of the needs assessment has been discussed in Chapter 5. The researcher analyses a summary of the primary school mathematical topics and categorizes the four learning areas that are present in the DSKP document.

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The mathematics learning areas include numbers and operations, measurement and geometry, relevanceand algebra, and statistics and probabilities.

Table 4.1

Mathematical Topics by Areas of Learning

Learning Areas	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Numbers and Operations	Whole Numbers up to 100	Whole Numbers up to 1000	Whole Number up to 10000	Whole Numbers and Basic Operation	Whole Numbers and Operation	Numbers and Operation
	Basic Operation	Basic Operation	Basic Operation	Fractions, Decimals and Percentages	Fractions, Decimals and Percentages	Decimals
	Decimals	Fractions and Decimals	Fractions, Decimals and Percentages	Money	Money	Decimals
	Money	Money	Money			Percentage
						Money
Measurement and Geometry	Time	Time	Time	Time	Time	Time
	Measurement	Measurement	Measurement	Measurement	Measurement	Length, Mass and Volume of Liquids
		Space: 3-Dimension, 2-Dimension, Problem Solving	Space: Prisma, Non-Prisma, Regular Polygon, Axis of Symmetry, Problem Solving	Space: Angles, Perpendicular and Parallel Lines, Perimeter and Areas, Volume of Solid and Problem Solving	Space: Regular Polygon, Angles, Perimeter and Areas, Volume of Solid and Problem Solving	Space:Angels, Circle, Problem Solving
Relevance and Algebra			Coordinates	Coordinates and Ratios	Coordinates and Ratios	Coordinates
						Coordinates and Ratios
Statistics and Probabilities	Data Management: Collect, Classify and Arrange the Data, Pictographs and Problem Solving.	Data Management: Collect, Classify and Arrange the Data, Bar Charts and Problem Solving	Data Management: Collect, Classify and Arrange the Data, Pie Chart, The Relevance between Pictographs, Bar Charts and pie charts and Problem Solving	Data Management: Pictographs and Bar Charts	Data Management: Pie Chart, Mod, Median, Min and Range and Problem Solving	Data Management: Data
						Probability

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Table 4.1 depicts the mathematical topics that are classified into the learning areas. The researcher then compared level 1 (Year 1, Year 2, and Year 3) students to level 2 (Year 4, Year 5, and Year 6) students. The mathematics curriculum states that level 1 is designed to build the students' understanding, mathematical skills, and basic applications while level 2 students are intended to develop more complex understanding, mathematics skills, and applications among themselves so that they can effectively address the challenges of daily life, particularly those involving mathematics.

According to Table 4.2, the data analysis reveals that measurement and geometry account for a higher percentage of the subjects that are covered in the primary school textbook. According to these findings, the DSKP for levels 1 and 2 emphasise the importance of measurement and geometry in the primary school education, implying that Malaysian primary schools should place a greater emphasis on these important areas of learning.

Table 4.2

Analysis on the mathematics topics of all grades

Areas Of Learning	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Percentage (%)
Number & Operation	4	4	4	3	3	5	44
Measurement & Geometry	2	3	3	3	3	3	33
Relation & Algebra	0	0	1	1	1	2	10
Statistics & Probability	1	1	1	1	1	2	13

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Furthermore, the analysis in Table 4.3 indicates that measurement and geometry learning brought good scores for the 2017–2019 UPSR between Test Paper 1 and Test Paper 2. This finding adds to the evidence that measurement and geometry are important areas of learning in primary school. According to Kupasan Mutu Jawapan Matematik UPSR, the ministry has advised the candidatesin 2013, 2014, and 2016 to focus on their strengths in measurement and geometry learning. As a result, the main focus of this research is on measurement and geometry learning, and the student level that is chosen as the primary target for this study are the level 2 students rather than level 1 students. These measurements and geometry scores demonstrate that these subjects are essential components of a good education.

Table 4.3

Kupasan Mutu Jawapan Matematik UPSR

Year	Paper 1	Paper 2
2017	22/40	34/60
2018	22/40	45/60
2019	21/40	41/60

4.4 Phase II (Design and Development)

The STEAM textbook was designed and developed using the ADDIE model. The acronym ADDIE stands for Analysis, Design, Development, Implementation, and Evaluation (Nada, 2015). This is the second phase, which focuses on creating a STEAM textbook to map out the study's objectives. This phase is closely related to the results of the first stage of the need analysis. This phase is critical because the information thatis

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gathered from the needs analysis survey is used to generate ideas for the STEAM textbook.

4.4.1 Analysis Stage

Based on the results of the needs analysis, the researcher must establish the background of the textbook's user, identify goals and objectives, and identify the target groups. Knowing the user's background will allow the textbook to be designed to meet their needs and provide them with relevant, up-to-date information.

4.4.1.1 User Background

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The phase I needs analysis results are used to develop ideas for the STEAM textbook at this stage. Figure 4.1 depicts the chosen mathematics topic and its duration. The researcher has classified, identified, and compared the measurement topic of the students in Year 4, 5, and 6. Year 6 students have been automatically removed from the user selection list due to their participation in the Primary School Achievement Test (UPSR).

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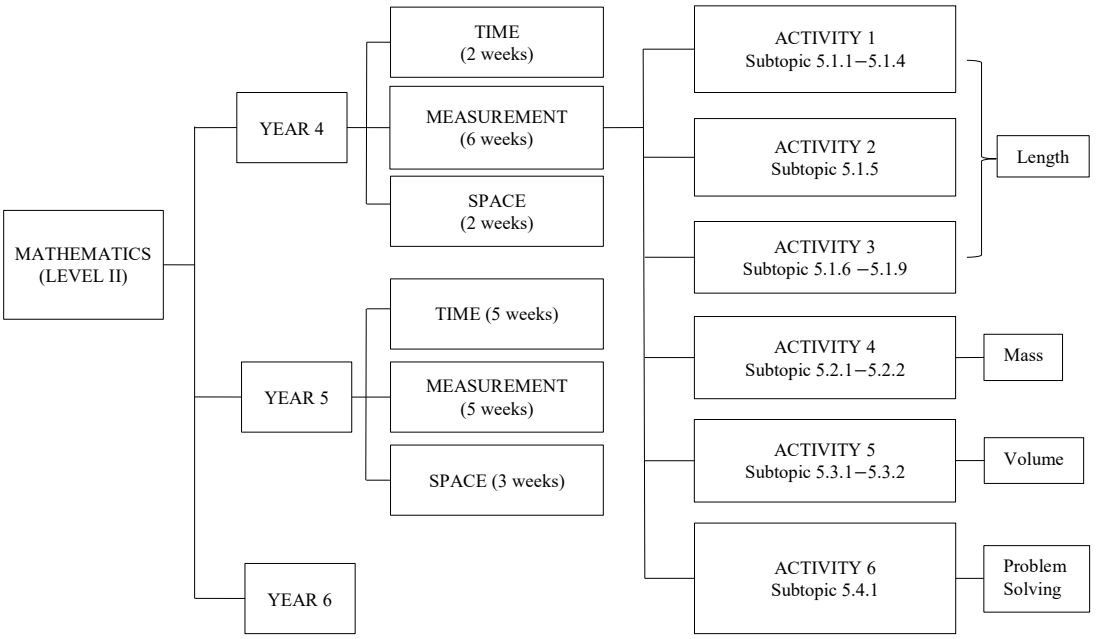


Figure 4.1. Duration in Mathematics Topics

The researcher then compared the measurement topics of the students in Year 4 and 5. Based on the annual lesson plan's minimum time allocation, it can be seen that the relevant topics for the study are Year 4 topics rather than Year 5 topics. The comparison shows that the Year 4 measurement topic lesson is the longest of any year. Six weeks as a learning duration is a long period that is appropriate for conducting additional research, such as testing its effectiveness. As a result, this STEAM textbook is used by Year 4 students. Year 4 students are the youngest in Level 2 and can be exposed early to develop good character. Year 4 students should also be exposed early to the mini-projects in order to make learning more interesting and to improve creative thinking skills. Furthermore, as they grow older, they should be exposed to the country's history in order to instil a love for the motherland. These are some of the reasons why Year 4 students have been chosen as the study's goal.

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4.4.1.2 Identify Goals and Objectives

The goal of the STEAM textbook is to develop a STEAM textbook for Year 4 students on the topic of measurement that integrates character education with the local wisdom theme. Furthermore, this STEAM textbook is designed as a supplement textbook for teachers as well as a guide for them to effectively apply the STEAM elements in teaching and learning by integrating character education and local wisdom themes. This STEAM textbook is designed to help the Year 4 students to understand measurement in an engaging and meaningful way.

The goal of this STEAM textbook is to improve the students' creative thinking skills through the application of STEAM elements, to develop good character through the rules or instructions set, and to improve the students' love for the motherland through the local wisdom theme, which is a traditional house with its own history and uniqueness. The STEAM textbook is intended to serve as a platform for students to participate in a variety of activities that are related to measurement, character education, and local wisdom.

4.4.1.3 Identify Target Groups

Based on the Curriculum Standard for Primary School (KSSR), the Year 4 syllabus on this STEAM textbook was specifically developed for primary school mathematics teachers. The textbook only covers one topic, which is measurement. The textbook takes a thorough and systematic approach to teaching the topic of measurement.

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4.4.2 Design stage

The STEAM development phase of this textbook for the Year 4 measurement topic goes into great detail about the book's design and content. Thus, Canva, a free design software was used by the researcher; Canva is an online graphic design tool that includes ready-to-use templates and is a great tool for creating creative STEAM textbook designs. This is convenient for the researcher, and it is also simple to use with a variety of designs and templates. The software also provides a wide range of design options, allowing the researcher to customise designs to their specific requirements.



Figure 4.2. Cover page of STEAM Textbook

Figure 4.2 depicts the front cover of a STEAM textbook. The cover page is the first page of the paper and its purpose is to entice the readers to read and review its content. This demonstrates the importance of creativity for the cover page in

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learning materials. The user gets a good first impression from this creativity page. Furthermore, it is forthright to include only the essentials in the textbook, such as the title, author's name, and its unique aspects. The textbook's distinctive features include STEAM, character education, the local wisdom theme, project-based learning, and the 5E approach. The first version of the textbook had 78 pages, including a front page, a preface, a STEAM project overview, a STEAM content, a 5E content, and the teaching and learning activities.

The textbook content can be divided into three sections- notes, exercises, and STEAM projects. The researcher examined the Curriculum and Assessment Standard Document (DSKP) for each subtopic in the measurement topic in terms of learning standards (learning outcomes) and time constraints. This procedure is necessary to ensure that each subtopic is consistent with the others.

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Table 4.4

Subtopics of Measurement

Subtopic	**Pages**
5.1 Length	9-36
5.2 Mass	37- 46
5.3 Volume of Liquids	47- 56
5.4 Problem Solving	57-61

This STEAM textbook begins with a note. The provided notes are incompatible with the current mathematics textbook. This is due to the researcher's attempt to follow the existing DSKP. The advantage of this textbook, however, is its inventiveness in capturing the students' attention. This note is also associated with daily life activities. The notes that are provided include examples of questions as well as solutions.

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Essentially, the researcher offers only one solution to the problem. This is done to avoid confusion among the teachers. Measurement subtopics are indicated in Table 4.4. As an assessment tool for students, each subtopic includes exercises. There is an additional exercise for students to reinforce their prior knowledge. The provided exercise is appropriate for the student's level.

The mini-projects that are provided are the main feature of this STEAM textbook. There are five mini-projects, also known as series projects. It is because all projects are related to each other, and the final project needs students to make the Kutai house model. Each project that is provided employs a project-based learning (PBL) strategy. This strategy allows students to apply their knowledge and skills in a real-world context, fostering deeper understanding and engagement. The mini-projects also encourage collaboration and critical thinking as students work together to solve problems and complete the tasks. Through PBL, all the 5E model components (engage, explore, explain, elaborate, and evaluate) are incorporated into the mini-projects, ensuring a comprehensive learning experience for the students. Additionally, the mini-projects provide opportunities for students to showcase their creativity and innovation as they design and create their solutions.

Overall, the inclusion of these mini-projects enhances the student's learning journey and prepares them for real-world applications of STEAM concepts. Furthermore, the STEAM series project brought the final result, which is the Kutai house model. As a result of this traditional house model, constructivism theory is put into practice as students actively engage in hands-on learning experiences. This allows them to not only understand the principles of architecture and design but also appreciate

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the cultural significance of traditional dwellings. Furthermore, the STEAM project fosters collaboration and teamwork among students as they work together to solve problems and overcome challenges throughout the process.

4.4.3 Development stage

The textbook development stage is the process of planning the project to meet each subtopic's learning standards. The mini-project is referred to as a STEAM project. Science, technology, engineering, art, and mathematics are all represented in the projects. The projects are also referred to as a ‘series of projects’ because each project represents or tells the story of a traditional house, i.e., the Kutai house; Pasir Salak is home to the Kutai House. The measurement topics are centred on its distinctive design and structure. There are five available projects, with the final project requiring the students to construct a model of a Kutai house in Pasir Salak. This project's primary goal is to instil good character in the students. Here, students must follow the instructions and rules that are set by the projects that they are working on. Following that, the projects aid in the development of positive traits such as cooperation, diligence, and obedience to instructions. The projects provide the students with a platform to learn and to grow holistically. All of these activities contribute to their character development and growth. Furthermore, through knowledge of the motherland's history, the local wisdom theme instils love forthe motherland. This, in turn, fosters a sense of national pride in the students, allowing them to be more confident in their identity. The STEAM project is summarised in Table 4.5.

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Table 4.5

Summary of STEAM project

Subtopic	Project name	Summary
5.1.1-5.1.5 (Length)	My Destination	My destination is a project making Map. The map is built on a given text. Once done building the map, students have required to label destination names and estimate the distance from destination to destination.
5.1.6-5.1.9 (Length)	Young Architecture	The Young Architects Project is a sketch project plan (without measuring length) and drawing dream house plan (by measuring length). Students exposed to one area of employment involving activities measure length.
5.2.1-5.2.2 (Mass)	Building Materials	Building Materials is a project that needs students to paint a dream house, labelling parts house and stating building materials that are used to build houses. Students also need to state the amount of material required to build.
5.3.1-5.3.2 (Volume)	Painting the House	The project of painting the house is a connection project from the STEAM 3 project which is Building Materials. Painting house is a coloring project using watercolor. The color of the water provided is basic colors that are red, blue, and Yellow. The project requires students to produce secondary colors and tertiary colors based on the given base color. After that, the students were required to color the results of work from the project STEAM 3 according to the specified guidance.
5.4.1 (Problem Solving)	Kutai House	Kutai House activity is a developing project for a traditional house that has uniqueness in its design and structure. This activity is carried out after the student is completed learning the Measurement topic in Mathematics Curriculum Year 4.

4.4.4 Implementation stage

The implementation stage is a process of deliberation about the STEAM project and the feasibility of the implementation period. In this stage, the textbook is not implemented for students and is not used in the classroom. Instead, the implementation stage focuses

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on reviewing and refining the instructional materials, ensuring they align with the project's goals and objectives. It involves seeking feedback from experts and stakeholders to make necessary adjustments before introducing the textbook to students. This stage is crucial for ensuring that the implementation of the textbook is effective and successful in achieving the desired learning outcomes. To ensure that all aspects of a STEAM project are implemented correctly, the implementation period must be carefully considered and planned. Each of these processes leads to a discussion of the learning from each project and the steps that are needed to complete that project. This procedure is followed for each STEAM project. Theproject's components and steps assist the teachers in carrying out the project for the students. Furthermore, it supports the teacher's knowledge on how to deliver in the classroom. Figure 4.3 depicts the project's teaching and learning components and steps.

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Figure 4.3. Teaching and Learning Components and Steps of the Project

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4.4.5 Evaluation stage

This stage is crucial in determining the validity and dependability of a STEAM textbook. Validating STEAM textbooks is critical for determining the content's accuracy as well as the effectiveness of their use in the classrooms. STEAM textbooks must be evaluated to ensure that they meet the students' and teachers' learning objectives. The extent to which a STEAM textbook covers the entire scope of the desired topics, including accuracy of information and material appropriateness for its intended audience, is referred to as content validity. Three expert panels evaluate the content's validity, which refers to five terms- content, exercises, projects, presentations and also language and terms used. They are experts in mathematics education due to their experience in developing modules and their extensive knowledge of the subject. Thus, content validity for the STEAM textbooks can be ensured in order to ensure that the information and material is accurate, appropriate, and effective for its intended audience.

Meanwhile, the dependability of 10 primary school mathematics teachers taking part in the pilot study is being assessed. The pilot study has utilised a standardised assessment to measure these 10 mathematics teachers' abilities to consistently provide accurate feedback and instruction. Pilot studies are critical for predicting some of the potential turbulence: taking the results of these tests into consideration allow any future problems to be identified and addressed before they become problematic. The results of these tests were closely monitored, and the data gathered were analysed to determine the dependability of each teacher. One of the important pilot tests is identifying the failure of the research protocol due to the respondent's inability to follow or the

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proposed question item being addressed is inappropriate or is difficult to understand. As a result, the reliability process must be completed prior to the actual study.

4.5 Phase III (Evaluation)

The evaluation phase is the final stage of DDR. This phase is known as the actual study. This phase evaluates the content of the developed STEAM textbook from the respondents' perspective in terms of its usability. In the evaluation phase, the respondents were given a survey questionnaire and asked to scale the usability of the STEAM textbook that was developed. The STEAM textbook's usability was evaluated by 58 primary school mathematics teachers in the Perak Tengah district. The questionnaire was administered using a 5-point Likert scale. The questionnaire included questions about the demography of respondents and the usability of STEAM textbook in terms of format, content, accessibility, feasibility of objectives, and satisfaction. Accordingly, the survey data were analysed using descriptive statistics and a mean score.

4.6 Summary

Developing a STEAM textbook as teaching material necessitates a systematic approach. DDR is a research design that provides a strong base for the development of STEAM textbooks. DDR research is divided into three stages: needs analysis, design and development, and evaluation. The needs analysis helps identify the specific requirements and goals of the STEAM textbook, taking into consideration the target

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audience and their learning needs. The design phase focuses on the structure and content of the textbook and employs techniques such as concept mapping, task analysis, storyboarding for implementation, and visual mapping for content presentation. Following that, the evaluation phase will determine whether or not the textbook has met its objectives. The design and development phases of the DDR approach are focused on developing learning materials that are adaptable to the needs of the learners as well as relevant to their context. The ADDIE model provides a framework for the depth of analysis, design, development, implementation, and evaluation that are required to develop a STEAM textbook. The ADDIE model(Analyse, Design, Develop, Implement, and Evaluate) is an instructional design process that can be used to create a successful STEAM textbook. This entire process culminates in the development of a successful STEAM textbook. It can be concluded from this thatresearch design is essential in the successful development of a STEAM textbook.

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CHAPTER 5

FINDINGS

5.1 Introduction

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This chapter discusses the results of the analysis of the data that are obtained based on the three study questions that are presented in Chapter 1. The study questions include: (i) Is there a need to develop a STEAM textbook integrated character education with local wisdom themes for primary school students for a mathematics topic? (ii) What is a valid STEAM textbook integrated character education with local wisdom themes for primary school students? (iii) What is the usability of a STEAM textbook integrated character education with local wisdom themes for primary school students? Data were analysed using the Statistical Package for the Social Science SPSS version 20 software, with questionnaires as the data collection instrument. This discussion of descriptive analysis includes only the calculation of frequency, percentage, and mean. The results of this study are described in detail in this chapter.

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5.2 Need Analysis

A need assessment was conducted among the primary school mathematics teachers using a Google Form platform to map the mathematics topic to the research objective. This survey is in the form of a questionnaire with two sections- respondents' demographics and a list of mathematics topics. The topic has been chosen based on the respondent's preferences in developing the STEAM textbook. This questionnaire is organised into a ranking order; the ranking prioritises the topic based on its suitability for this study.

Table 5.1

Demographic Profile of Respondents

	Percentage (%)
Gender	
Male	60
Female	40
Race	
Malay	87
Indian	0
Chinese	23
Others	0
Mathematics Teaching Experience	
1-5 years	13
6-10 years	7
11-15 years	46
16-20 years	27
more than 20 years	7

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There are 15 respondents are required to participate in this needs assessment survey. Table 5.1 shows the demographic breakdown of the respondents by gender, race, and mathematics teaching experience. The result of the needs analysis shows that 60% of male faculty and 40% of female faculty have participated in the survey. The demographics by race report that 87% are Malay teachers, 13% Chinese teachers, and there are no Indian teachers and others races who have participate in the survey. In addition, the result shows the demographics of the respondents based on their experience in teaching primary mathematics. The majority, 46% of the respondents reported having 11-15 years of experience teaching primary school mathematics. Teachers with more than 20 years of experience and 6- 10 years of experience were only 7%; the lowest percentage that had responded to the survey. Other teaching practices showed that 27% had 14-20 years of experience,followed by 13% of teachers with 1-5 years of teaching experience.

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Table 5.2

Rank Order of Mathematics Topics

Topic	Rank Order
Length, Mass, and Volume of Liquid	1
Measurement	2
Space	3
Time	4

Table 5.2 indicates the rank order of mathematics topics to map the mathematics content with the research objective. The result shows that the majority of respondents agree that the topic length, mass, and volume of liquid have the highest rank (number 1) as a priority for this textbook. This is followed by the measurement topic, space, and

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ends with time, which is considered a lower priority for developing this textbook. However, the length, mass, and volume of liquid are listed in the Year 6 syllabus. Thus, the researcher needs to remove it from the list of topic selection because the Year 6 students will sit for the Primary School Achievement Test (UPSR). As information, this need analysis is working before the announcement that the UPSRis to be abolished in 2021. On the other hand, the measurement topic is picked up as the priority in mapping the mathematic content in developing the STEAM textbook.

Table 5.3

Analysis of Mathematical Topic Needs

Topic	Frequency
Time	7
Measurements	8
Space	6
Length, Mass and Volume of Liquids	5

The needs analysis for the selection of the mathematics subject in the area of measurement and geometry was carried out among 15 respondents from the primary school mathematics teachers. The data analysed in Table 5.3 shows that the highest frequency is the topic of measurement with 8, followed by time with 7, spacewith 6, and finally the topic of length, mass and volume of liquids with 5. This high frequency indicates the priority of the topic in this textbook.

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5.3 Validity of Textbook Content

The textbook is one of the sources of information to which teachers and students must refer. The textbook that is developed here implements the elements of STEAM, integrates character education, and incorporates themes of wisdom into its content. To ensure that the content of this textbook is appropriate and meets the goals of textbook development, three panels of experts have been appointed to review this textbook. After the review by the experts, a questionnaire on the validity of the content of the textbook is completed. The degree of agreement of the expert panel on this textbook is analysed to determine the validity of the content of the textbook.

Table 5.4

Textbook's Face Validity

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Item	Statement	Percentage (%)
1	Cover page of the textbook is interesting.	100
2	Diagram is easy to refer in textbook.	93
3	Language used is easy to understand.	93
4	Font size is suitable and easy to read.	93
5	Order of the text is easy to follow in the textbook.	80
6	Objectives of the textbook are clearly stated.	80
7	Instruction is clear in the textbook.	93
	Overall	90

Table 5.4 shows the textbook's face validity. In general, the validity of the pages of this textbook is checked by experts at a glance. The analysis of the data shows that item 1 (the cover of the textbook is interesting) has received full agreement from all the experts. The cover page of a textbook plays an important role before the user sees

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the content. This full scale clearly shows that the cover page is one of the incentives for the users to view the book. The lowest agreement shows item 5 (Order of the text is easy to follow in the textbook) and item 6 (Objectives of the textbook are clearly stated) with an 80% agreement, respectively. The results show that the overall agreement on the textbook's face validity, in general, reaches a high value of 90%. This shows that this textbook's face is generally good and appropriate.

Table 5.5

The validity of the textbook's content

Item	Statement	Percentage (%)
	A. Content	
1	Comply with the content aspect in the DSKP.	80
2	Contains sufficient information as a source of teaching and learning.	80
3	Contains up-to-date information of a current nature.	87
4	Have information that corresponds to the level of abilities of the student.	93
5	Have a reading level (readability) in accordance with the age of the student.	93
6	Have accurate factual information.	93
	Total	88

Table 5.5 shows the validity of the textbook's content. In terms of the textbook content with six items, it is shown that item 1 (comply with the content aspect in the DSKP) and item 2 (contains sufficient information as a source of teaching and learning) has the lowest agreement at 80%. However, for item 4, item 5, and item 6, the information presented by the researcher reached 93% as the highest agreement. This explains that the presented information is appropriate to the reading level and age

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level of the student. In addition, the factual information that has been provided is accurate. The overall textbook content shows 88% agreement by the experts.

Table 5.6

The validity of the textbook's content based on exercises

Item	Statement	Percentage (%)
	B. Exercises	
7	Have adequate reinforcement and enrichment exercises.	93
8	Have different exercises and questions.	87
9	Have exercises that is suitable for the level of abilities of the student (Year 4).	93
10	Have exercises that can help improve students' thinking skills.	80
11	Provide exercises that corresponds to the learning topic.	87
	Total	88

Based on Table 5.6, the results for the exercise term showed that five items achieved 88% agreement. Item 10 (exercises that can improve students' thinking skills) has the lowest agreement of 80% compared to the other items. Respectively, item 7 and item 9 show 93% as the highest agreement that the textbook has adequate exercises for reinforcement and enrichment and that it is appropriate for the student's ability level.

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Table 5.7

The validity of the textbook's content based on projects

Item	Statement	Percentage (%)
	C. Projects	
12	Provide enough projects for teaching.	87
13	Preparing an interesting project.	93
14	Suitable for implementation in classrooms.	93
15	Helps improve the learning skills of the 21st century.	93
16	Have a project proposal that is able to stimulate the student minds.	93
17	Have a project instruction that is easy to understand.	87
	Total	91

Table 5.7 shows the validation based on projects that consists of six items which shows 91% agreement. Respectively, item 12 and item 17 show 87% respondents' agreement which indicates that the projects that are provided are enough for teaching and the project instructions are easy to understand. Item 13, item 14, item 15, and item 16 show that the experts have agreed on a 93% agreement for each item. This indicates that the provided projects are interesting and suitable for classroom implementation. Furthermore, the projects contribute to the improvement of 21st century learning skills, and the proposed project is able to stimulate the students' minds.

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Table 5.8

The validity of the textbook's content based on presentation

Item	Statement	Percentage (%)
	D. Presentation	
18	Have parts arranged in a reasonable order.	93
19	Using appropriate and interesting illustrations, diagrams and tables (graphics).	93
20	Using clear, appropriate and interesting typography (type of letter and letter size).	93
21	Have an interesting cover design.	93
22	Using the appropriate colour.	93
	Total	93

Table 5.8 shows the textbook presentation with 93% of agreement out of the five items that were answered positively through the scale scores of 4 and 5 (agree and strongly agree). This shows that the textbook is presented in an orderly arrangement, using appropriate and interesting illustrations, diagrams, and tables (graphs). Besides, the typography (font type and size) is clear, appropriate, and interesting. It shows that the interesting cover design with the use of appropriate colors for the textbook has also been positively received by the experts.

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Table 5.9

The validity of the textbook's content based on language and terms

Item	Statement	Percentage (%)
	E. Language and Terms	
23	Use the default language in terms of spelling and grammar.	87
24	Using language and terms that correspond to the student's level of ability.	93
25	Use a language barrel (term or style) that compatible with the field of Mathematical Education.	93
26	Using language and terms that are easy for student to understand.	93
27	Using a language style that attracts student to read.	93
	Total	92

Moreover, the textbook language and the terms that are used have also been rated well by the experts with 92% on a scale of 4 and 5 (agree and strongly agree), as shown in Table 5.9. Item 23 shows the lowest agreement with 87% which is the agreed-upon performance of standard language that is used in terms of spelling and grammar. Items 24, item 25, item 26, and item 27 show a high agreement at 93%. This indicates that the language and the terms that are used in this textbook are appropriate for the student's abilities and that the language is compatible with the field of mathematics education. It is also easy for the students to understand, and the style of language that is used attracts them to read.

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Table 5.10

Overall of validity

Item	Terms	Percentage (%)
1,2,3,4,5,6	Content	88
7,8,9,10,11	Exercises	88
12,13,14,15,16,17	Projects	91
18,19,20,21,22	Presentation	93
23,24,25,26,27	Language and Terms	92
Overall		90

As indicated in Table 5.10, there are 27 items of the STEAM textbook's content validity, including the exercises, projects, presentations, language, and terms that have been involved in its development. The presentation's term is displayed mostly in the highest percentage (93%), followed by language and the terms that are used (92%). There is 91% agreement with the project's term. The results for the content indicated that 88% of the experts agreed with the exercise term equally. The content of the textbook receives a high acceptance rating of 90% in the overall evaluation. The STEAM textbook has great authenticity, as evidenced by the 90% agreement among the experts.

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5.4 Usability of Textbook

The usability of the textbook refers to its usability in achieving the learning objectives from the teacher's perspective after reviewing the textbook. The usability questionnaire consists of two parts: Part A (Demographic profile of respondents) and Part B (Usability of textbook development); 58 mathematics teachers have participated in the survey.

5.4.1 Demographic Profile of Respondents

Table 5.11 shows the demographic profile of the respondents by gender, race and mathematics teaching experience. There were 20 male mathematics teachers (34.5 %) and 38 female mathematics teachers (65.5 %) who participated in the survey. It can be seen that more female teachers rather than the male teachers have participated in the survey. The data analysed show that the Malays were the most likely to have participated in the survey with 54 teachers (93.1 %), followed by Indians with 3 teachers (5.2 %) and only one Chinese teacher (1.7 %). There are no other races that did not participate in the survey. The data also show that the highest percentage of experience in teaching mathematics is more than 20 years with 23 teachers (39.7 %). This is followed by 11-15 years of experience with 12 teachers (20.7 %), and 11 teachers (19.0 %) with 16-20 years of experience in teaching mathematics. The lowestpercentage is 6 teachers (10.3 %) with 1-5 years and 6-10 years of experience.

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Table 5.11

Demographic Profile of Respondents

	N	Percentage (%)
Gender		
Male	20	34.5
Female	38	65.5
Race		
Malay	54	93.1
Indian	3	5.2
Chinese	1	1.7
Others	0	0.0
Mathematics Teaching Experience		
1-5 years	6	10.3
6-10 years	6	10.3
11-15 years	12	20.7
16-20 years	11	19.0
more than 20 years	23	39.7

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5.4.2 Usability of Textbook Development

The usability of a textbook refers to its usability to achieve the learning objectives from the teacher's perspective after reviewing the textbook. The questionnaire was conducted on 58 mathematics teachers. The textbook's usability has five terms, namely formats, content, accessibility and feasibility of objectives, and satisfaction are studied.

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Table 5.12

The Usability Format

No.	Item	Mean (Min)	Standard Deviation (SD)	Level
	Format			
1	The size of the textbook is appropriate and easy to carry.	4.26	0.79	High
2	The sub-arrangement of the textbook is appropriate.	4.26	0.55	High
3	The size of the writing used is appropriate.	4.50	0.54	High
4	The layout of all sub-textbook is uniform.	4.22	0.50	High
5	Photos are placed in a suitable place.	4.41	0.53	High
6	The diagram is placed in the appropriate place.	4.43	0.57	High
7	The instructions in the textbook are clear.	4.40	0.53	High
8	The project provided is appropriate.	4.28	0.64	High
	Total	4.34	0.42	High

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Table 5.12 shows The format of the textbook shows the highest mean score compared to the other constructs with a mean score of 4.34 (SD = 0.42). Item 3 shows that the mean of an item is the highest at 4.50 (SD = 0.54). It shows that the size of the writing that is used in the textbook is appropriate. Compared with item 4 (the layout of the sub- textbook is uniform), the mean score is lowest at 4.22 (SD = 0.50). This shows that the respondents' agreement with the uniform layout of the sub-textbook is lower. Overall, the items show that the mean score is above 4. According to Hamidah, Jamal and Khalid (2015), the interpretation of the mean score for the usability of the textbook has revealed that the usability is perceived as high by the respondents.

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Table 5.13

The Usability Contents

No.	Item	Mean (Min)	Standard Deviation (SD)	Level
	Contents			
9	I understand the objectives of the textbook clearly.	4.29	0.59	High
10	I easily understand the instructions found in the textbook.	4.33	0.57	High
11	I can use textbook with ease.	4.19	0.58	High
12	I understand the ideas found in textbook.	4.29	0.56	High
13	The ideas found in textbook are interesting.	4.38	0.59	High
14	The lesson project provided is fun.	4.29	0.68	High
15	The prepared project can be well followed by the students.	4.07	0.59	High
16	The exercises given is relevant to the daily life of the students.	4.26	0.72	High
17	The prepared project help students master the skills of the taught mathematics.	4.17	0.68	High
18	I was able to do all the things directed in the textbook.	4.16	0.62	High
19	Words used in textbook is easy to understand.	4.31	0.57	High
20	The style of writing textbook is suitable.	4.31	0.54	High
	Total	4.25	0.48	High

Table 5.13, the textbook content shows a mean of 4.25 (SD = 0.48). Item 13 with a mean of 4.38 (SD = 0.59) has the highest mean which indicates that the ideas in the textbook are interesting. This is followed by item 10 with a mean of 4.33 (SD=0.57) which shows that the respondents easily understand the instructions that are given in the textbook. Item 19 and item 20 show the same mean of 4.31 (SD=0.57 and SD 0.54). This shows that the words that are used are easy to understand and that the writing style fits the textbook that is developed. The lowest mean score compared to the others items in textbook content describes item 15 (the prepared project can be

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well followed by the students) which has the lowest agreement with the mean score of 4.07 (SD = 0.59). However, all items in the textbook context are still in the highest interpretation mean which is above 4.

Table 5.14

The Usability Objective Accessibility

No.	Item	Mean (Min)	Standard Deviation (SD)	Level
	Objective Accessibility			
21	The teaching project helps to achieve the objectives set.	4.24	0.60	High
22	Students are able to perform the assigned tasks.	4.00	0.56	High
23	The exercises given can test the students' understanding of the content of the lesson.	4.17	0.57	High
24	The tasks given can improve the students' understanding of the content of the lesson.	4.16	0.62	High
	Total	4.14	0.52	High

Overall, the objective accessibility of the textbook that has been developed shows a mean of 4.14 (SD = 0.52) in Table 5.14. Item 21 shows that the teaching project helps to achieve the objectives that are set where the highest mean is 4.24 (SD = 0.60), rather than item 22, item 23, and item 24. The respondents' agreement on item 22 (the students are not able to perform the assigned tasks) is shown with the lowest mean of 4.00 (SD = 0.56). Item 23 (the exercises given can test the student's understanding of the content of the lesson) brings a mean of 4.17 (SD=0.57), followed by item 24 (the task given can improve the students' understanding of the content of the lesson) with a mean of 4.16 (SD = 0.62).

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Table 5.15

The Usability Teaching and Learning Processes

No.	Item	Mean (Min)	Standard Deviation (SD)	Level
	Feasibility of Teaching and Learning Processes			
25	The proposed time for the teaching of each sub-textbook is appropriate.	3.83	0.68	High
26	The proposed time for the student's project is sufficient.	3.81	0.66	High
27	This textbook made it easier for me to teach the topic of measurements and measures.	4.16	0.59	High
28	Simple lesson projects are arranged in order from simple to difficult.	4.24	0.60	High
29	The teaching project is easy to implement.	4.03	0.62	High
30	The proposed teaching aids are appropriate.	4.17	0.65	High
31	The proposed teaching tools help to achieve the objectives of the lesson.	4.21	0.52	High
32	Reinforcement exercises help pupils understand the lesson well.	4.28	0.59	High
33	Recommendations for answers for reinforcing exercises can help the teacher.	4.40	0.53	High
	Total	4.12	0.47	High

The data were also analysed in terms of the feasibility of the teaching and learning process from the teachers' perspective in Table 5.15. Two items show that item 25 and item 26 are below 4 with a mean of 3.83 (SD = 0.68) and 3.81 (SD = 0.66), respectively. The respondents' agreement is lesser when it comes to the adequacy of the proposed time for teaching each sub-textbook and the sufficiency of the proposed time for the student project. However, the respondent's agreement toitem 33 with a mean of 4.40 (SD = 0.53) leads to the highest recommendations for the responses on reinforcing the exercises that can help the teacher. Overall, the feasibility of the teaching and learning process is still highly rated with a mean of 4.12 (SD = 0.47).

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Table 5.16

The Usability Satisfaction

No.	Item	Mean (Min)	Standard Deviation (SD)	Level
	Satisfaction			
34	This textbook is easy to use.	4.19	0.61	High
35	This textbook can save me time preparing for teaching.	4.03	0.79	High
36	This textbook helped me teach more effectively.	3.98	0.76	High
37	The proposed project can attract students to study.	4.16	0.70	High
38	I expect there to be textbook like this for other topics.	4.24	0.68	High
	Total	4.12	0.61	High

Table 5.16 shows the satisfaction with the textbook with the mean score of 4.12 (SD = 0.61) which corresponds to the feasibility of teaching and learning. They also had the lowest mean compared to the other terms. The lowest mean, which is below 4, shows that item 36 (the textbook helped me teach more effectively) is lower than other items with a mean of 3.98 (SD = 0.76). This item shows that the respondents have agreed the least with the effectiveness of the textbook in helping them teach. The time saved in lesson preparation by the textbook is also not highly rated with a mean of 4.03 (SD = 0.79). Nevertheless, the respondents' expectation to being able to use the textbook on other topics shows a mean of 4.24. Its standard deviation is 0.68. This suggests that while the textbook may not be highly effective in helping the respondents teach, they still have a positive outlook on its potential use for other topics. The relatively low standard deviation for this item indicates that there is a general consensus among the respondents regarding their expectation of using the textbook for other subjects.

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Table 5.17

The Overall Usability

	Item	Mean (Min)	Standard Deviation (SD)	Level
Format	1, 2, 3, 4, 5, 6, 7, 8	4.34	0.42	High
Contents	9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20	4.25	0.48	High
Objective Accessibility	21, 22, 23, 24	4.14	0.52	High
Feasibility of Teaching and Learning Processes	25, 26, 27, 28, 29, 30, 31, 32, 33	4.12	0.47	High
Satisfaction	34, 35, 36, 37, 38	4.12	0.61	High
Overall		4.21	0.45	High

In short, the five terms are scored with a high mean based on the interpretation table of Hamidah, Jamal and Khalid (2015). All the terms scored mean are above 4. Briefly, Table 5.17 shows that the format term has the highest mean of 4.34 (SD=0.42), followed by content with a mean of 4.25 (SD =0.48), objective accessibility with a mean of 4.14 (SD =0.52), and the same place with the same mean, namely, feasibility of teaching and learning, and satisfaction with the textbook with 4.12 (SD=0.47) and 4.12 (SD =0.61), respectively. Overall, the 38 items with a mean of 4.21 (SD =0.45) indicate that the usability of the textbook is perceived as high by the respondents.

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5.5 Summary

Finally, the study looked at data for the needs, validity, accuracy, and usability of STEAM textbooks from a perspective of a teacher. The Statistical Package for the Social Sciences (SPSS) version 20 programme and the percentage comparison formula had thoroughly examined the data. The calculation of frequency, percentage, and mean score is covered in this descriptive analysis discussion. The findings demonstrate the STEAM textbook's excellent validity and high levels of expert agreement. A STEAM textbook's usability scored well overall, with a good mean. The findings of this study demonstrate that teachers can use the STEAM textbook as an alternative teaching tool to enhance students' comprehension, particularly in the subjects of measurement and geometry, which incorporate character education.

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CHAPTER 6

DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS

6.1 Introduction

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This chapter discusses four main parts which are the summary of the study, discussion of the study findings, implications of the study, and recommendations for further study. The research summary is a synopsis from chapter 1 to chapter 5. The discussion of the research findings is an outline based on the research objectives and research questions. In addition, the implications of the study discuss the importance of the study findings on the STEAM textbook that is developed. The improvement of the STEAM textbook is discussed in the further study proposal at the end of this chapter.

6.2 Summary Study

As a summary, this study has developed a STEAM textbook that integrates character education with local wisdom themes for primary school students. Three study

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objectives are studied, namely: (1) identifying the need to develop a STEAM textbook that is integrated with character education and local wisdom themes for primary school students; (2) developing a valid STEAM textbook integrated with character education and local wisdom themes for primary school students; (3) analysing the usability of a STEAM textbook that integrates character education with local wisdom themes for primary school students.

The first study objective, which is the needs analysis, has been carried out through a survey method using a questionnaire to identify the mathematical topics in primary school that follow the objectives of this study. Based on the survey, the topics that are listed are the measurements and geometry topics for year 4, 5, and 6. From the data analysed, some further detailed factors have been listed, such as the user's background, goals, and objectives, as well as the target groups that go hand in hand with the development of the STEAM textbook. The results showed that thetopic of measurement from Year 4 was chosen as the mathematical topic of this study.

The design and development research approach were used to develop a STEAM textbook that integrated character education with local wisdom themes for primary school students. The second and third objectives were achieved using the questionnaire instrument to collect validity and usability data in a study. Three experts were involved in the validation test, and 58 mathematics teachers took a usability test. Studies have shown that the overall validity of the textbook's content, as judged by the experts, has achieved the highest level of agreement. This includes the content, exercises, projects, presentations, language, and terms of the textbook. The highest agreement validation proves that the STEAM textbook that is developed has good content. The usability of

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the STEAM textbook has also received a high mean score from the respondents. The respondent's perspective shows that the textbook in terms of format, content, objective accessibility, the feasibility of teaching and learning, and satisfaction, is perceived to be good.

6.3 Discussion

Discussion of the findings refers to the findings that have been obtained to answer the question of the study. The first question of the study is the analysis of the implemented requirements for fixing the selection of the appropriate topic for the STEAM textbook. The findings showed that a majority of the respondents had chosen the measurement topic. Through these findings, the researcher made a comparison to the measurement topics for year II students, which referred to the standard of content and the standard of learning. Here, the time difference is also emphasised by the researcher. Based on the researcher's comparison, the suitability of this STEAM textbook is appropriate for Year 4 students. Among the reasons for the selection is, the students should be appropriately exposed to the STEAM elements that have been brought into the development of this textbook before they cross the threshold between Year 5 and Year 6. According to the measurement topic on the annual lesson plan, the topic will last 6 weeks. The period is appropriate if this further study is carried out.

The second question is to test the validity of the content of the developed STEAM textbook. The validity of the STEAM textbook contents refers to exercises, projects, presentations, language, and the terms that are used. The study's findings

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clearly demonstrated the validity of the STEAM textbook content, as the majority of its exercises, projects, presentations, language, and terms were agreed upon by all three experts. This finding is consistent with the research of Risma Gita and Mohammad Asikin (2021, who have also reported that all the six experts have agreed on the STEAM textbook content. As a result, these findings support the argument that the STEAM textbook content is inadequate.

Concerning the third question, the usability of the STEAM textbook refers to the teacher's views on formats, content, accessibility, the feasibility of objectives, and satisfaction with the textbook. The findings show that the mean score is highly interpreted and that respondents place a high score on usability. This result cannot be compared to any other study based on a review of the literature because the same criteria are not used to evaluate usability from the teachers' perspective, which is a reliable method of comparison across studies. As a result, according to the teachers who have used it, the STEAM textbook is extremely useful.

6.4 Implication

The implications of this study refer to the effect of the development of the STEAM textbook on specific parties (education ministry, teachers and students), and the impact on the testing of the validity and usability textbook.

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6.4.1 Development STEAM Textbook

The specialisation of this textbook has beneficial implications for some parties, especially for the ministry of education, teachers, students, and society. The textbook's features included STEAM elements and the integration of character education with the local wisdom theme. The features of this textbook make for a new exposure to education, especially in the mathematics field.

This specialty opens up opportunities for the education ministry to produce other textbooks or modules that apply the STEAM element. The addition of this element of art certainly helps to produce a generation that is creatively minded in solving problems. Furthermore, this textbook also integrates character education with local wisdom themes that refer to the Kutai house. The good character that is stated in this textbook gives a new introduction and makes it easier for the teachersto apply this good character. In addition, students can get to know the history of the Kutai house through the theme of local wisdom. Thus, the theme in this book indirectly enhances the feeling of love for the motherland. This implies that the developed STEAM textbook breathes new life into the world of education. Correspondingly, the ministry of education can conduct a more in-depth study of thistextbook in line with the progress of the revolutionary industry 4.0.

The implications of the development of this textbook also provide convenience for the teachers. This is because mathematics subjects are considered to be difficult to be dealt with as interesting mini-projects which involve art elements, especially to attract students to learn while increasing their creativity in thinking. Teachers are also

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given guidance on how to implement the project using the proposed materials or tools. Project-based learning, as an approach that is used in this textbook, can provide exposure to projects that can be implemented with the use of the STEAM elements and the integration of character education that needs to be implemented, and thus provide exposure to the mathematics teacher, especially to inculcate the feeling of love for the motherland through the theme of local wisdom.

For the students, the implications of the textbook that is developed are interesting through the mini-projects that are implemented. Students are exposed to a project that contains STEAM elements that can attract them to implement each element. Students are not burdened with boring sheet exercises. In fact, through the mini-projects available, the students go through the 5E process, which is involvement, exploration, description, processing, and research, throughout the implementation of the project. This mini-project indirectly allows students to get to know history through an infused theme of local wisdom. The character of the students is also formed through the projects that are implemented; among them is to obey instructions and to work together to complete the given project.

Therefore, the implications of the textbook that is developed also shed light on features such as the elements of STEAM and the integration of character education with the theme of local wisdom. This textbook explains how to implement STEAM elements, character education, and local wisdom. Through this textbook, educators are able to produce a generation of students who possess good character and who love their motherland because they know its history.

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6.4.2 Validity of Textbook Content

The validity of the expert-tested textbook content has a positive impact on the development and evaluation of this textbook. The validity of the contents of these textbooks is carried out by experts according to their respective expertise, such as the experience in developing modules containing elements of science, technology, engineering, arts and mathematics (STEAM) and experience in mathematics. Experts evaluate the validity of the content of this textbook based on the content, exercises, projects, presentations, language, and the terms that are used. The findings that are obtained from the experts have a high impact on testing the accuracy of the content and meeting the objectives of the study.

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6.4.3 Usability of Textbook

The textbook usability survey refers to the perspective of the primary school mathematics teacher. Accordingly, usability looks at terms such as formats, content, accessibility, the feasibility of objectives, and satisfaction. Through usability, the results were well-impacted. This is because the findings are obtained from the teacher who has mastered the teaching and learning of mathematics. The views of this teacher are in line with his/her experience in the process of teaching and learning. The results of this usability evaluation test the accuracy of suitability and the objective goals that are intended to beachieved in this study.

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6.5 Recommendations

Based on this discussion, further recommendations in this study are based on the development of the STEAM textbook integrated character education with local wisdom themes for primary school students.

a) STEAM textbook

Based on the survey, the teacher hopes that further studies will further strengthen the content of this textbook for all levels of students' abilities. The teachers have also recommended that the textbook be produced in digital form to facilitate access. In addition, in light of recent technological advancements, the teacher has proposed replacing the built-in link with a QR code.

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b) Study Location

Character education is combined with a local wisdom theme that refers to the Kutai House in Pasir Salak, Perak. It is hoped that further studies can continue at various other historical sites. This is because this STEAM textbook provides a reform in the field of mathematics education that links historical elements to introduce students to the history of thecountry and instil a love for the motherland.

c) Study Methodology

In terms of study methodology, two things are suggested for the next study: the topic of the study and the method of the study. In this study, there was only one topic. It is hoped that further studies by other researchers will be able to produce STEAM

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textbooks that integrate character education with local wisdom themes for primary school students with other topics in mathematics subjects. This is because this textbook develops the students' good character from an early age of the students from an early age, assisting in honing creative thinking skills, whereby the learning approach that applies the STEAM element can be an attraction to the learning of mathematics as well as to keep pace with the current generation. On the other hand, the study method discussing the development of this textbook only tests the validity of the content and usability from the respondent's perspective. More research is expected to be conducted to test the effectiveness of this STEAM textbook. This will help to reinforce the real-world implications of the developed STEAM textbook.

6.6 Summary

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The background of this study and its problem statement describe that there is a necessity to develop a STEAM textbook that integrates character education with the theme of local wisdom as a supplementary textbook. STEAM education is one of the alternative approaches that needs to be explored by the teacher to help them implement STEAM education in Mathematics education. STEAM education also brings a good impact on the younger generation, especially primary school students. It is one of the needs for them to be involved in STEAM education from a young age. In addition, it helps them to be creative and innovative to move forward in the Industry Revolutionary 4.0.

This STEAM textbook has been tested for validity and usability in its heyday. The results can show that this textbook has a high content validity. In addition, the

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ability analysis that was obtained showed that this textbook had a high min score that referred to the teacher's view. Thus, the objectives of the study have been achieved steadfastly. However, this textbook has not been tested for its effectiveness, thus, a few recommendations for further studies have been discussed to overcome the constraints in this textbook.

Overall, it is hoped that this STEAM textbook will contribute to, and benefit the Ministry of Education and educators to apply STEAM elements in teaching. This research helps the teachers by providing an overview and the idea of STEAM education for Mathematics subjects, which is not only mere calculation but can involve an interesting learning project and to apply character education as well as give exposure to implement the local wisdom in mathematics.

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APPENDICES

APPENDIX A

A NEED ANALYSIS FORM, A VALIDITY FORM, AND A USABILITY FORM

UNIVERSITI PENDIDIKAN SULTAN IDRIS
SULTAN IDRIS EDUCATION UNIVERSITY

SOAL SELIDIK ANALISIS KEPERLUAN

PEMBINAAN BUKU TEKS STEAM INTEGRASI PENDIDIKAN KARAKTER DENGAN TEMA KEBIJAKSANAAN TEMPATAN MURID SEKOLAH RENDAH

Kajian ini adalah untuk mengenal pasti tajuk-tajuk Matematik sekolah rendah dalam bidang pembelajaran Sukatan dan Geometri Tahap 2 iaitu Tahun 4, Tahun 5 dan Tahun 6. Kajian ini akan membangunkan buku teks STEAM dengan mengintegrasikan pendidikan karakter murid sekolah rendah untuk membangunkan personaliti murid dari usia muda. Tema Kebijaksanaan Tempatan terkandung dalam buku teks bertujuan meningkatkan kecintaan murid kepada tanah air. Buku teks yang bakal dibangunkan sebagai buku teks tambahan mengandungi lima elemen STEAM yang diintegrasikan dengan pendidikan karakter dan mengandungi tema kebijaksanaan tempatan Daerah Perak Tengah (Pasir Salak). Dalam kajian ini, Rumah Kutai di Pasir Salak merupakan elemen sejarah yang akan digunakan dan salah satu keunikan rumah Kutai ialah dibina tanpa paku. Keunikan rumah Kutai yang memberi penekanan kepada reka bentuk dan struktur adalah sesuai untuk menjadi fokus utama buku teks STEAM. Berdasarkan tajuk-tajuk Matematik sekolah rendah Tahap 2, yang manakah kesesuaian untuk membantu merancang dan membangunkan buku teks yang efektif dan menarik dalam pengajaran Matematik.

Panduan:

i. Soal selidik ini hanya untuk **guru matematik sekolah rendah** sahaja.
ii. Soal selidik ini mengandungi **DUA (2)** bahagian:

Bahagian A : Demografi Responden
Bahagian B : Senarai Tajuk Matematik Sekolah Rendah

iii. Semua maklumat yang diperoleh adalah **SULIT**. Pengumpulan maklumat ini hanya bertujuan untuk laporan penyelidikan semata-mata.

Kerjasama tuan/puan, saya dahului dengan ucapan ribuan terima kasih.

Yang benar,

(FARHANA AIDA BT MOHD KHALID)
Fakulti Sains dan Matematik
Universiti Pendidikan Sultan Idris

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BAHAGIAN A: DEMOGRAFI RESPONDEN

Sila tandakan (/) pada ruangan yang berkenaan.

1. Jantina:

	Lelaki
	Perempuan

2. Bangsa:

	Melayu
	India
	Cina
	Lain-lain

3. Pengalaman Mengajar Matematik:

	1-5 Tahun
	6-10 Tahun
	11-15 Tahun
	16-20 Tahun
	Lebih 20 Tahun

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BAHAGIAN B: SENARAI TAJUK MATEMATIK SEKOLAH RENDAH

Berikut merupakan tajuk-tajuk yang terdapat dalam bidang pembelajaran Sukatan dan Geometri. **Anda dikehendaki menyatakan susunan nombor (*rank order*) tajuk Matematik Tahap 2 pembangunan buku teks STEAM yang sesuai diintegrasikan dengan pendidikan karakter dan mengandungi tema kebijaksanaan tempatan Daerah Perak Tengah (Pasir Salak).**

Sila nyatakan susunan keutamaan nombor (*rank order*) 1, 2, 3 dan 4 bagi tajuk Sukatan dan Geometri.

Panduan: Susunan nombor ini adalah mengikut keutamaan iaitu nombor 1 menunjukkan peringkat tertinggi dan nombor seterusnya menunjukkan keutamaan paling rendah.

SUKATAN DAN GEOMETRI

No.	Tajuk-tajuk Matematik	Susunan Nombor (*Rank Order*)
1.	**Masa dan Waktu** ▪ Sistem 12 jam dan sistem 24 jam ▪ Tempoh masa ▪ Anggaran masa ▪ Perkaitan dalam masa ▪ Operasi asas masa ▪ Penyelesaian melibatkan masalah	
2.	**Ukuran dan Sukatan** ▪ Panjang: milimeter, kilometer, sentimeter, meter ▪ Jisim: kilogram, gram ▪ Isi padu cecair: mililiter, liter ▪ Penyelesaian masalah	
3.	**Ruang** ▪ Sudut ▪ Garis selari dan garis serenjang ▪ Perimeter dan luas ▪ Isi padu pepejal ▪ Poligon sekata ▪ Bentuk 2 dimensi ▪ Bentuk 3 dimensi ▪ Penyelesaian masalah	
4.	**Panjang, Jisim dan Isi Padu Cecair** • Penyelesaian masalah melibatkan panjang, jisim, isi padu cecair.	

Soal selidik ini diadaptasi daripada Sazilah Sam (2017)

-SOALAN TAMAT-

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BORANG PENGAKUAN MENYEMAK INSTRUMEN

Dengan ini, saya telah menyemak instrumen yang telah disediakan oleh penyelidik. Saya dapati instrumen ini:

1–Sangat tidak setuju
2–Tidak setuju
3–Setuju
4–Sangat setuju

Arahan: Sila tandakan (/) pada ruangan yang berkenaan.

No.	Perkara yang dinilai	Tahap Persetujuan			
		1	2	3	4
1.	Instrumen yang dibina bersesuaian dengan tajuk.				
2.	Bahasa yang digunakan mudah difahami.				
3.	Saiz tulisan adalah sesuai dan mudah dibaca.				
4.	Arahan yang diberikan adalah jelas.				
5.	Bebas daripada kesalahan ejaan.				
6.	Objektif yang dinyatakan adalah jelas.				

Komen/ Cadangan lain tentang keseluruhan instrumen:

_____

_____

_____

_____

Nama : .....

Tandatangan : .....

Jawatan : .....

Cop Jawatan : .....

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PEMBINAAN BUKU TEKS STEAM INTEGRASI PENDIDIKAN KARAKTER DENGAN TEMA KEBIJAKSANAAN TEMPATAN MURID SEKOLAH RENDAH

Kajian ini bertujuan untuk mendapatkan kesahan muka dan kesahan kandungan bagi buku teks daripada pakar mengenai instrumen kajian. Kajian ini telah membangunkan buku teks STEAM dengan mengintegrasikan pendidikan karakter murid sekolah rendah untuk membangunkan personaliti murid dari usia muda. Tema Kebijaksanaan Tempatan terkandung dalam buku teks bertujuan meningkatkan kecintaan murid kepada tanah air. Buku teks ini dibangunkan sebagai buku teks tambahan yang mengandungi lima elemen STEAM dengan mengintegrasikan pendidikan karakter dan merangkumi tema kebijaksanaan tempatan Daerah Perak Tengah (Pasir Salak). Dalam kajian ini, Rumah Kutai di Pasir Salak merupakan elemen sejarah yang digunakan dan salah satu keunikan rumah Kutai ialah dibina tanpa paku. Keunikan rumah Kutai yang memberi penekanan kepada reka bentuk dan struktur adalah sesuai untuk menjadi fokus utama buku teks STEAM. Melalui maklum balas yang diberikan ini akan membantu penyelidik untuk menghasilkan buku teks yang lebih baik.

Panduan

i. Soal selidik ini mengandungi **DUA (2)** bahagian

Bahagian A : Kesahan Muka
Bahagian B : Kesahan Kandungan Buku Teks

ii. Semua maklumat yang diperolehi adalah **SULIT**. Pengumpulan maklumat ini hanya bertujuan untuk laporan penyelidikan semata-mata.

Kerjasama Prof. /Dr./Tuan, saya dahului dengan ucapan ribuan terima kasih.

Yang benar,

(FARHANA AIDA BT MOHD KHALID)
Fakulti Sains Dan Matematik
Universiti Pendidikan Sultan Idris

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BAHAGIAN A:

KESAHAN MUKA BUKU TEKS STEAM INTEGRASI PENDIDIKAN KARAKTER DENGAN TEMA KEBIJAKSANAAN TEMPATAN MURID SEKOLAH RENDAH

Arahan:

Berikut adalah beberapa pernyataan berkaitan dengan kesahan muka buku teks untuk dinilai. Bagi setiap soalan yang dikemukakan, anda diminta menyatakan jawapan anda dengan membulatkan mana-mana satu daripada pilihan yang berkenaan berdasarkan panduan yang disediakan seperti berikut:

1 –Sangat tidak setuju
2 –Tidak setuju
3 –Kurang setuju
4 –Setuju
5 –Sangat setuju

No.	Pernyataan	Skala					Komen/ Cadangan
		1	2	3	4	5	
KESAHAN MUKA							
1.	Muka depan buku teks menarik.	1	2	3	4	5	
2.	Rajah dalam buku teks senang dirujuk.	1	2	3	4	5	
3.	Bahasa yang digunakan mudah difahami.	1	2	3	4	5	
4.	Saiz tulisan sesuai dan mudah dibaca.	1	2	3	4	5	
5.	Susunan teks dalam buku teks tersebut senang diikuti.	1	2	3	4	5	
6.	Objektif buku teks yang dinyatakan adalah jelas.	1	2	3	4	5	
7.	Arahan dalam buku teks adalah jelas.	1	2	3	4	5	

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BAHAGIAN B:

KESAHAN KANDUNGAN BUKU TEKS STEAM INTEGRASI PENDIDIKAN KARAKTER DENGAN TEMA KEBIJAKSANAAN TEMPATAN MURID SEKOLAH RENDAH.

Arahan:

Berikut adalah beberapa pernyataan berkaitan dengan kesahan kandungan buku teks untuk dinilai. Setelah meneliti buku teks yang dibangunkan oleh penyelidik, sila bulatkan jawapan berdasarkan skala berikut.

1 – Sangat tidak setuju
2 – Tidak setuju
3 – Kurang setuju
4 – Setuju
5 – Sangat setuju

No.	Pernyataan	Skala					Komen/ Cadangan
		1	2	3	4	5	
A. ISI KANDUNGAN							
1.	Menepati aspek kandungan dalam DSKP.	1	2	3	4	5	
2.	Mengandungi maklumat yang mencukupi sebagai sumber pengajaran dan pembelajaran.	1	2	3	4	5	
3.	Mengandungi maklumat terkini yang bersifat semasa.	1	2	3	4	5	
4.	Mempunyai maklumat yang sesuai dengan tahap kebolehan murid.	1	2	3	4	5	
5.	Mempunyai tahap keterbacaan (readability) sesuai dengan peringkat umur murid.	1	2	3	4	5	
6.	Mempunyai maklumat fakta yang tepat.	1	2	3	4	5	
B. LATIHAN							
7.	Mempunyai latihan pengukuhan dan pengayaan yang mencukupi.	1	2	3	4	5	
8.	Mempunyai latihan dan soalan yang bercapah/berbeza/menyimpang.	1	2	3	4	5	
9.	Mempunyai latihan yang sesuai dengan aras kebolehan murid (Tahun 4).	1	2	3	4	5	

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10.	Mempunyai latihan yang boleh membantu meningkatkan kemahiran berfikir murid.	1	2	3	4	5	
11.	Menyediakan latihan yang sesuai dengan tajuk pembelajaran.	1	2	3	4	5	
C. PROJEK							
12.	Menyediakan projek yang mencukupi untuk pengajaran.	1	2	3	4	5	
13.	Menyediakan projek yang menarik.	1	2	3	4	5	
14.	Sesuai untuk dilaksanakan di dalam bilik darjah/kelas.	1	2	3	4	5	
15.	Membantu meningkatkan kemahiran pembelajaran abad ke-21.	1	2	3	4	5	
16.	Mempunyai cadangan projek yang mampu merangsang minda murid.	1	2	3	4	5	
17.	Mempunyai arahan projek yang mudah untuk difahami.	1	2	3	4	5	
D. PERSEMBAHAN							
18.	Mempunyai bahagian-bahagian yang disusun mengikut urutan yang wajar.	1	2	3	4	5	
19.	Menggunakan ilustrasi, rajah dan jadual (grafik) yang sesuai dan menarik.	1	2	3	4	5	
20.	Menggunakan tipografi (jenis huruf dan saiz huruf) yang jelas, sesuai dan menarik.	1	2	3	4	5	
21.	Mempunyai reka bentuk kulit buku yang menarik.	1	2	3	4	5	
22.	Menggunakan warna yang sesuai.	1	2	3	4	5	
E. BAHASA DAN ISTILAH							
23.	Menggunakan bahasa yang baku dari segi ejaan dan tatabahasa.	1	2	3	4	5	
24.	Menggunakan bahasa dan istilah yang sesuai dengan tahap kemampuan murid.	1	2	3	4	5	
25.	Menggunakan laras bahasa (istilah atau gaya) yang sesuai dengan bidang Pendidikan Matematik.	1	2	3	4	5	
26.	Menggunakan bahasa dan istilah yang mudah difahami oleh murid.	1	2	3	4	5	
27.	Menggunakan gaya bahasa yang menarik murid untuk membaca.	1	2	3	4	5	

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Ulasan keseluruhan penilai mengenai buku teks:

_____
_____
_____
_____
_____

Cadangan penilai untuk penambahbaikan buku teks:

_____
_____
_____
_____
_____

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Soal selidik ini diadaptasi daripada Siti Nasuha Singki (2021) dan Siti Rohaida Hashim (2017)

-SOAL SELIDIK TAMAT-

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BORANG PENGAKUAN MENYEMAK INSTRUMEN

Dengan ini, saya telah menyemak instrumen yang telah disediakan oleh penyelidik. Saya dapati instrumen ini:

1 – Sangat tidak setuju
2 – Tidak setuju
3 – Setuju
4 – Sangat setuju

Arahan: Sila tandakan (/) pada ruangan yang berkenaan.

No.	Pekara yang dinilai	Tahap Persetujuan			
		1	2	3	4
1.	Format instrumen kajian adalah bersesuaian.				
2.	Bahasa yang digunakan mudah difahami.				
3.	Saiz tulisan adalah sesuai dan mudah dibaca.				
4.	Arahan yang diberikan adalah jelas.				
5.	Bebas daripada kesalahan ejaan.				
6.	Objektif yang dinyatakan adalah jelas.				

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Komen/ Cadangan lain tentang keseluruhan instrumen:

_____

_____

_____

Nama : .....

Tandatangan : .....

Jawatan : .....

Cop Jawatan : .....

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SOAL SELIDIK KEBOLEHGUNAAN BUKU TEKS

PEMBINAAN BUKU TEKS STEAM INTEGRASI PENDIDIKAN KARAKTER DENGAN TEMA KEBIJAKSANAAN TEMPATAN MURID SEKOLAH RENDAH

Kajian ini bertujuan untuk mendapatkan maklum balas tentang kebolehgunaan buku teks yang telah dibangunkan melalui perspektif guru matematik sekolah rendah. Kajian ini telah membangunkan buku teks STEAM dengan mengintegrasikan pendidikan karakter murid sekolah rendah untuk membangunkan personaliti murid dari usia muda. Tema Kebijaksanaan Tempatan terkandung dalam buku teks bertujuan meningkatkan kecintaan murid kepada tanah air. Buku teks ini dibangunkan sebagai buku teks tambahan yang mengandungi lima elemen STEAM dengan mengintegrasikan pendidikan karakter dan merangkumi tema kebijaksanaan tempatan Daerah Perak Tengah (Pasir Salak). Dalam kajian ini, Rumah Kutai di Pasir Salak merupakan elemen sejarah yang digunakan dan salah satu keunikan rumah Kutai ialah dibina tanpa paku. Keunikan rumah Kutai yang memberi penekanan kepada reka bentuk dan struktur adalah sesuai untuk menjadi fokus utama buku teks STEAM. Melalui maklum balas yang diberikan ini akan membantu penyelidik untk menghasilkan buku teks yang lebih baik.

Panduan:

i. Soal selidik ini mengandungi **DUA (2)** bahagian:

Bahagian A : Demografi Responden
Bahagian B : Senarai Tajuk Matematik Sekolah Rendah

ii Semua maklumat yang diperolehi adalah **SULIT**. Pengumpulan maklumat ini hanya bertujuan untuk laporan penyelidikan semata-mata

Kerjasama tuan/puan, saya dahului dengan ucapan ribuan terima kasih.

Yang benar,

(FARHANA AIDA BT MOHD KHALID)
Fakulti Sains dan Matematik
Universiti Pendidikan Sultan Idris

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BAHAGIAN A: DEMOGRAFI RESPONDEN

Sila tandakan (/) pada ruangan yang berkenaan.

1. Jantina:

	Lelaki
	Perempuan

2. Bangsa:

	Melayu
	India
	Cina
	Lain-lain

3. Pengalaman Mengajar Matematik:

	1-5 Tahun
	6-10 Tahun
	11-15 Tahun
	16-20 Tahun
	Lebih 20 Tahun

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BAHAGIAN B: KEBOLEHGUNAAN BUKU TEKS

Arahan: Berikut adalah beberapa pernyataan berkaitan dengan kebolehgunaan buku teks untuk dinilai. Setelah meneliti buku teks yang dibangunkan oleh penyelidik, sila bulatkan jawapan berdasarkan skala berikut.

1 – Sangat tidak setuju
2 – Tidak setuju
3 – Kurang setuju
4 – Setuju
5 – Sangat setuju

No.	Penyataan item	Skala					Komen/ Cadangan
A. Format		STS	TS	KS	S	SS	
1.	Saiz buku teks adalah sesuai dan senang dibawa.	1	2	3	4	5	
2.	Susunan sub buku teks adalah sesuai	1	2	3	4	5	
3.	Saiz tulisan yang digunakan adalah sesuai	1	2	3	4	5	
4.	Susun atur bagi semua sub buku teks adalah seragam.						
5.	Foto diletakkan pada tempat yang sesuai.	1	2	3	4	5	
6.	Gambar rajah diletakkan pada tempat yang sesuai.	1	2	3	4	5	
7.	Arahan dalam buku teks adalah jelas.	1	2	3	4	5	
8.	Lampiran dalam buku teks senang dirujuk.	1	2	3	4	5	
9.	Projek yang disediakan adalah sesuai.	1	2	3	4	5	

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	B. Isi kandungan	STS	TS	KS	S	SS	
10.	Saya memahami objektif buku teks dengan jelas.	1	2	3	4	5	
11.	Saya mudah memahami arahan yang terdapat dalam buku teks.	1	2	3	4	5	
12.	Saya dapat menggunakan buku teks dengan senang.	1	2	3	4	5	
13.	Saya memahami idea yang terdapat dalam buku teks.	1	2	3	4	5	
14.	Idea yang terdapat dalam buku teks menarik.	1	2	3	4	5	
15.	Projek pengajaran yang disediakan adalah menyeronokkan.	1	2	3	4	5	
16.	Projek yang disediakan dapat diikuti dengan baik oleh murid.	1	2	3	4	5	
17.	Latihan yang diberikan adalah relevan dengan kehidupan seharian murid.	1	2	3	4	5	
18.	Projek yang disediakan membantu murid menguasai kemahiran matematik yang diajar.	1	2	3	4	5	
19.	Saya dapat melakukan semua perkara yang diarahkan dalam buku teks.	1	2	3	4	5	
20.	Perkataan yang digunakan dalam buku teks mudah difahami.	1	2	3	4	5	
21.	Gaya penulisan buku teks sesuai.	1	2	3	4	5	

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	C. Kebolehcapaian objektif	STS	TS	KS	S	SS	
22.	Projek pengajaran membantu mencapai objektif yang ditetapkan.	1	2	3	4	5	
23.	Murid dapat melaksanakan tugasan yang diberi.	1	2	3	4	5	
24.	Latihan yang diberi dapat menguji kefahaman murid tentang isi pelajaran.	1	2	3	4	5	
25.	Tugasan yang diberi dapat meningkatkan kefahaman murid tentang isi pelajaran.	1	2	3	4	5	
	D. Kebolehlaksaan proses pengajaran dan pembelajaran	**STS**	**TS**	**KS**	**S**	**SS**	
26.	Masa yang dicadangkan bagi pengajaran setiap sub buku teks adalah sesuai.	1	2	3	4	5	
27.	Masa yang dicadangkan bagi projek murid adalah mencukupi.	1	2	3	4	5	
28.	Buku teks ini memudahkan saya mengajar topik ukuran dan sukatan.	1	2	3	4	5	
29.	Projek pengajaran mudah disusun mengikut urutan dari mudah kepada sukar.	1	2	3	4	5	
30.	Projek pengajaran mudah untuk dilaksanakan.	1	2	3	4	5	
31.	Bahan bantu mengajar yang dicadangkan adalah sesuai.	1	2	3	4	5	
32.	Bahan bantu mengajar yang dicadangkan membantu mencapai objektif pelajaran.	1	2	3	4	5	

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33.	Latihan pengukuhan membantu murid memahami pelajaran dengan baik.	1	2	3	4	5	
34.	Cadangan jawapan bagi latihan pengukuhan dapat membantu guru.	1	2	3	4	5	
E. Kepuasan		**STS**	**TS**	**KS**	**S**	**SS**	
35.	Buku teks ini mudah digunakan.	1	2	3	4	5	
36.	Buku teks ini boleh menjimatkan masa persediaan mengajar saya.	1	2	3	4	5	
37.	Buku teks ini membantu saya mengajar dengan lebih berkesan.	1	2	3	4	5	
38.	Projek yang dicadangkan dapat menarik minat murid untuk belajar.	1	2	3	4	5	
39.	Saya mengharapkan terdapat buku teks seperti ini bagi topik lain.	1	2	3	4	5	

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Soal selidik ini diadaptasi daripada Ismail Sulaiman (2018).

-SOALAN TAMAT-

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BORANG PENGAKUAN MENYEMAK INSTRUMEN

Dengan ini, saya telah menyemak instrumen yang telah disediakan oleh penyelidik. Saya dapati instrumen ini:

1 – Sangat tidak setuju
2 – Tidak setuju
3 – Setuju
4 – Sangat setuju

Arahan: Sila tandakan (/) pada ruangan yang berkenaan.

No.	Pekara yang dinilai	Tahap Persetujuan			
		1	2	3	4
1.	Instrumen yang dibina bersesuaian dengan tajuk kajian.				
2.	Susunan item dan tret menepati konstruk.				
3.	Kesesuaian dari segi aspek kejelasan maksud dan huraian setiap kriteria.				
4.	Kesesuaian instrumen dan kebolehlaksanaan.				

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Komen/ Cadangan lain tentang keseluruhan instrumen:

_____

_____

_____

_____

Nama : .....

Tandatangan : .....

Jawatan : .....

Cop Jawatan : .....

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APPENDIX B

THE VALIDITY DECLARATION FORM OF INSTRUMENTS

UNIVERSITI PENDIDIKAN SULTAN IDRIS
SULTAN IDRIS EDUCATION UNIVERSITY

35900 TANJONG MALIM
PERAK DARUL RIDZUAN, MALAYSIA

TEL: +605 450 6000 / +60 6661
FAKS: +605 458 3775
EMEL: ips@fsmt.upsi.edu.my

INSTITUT PENGAJIAN SISWAZAH

Ho Ruj : UPSI/IPS-3/475 5 Jilid 36
Tarikh : 22 Januari 2022
19 Jamadilawwal 1443H

Dr. Muhammad Sofwan Mahmud
Universiti Kebangsaan Malaysia
43600 UKM, Bangi, Selangor Darul Ehsan

YBhg.Prof./Prof.Madya/Dr./Tn./Pn.,

PELANTIKAN SEBAGAI PANEL PAKAR PENGESAHAN INSTRUMEN KAJIAN.

Dengan segala hormatnya perkara di atas adalah dirujuk.

2. Adalah dimaklumkan bahawa pelajar seperti butiran di bawah merupakan pelajar Program Pengajian Siswazah Sarjana Pendidikan (Matematik), Universiti Pendidikan Sultan Idris (UPSI):

Nama	: **Farhana Aida Binti Mohd Khalid**
No. Matrik	**M20192001394**
Fakulti	: **Fakulti Sains dan Matematik**
Tajuk Kajian	***Development of STEAM Textbook Integrated Character Education with Local Wisdom Themes for Primary School Students.***

3. Sehubungan itu, saya ingin memohon khidmat kepakaran YBhg.Prof./Prof.Madya/Dr./Tn./Pn. dalam membantu penyelidikan beliau supaya ia lebih signifikan dan relevan. Bersama-sama ini disertakan dokumen berkaitan untuk tindakan dan perhatian YBhg.Prof./Prof.Madya/Dr./Tn./Pn. selanjutnya. Sebarang pertanyaan atau kesulitan boleh menghubungi penyelidik di talian **01121129385** atau alamat emel ke **farhanakhalidzain@yahoo.com.my.**

4. Kerjasama dan kesudian pihak YBhg.Prof./Prof.Madya/Dr./Tn./Pn. berhubung perkara ini amatlah dihargai dan didahului dengan ucapan ribuan terima kasih.

Sekian.

"WAWASAN KEMAKMURAN BERSAMA 2030"
"BERKHIDMAT UNTUK NEGARA"
'UNIVERSITI NO.1 PENDIDIKAN'

Saya yang menjalankan amanah,

(PROFESSOR DR. RAJA NOR SAFINAS BINTI RAJA HARUN)
Dekan, Institut Pengajian Siswazah
05-4505487
sk Fail

05-45068 ptbupsi

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BORANG PENGAKUAN MENYEMAK INSTRUMEN

Dengan ini, saya telah menyemak instrumen yang telah disediakan oleh penyelidik. Saya dapati instrumen ini:

1 – Sangat tidak setuju
2 – Tidak setuju
3 – Setuju
4 – Sangat setuju

Arahan: Sila tandakan (/) pada ruangan yang berkenaan.

No.	~~Pekara~~Perkara yang dinilai	Tahap Persetujuan			
		1	2	3	4
1.	Instrumen yang dibina bersesuaian dengan tajuk.				/
2.	Bahasa yang digunakan mudah difahami.				/
3.	Saiz tulisan adalah sesuai dan mudah dibaca.				/
4.	Arahan yang diberikan adalah jelas.				/
5.	Bebas daripada kesalahan ejaan.			/	
6.	Objektif yang dinyatakan adalah jelas.				/

Komen/ Cadangan lain tentang keseluruhan instrumen:

Tiada sebarang komen. Selamat maju jaya.

Nama : Dr Muhammad Sofwan Mahmud

Tandatangan :

Jawatan : Pensyarah Kanan

Cop Jawatan :

DR. MUHAMMAD SOFWAN MAHMUD
Pensyarah
Pusat Inovasi Pembelajaran & Pengajaran
Fakulti Pendidikan
Universiti Kebangsaan Malaysia

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BORANG PENGAKUAN MENYEMAK INSTRUMEN

Dengan ini, saya telah menyemak instrumen yang telah disediakan oleh penyelidik. Saya dapati instrumen ini:

1 – Sangat tidak setuju
2 – Tidak setuju
3 – Setuju
4 – Sangat setuju

Arahan: Sila tandakan (/) pada ruangan yang berkenaan.

No.	Perkara yang dinilai	Tahap Persetujuan			
		1	2	3	4
1.	Format instrumen kajian adalah bersesuaian.				/
2.	Bahasa yang digunakan mudah difahami.				/
3.	Saiz tulisan adalah sesuai dan mudah dibaca.				/
4.	Arahan yang diberikan adalah jelas.				/
5.	Bebas daripada kesalahan ejaan.				/
6.	Objektif yang dinyatakan adalah jelas.				/

Komen/ Cadangan lain tentang keseluruhan instrumen:

_____

_____

_____

_____

Nama : Dr Muhammad Sofwan Mahmud

Tandatangan :

Jawatan : Penyarah Kanan

Cop Jawatan :

DR. MUHAMMAD SOFWAN MAHMUD
Penyarah
Pusat Inovasi Pembelajaran & Pengajaran
Fakulti Pendidikan
Universiti Kebangsaan Malaysia

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BORANG PENGAKUAN MENYEMAK INSTRUMEN

Dengan ini, saya telah menyemak instrumen yang telah disediakan oleh penyelidik. Saya dapati instrumen ini:

1 –Sangat tidak setuju
2–Tidak setuju
3–Setuju
4–Sangat setuju

Arahan: Sila tandakan (/) pada ruangan yang berkenaan.

No.	Pekara yang dinilai	Tahap Persetujuan			
		1	2	3	4
1.	Format instrumen kajian adalah bersesuaian.				/
2.	Bahasa yang digunakan mudah difahami.				/
3.	Saiz tulisan adalah sesuai dan mudah dibaca.				/
4.	Arahan yang diberikan adalah jelas.				/
5.	Bebas daripada kesalahan ejaan.			/	
6.	Objektif yang dinyatakan adalah jelas.				/

Komen/ Cadangan lain tentang keseluruhan instrumen:

-

Nama : Dr. Muhammad Sofwan mahmod

Tandatangan :

Jawatan : Pensyarah Kanan

Cop Jawatan :

DR. MUHAMMAD SOFWAN MAHMUD
Pensyarah
Pusat Inovasi Pembelajaran & Pengajaran
Fakulti Pendidikan
Universiti Kebangsaan Malaysia

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UNIVERSITI PENDIDIKAN SULTAN IDRIS
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PERAK DARUL RIDZUAN MALAYSIA
TEL: +605-450 6090 / 450 6091
FAKS: +605-458 1776
EMEL: ips@upsi.edu.my

INSTITUT PENGAJIAN SISWAZAH

Rujukan Kami: UPSI/IPS-3/475 5 Jld.(4)
Tarikh: 6 Disember 2021
14 Jamadil Awal 1443H

Encik Afan Akhbar Mustam
Pensyarah
IPG Kampus Pendidikan Teknik
Kompleks Pendidikan Nilai
71760 Bandar Enstek, Negeri Sembilan

YBhg.Prof./Prof.Madya/Dr./Tn./Pn.,

PELANTIKAN SEBAGAI PAKAR PENILAI PENGESAHAN INSTRUMEN KAJIAN.

Dengan segala hormatnya perkara di atas adalah dirujuk.

2. Adalah dimaklumkan bahawa pelajar seperti butiran di bawah merupakan pelajar Program Pengajian Siswazah Sarjana Pendidikan (Matematik), Universiti Pendidikan Sultan Idris (UPSI):

Nama	**Farhana Aida Binti Mohd Khalid**
No. Matrik	**M20192001394**
Fakulti	: **Fakulti Sains dan Matematik**
Tajuk Kajian	***Development of STEAM Textbook Integrated Character Education with Local Wisdom Themes for Primary School Students..***

3. Sehubungan itu, saya ingin memohon khidmat kepakaran YBhg.Prof./Prof.Madya/Dr./Tn./Pn. dalam membantu penyelidikan beliau supaya ia lebih signifikan dan relevan. Bersama-sama ini disertakan dokumen berkaitan untuk tindakan dan perhatian YBhg.Prof./Prof.Madya/Dr./Tn./Pn. selanjutnya. Sebarang pertanyaan atau kesulitan boleh menghubungi penyelidik di talian **01121129385** atau alamat emel ke **farhanakhalidzain@yahoo.com.my.**

4. Kerjasama dan kesudian pihak YBhg.Prof./Prof.Madya/Dr./Tn./Pn. berhubung perkara ini amatlah dihargai dan didahului dengan ucapan ribuan terima kasih.

Sekian.

"WAWASAN KEMAKMURAN BERSAMA 2030"
"BERKHIDMAT UNTUK NEGARA"
'UNIVERSITI NO.1 PENDIDIKAN'

Saya yang menjalankan amanah,

(PROFESOR DR. RAJA NOR SAFINAS BINTI RAJA HARUN)
Dekan, Institut Pengajian Siswazah
05-4505487
sk Fol

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1 – Sangat tidak setuju
2 – Tidak setuju
3 – Setuju
4 – Sangat setuju

Arahan: Sila tandakan (/) pada ruangan yang berkenaan.

No.	Perkara yang dinilai	Tahap Persetujuan			
		1	2	3	4
1.	Instrumen yang dibina bersesuaian dengan tajuk.				✓
2.	Bahasa yang digunakan mudah difahami.				✓
3.	Saiz tulisan adalah sesuai dan mudah dibaca.				✓
4.	Arahan yang diberikan adalah jelas.				✓
5.	Bebas daripada kesalahan ejaan.				✓
6.	Objektif yang dinyatakan adalah jelas.				✓

Komen/ Cadangan lain tentang keseluruhan instrumen:

INSTRUMENT YANG DIBINA BERSESUAIAN

Nama: AFIAN AKHBAR BIN MUSTAM

Tandatangan: .....

Jawatan: .....

AFIAN AKHBAR BIN MUSTAM
KETUA JABATAN MATEMATIK
IPG KAMPUS PENDIDIKAN TEKNIK
KOMPLEKS PENDIDIKAN NILAI
71760 BANDAR ENSTEK NILAI
NEGERI SEMBILAN

Cop Jawatan: .....

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

BORANG PENGAKUAN MENYEMAK INSTRUMEN

Dengan ini, saya telah menyemak instrumen yang telah disediakan oleh penyelidik. Saya dapati instrumen ini:

1 – Sangat tidak setuju
2 – Tidak setuju
3 – Setuju
4 – Sangat setuju

Arahan: Sila tandakan (/) pada ruangan yang berkenaan.

No.	Perkara yang dinilai	Tahap Persetujuan			
		1	2	3	4
1.	Format instrumen kajian adalah bersesuaian.				✓
2.	Bahasa yang digunakan mudah difahami.				✓
3.	Saiz tulisan adalah sesuai dan mudah dibaca.				✓
4.	Arahan yang diberikan adalah jelas.				✓
5.	Bebas daripada kesalahan ejaan.				✓
6.	Objektif yang dinyatakan adalah jelas.				✓

Komen/ Cadangan lain tentang keseluruhan instrumen:

Istrumen yang dibina bersesuaian dan menguji apa yang ingin diuji

Nama: AFIAN AKHBAR BIN MUSTAM

Tandatangan: .....

Jawatan: .....

AFIAN AKHBAR BIN MUSTAM
KETUA JABATAN MATEMATIK
IPG KAMPUS PENDIDIKAN TEKNIK
KOMPLEKS PENDIDIKAN NILAI
71760 BANDAR ENSTEK NILAI
NEGERI SEMBILAN

Cop Jawatan: .....

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

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BORANG PENGAKUAN MENYEMAK INSTRUMEN

Dengan ini, saya telah menyemak instrumen yang telah disediakan oleh penyelidik. Saya dapati instrumen ini:

1 – Sangat tidak setuju
2 – Tidak setuju
3 – Setuju
4 – Sangat setuju

Arahan: Sila tandakan (/) pada ruangan yang berkenaan.

No.	Perkara yang dinilai	Tahap Persetujuan			
		1	2	3	4
1.	Format instrumen kajian adalah bersesuaian.				✓
2.	Bahasa yang digunakan mudah difahami.				✓
3.	Saiz tulisan adalah sesuai dan mudah dibaca.				✓
4.	Arahan yang diberikan adalah jelas.				✓
5.	Bebas daripada kesalahan ejaan.				✓
6.	Objektif yang dinyatakan adalah jelas.				✓

Komen/ Cadangan lain tentang keseluruhan instrumen:

BAHASA YANG DIGUNAPAKAI SESUAI DAN MEMENUHI STANDARD AKADEMIK

Nama: AFIAN AKHBAR BIN MUSTAM

Tandatangan:

Jawatan:

AFIAN AKHBAR BIN MUSTAM
KETUA JABATAN MATEMATIK
IPG KAMPUS PENDIDIKAN TEKNIK
KOMPLEKS PENDIDIKAN NILAI
71760 BANDAR ENSTEK NILAI
NEGERI SEMBILAN

Cop Jawatan:

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

APPENDIX C

EDUCATION POLICY PLANNING AND RESEARCH DIVISION (EPRD) APPROVAL LETTER

KEMENTERIAN PENDIDIKAN MALAYSIA
BAHAGIAN PERANCANGAN DAN PENYELIDIKAN DASAR PENDIDIKAN
ARAS 1-4, BLOK E3
KOMPLEKS KERAJAAN PARCEL E
PUSAT PENTADBIRAN KERAJAAN PERSEKUTUAN
62604 PUTRAJAYA

TEL : 03-8884 6021
FAKS : 03-8884 6579

Ruj. Kami : KPM.600-3/2/3-eras(12168)
Tarikh : 20 Mac 2022

FARHANA AIDA BT MOHD KHALID
NO. KP : 930812105184

NO 39 JALAN KEMBOJA 4B/3,
SEKSYEN BS 8, BUKIT SENTOSA 3 48300 RAWANG
SELANGOR

Tuan,

KELULUSAN BERSYARAT UNTUK MENJALANKAN KAJIAN :
DEVELOPMENT OF STEAM TEXTBOOK INTEGRATED CHARACTER EDUCATION WITH LOCAL WISDOM THEMES FOR PRIMARY SCHOOL STUDENTS

Perkara di atas adalah dirujuk.

2 Sukacita dimaklumkan bahawa permohonan tuan untuk menjalankan kajian seperti di bawah telah diluluskan dengan syarat :

" PENGUTIPAN DATA TERMASUK SECARA DALAM TALIAN (CONTOH: GOOGLE FORM) PERLU MENDAPATKAN KEBENARAN PENGARAH JPN DAN PERTIMBANGAN PENTADBIR SEKOLAH. "

3. Kelulusan adalah berdasarkan kepada kertas cadangan penyelidikan dan instrumen kajian yang dikemukakan oleh tuan kepada bahagian ini. Walau bagaimanapun kelulusan ini bergantung kepada kebenaran Jabatan Pendidikan Negeri dan Pengetua / Guru Besar yang berkenaan.

4 Surat kelulusan ini sah digunakan bermula dari **21 Mac 2022** hingga **12 September 2022**

5. Tuan dikehendaki menyerahkan senaskhah laporan akhir kajian dalam bentuk hardcopy bersama salinan softcopy berformat pdf dalam CD kepada Bahagian ini.Tuan juga dinasihatkan supaya mendapat kebenaran terlebih dahulu daripada Bahagian ini sekiranya sebahagian atau sepenuhnya dapatan kajian tersebut hendak diterbitkan di mana-mana forum, seminar atau diumumkan kepada media massa.

Sekian untuk maklumat dan tindakan tuan selanjutnya. Terima kasih

"BERKHIDMAT UNTUK NEGARA"

Saya yang menjalankan amanah,

Ketua Pengarah Kanan
Sektor Penyelidikan dan Penilaian Dasar
b.p. Pengarah
Bahagian Perancangan dan Penyelidikan Dasar Pendidikan
Kementerian Pendidikan Malaysia

salinan kepada:-

JABATAN PENDIDIKAN PERAK

"SURAT INI DIJANA OLEH KOMPUTER DAN TIADA TANDATANGAN DIPERLUKAN."

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

APPENDIX D

PERAK EDUCATION DEPARTMENT PERMISSION LETTER

KEMENTERIAN PENDIDIKAN MALAYSIA
Jabatan Pendidikan Negeri Perak
Jalan Tun Abdul Razak
30640 Ipoh, Perak Darul Ridzuan

Tel : 605 501 3000
Faks : 605 527 7277
Laman Web : http://jpnperak.moe.gov.my

"PENDIDIKAN BERKUALITI, SEKOLAH UNGGUL, MURID HOLISTIK"

Ruj. Kami : JPNPk.SPS.USJK.600-1 Jld.4(16)
Tarikh : 8 April 2022

Farhana Aida binti Mohd Khalid
No.39, Jalan Kemboja 4B/3
Seksyen BS8, Bukit Sentosa 3
48300 Rawang, Selangor

Tuan,

KELULUSAN UNTUK MENJALANKAN KAJIAN DI SEKOLAH-SEKOLAH DI NEGERI PERAK DI BAWAH JABATAN PENDIDIKAN NEGERI PERAK

Dengan segala hormatnya, perkara di atas adalah dirujuk dan surat tuan yang diterima pada 12 April 2022 adalah berkaitan.

2. Sehubungan dengan itu, dimaklumkan bahawa Jabatan Pendidikan Negeri Perak tiada halangan untuk membenarkan pihak tuan menjalankan kajian yang bertajuk ***"DEVELOPMENT OF STEAM TEXTBOOK INTEGRATED CHARACTER EDUCATION WITH LOCAL WISDOM THEMES FOR PRIMARY SCHOOL STUDENTS"*** seperti dinyatakan dalam surat tuan dengan syarat-syarat berikut:

2.1 Pihak tuan perlu mendapatkan kebenaran terlebih dahulu daripada Pegawai Pendidikan Daerah dan Pengetua / Guru Besar sekolah berkenaan untuk menggunakan sampel kajian;

2.2 Kajian yang dijalankan hendaklah tidak mengganggu proses pengajaran dan pembelajaran yang telah ditetapkan oleh pihak sekolah;

2.3 Pihak tuan bertanggungjawab menjaga keselamatan dan kebajikan murid dan guru yang terlibat dalam kajian ini;

2.4 Murid, guru dan warga sekolah tidak boleh dipaksa terlibat dalam kajian ini;

2.5 Pihak tuan hendaklah bertanggungjawab menanggung semua kos kajian;

2.6 Pihak tuan dipohon agar menghantar satu (1) salinan laporan kajian dalam tempoh 30 hari ke jabatan ini selepas kajian tersebut dilaksanakan;

2.7 Tiada sebarang implikasi kewangan kepada Jabatan Pendidikan Negeri Perak, Pejabat Pendidikan Daerah dan pihak sekolah;

/2

We Del/ver

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05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

KELULUSAN UNTUK MENJALANKAN KAJIAN DI SEKOLAH-SEKOLAH DI NEGERI PERAK DI BAWAH JABATAN PENDIDIKAN NEGERI PERAK

Ruj. Kami : JPNPk.SPS.USJK.600-1 Jld.4(16)
Tarikh : 13 April 2022

2.8 Pengutipan data adalah secara dalam talian melalui medium yang selamat dan terjamin kerahsiaan; dan

2.9 **Mematuhi *Standard Operating Procedure*(SOP) kesihatan dan penjarakan fizikal mengikut garis panduan yang telah dikeluarkan oleh Majlis Keselamatan Negara (MKN), Kementerian Kesihatan Malaysia (KKM) dan Kementerian Pendidikan Malaysia (KPM) bagi menangani pandemik Covid-19 yang sedang berkuatkuasa.**

3. Sukacita juga diingatkan, sekiranya sebahagian atau sepenuhnya dapatan kajian tersebut hendak dibentangkan di mana-mana forum atau seminar atau diumumkan kepada media massa, pihak tuan perlu mendapatkan kebenaran terlebih dahulu daripada Bahagian Perancangan dan Penyelidikan Dasar Pendidikan, Kementerian Pendidikan Malaysia dan satu (1) salinan kepada Jabatan Pendidikan Negeri Perak.

4. Kebenaran ini adalah untuk tujuan yang dipohon dan melibatkan sekolah dalam daerah yang dinyatakan sahaja dan luput **selepas tarikh 12 SEPTEMBER 2022.**

Sekian, terima kasih.

"WAWASAN KEMAKMURAN BERSAMA 2030"

"BERKHIDMAT UNTUK NEGARA"

Saya yang menjalankan amanah,

(AZMI BIN BAHAT)
Timbalan Pengarah Pendidikan
Sektor Pengurusan Sekolah
b.p Pengarah Pendidikan Negeri Perak

s.k: Pengarah Pendidikan Negeri Perak

"SEJAHTERA RAKYAT PERAK DARUL RIDZUAN"

05-45068 ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

APPENDIX E

PERAK TENGAH DISTRICT EDUCATION OFFICE PERMISSION LETTER

KEMENTERIAN PENDIDIKAN MALAYSIA
Pejabat Pendidikan Daerah Perak Tengah
32610 Bandar Baru Seri Iskandar
Perak Darul Ridzuan

Tel : 05 – 3711273
Faks : 05 – 3711272
Email : ppdperaktgh@moe.gov.my

"PENDIDIKAN BERKUALITI, SEKOLAH UNGGUL, MURID HOLISTIK"

Ruj. Kami : PPD.PET.500-3/3/1 Jld. 3 (43)
Tarikh : 27 April, 2022

FARHANA AIDA BINTI MOHD KHALID
No. 39, Jalan Kemboja 4B/3,
Seksyen BS 8, Bukit Sentosa 3
48300 Rawang,
Selangor Darul Ehsan

Tuan,

PERMOHONAN MENJALANKAN PENYELIDIKAN

Dengan segala hormatnya merujuk kepada perkara di atas serta surat tuan yang bertarikh 21 April 2022.

2. Sukacita dimaklumkan pihak Pejabat Pendidikan Daerah Perak Tengah **tiada halangan** bagi pihak tuan berurusan dengan Sekolah-Sekolah Rendah Daerah Perak Tengah untuk menjalankan kajian yang bertajuk ***"DEVELOPMENT OF STEAM TEXTBOOK INTEGRATED CHARACTER EDUCATION WITH LOCAL WISDOM THEMES FOR PRIMARY SCHOOL STUDENTS"*** seperti dinyatakan dalam surat tuan dengan syarat-syarat berikut :

2.1 Pihak tuan perlu mendapatkan kebenaran terlebih dahulu daripada Guru Besar sekolah berkenaan untuk menggunakan sampel kajian ;

2.2 Kajian yang dijalankan hendaklah tidak mengganggu atau menjejaskan proses pengajaran dan pembelajaran yang telah ditetapkan oleh pihak sekolah ;

2.3 Pihak tuan bertanggungjawab menjaga keselamatan dan kebajikan murid dan guru yang terlibat dalam kajian ini ;

2.4 Murid, guru dan warga sekolah mahupun pihak sekolah sendiri tidak boleh dipaksa terlibat dalam kajian ini ;

2.5 Pihak tuan hendaklah bertanggungjawab menanggung semua kos kajian ;

2.6 Pihak tuan dipohon mengemukakan satu (1) salinan laporan kajian dalam tempoh 30 hari ke pejabat ini selepas kajian tersebut dilaksanakan ;

2.7 Tiada sebarang implikasi kewangan kepada Jabatan Pendidikan Negeri Perak, Pejabat Pendidikan Daerah Perak Tengah, sekolah, guru serta murid yang terlibat ;

2.8 Pengutipan data adalah **secara dalam talian** melalui medium yang selamat dan terjamin kerahsiaan ;

.../2

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

PERMOHONAN MENJALANKAN PENYELIDIKAN

Ruj. Kami : PPD.PET.500-3/3/1 Jld. 3 (43) Tarikh : 21 April, 2022

2.9 **Mematuhi *Standard Operating Procedure (SOP)* kesihatan dan penjarakan fizikal mengikut garis panduan yang telah dikeluarkan oleh Majlis Keselamatan Negara (MKN), Kementerian Kesihatan Malaysia (KKM) dan Kementerian Pendidikan Malaysia (KPM) bagi menangani Pandemik Covid-19 yang sedang berkuatkuasa** ; dan

2.10 Pejabat Pendidikan Daerah Perak Tengah berhak menarik balik surat kelulusan / kebenaran ini sekiranya pihak tuan gagal mematuhi syarat dan peraturan yang ditetapkan atau bercanggah dengan dasar sedia ada yang sedang berkuatkuasa.

3. Sukacita juga diingatkan, sekiranya sebahagian atau sepenuhnya dapatan kajian tersebut hendak dibentangkan di mana-mana forum atau seminar atau diumumkan kepada media massa, pihak tuan perlu mendapatkan kebenaran terlebih dahulu daripada Bahagian Perancangan dan Penyelidikan Dasar Pendidikan, Kementerian Pendidikan Malaysia dan satu (1) salinan kepada Pejabat Pendidikan Daerah Perak Tengah.

4. Kebenaran ini adalah untuk tujuan yang dipohon sahaja dan melibatkan sekolah dalam daerah yang dinyatakan sahaja serta **luput selepas tarikh 12 SEPTEMBER 2022**.

Sekian, terima kasih.

"WAWASAN KEMAKMURAN BERSAMA 2030"

"BERKHIDMAT UNTUK NEGARA"

05-45068 ptbupsi

Saya yang menjalankan amanah,

(MOHD FATHILAH BIN MOHD NOOR)
Pegawai Pendidikan Daerah
Perak Tengah

" SEJAHTERA RAKYAT PERAK DARUL RIDZUAN"

"SEDERAP MELANGKAH MENERAJUI KECEMERLANGAN"

We Del/ver

(Sila catatkan rujukan pejabat ini apabila berhubung)

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APPENDIX F

LETTER APPOINTING AN EXPERT IN INSTRUMENT VALIDITY

UNIVERSITI PENDIDIKAN SULTAN IDRIS
(SULTAN IDRIS EDUCATION UNIVERSITY)

35900 TANJONG MALIM
PERAK DARUL RIDZUAN MALAYSIA

TEL: +605-450 6000 / 450 6001
FAKS: +605 456 3776
EMEL: pps@upsi.edu.my

INSTITUT PENGAJIAN SISWAZAH

Ho Rujukan: UPSI/IPS-3/475.5 Jld 30
Tarikh: 21 Februari 2022
18 Rejab 1443H

Dr. Mohd Afifi bin Bahauddin Setambah
Pensyarah Universiti DS51
Fakulti Pembangunan Manusia
Kampus Sultan Azlan Shah (Proton City)
Universiti Pendidikan Sultan Idris
35900 Tg Malim, Perak Darul Ridzuan.

YBhg.Prof./Prof.Madya/Dr./Tn./Pn.,

PELANTIKAN SEBAGAI PANEL PAKAR PENGESAHAN INSTRUMEN KAJIAN.

Dengan segala hormatnya perkara di atas adalah dirujuk.

2. Adalah dimaklumkan bahawa pelajar seperti butiran di bawah merupakan pelajar Program Pengajian Siswazah Sarjana Pendidikan (Matematik), Universiti Pendidikan Sultan Idris (UPSI).

Nama	: **Farhana Aida Binti Mohd Khalid**
No. Matrik	**M20192001394**
Fakulti	: **Fakulti Sains dan Matematik**
Tajuk Kajian	***Development of STEAM Textbook Integrated Character Education with Local Wisdom Themes for Primary School Students.***

3. Sehubungan itu, saya ingin memohon khidmat kepakaran YBhg.Prof./Prof.Madya/Dr./Tn./Pn. dalam membantu penyelidikan beliau supaya ia lebih signifikan dan relevan. Bersama-sama ini disertakan dokumen berkaitan untuk tindakan dan perhatian YBhg.Prof./Prof.Madya/Dr./Tn./Pn. selanjutnya. Sebarang pertanyaan atau kesulitan boleh menghubungi penyelidik di talian **01121129385** atau alamat emel ke **farhanakhalidzain@yahoo.com.my**.

4. Kerjasama dan kesudian pihak YBhg.Prof./Prof.Madya/Dr./Tn./Pn. berhubung perkara ini amatlah dihargai dan didahului dengan ucapan ribuan terima kasih.

Sekian.

"WAWASAN KEMAKMURAN BERSAMA 2030"
"BERKHIDMAT UNTUK NEGARA"
'UNIVERSITI NO.1 PENDIDIKAN'

Saya yang menjalankan amanah,

(PROFESSOR DR. RAJA NOR SAFINAS BINTI RAJA HARUN)
Dekan, Institut Pengajian Siswazah
05-4505487
sk Fail

05-45068 ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

UNIVERSITI PENDIDIKAN SULTAN IDRIS
SULTAN IDRIS EDUCATION UNIVERSITY

SOAL SELIDIK KESAHAN PAKAR

PEMBINAAN BUKU TEKS STEAM INTEGRASI PENDIDIKAN KARAKTER DENGAN TEMA KEBIJAKSANAAN TEMPATAN MURID SEKOLAH RENDAH

Kajian ini bertujuan untuk mendapatkan kesahan muka dan kesahan kandungan bagi buku teks daripada pakar mengenai instrumen kajian. Kajian ini telah membangunkan buku teks STEAM dengan mengintegrasikan pendidikan karakter murid sekolah rendah untuk membangunkan personaliti murid dari usia muda. Tema Kebijaksanaan Tempatan terkandung dalam buku teks bertujuan meningkatkan kecintaan murid kepada tanah air. Buku teks ini dibangunkan sebagai buku teks tambahan yang mengandungi lima elemen STEAM dengan mengintegrasikan pendidikan karakter dan merangkumi tema kebijaksanaan tempatan Daerah Perak Tengah (Pasir Salak). Dalam kajian ini, Rumah Kutai di Pasir Salak merupakan elemen sejarah yang digunakan dan salah satu keunikan rumah Kutai ialah dibina tanpa paku. Keunikan rumah Kutai yang memberi penekanan kepada reka bentuk dan struktur adalah sesuai untuk menjadi fokus utama buku teks STEAM. Melalui maklum balas yang diberikan ini akan membantu penyelidik untuk menghasilkan buku teks yang lebih baik.

Panduan

i. Soal selidik ini mengandungi **DUA (2)** bahagian

Bahagian A : Kesahan Muka
Bahagian B : Kesahan Kandungan Buku Teks

ii. Semua maklumat yang diperolehi adalah **SULIT**. Pengumpulan maklumat ini hanya bertujuan untuk laporan penyelidikan semata-mata.

Kerjasama Prof. /Dr./Tuan, saya dahului dengan ucapan ribuan terima kasih.

Yang benar,

(FARHANA AIDA BT MOHD KHALID)
Fakulti Sains Dan Matematik
Universiti Pendidikan Sultan Idris

05-45068 ptbupsi

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05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

BAHAGIAN A:

KESAHAN MUKA BUKU TEKS STEAM INTEGRASI PENDIDIKAN KARAKTER DENGAN TEMA KEBIJAKSANAAN TEMPATAN MURID SEKOLAH RENDAH

Arahan:

Berikut adalah beberapa pernyataan berkaitan dengan kesahan muka buku teks untuk dinilai. Bagi setiap soalan yang dikemukakan, anda diminta menyatakan jawapan anda dengan membulatkan mana-mana satu daripada pilihan yang berkenaan berdasarkan panduan yang disediakan seperti berikut:

1 –Sangat tidak setuju
2 –Tidak setuju
3 –Kurang setuju
4 –Setuju
5 –Sangat setuju

No.	Pernyataan	Skala					Komen/ Cadangan
		1	2	3	4	5	
KESAHAN MUKA							
1.	Muka depan buku teks menarik.	1	2	3	4	5	
2.	Rajah dalam buku teks senang dirujuk.	1	2	3	4	5	
3.	Bahasa yang digunakan mudah difahami.	1	2	3	4	5	
4.	Saiz tulisan sesuai dan mudah dibaca.	1	2	3	4	5	
5.	Susunan teks dalam buku teks tersebut senang diikuti.	1	2	3	4	5	
6.	Objektif buku teks yang dinyatakan adalah jelas.	1	2	3	4	5	tiada objektif yang spesifik
7.	Arahan dalam buku teks adalah jelas.	1	2	3	4	5	

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05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

BAHAGIAN B:

KESAHAN KANDUNGAN BUKU TEKS STEAM INTEGRASI PENDIDIKAN KARAKTER DENGAN TEMA KEBIJAKSANAAN TEMPATAN MURID SEKOLAH RENDAH.

Arahan:

Berikut adalah beberapa pernyataan berkaitan dengan kesahan kandungan buku teks untuk dinilai. Setelah meneliti buku teks yang dibangunkan oleh penyelidik, sila bulatkan jawapan berdasarkan skala berikut.

1 – Sangat tidak setuju
2 – Tidak setuju
3 – Kurang setuju
4 – Setuju
5 – Sangat setuju

No.	Pernyataan	Skala					Komen/ Cadangan
		1	2	3	4	5	
A. ISI KANDUNGAN							
1.	Menepati aspek kandungan dalam DSKP.	1	2	3	4	5	
2.	Mengandungi maklumat yang mencukupi sebagai sumber pengajaran dan pembelajaran.	1	2	3	4	5	apakah perbezaan maklumat buku teks ini dengan buku teks sedia ada
3.	Mengandungi maklumat terkini yang bersifat semasa.	1	2	3	4	5	apakah perbezaan maklumat buku teks ini dengan buku teks sedia ada
4.	Mempunyai maklumat yang sesuai dengan tahap kebolehan murid.	1	2	3	4	5	
5.	Mempunyai tahap keterbacaan (readability) sesuai dengan peringkat umur murid.	1	2	3	4	5	
6.	Mempunyai maklumat fakta yang tepat.	1	2	3	4	5	
B. LATIHAN							
7.	Mempunyai latihan pengukuhan dan pengayaan yang mencukupi.	1	2	3	4	5	
8.	Mempunyai latihan dan soalan yang bercapah/berbeza/menyimpang.	1	2	3	4	5	masukkan elemen KBAT
9.	Mempunyai latihan yang sesuai dengan aras kebolehan murid (Tahun 4).	1	2	3	4	5	

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10.	Mempunyai latihan yang boleh membantu meningkatkan kemahiran berfikir murid.	1	2	3	4	5	tambah soalan masalah bukan rutin yang melibatkan STEM
11.	Menyediakan latihan yang sesuai dengan tajuk pembelajaran.	1	2	3	4	5	
C. PROJEK							
12.	Menyediakan projek yang mencukupi untuk pengajaran.	1	2	3	4	5	
13.	Menyediakan projek yang menarik.	1	2	3	4	5	
14.	Sesuai untuk dilaksanakan di dalam bilik darjah/kelas.	1	2	3	4	5	
15.	Membantu meningkatkan kemahiran pembelajaran abad ke-21.	1	2	3	4	5	
16.	Mempunyai cadangan projek yang mampu merangsang minda murid.	1	2	3	4	5	
17.	Mempunyai arahan projek yang mudah untuk difahami.	1	2	3	4	5	
D. PERSEMBAHAN							
18.	Mempunyai bahagian-bahagian yang disusun mengikut urutan yang wajar.	1	2	3	4	5	
19.	Menggunakan ilustrasi, rajah dan jadual (grafik) yang sesuai dan menarik.	1	2	3	4	5	
20.	Menggunakan tipografi (jenis huruf dan saiz huruf) yang jelas, sesuai dan menarik.	1	2	3	4	5	
21.	Mempunyai reka bentuk kulit buku yang menarik.	1	2	3	4	5	
22.	Menggunakan warna yang sesuai.	1	2	3	4	5	
E. BAHASA DAN ISTILAH							
23.	Menggunakan bahasa yang baku dari segi ejaan dan tatabahasa.	1	2	3	4	5	
24.	Menggunakan bahasa dan istilah yang sesuai dengan tahap kemampuan murid.	1	2	3	4	5	
25.	Menggunakan laras bahasa (istilah atau gaya) yang sesuai dengan bidang Pendidikan Matematik.	1	2	3	4	5	
26.	Menggunakan bahasa dan istilah yang mudah difahami oleh murid.	1	2	3	4	5	
27.	Menggunakan gaya bahasa yang menarik murid untuk membaca.	1	2	3	4	5	

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Ulasan keseluruhan penilai mengenai buku teks:

Secara keseluruhan buku teks ini menepati DSKP matematik. Buku teks ini boleh dirujuk bagi mencapai objektif pembelajaran. Walau bagaimanapun, apakah perbezaan maklumat, soalan yang ditulis berbanding dengan buku teks sedia ada. Isi kandungan juga tidak ditulis muka surat. Objektif tidak dinyatakan dengan jelas.

Cadangan penilai untuk penambahbaikan buku teks:

Masukkan beberapa elemen KBAT dalam soalan seperti soalan latihan pengukuhan yang berbentuk penyelesaian masalah bukan rutin. Aktiviti di dalam buku teks perlu diperincikan langkah demi langkah. Contoh: aktiviti yang boleh menghubungkan cm dan mm. Bincangkan bagaimana aktiviti tersebut dijalankan.

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Nama: Dr. Mohd Afifi Bin Bahurudin Setambah

Tandatangan:

Jawatan: PENSYARAH KANAN
FAKULTI PEMBANGUNAN MANUSIA
UNIVERSITI PENDIDIKAN SULTAN IDRIS
TANJONG MALIM, PERAK

Cop Jawatan:

Soal selidik ini diadaptasi daripada Siti Nasuha Singki (2021) dan Siti Rohaida Hashim (2017)

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35900 TANJONG MALIM
PERAK DARUL RIDZUAN MALAYSIA

TEL: +605 450 6000 / 450 6001
FAKS: +605 458 2776
EMEL: [illegible]

INSTITUT PENGAJIAN SISWAZAH

Ho Rujukan: UPSI/IPS-3/475.5 Jilid 39
Tarikh: 21 Mac 2022
18 Syaaban 1443H

Dr Nurihan binti Nasir
Pensyarah Universiti DS51
Fakulti Sains dan Matematik
Kampus Sultan Azlan Shah (Proton City)
Universiti Pendidikan Sultan Idris
35900 Tg Malim, Perak Darul Ridzuan.

YBhg.Prof./Prof.Madya/Dr./Tn./Pn.,

PELANTIKAN SEBAGAI PANEL PAKAR PENGESAHAN INSTRUMEN KAJIAN.

Dengan segala hormatnya perkara di atas adalah dirujuk.

2. Adalah dimaklumkan bahawa pelajar seperti butiran di bawah merupakan pelajar Program Pengajian Siswazah Sarjana Pendidikan (Matematik), Universiti Pendidikan Sultan Idris (UPSI).

Nama	: **Farhana Aida Binti Mohd Khalid**
No. Matrik	**M20192001394**
Fakulti	: **Fakulti Sains dan Matematik**
Tajuk Kajian	***Development of STEAM Textbook Integrated Character Education with Local Wisdom Themes for Primary School Students.***

3. Sehubungan itu, saya ingin memohon khidmat kepakaran YBhg.Prof./Prof.Madya/Dr./Tn./Pn. dalam membantu penyelidikan beliau supaya ia lebih signifikan dan relevan. Bersama-sama ini disertakan dokumen berkaitan untuk tindakan dan perhatian YBhg.Prof./Prof.Madya/Dr./Tn./Pn selanjutnya. Sebarang pertanyaan atau kesulitan boleh menghubungi penyelidik di talian **01121129385** atau alamat emel ke **farhanakhalidzain@yahoo.com.my**.

4. Kerjasama dan kesudian pihak YBhg.Prof./Prof.Madya/Dr./Tn./Pn. berhubung perkara ini amatlah dihargai dan didahului dengan ucapan ribuan terima kasih.

Sekian.

"WAWASAN KEMAKMURAN BERSAMA 2030"
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'UNIVERSITI NO.1 PENDIDIKAN'

Saya yang menjalankan amanah,

(PROFESSOR DR. RAJA NOR SAFINAS BINTI RAJA HARUN)
Dekan, Institut Pengajian Siswazah
05-4505487
sk Fail

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SOAL SELIDIK KESAHAN PAKAR

PEMBINAAN BUKU TEKS STEAM INTEGRASI PENDIDIKAN KARAKTER DENGAN TEMA KEBIJAKSANAAN TEMPATAN MURID SEKOLAH RENDAH

Kajian ini bertujuan untuk mendapatkan kesahan muka dan kesahan kandungan bagi buku teks daripada pakar mengenai instrumen kajian. Kajian ini telah membangunkan buku teks STEAM dengan mengintegrasikan pendidikan karakter murid sekolah rendah untuk membangunkan personaliti murid dari usia muda. Tema Kebijaksanaan Tempatan terkandung dalam buku teks bertujuan meningkatkan kecintaan murid kepada tanah air. Buku teks ini dibangunkan sebagai buku teks tambahan yang mengandungi lima elemen STEAM dengan mengintegrasikan pendidikan karakter dan merangkumi tema kebijaksanaan tempatan Daerah Perak Tengah (Pasir Salak). Dalam kajian ini, Rumah Kutai di Pasir Salak merupakan elemen sejarah yang digunakan dan salah satu keunikan rumah Kutai ialah dibina tanpa paku. Keunikan rumah Kutai yang memberi penekanan kepada reka bentuk dan struktur adalah sesuai untuk menjadi fokus utama buku teks STEAM. Melalui maklum balas yang diberikan ini akan membantu penyelidik untuk menghasilkan buku teks yang lebih baik.

Panduan:

i. Soal selidik ini mengandungi **DUA (2)** bahagian:

Bahagian A : Kesahan Muka
Bahagian B : Kesahan Kandungan Buku Teks

ii. Semua maklumat yang diperolehi adalah **SULIT**. Pengumpulan maklumat ini hanya bertujuan untuk laporan penyelidikan semata-mata.

Kerjasama Prof. /Dr./Tuan, saya dahului dengan ucapan ribuan terima kasih.

Yang benar,

(FARHANA AIDA BT MOHD KHALID)
Fakulti Sains Dan Matematik
Universiti Pendidikan Sultan Idris

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BAHAGIAN A:

KESAHAN MUKA BUKU TEKS STEAM INTEGRASI PENDIDIKAN KARAKTER DENGAN TEMA KEBIJAKSANAAN TEMPATAN MURID SEKOLAH RENDAH

Arahan:

Berikut adalah beberapa pernyataan berkaitan dengan kesahan muka buku teks untuk dinilai. Bagi setiap soalan yang dikemukakan, anda diminta menyatakan jawapan anda dengan membulatkan mana-mana satu daripada pilihan yang berkenaan berdasarkan panduan yang disediakan seperti berikut:

1 -Sangat tidak setuju
2 – Tidak setuju
3 – Kurang setuju
4 – Setuju
5 – Sangat setuju

No.	Pernyataan	Skala					Komen/ Cadangan
		1	2	3	4	5	
KESAHAN MUKA							
1.	Muka depan buku teks menarik.	1	2	3	4	5	
2.	Rajah dalam buku teks senang dirujuk.	1	2	3	4	5	
3.	Bahasa yang digunakan mudah difahami.	1	2	3	4	5	
4.	Saiz tulisan sesuai dan mudah dibaca.	1	2	3	4	5	
5.	Susunan teks dalam buku teks tersebut senang diikuti.	1	2	3	4	5	
6.	Objektif buku teks yang dinyatakan adalah jelas.	1	2	3	4	5	
7.	Arahan dalam buku teks adalah jelas.	1	2	3	4	5	

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BAHAGIAN B:

KESAHAN KANDUNGAN BUKU TEKS STEAM INTEGRASI PENDIDIKAN KARAKTER DENGAN TEMA KEBIJAKSANAAN TEMPATAN MURID SEKOLAH RENDAH.

Arahan:

Berikut adalah beberapa pernyataan berkaitan dengan kesahan kandungan buku teks untuk dinilai. Setelah meneliti buku teks yang dibangunkan oleh penyelidik, sila bulatkan jawapan berdasarkan skala berikut.

1 – Sangat tidak setuju
2 – Tidak setuju
3 – Kurang setuju
4 – Setuju
5 – Sangat setuju

No.	Pernyataan	Skala					Komen/ Cadangan
		1	2	3	4	5	
A. ISI KANDUNGAN							
1.	Menepati aspek kandungan dalam DSKP.	1	2	3	4	5	
2.	Mengandungi maklumat yang mencukupi sebagai sumber pengajaran dan pembelajaran.	1	2	3	4	5	
3.	Mengandungi maklumat terkini yang bersifat semasa.	1	2	3	4	5	
4.	Mempunyai maklumat yang sesuai dengan tahap kebolehan murid.	1	2	3	4	5	
5.	Mempunyai tahap keterbacaan (readability) sesuai dengan peringkat umur murid.	1	2	3	4	5	
6.	Mempunyai maklumat fakta yang tepat.	1	2	3	4	5	
B. LATIHAN							
7.	Mempunyai latihan pengukuhan dan pengayaan yang mencukupi.	1	2	3	4	5	
8.	Mempunyai latihan dan soalan yang bercapah/berbeza/menyimpang.	1	2	3	4	5	
9.	Mempunyai latihan yang sesuai dengan aras kebolehan murid (Tahun 4).	1	2	3	4	5	

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10.	Mempunyai latihan yang boleh membantu meningkatkan kemahiran berfikir murid.	1	2	3	4	5	
11.	Menyediakan latihan yang sesuai dengan tajuk pembelajaran.	1	2	3	4	5	
C. PROJEK							
12.	Menyediakan projek yang mencukupi untuk tajuk ukuran dan sukatan.	1	2	3	4	5	
13.	Menyediakan projek yang menarik.	1	2	3	4	5	
14.	Sesuai untuk dilaksanakan di dalam dalam dalam/kelas.	1	2	3	4	5	
15.	Membantu meningkatkan kemahiran pembelajaran abad ke-21.	1	2	3	4	5	
16.	Mempunyai cadangan projek yang mampu merangsang minda murid.	1	2	3	4	5	
17.	Mempunyai arahan projek yang mudah difahami.	1	2	3	4	5	
D. PERSEMBAHAN							
18.	Mempunyai bahagian-bahagian yang disusun mengikut urutan.	1	2	3	4	5	
19.	Menggunakan ilustrasi, rajah dan jadual (grafik) yang sesuai dan menarik.	1	2	3	4	5	
20.	Menggunakan tipografi (jenis huruf dan saiz huruf) yang jelas, sesuai dan menarik.	1	2	3	4	5	
21.	Mempunyai reka bentuk kulit buku yang menarik.	1	2	3	4	5	
22.	Menggunakan warna yang sesuai.	1	2	3	4	5	
E. BAHASA DAN ISTILAH							
23.	Menggunakan bahasa baku dari segi ejaan dan tatabahasa.	1	2	3	4	5	
24.	Menggunakan bahasa dan istilah yang sesuai dengan tahap kemampuan murid.	1	2	3	4	5	
25.	Menggunakan laras bahasa (istilah atau gaya) yang sesuai dengan bidang Pendidikan Matematik.	1	2	3	4	5	
26.	Menggunakan bahasa dan istilah yang mudah difahami oleh murid.	1	2	3	4	5	
27.	Menggunakan gaya bahasa yang menarik murid untuk membaca.	1	2	3	4	5	

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Ulasan keseluruhan penilai mengenai buku teks:

Keseluruhan buku teks ini memenuhi kehendak bidang pembelajaran sukatan dan geometri bagi tajuk ukuran dan sukatan.

Cadangan penilai untuk penambahbaikan buku teks:

Sila rujuk pembetulan yang dibincangkan dan dicatatkan pada sesi perbincangan lepas.

Nama: Dr. Nurihan binti Nasir

Tandatangan: .....

Jawatan: Pensyarah Kanan

Cop Jawatan:

DR.NURIHAN NASIR
Lecturer
Department Of Mathematics
Faculty Of Science And Mathematics
Sultan Idris Education University
35900 Tanjong Malim Perak

Soal selidik ini diadaptasi daripada Siti Nasuha Singki (2021) dan Siti Rohaida Hasbun (2017)

-SOAL SELIDIK TAMAT-

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05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

UNIVERSITI PENDIDIKAN SULTAN IDRIS
35900 TANJONG MALIM
PERAK DARUL RIDZUAN MALAYSIA
TEL: +605 450 6000 / +60 6000
FAKS: +605 458 3776
EMEL: ipsis@fsmt.upsi.edu.my

INSTITUT PENGAJIAN SISWAZAH

Ho Rujukan: UPSI/IPS-3/475.5 Jilid 20
Tarikh: 21 Februari 2022
19 Rejab 1443H

Puan Nurul Huda Binti Kasim
SMK Syeikh Ghani
Jalan Sungkai
35500 Bidor, Perak.

YBhg.Prof./Prof.Madya/Dr./Tn./Pn.,

PELANTIKAN SEBAGAI PANEL PAKAR PENGESAHAN INSTRUMEN KAJIAN.

Dengan segala hormatnya perkara di atas adalah dirujuk.

2. Adalah dimaklumkan bahawa pelajar seperti butiran di bawah merupakan pelajar Program Pengajian Siswazah Sarjana Pendidikan (Matematik), Universiti Pendidikan Sultan Idris (UPSI):

Nama	: **Farhana Aida Binti Mohd Khalid**
No. Matrik	**M20192001394**
Fakulti	: **Fakulti Sains dan Matematik**
Tajuk Kajian	***Development of STEAM Textbook Integrated Character Education with Local Wisdom Themes for Primary School Students.***

3. Sehubungan itu, saya ingin memohon khidmat kepakaran YBhg.Prof./Prof.Madya/Dr./Tn./Pn. dalam membantu penyelidikan beliau supaya ia lebih signifikan dan relevan. Bersama-sama ini disertakan dokumen berkaitan untuk tindakan dan perhatian YBhg.Prof./Prof.Madya/Dr./Tn./Pn. selanjutnya. Sebarang pertanyaan atau kesulitan boleh menghubungi penyelidik di talian **01121129385** atau alamat emel ke **farhanakhalidzain@yahoo.com.my.**

4. Kerjasama dan kesudian pihak YBhg.Prof./Prof.Madya/Dr./Tn./Pn. berhubung perkara ini amatlah dihargai dan didahului dengan ucapan ribuan terima kasih.

Sekian.

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"BERKHIDMAT UNTUK NEGARA"
'UNIVERSITI NO.1 PENDIDIKAN'

Saya yang menjalankan amanah,

(PROFESOR DR. RAJA NOR SAFINAS BINTI RAJA HARUN)
Dekan, Institut Pengajian Siswazah
05-4505487
sk Fail

05-45068 ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

05-4506832 pustaka.upsi.edu.my Perpustakaan Tuanku Bainun Kampus Sultan Abdul Jalil Shah PustakaTBainun ptbupsi

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PEMBINAAN BUKU TEKS STEAM INTEGRASI PENDIDIKAN KARAKTER DENGAN TEMA KEBIJAKSANAAN TEMPATAN MURID SEKOLAH RENDAH

Kajian ini bertujuan untuk mendapatkan kesahan muka dan kesahan kandungan bagi buku teks daripada pakar mengenai instrumen kajian. Kajian ini telah membangunkan buku teks STEAM dengan mengintegrasikan pendidikan karakter murid sekolah rendah untuk membangunkan personaliti murid dari usia muda. Tema Kebijaksanaan Tempatan terkandung dalam buku teks bertujuan meningkatkan kecintaan murid kepada tanah air. Buku teks ini dibangunkan sebagai buku teks tambahan yang mengandungi lima elemen STEAM dengan mengintegrasikan pendidikan karakter dan merangkumi tema kebijaksanaan tempatan Daerah Perak Tengah (Pasir Salak). Dalam kajian ini, Rumah Kutai di Pasir Salak merupakan elemen sejarah yang digunakan dan salah satu keunikan rumah Kutai ialah dibina tanpa paku. Keunikan rumah Kutai yang memberi penekanan kepada reka bentuk dan struktur adalah sesuai untuk menjadi fokus utama buku teks STEAM. Melalui maklum balas yang diberikan ini akan membantu penyelidik untuk menghasilkan buku teks yang lebih baik.

Panduan

i. Soal selidik ini mengandungi **DUA (2)** bahagian

Bahagian A : Kesahan Muka
Bahagian B : Kesahan Kandungan Buku Teks

ii. Semua maklumat yang diperolehi adalah **SULIT**. Pengumpulan maklumat ini hanya bertujuan untuk laporan penyelidikan semata-mata.

Kerjasama Prof. /Dr./Tuan, saya dahului dengan ucapan ribuan terima kasih.

Yang benar,

(FARHANA AIDA BT MOHD KHALID)
Fakulti Sains Dan Matematik
Universiti Pendidikan Sultan Idris

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BAHAGIAN A:

KESAHAN MUKA BUKU TEKS STEAM INTEGRASI PENDIDIKAN KARAKTER DENGAN TEMA KEBIJAKSANAAN TEMPATAN MURID SEKOLAH RENDAH

Arahan:

Berikut adalah beberapa pernyataan berkaitan dengan kesahan muka buku teks untuk dinilai. Bagi setiap soalan yang dikemukakan, anda diminta menyatakan jawapan anda dengan membulatkan mana-mana satu daripada pilihan yang berkenaan berdasarkan panduan yang disediakan seperti berikut:

1 -Sangat tidak setuju
2 –Tidak setuju
3 –Kurang setuju
4 –Setuju
5 –Sangat setuju

No.	Pernyataan	Skala					Komen/ Cadangan
		1	2	3	4	5	
KESAHAN MUKA							
1.	Muka depan buku teks menarik.	1	2	3	4	(5)	
2.	Rajah dalam buku teks senang dirujuk.	1	2	3	4	(5)	
3.	Bahasa yang digunakan mudah difahami.	1	2	3	4	(5)	
4.	Saiz tulisan sesuai dan mudah dibaca.	1	2	3	4	(5)	
5.	Susunan teks dalam buku teks tersebut senang diikuti.	1	2	3	(4)	5	*Tambahkan contoh pertanyaan teks dengan gambar*
6.	Objektif buku teks yang dinyatakan adalah jelas.	1	2	3	4	(5)	
7.	Arahan dalam buku teks adalah jelas.	1	2	3	4	(5)	

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BAHAGIAN B:

KESAHAN KANDUNGAN BUKU TEKS STEAM INTEGRASI PENDIDIKAN KARAKTER DENGAN TEMA KEBIJAKSANAAN TEMPATAN MURID SEKOLAH RENDAH.

Arahan:

Berikut adalah beberapa pernyataan berkaitan dengan kesahan kandungan buku teks untuk dinilai. Setelah meneliti buku teks yang dibangunkan oleh penyelidik, sila bulatkan jawapan berdasarkan skala berikut.

1 – Sangat tidak setuju
2 – Tidak setuju
3 – Kurang setuju
4 – Setuju
5 – Sangat setuju

No.	Pernyataan	Skala					Komen/ Cadangan
		1	2	3	4	5	
A. ISI KANDUNGAN							
1.	Menepati aspek kandungan dalam DSKP.	1	2	(3)	4	5	*Hendaya gunakan pembelajaran english yang lebih sesuai dengan Standard Pembelajaran dalam DSKP - Matematik Tahun 4*
2.	Mengandungi maklumat yang mencukupi sebagai sumber pengajaran dan pembelajaran.	1	2	3	(4)	5	*Tambah lagi aspek dalam Pages STEMAM supaya lebih sesuai dengan Standard Pembelajaran. Tambahan bahasa english yang sesuai untuk menggabungkan unsur dalam pengajaran*
3.	Mengandungi maklumat terkini yang bersifat semasa.	1	2	3	4	(5)	
4.	Mempunyai maklumat yang sesuai dengan tahap kebolehan murid.	1	2	3	4	(5)	
5.	Mempunyai tahap keterbacaan (readability) sesuai dengan peringkat umur murid.	1	2	3	4	(5)	
6.	Mempunyai maklumat fakta yang tepat.	1	2	3	4	(5)	
B. LATIHAN							
7.	Mempunyai latihan pengukuhan dan pengayaan yang mencukupi.	1	2	3	4	(5)	
8.	Mempunyai latihan dan soalan yang bercapah/berbeza/menyimpang.	1	2	3	4	(5)	
9.	Mempunyai latihan yang sesuai dengan aras kebolehan murid (Tahun 4).	1	2	3	4	(5)	

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10.	Mempunyai latihan yang boleh membantu meningkatkan kemahiran berfikir murid.	1	2	3	4	5	
11.	Menyediakan latihan yang sesuai dengan tajuk pembelajaran.	1	2	3	4	5	
C. PROJEK							
12.	Menyediakan projek yang mencukupi untuk pengajaran.	1	2	3	4	5	
13.	Menyediakan projek yang menarik.	1	2	3	4	5	
14.	Sesuai untuk dilaksanakan di dalam dalik darjah/kelas.	1	2	3	4	5	
15.	Membantu meningkatkan kemahiran pembelajaran abad ke-21.	1	2	3	4	5	
16.	Mempunyai cadangan projek yang mampu merangsang minda murid.	1	2	3	4	5	
17.	Mempunyai arahan projek yang mudah untuk difahami.	1	2	3	4	5	
D. PERSEMBAHAN							
18.	Mempunyai bahagian-bahagian yang disusun mengikut urutan yang wajar.	1	2	3	4	5	
19.	Menggunakan ilustrasi, rajah dan jadual (grafik) yang sesuai dan menarik.	1	2	3	4	5	
20.	Menggunakan tipografi (jenis huruf dan saiz huruf) yang jelas, sesuai dan menarik.	1	2	3	4	5	
21.	Mempunyai reka bentuk kulit buku yang menarik.	1	2	3	4	5	
22.	Menggunakan warna yang sesuai.	1	2	3	4	5	
E. BAHASA DAN ISTILAH							
23.	Menggunakan bahasa yang baku dari segi ejaan dan tatabahasa.	1	2	3	4	5	
24.	Menggunakan bahasa dan istilah yang sesuai dengan tahap kemampuan murid.	1	2	3	4	5	
25.	Menggunakan laras bahasa (istilah atau gaya) yang sesuai dengan bidang Pendidikan Matematik.	1	2	3	4	5	
26.	Menggunakan bahasa dan istilah yang mudah difahami oleh murid.	1	2	3	4	5	
27.	Menggunakan gaya bahasa yang menarik murid untuk membaca.	1	2	3	4	5	

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Ulasan keseluruhan penilai mengenai buku teks:

Tahniah! Secara keseluruhan penggiat dapat memperkenalkan konsep matematik dengan menarik. Isikan dan cara penggunaan murid dengan melabelkan Pigai STEAM dengan baik. Susunan gambar dan teks dapat memikat minat penggunaan buku teks ini. Semoga usaha yang dilakukan dapat digunakan secara meluas.

Cadangan penilai untuk penambahbaikan buku teks:

Penggiat harus berhati-hati semasa menulis Standard Pembelajaran dan kriteria berdasarkan dengan DSKP Matematik Tahun 4. Idea bagi integrasi STEAM dalam Matematik perlu pembacaan berakhir lampaian yang dilaporkan. Namun demikian, antara kriteria yang sesuai dengan Standard Pembelajaran yang telah dinyatakan dalam DSKP Matematik. Penekanan bagi aplikasi konsep pengukuran dan unit pengukuran dalam PBL perlu dikaitkan supaya selari dengan DSKP. Selain itu disarankan penggiat menambahkan gambar pencetus idea dalam setiap PBL STEAM bagi menggalakkan murid berpikir dan selari dengan langkah 5E dan gunakan BPK KPM

Nama : Nurul Huda Binti Kasim

Tandatangan :

Jawatan : Pegawai Perkhidmatan Pendidikan DG 44 (Sains)

Cop Jawatan : ..SMK SYERIA ABDUL GHANI, BIDOR, PERAK.....

Soal selidik ini diadaptasi daripada Siti Nasuha Singki (2021) dan Siti Rohaida Hashim (2017)

-SOAL SELIDIK TAMAT-

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APPENDIX G

STEAM PROJECT

SLAID PEMBENTANGAN GURU (SET INDUKSI)



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Sumber: https://www.thepatriots.asia/menara-berkembar-petronas-sebuah-kebanggaan-malaysia/



Sumber: http://www.muziumnegara.gov.my/

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Sumber: https://www.tempatmenarik.my/zoo-negara-tumpuan-pelancong-ke-kuala-lumpur/



Sumber: http://www.mdks.gov.my/en/visitors/places-interest/pantai-remis-jeram-kuala-selangor

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SESI SOAL JAWAB

- Apakah tempat ini?
- Pernahkah kunjung ke tempat ini?
- Apakah perkara menarik yang ada di sana?



TEKS

Encik Adam tinggal di Tanjong Malim. Beliau dan keluarga ingin bercuti ke sebuah destinasi. Destinasi itu terletak di Pasir Salak. Di sepanjang perjalanan, beliau akan melalui beberapa destinasi iaitu Behrang Stesen, Slim River, Trolak, Sungkai, Chenderong Balai dan akhirnya ke Kampung Gajah.



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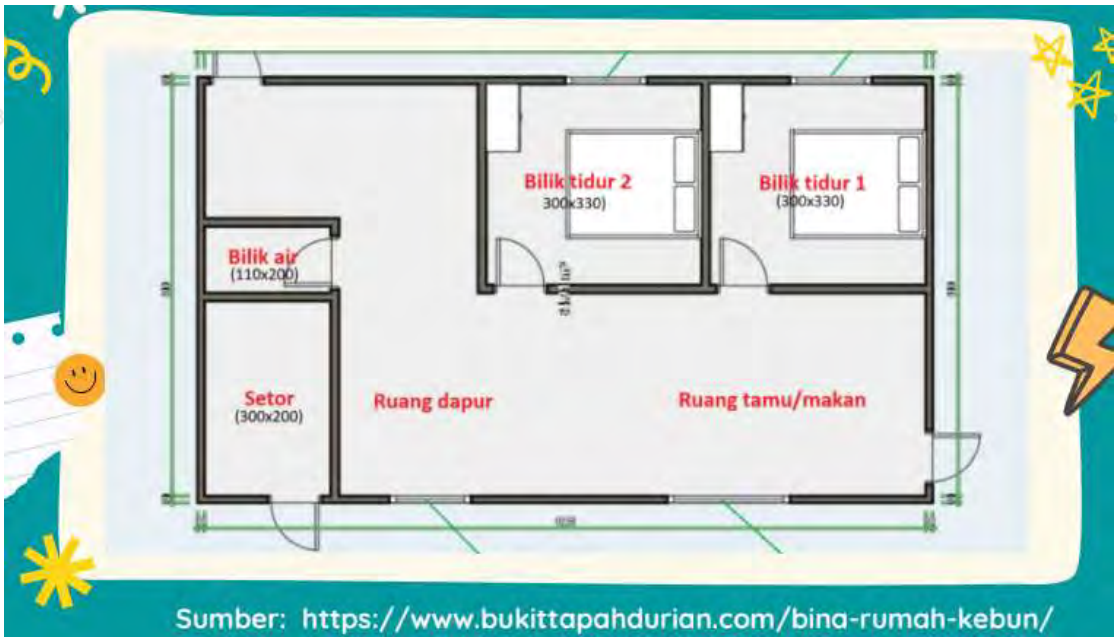


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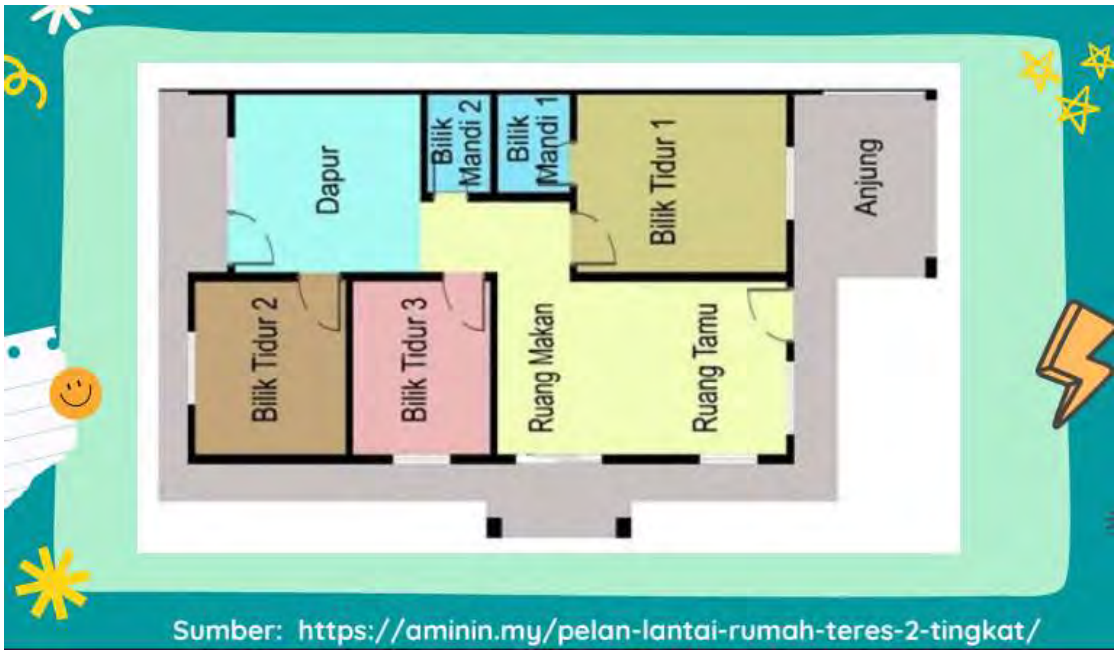
SLAID PEMBENTANGAN GURU (SET INDUKSI)



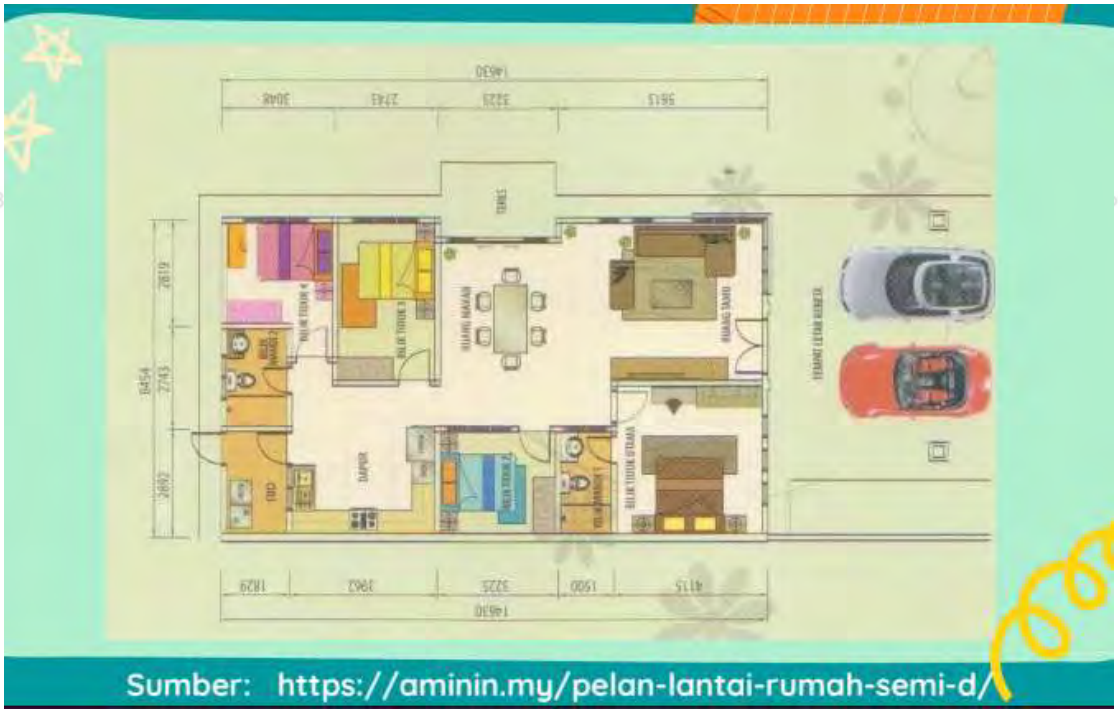


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Sumber: https://aminin.my/pelan-lantai-rumah-teres-2-tingkat/



Sumber: https://aminin.my/pelan-lantai-rumah-semi-d/

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Sumber: https://aminin.my/pelan-lantai-rumah-1-tingkat/

SESI SOAL JAWAB

- Berdasarkan gambar berikut, apakah ia?
- Siapakah yang membuat pelan bangunan?
- Siapa yang bercita-cita nak jadi arkitek?
- Kenapa penting buat pelan rumah?

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SLAID PEMBENTANGAN GURU (SET INDUKSI)





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Sumber: https://myhomes.my/bata-merah-vs-bata-simen/



Sumber:https://www.99.co/blog/indonesia/jenis-paku-bangunan-rumah/

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Sumber:https://techno.expertexpro.com/ms/stroitelnye-materialy/1538-vidy-brusa-dlya-stroitelstva-doma.html

SESI SOAL JAWAB

- Berdasarkan gambar tersebut, apakah ia?
- Apakah kegunaan bahan-bahan itu?

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SLAID PEMBENTANGAN GURU (AKTIVITI 1)





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WARNA ASAS

- Warna asas atau warna primer merupakan warna dasar sesebuah warna.
- Warna asas - merah, biru dan kuning



WARNA SEKUNDER

- Warna sekunder juga dipanggil sebagai warna kedua.
- Warna sekunder ialah jingga, ungu dan hijau

Jingga = merah + kuning

Ungu = merah + biru

Hijau = kuning + biru

- Warna sekunder = warna asas + warna asas



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WARNA TERTIER

- Warna tertier atau warna ketiga adalah campuran warna asas dan warna sekunder.

- biru ungu = biru + ungu

biru hijau = biru + hijau

kuning jingga = kuning + jingga

kuning hijau = kuning + hijau

merah jingga = merah + jingga

merah ungu = merah + ungu

- Warna tertier = warna asas + warna sekunder



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APPENDIX H

SPSS ANALYSIS DATA

PILOT TEST

Reliability

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	10	100.0
	Excluded[a]	0	.0
	Total	10	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.986	38

Item Statistics

	Mean	Std. Deviation	N
ITEM1	4.50	.527	10
ITEM2	4.40	.516	10
ITEM3	4.60	.516	10
ITEM4	4.30	.483	10
ITEM5	4.50	.527	10
ITEM6	4.60	.516	10
ITEM7	4.60	.516	10
ITEM8	4.20	.789	10
ITEM9	4.40	.516	10
ITEM10	4.40	.516	10
ITEM11	4.40	.516	10
ITEM12	4.60	.516	10
ITEM13	4.60	.516	10
ITEM14	4.40	.699	10
ITEM15	4.40	.516	10
ITEM16	4.50	.527	10

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ITEM17	4.50	.527	10
ITEM18	4.50	.527	10
ITEM19	4.50	.527	10
ITEM20	4.40	.516	10
ITEM21	4.50	.527	10
ITEM22	4.30	.483	10
ITEM23	4.30	.675	10
ITEM24	4.30	.675	10
ITEM25	4.10	.738	10
ITEM26	4.20	.632	10
ITEM27	4.30	.675	10
ITEM28	4.40	.516	10
ITEM29	4.10	.738	10
ITEM30	4.30	.483	10
ITEM31	4.50	.527	10
ITEM32	4.40	.516	10
ITEM33	4.50	.527	10
ITEM34	4.40	.516	10
ITEM35	4.20	.789	10
ITEM36	4.40	.516	10
ITEM37	4.50	.527	10
ITEM38	4.40	.516	10

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Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
ITEM1	162.90	300.322	.614	.987
ITEM2	163.00	297.556	.786	.986
ITEM3	162.80	297.733	.776	.986
ITEM4	163.10	296.989	.877	.986
ITEM5	162.90	302.100	.515	.987
ITEM6	162.80	298.178	.750	.986
ITEM7	162.80	297.733	.776	.986
ITEM8	163.20	287.956	.868	.986
ITEM9	163.00	294.889	.940	.986
ITEM10	163.00	294.889	.940	.986
ITEM11	163.00	294.889	.940	.986
ITEM12	162.80	297.733	.776	.986
ITEM13	162.80	300.844	.598	.987
ITEM14	163.00	294.444	.704	.986

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ITEM15	163.00	294.889	.940	.986
ITEM16	162.90	297.211	.789	.986
ITEM17	162.90	297.211	.789	.986
ITEM18	162.90	301.878	.528	.987
ITEM19	162.90	295.433	.889	.986
ITEM20	163.00	294.889	.940	.986
ITEM21	162.90	297.211	.789	.986
ITEM22	163.10	296.989	.877	.986
ITEM23	163.10	295.433	.687	.986
ITEM24	163.10	295.433	.687	.986
ITEM25	163.30	289.344	.874	.986
ITEM26	163.20	292.844	.858	.986
ITEM27	163.10	290.767	.895	.986
ITEM28	163.00	297.556	.786	.986
ITEM29	163.30	291.344	.791	.986
ITEM30	163.10	296.989	.877	.986
ITEM31	162.90	295.433	.889	.986
ITEM32	163.00	294.889	.940	.986
ITEM33	162.90	298.544	.714	.986
ITEM34	163.00	294.889	.940	.986
ITEM35	163.20	287.289	.894	.986
ITEM36	163.00	294.889	.940	.986
ITEM37	162.90	295.433	.889	.986
ITEM38	163.00	294.889	.940	.986

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
167.40	311.822	17.658	38

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Usability of STEAM Textbook

Frequencies

Statistics

		JANTINA	BANGSA	PENGALAMAN
N	Valid	58	58	58
	Missing	0	0	0

Frequency Table

JANTINA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	LELAKI	20	34.5	34.5	34.5
	PEREMPUAN	38	65.5	65.5	100.0
	Total	58	100.0	100.0	

BANGSA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MELAYU	54	93.1	93.1	93.1
	INDIA	3	5.2	5.2	98.3
	CINA	1	1.7	1.7	100.0
	Total	58	100.0	100.0	

PENGALAMAN MENGAJAR MATEMATIK

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-5 TAHUN	6	10.3	10.3	10.3
	6-10 TAHUN	6	10.3	10.3	20.7
	11-15 TAHUN	12	20.7	20.7	41.4
	16-20 TAHUN	11	19.0	19.0	60.3
	LEBIH 20 TAHUN	23	39.7	39.7	100.0
	Total	58	100.0	100.0	

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Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
FORMAT	58	4	5	4.34	.423
ISI_KANDUNGAN	58	3.25	5.00	4.2543	.48376
KEBOLEHCAPAIAN_OBJEKTIF	58	3.00	5.00	4.1422	.52170
KEBOLEHLAKSANAAN_PROSES_PDP	58	3.00	5.00	4.1245	.47465
KEPUASAN	58	2.20	5.00	4.1207	.61438
KESELURUHAN_GURU	58	3.16	5.00	4.2132	.45040
Valid N (listwise)	58				

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
ITEM1	58	2	5	4.26	.785
ITEM2	58	3	5	4.26	.548
ITEM3	58	3	5	4.50	.538
ITEM4	58	3	5	4.22	.497
ITEM5	58	3	5	4.41	.531
ITEM6	58	3	5	4.43	.565
ITEM7	58	3	5	4.40	.528
ITEM8	58	3	5	4.28	.643
ITEM9	58	3	5	4.29	.593
ITEM10	58	3	5	4.33	.574
ITEM11	58	3	5	4.19	.576
ITEM12	58	3	5	4.29	.562
ITEM13	58	3	5	4.38	.587
ITEM14	58	3	5	4.29	.676
ITEM15	58	3	5	4.07	.588
ITEM16	58	2	5	4.26	.715
ITEM17	58	2	5	4.17	.679
ITEM18	58	3	5	4.16	.616
ITEM19	58	3	5	4.31	.568
ITEM20	58	3	5	4.31	.537
ITEM21	58	3	5	4.24	.601
ITEM22	58	3	5	4.00	.562
ITEM23	58	3	5	4.17	.566
ITEM24	58	3	5	4.16	.616
ITEM25	58	3	5	3.83	.679
ITEM26	58	2	5	3.81	.661
ITEM27	58	3	5	4.16	.586

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ITEM28	58	3	5	4.24	.601
ITEM29	58	3	5	4.03	.620
ITEM30	58	2	5	4.17	.653
ITEM31	58	3	5	4.21	.522
ITEM32	58	3	5	4.28	.586
ITEM33	58	3	5	4.40	.528
ITEM34	58	2	5	4.19	.606
ITEM35	58	2	5	4.03	.794
ITEM36	58	2	5	3.98	.761
ITEM37	58	2	5	4.16	.696
ITEM38	58	2	5	4.24	.683
Valid N (listwise)	58				

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