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Development of Kaffah Learning Model on Fluid Concept to Improve Metacognition, Character, and Scientific Attitude Prospective Teacher Students

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Abstract

Development of Kaffah Learning Model on Fluid Concept to Improve Metacognition, Character, and Scientific Attitude Prospective Teacher Students. *The objective of this research is to develop the Kaffah learning model, which will be accompanied by supporting tools and learning resources, with the aim of enhancing metacognition, character, and scientific attitudes among students. The supporting components of the Kaffah learning model, which have been developedThe product that will be applied is a product that is already feasible, which is already valid and tested. The research was conducted using the Borg and Gall model development research method, which involved the following steps: research and information collection, planning, developing a preliminary form of the product, preliminary field testing, main product revision, main field testing, operational product revision, operational field testing, final product revision, dissemination and implementation. The response questionnaire of educators and students to the product was utilized to evaluate its practicality. Observation sheets were utilized to assess learning implementation, validity, and reliability. Moderation techniques were employed to evaluate learning and project assessment. Finally, the success of projects made by students was evaluated through the use of a project assessment. The data was subjected to various analyses, including a feasibility test, a practicality test, and an effectiveness test. The latter was conducted using N-Gain, with the results subsequently confirmed by an independent t-test and a multiple analysis of variance (MANOVA) test. The findings demonstrated that the Kaffah learning model, when accompanied by supporting devices and learning, is both valid and reliable. Consequently, it can be concluded that the model is a feasible option for use in learning.*

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Abstrak

Tujuan penelitian ini adalah mengembangkan model pembelajaran Kaffah yang disertai perangkat pendukung dan sumber belajar untuk meningkatkan metakognisi, karakter, dan sikap ilmiah mahasiswa. Komponen pendukung model pembelajaran Kaffah yang telah dikembangkan adalah produk yang layak, valid, dan teruji. Penelitian ini dilakukan dengan menggunakan metode penelitian pengembangan model Borg and Gall yang meliputi langkah-langkah sebagai berikut: penelitian dan pengumpulan informasi, perencanaan, pengembangan bentuk awal produk, uji lapangan awal, revisi produk utama, uji lapangan utama, revisi produk operasional, uji lapangan operasional, revisi produk akhir, diseminasi dan implementasi. Angket tanggapan pendidik dan peserta didik terhadap produk digunakan untuk mengevaluasi kepraktisannya. Lembar observasi digunakan untuk menilai keterlaksanaan pembelajaran, validitas, dan reliabilitas. Lembar observasi digunakan untuk menilai implementasi pembelajaran, validitas, dan reliabilitas. Teknik moderasi digunakan untuk mengevaluasi pembelajaran dan penilaian proyek. Akhirnya, keberhasilan proyek yang dibuat oleh siswa dievaluasi melalui penggunaan penilaian proyek. Data tersebut menjadi sasaran berbagai analisis, termasuk uji kelayakan, uji kepraktisan, dan uji efektivitas. Terakhir dilakukan dengan

menggunakan N-Gain, dengan hasil selanjutnya dikonfirmasi oleh uji-t independen dan uji analisis varians berganda (MANOVA). Temuan tersebut menunjukkan bahwa model pembelajaran Kaffah, jika disertai dengan perangkat pendukung dan pembelajaran, valid dan reliabel. Akibatnya, dapat disimpulkan bahwa model tersebut merupakan pilihan yang layak untuk digunakan dalam pembelajaran.

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INTRODUCTION

Nowadays, we often hear about cases that occur in society, especially among students, such as delinquency, suicide, drugs, and even serious cases of murder. This case at least provides a link between social cases and educational policies. The change of leadership will replace the curriculum policy (A. Sarjan et al., 2022). It is recorded that during Indonesia's independence, there have been 12 curriculum changes, the last being the independent curriculum in 2022. The real meaning of independent learning is student independence in the learning process and independence for the educational environment to determine for itself the best way in the learning process. The questions that arise are what needs to be improved based on future policy orientation and how to design the national education system in the long term. The facts that occur in Indonesia, the availability of resources is not the main factor to improve education. Linearly, improving the quality of education requires adequate resources, but factually, adequate resources are not necessarily a contributing factor. Mental corruption is an unavoidable fact when abundant resources are provided. Education today is more scientific, rational, effective, and efficient. Prioritizing rationality is the reason why education in Indonesia is dry. Education in Indonesia is still dry of spiritual values, so the moral crisis and the loss of the value of honesty, the relationship between lecturers and students, only limited to the classroom, so that emotional closeness is reduced, this is a threat to the nation's generation. Especially at this time, Indonesia has just come out of the Covid-19 pandemic, which forced schools to implement distance learning (online). Without thinking about the humanism aspect, online learning also makes education dry, because learning is not just remembering and memorizing, but learning is a process that is characterized by a change in students. Spirituality activities in education provide goodness in learning, such as religious activities before the national exam will provide an injection of confidence, trust, honesty, motivation, which is a source of strength for students in facing it. The facts in the field show that the spirituality factor plays a very important role in learning, but it is only outlined in the curriculum. At most, it is only described in the core competencies in the learning objectives, which is very poor in practice (Hidayat, 2015). Science is derived from the Latin word scientia, whose literal meaning is knowledge, but then developed into a specific natural science or science, which is a collection of knowledge and processes. The process is the steps taken by scientists to conduct investigations in order to find explanations about natural phenomena. These steps are formulating problems, formulating hypotheses, designing experiments, collecting data, analyzing, and finally drawing conclusions. Science is the study of the vast natural world created by Allah SWT (Purwanto et al., 2020). Technology has enabled the creation of human beings through a container called an incubator. In this incubator, human chemical elements are dissolved and everything that affects them is monitored in such a way that a human child is born. If this cloning technology is applied to animals and plants, there would be no problem of propriety or decency. However, if the cloning technology is directed at humans, then the child will have difficulty answering questions about who its parents are, why it should be called a human created by Allah SWT instead of a human being, and what should be done to anticipate the birth of parentless humans in the future. The problem does not end here, but will continue and be complex, such as family ties based on blood relations, both

up, down and sideways (nasab), inheritance, all people who are forbidden to marry forever because of descent, breast-feeding and marriage in Islamic law (mahram), and others. Basically, Islam does not prevent every scientist's creativity and innovation from developing their research, but if the research crosses or intersects with the boundaries of the predetermined conditions then Islam prohibits it. Based on the facts and reasons that have been described above, in the future changes are needed in the education curriculum in Indonesia, especially in the learning process. The learning process is the main thing in modeling and transferring concepts. Future learning must be based on religion, process, science, application and meaning, so that students are formed who are independent in solving problems, have character and have a scientific attitude. These students are able to overcome multidimensional problems in the future, therefore it is necessary to develop a comprehensive science learning model (Kaffah) accommodating the concepts needed in future education. (Hindarto, 2013), the integration of character education in science learning is concluded to foster habits of scientific behavior in students. These attitudes include responsibility, honesty, cooperation, confidence, curiosity, and creativity. Kaffah learning model is inspired by problem-based learning, project learning and holistic approach. Problem-based science learning oriented to character education produces student activeness (Lidiana et al., 2018). Meanwhile (Hung, W., Jonassen, D. H., & Liu, 2008), stated that project learning was developed influential in improving the learning outcomes of students' cognitive aspects. Problem-based learning is actually the basis of the scientific approach in the 2013 curriculum. The process of discovering science concepts is a skill to find problems, put forward hypotheses then seek further information through research then draw conclusions and communicate the results of research. When compared with the stages of the scientific approach, namely observing, questioning, gathering information, associating/processing information, and communicating, it appears that problem-based learning inspires the scientific approach. One of the activities that can be taken is conducting experiments. Experimentation, students can gain direct experience about the nature of science with the discovery process. The discovery process makes students independent, self-disciplined, self-monitored, and improve their own thinking process. Students will more easily remember a concept if they see it directly, students even not only remember but understand a concept if they do it themselves through experiments. Through experiments, students can find problems, make hypotheses, conduct experiments to gather information, collect and analyze data, as well as find answers to the problems found (Gunada et al., 2023). Problems that arise through experiments are a very potential source of stimulation to learn more. With experiments, there will be a physics learning process that has a weighty scientific content (Afifah, G., & Wayan Gunada, 2020). This integration results in a Kaffah science learning structure with its syntax. Kaffah learning also integrates project learning. (Derevenskaia, 2014), project learning in school children's environmental education shows advantages over traditional forms of education in the form of classroom learning. This finding is emphasized by (Habók & Nagy, 2016), which says that groups of educators based on project learning have a positive perception of learning development, when compared to groups of teachers with traditional learning. In the 2013 curriculum and the independent curriculum, project learning is one of the recommended learning models. Educators as implementers in running the curriculum must understand this learning model well. This is reinforced by (Zhao et al., 2023), that project learning increases educators' understanding of curriculum standards and provides new insights into curriculum alignment research. One of the goals in the curriculum is to improve the character of students so that they can carry themselves in social interactions. (Alberto, J., Gonçalves, P., Arantes Do Amaral, J. A., & Hess, 2015), as project learning progresses, learners should know more about socially related projects, because (Rolina, 2014), the project method can be used in developing student character such as responsibility, and independence. Based on these findings, it is necessary to integrate project learning, problem-based learning with a holistic approach that is expected to give birth to a new learning model oriented to religion, process, application and

meaning. The specific purpose of this research is to form Kaffah students who are ready to spearhead the formation of a society that is knowledgeable, characterized and ready to become professional educators.

METHODS

This research is a research and development with the (Gale & Lingard, 2010)model.

Development Procedure

The research procedure to be conducted is in accordance with the Borg & Gall research and development model. In the main field testing stage, a combination of Borg & Gall model development research with experimental research (pretest-posttest control group design) was conducted with class IIIE PGMI State Islamic University (UIN) Mataram as the test class and class IIIJ PGSD University Mataram as the comparison class. This is done to strengthen the research results obtained because there is an independent comparison class with additional tests, namely independent t-test and MANOVA.

Feasibility Test of Kaffah Learning Instrument

The validity test data of the Kaffah Learning Instrument were obtained from six expert validators. The validated instruments consist of: a) Kaffah learning structure and its syntax; b) Kaffah learning implementation plan; c) Kaffah learning model book; d) Loving ALLAH with science book; e) Kaffah science kit book; f) Kaffah science kit; g) Metacognition questionnaire; h) Character questionnaire; i) Scientific attitude questionnaire; j) Kaffah question model; k) Student worksheet; l) Kaffah learning observation sheet; m) Syllabus. The validity value of the instrument is searched by the formula: Validity test is one of the feasibility tests of research instruments so that they are suitable for use on research variables. Validity test can be divided into three, namely construct validity test, content validity test and external validity test (Kumaidi, 2004; Lulu et al., 2022; Virtue et al., 2019). The decision criteria for validity testing refer to the following conditions: a) if rcount> rtable, then the statement item is said to be valid; b) if rcount < rtable, then the statement item is said to be invalid. The validity test data of the Kaffah learning instrument was obtained from six expert validators. learning implementation plan; c) Kaffah learning model book; d) loving ALLAH with science book; e) Kaffah science kit book; f) Kaffah science kit; g) metacognition questionnaire; h) character questionnaire; i) scientific attitude questionnaire; j) Kaffah question model; k) student worksheet; l) Kaffah learning observation sheet; m) syllabus. The reliability value of the instrument is sought using SPSS with the criteria for making reliability test decisions referring to the following conditions if the Crombach Alpha value is greater than the Sig. Comparison, then the statement can be said to be reliable. The table shows that all statements on the Kaffah learning structure instrument and its syntax are greater than the Sig value. Comparator, then this instrument is reliable. Reliability test is one of the tests of research instruments on the relationship between research variables. Instrument reliability test can be done by external or internal means. Externally can be done by test-retest, equivalent, and combined. While internally it can be measured by analyzing the consistency of the components of the components in the research instrument with certain techniques

Research Instruments

A research instrument is a tool used to collect data and measure observed phenomena (Supriadi, 2020). This research and development uses several instruments to collect data, namely: validation questionnaire, practicality questionnaire, Kaffah assessment test instrument, Kaffah learning observation sheet, response questionnaire, metacognition questionnaire, character questionnaire and scientific attitude questionnaire.

Data Collection Technique

Data collection techniques are ways used by researchers to collect data. According to Sugiyono (2014) data collection is the most important step in research, because research talks about data not just chatter.

Data Collection Technique

The data analyzed in this research and development is quantitative data. Data obtained from the assessment of validation questionnaires by experts and practitioners, response questionnaires of lecturers and students, Kaffah assessment instruments, metacognition questionnaires, character questionnaires, scientific attitude questionnaires and Kaffah learning observation sheets. Suprianto (2018), data analysis is intended to understand what is behind all the data, categorize it, summarize it into a compact and easy to understand

RESULTS AND DISCUSSION

Kaffah learning support consisting of reading materials (Kaffah Learning Models, Kaffah's Love of Allah with Science, Kaffah's Science Kits), tools (Kaffah's Science Kits), and Kaffah's learning tools; Kaffah's metacognitive assessment tools; Kaffah's character assessment tools; Kaffah's scientific attitude assessment tools; Kaffah's question model assessment tools; Kafka's work sheet assessment tools; Kafka's learning observation sheet assessment tools, Kaffah Questioning Model, Validity and Reliability of Kaffah Learning Devices, Feasibility of Kaffah Learning Devices, First Trial of Kaffah Questioning, Effectiveness of Kaffah Questioning, Product Trial Outcomes, Metacognition Questionnaire, Character and Scientific Attitude, Kaffah Learning Evaluation and Kaffah Learning Dissemination, then the discussion which consists of the development of Kaffah Learning Model, Feasibility of Kaffah Learning Model, Practicability of Kaffah Learning Model, Effectiveness of Kaffah Learning Model and Characteristics of Kaffah Learning Model.

Initial Study on Metacognition, Character and Scientific Attitude

Initial studies on metacognition, character and scientific attitudes were conducted on 102 PGMI UIN Mataram students in the even semester of the 2023/2024 academic year as shown in table 1.

Tabel 1. Student Data Semester 3 PGMI UIN Mataram

No	Class (PGMI UIN Mataram)	Students		Total
		Men	Women	
1.	2C	3	26	29
2.	2D	4	31	35
3.	2E	8	30	38
				102

The recapitulation of students' metacognition, character and scientific attitude is shown in Table 2.

Tabel 2. Recapitulation of Metacognition, Character and Scientific Attitude of Students

No	Variable	3C Class	3D Class	3E Class
1.	Metakognisi	2,25	2,32	2,23
2.	Character	3,34	3,30	3,26
3.	Scientific attitude	3,23	3,33	3,24
	Average	2,94	2,98	2,91

Table 2 shows the results of the first study of metacognition, character and attitude towards science in the third semester of classes C, D and E of PGMI UIN Mataram. Class 3E's average is lower than the other two.

Kaffah Learning Structure

As shown in Table 3, the notes of the expert validators give an indication of the structure of learning in Kaffah, namely.

Table 3. Notes from Expert Validators on the Kaffah Learning Structure

No.	Validator	Instance	Kaffah Learning Structure Notes
1.	Prof. Dr. Festiyed, M.S.	Universitas Negeri Padang (UNP)	The link to religion should inspire every step and aspect of Kaffah learning.
2.	Prof. Dr. H. Suhirman, S.Pd., M.Si.	Universitas Islam Negeri (UIN) Mataram	In the structure of Kaffah learning it is also important to consider: a) Delivery of learning objectives b) Feedback that helps students better understand the problems/questions that arise
3.	Dr. Gunawan, M.Pd.	Universitas Mataram	a) Consider the reason for selecting each component and include it in the appropriate section. b) Need to know what video will be shown, how many minutes long it will be, at which stage it will be shown c) The syntax can be adjusted so that word choice can be more consistent
4.	Prof. Dr. Joni Rokhmat, M.Si.	Universitas Mataram	a) Distinguished main and accompanying learning content b) When the learning context is ipa, then ipa becomes the main content c) related to point b outside of ipa, it becomes accompanying content d) the main content in the learning process must have a dominant duration portion e) related to point d above, each component of the learning structure needs to mention the percentage (%) of time provided
5.	Prof. Dr. H. Agus Ramdani, M.Sc.	Universitas Mataram	The delivery of religious aspects such as the words of ALLAH SWT, Hadith, stories of prophets and companions and inspirational stories should be more flexible.
6.	Prof. Dr. Aliefman Hakim, M.Si.	Universitas Mataram	Consider the timing of the application aspect as it contains several aspects that must be understood by learners

The structure of Kaffah Learning consists of the Main Stage, Learning Stages, Examples of Activities that can be done, and Kaffah Aspects. The main stages in Kaffah learning are initial activities, core activities, and final activities. The structure of Kaffah learning is shown in Table 4.

Tabel 4. Kaffah Learning Structure

Main stage	Learning Stage	Example	Kaffah Aspectg
Initial Activity	Introduction	Conveying the words of ALLAH SWT, Hadith, stories about the time of the Prophet or his companions, inspirational or true stories .	Religion
	Motivation	Demonstration using tools from the Kaffah Science Kit or tools created by educators, stories/events, playing videos, presenting phenomena, reviewing previous lessons, observing technical applications in the environment, communicating objectives, exploring initial knowledge (apperception).	Process
Central Activity	Problem formulation	Formulate and write down questions or problems about the learning topic,	
	Alleged	Ask Opinion	
	Activities	Review the Quran and Hadith, experiment, play/simulate, collect materials to compare or classify, check how technical equipment works	
	Observation	Observation	
	Problem Solved	Explanation (guessing-discussion), rationale, formulation of conclusions	Concept
		Explanation by educator (if needed)	
Final Activity	Apply	Concept links to technology, environment, art, and math	Application
	Interpreting	Explaining the application of concepts in accordance with the environment and the lives of students, interpreting the concept of the Al-Quran perspective, interpreting the concept of the Hadith perspective, interpreting formulas/concepts	Meaning

Kaffah Learning Structure is a guideline for educators in developing learning that will be carried out. Educators should allocate a larger proportion of the total learning hours to core activities, namely 60%, initial activities 15% and final activities 25%, in accordance with the main stages of learning, namely initial activities, core activities and final activities.

Kaffah Learning Syntax

Based on the structure of Kaffah learning in table 4, we found the steps of learning activities (syntax) when teaching with Kaffah learning, as in table 5.

Tabel 5. Kaffah Learning Syntax

Phase	Learning Activity Steps	Learning Stage
1	Observation	Introduction & Motivation
2	Asking	Problem Solve
3	Guessing	Guessing
4	Doing	Activity
5	Summarize	Answering Question
6	Apply	Apply
7	Interpreting	Interpreting

The syntax of Kaffah Learning does not limit educators' innovation and creativity in developing learning, but gives them flexibility in planning their learning. The expert validator's notes on the Kaffah Learning Implementation Plan provide inspiration for determining the phases of Kaffah Learning. The expert validator notes in Table 6 are

Tabel 6. Notes from Expert Validators on Kaffah Lesson Plans

No.	Validator	Instance	RPP Kaffah Note
1.	Prof. Dr. Festiyed, M.S.	Universitas Negeri Padang (UNP)	For Kaffah learning in the application aspect, if there is insufficient time, it should be assigned in the form of a project.
2.	Prof. Dr. H. Suhirman, S.Pd., M.Si.	Universitas Islam Negeri (UIN) Mataram	The instrument for assessing the feasibility of lesson plans for Kaffah learning must be comprehensive and cover these aspects, and can be adapted to the context of educational institutions with relevant education levels..
3.	Dr. Gunawan, M.Pd.	Universitas Mataram	a) There are some tools and materials that have not been listed but are present in the experimental activities carried out b) Some pictures do not have names and numbers, for pictures include the source if the picture is taken from a certain website c) Some words/sentences need to be adjusted d) Try to be more consistent with the use of the terms educator, student, lecturer, educator and so on..
4.	Prof. Dr. Joni Rokhmat, M.Si.	Universitas Mataram	a) Objective formula aspect "c" in ABCD format is missing b) Terminology of facilities and learning subjects c) In the investigation process, it would be good if a graphic approach is added d) back to the main and supporting content, there needs to be a time duration in the lesson plan in considering the priority portion of learning

			e) There are still wrong pictures, an example I got in the lifting force lesson plan f) The challenge of how to universalize Kaffah values so that they can be generally accepted, for example when implemented in schools whose religious basis is other than Islam g) The pictures should be numbered
5.	Prof. Dr. H. Agus Ramdani, M.Sc.	Universitas Mataram	The stages in the lesson plan show the process of discovering the concept to be obtained.
6.	Prof. Dr. Aliefman Hakim, M.Si.	Universitas Mataram	Lesson plans are contextual and relevant to learners' lives.

Supporting Kaffah Learning

The Kaffah learning model book is intended for educators as examples and guidelines in implementing and developing Kaffah learning. The systematics of this book consists of how to use the book, messages and suggestions for educators, the structure and syntax of Kaffah learning, Kaffah learning models on the concept of fluids, material about fluids, questions about fluids. The Kaffah learning model book is a research book, has been used in limited and wide-scale trials and is expected to be used by educators in teaching. This book is organized according to the flow of logic, presented in formal language and discusses one field of science. This book can be used as a reference in writing reference books. The book Loving ALLAH with Science is intended for students to increase their knowledge about describing fluid science, Quranic verses about fluid, the relationship between the two, the perspective of fluid on natural law and the wisdom of studying science. The systematics of this book consists of a description of fluid science, concepts and laws on static fluids, concepts and laws on dynamic fluids, Quranic verses on fluids, the relationship between fluids and Quranic verses, fluid perspectives on natural laws and the wisdom of the study of science. This book presents ALLAH's messages in the universe that are scientifically studied in science. These messages are contained in ALLAH's words in the Qur'an. The best among you are those who study and teach the Qur'an. This book studies theoretical physics about fluids which are then connected to what is found in the Qur'an and Hadith. Alhamdulilah, today there are many scientific findings in the field of science that show evidence of the truth of the Qur'an, one of which is this fluid concept. The Kaffah science kit book is a support for Kaffah learning. This book contains an introduction to the equipment and instructions for simple experiments that can be done using inorganic materials that are easily obtained from the surrounding environment. The systematics of this book consists of the classification of tools in the Kaffah science kit, recommendations for science experiments on the Kaffah science kit and how to make science equipment for the experiment. Kaffah science kits are created to assist educators in providing Kaffah learning. In accordance with its definition, a kit is a box that contains equipment and is easy to carry (portable). Kaffah science kit means a box that contains Kaffah learning equipment and is easy to move or carry into the classroom, laboratory and to other learning locations. This Kaffah science kit box contains tools and materials that can be used by educators in teaching science with Kaffah learning and become tools and materials for group work for students. The Kaffah science kit contains tools and materials that can be grouped into: 1) posters of science concepts; 2) posters of Kaffah aspects; 3) Qur'anic verses about fluid; 4) newspaper clippings; 5) games; 6) simple tools; 7) Kaffah science kit books; 8) short stories; 9) posters of metacognition, character and scientific attitudes. These nine groups of tools and

materials can be put in a box and designed to be easy to pick up, safe and organized to make it easier for educators or students to pick up and return them. Experiments that can be done by utilizing the Kaffah science kit are: 1) pressure; 2) floating and sinking; 3) simple submarine; 4) air pressure water pump; 5) simple barometer; 6) magic egg; 7) air pressure rocket; 8) paper airplane; 9) simple helicopter; 10) simple waterwheel; 11) density; 12) airplane lift; 13) Bernoulli's principle; 14) hydrostatic pressure; 15) continuity principle; 16) hydraulic jack; 17) simple scales. The kaffah learning tools produced by one of the forms of preparation made by an educator before learning are in the form of learning tools. These devices are used as guidelines and pedagogical aids in conducting learning. The kaffah learning tools produced in the form of syllabus, kaffah lesson plans and student worksheets.

Kaffah Problem Model

The Kaffah Question Model is a question with questions related to: 1) the connection between science and religion; 2) the process of science; 3) scientific concepts; 4) applications of scientific concepts; 5) the significance of scientific concepts. The connection between science and religion includes fluid science in the Qur'an, Hadith, inspirational or real stories. The process of science involves the ability to formulate problems, make hypotheses, carry out activities, make observations, and draw conclusions. Science concepts are concepts gained in accordance with the learning objectives. The application of concepts is the application of concepts to technology, environment, art, and mathematics, while the meaning of science concepts is a fluid perspective on natural law where the fluid concept proves the truth of the Qur'an, the meaning of science formulas in life, and the application of concepts in the students' environment so that they feel the meaning directly.

Kaffah Problem Model

The developed Kaffah learning will be evaluated by expert lecturers, facilitators and cofacilitators. The expert lecturers came from Padang State University (UNP), Mataram State Islamic University (UIN) and Mataram University. The results of the assessment of expert lecturers, promoters and co-promoters are used as the basis for declaring the product feasible or not feasible for use in learning. Product validation is done to determine the level of validity or reliability of the product. This means that the instrument is said to be valid if it is able to measure what is desired. The products validated are: a) Kaffah Learning Structure and its syntax; b) Kaffah Learning Implementation Plan; c) Kaffah Learning Model Book; d) Loving ALLAH with Science Book; e) Kaffah Science Kit Book; f) Kaffah Science Kit; g) Metagcognition Questionnaire; h) Character Questionnaire; i) Scientific Attitude Questionnaire; j) Kaffah Question Model; k) Student Worksheet; l) Kaffah Learning Observation Sheet. The results of the expert validation can be described as follows. Kaffah Learning Structure and Syntax, Degree of freedom is df = n-2 = 6-2 = 4 so that the r table value is 0.729. The decision-making criteria for the validity test refer to the following conditions: a) if rcount> rTable, then the statement item is said to be valid; b) if rcount < rTable, then the statement item is said to be invalid. The table shows that all statements on the Kaffah learning structure instrument and its syntax are greater than 0.729, so this instrument is valid. Kaffah Learning Implementation Plan, Degree of freedom is df = n-2 = 6-2 = 4 so that the r table value is 0.729. The criteria for making validity test decisions refer to the following conditions: a) if rcount> rTable, then the statement item is said to be valid; b) if rcount < rTable, then the statement item is said to be invalid. The table shows that all statements on the Kaffah Learning Implementation Plan instrument are greater than 0.729, so this instrument is valid. The result of the validity test of the Kaffah learning plan with degrees of freedom is df = n-2 = 6-2 = 4, so the value of r table is 0.729. Kaffah Learning Model Book, the criteria for making validity test decisions refer to the following conditions: a) if rcount> rTable, then the statement item is said to be valid; b) if rcount < rTable, then the statement item is said to be invalid. The table above shows that all statements on the Kaffah learning implementation plan instrument are

greater than 0.729, so this instrument is valid. The book Loving GOD with Science, Degree of freedom is df = n-2 = 6-2 = 4 so that the r table value is 0.729. The criteria for making validity test decisions refer to the following conditions: a) if rcount> rTable, then the statement item is said to be valid; b) if rcount < rTable, then the statement item is said to be invalid. The table above shows that all statements in the Kaffah learning model book and its syntax are greater than 0.729, so this instrument is valid. Kaffah Science Kit Book, The degrees of freedom are df = n-2 = 6-2 = 4, so the value of rTable is 0.729. The decision criteria for the validity test refer to the following conditions: a) if rcount> rTable, then the statement item is said to be valid; b) if rcount < rTable, then the statement item is said to be invalid. The table above shows that all the statements on the Kaffah science kit book instrument are greater than 0.729, so this instrument is valid. Kit Sains Kaffah, Degree of freedom is df = n-2 = 6-2 = 4 so that the r table value is 0.729. The decision-making criteria for the validity test refer to the following conditions: a) if rcount> rTable, then the statement item is said to be valid; b) if rcount < rTable, then the statement item is said to be invalid. The table above shows that all statements on the Kaffah science kit instrument are greater than 0.729, so this instrument is valid. Metacognition Questionnaire, Degree of freedom is df = n-2 = 6-2 = 4 so that the r table value is 0.729. The decision-making criteria for the validity test refer to the following conditions: a) if rcount> rTable, then the statement item is said to be valid; b) if rcount < rTable, then the statement item is said to be invalid. The table above shows that all statements in the metacognition questionnaire instrument are greater than 0.729, so this instrument is valid. Character Questionnaire, Degree of freedom is df = n-2 = 6-2 = 4 so that the r table value is 0.729. The decision-making criteria for the validity test refer to the following conditions: a) if rcount> rTable, then the statement item is said to be valid; b) if rcount < rTable, then the statement item is said to be invalid. The table above shows that all statements in the character questionnaire instrument are greater than 0.729, so this instrument is valid. Scientific Attitude Questionnaire, Degree of freedom is df = n-2 = 6-2 = 4 so that the r table value is 0.729. The criteria for making validity test decisions refer to the following conditions: a) if rcount> rTable, then the statement item is said to be valid; b) if rcount < rTable, then the statement item is said to be invalid. The table above shows that all statements on the Kaffah learning structure instrument and its syntax are greater than 0.729, so this instrument is valid. Kaffah question model, Degree of freedom is df = n-2 = 6-2 = 4 so that the r table value is 0.729. The decision-making criteria for the validity test refer to the following conditions: a) if rcount> rTable, then the statement item is said to be valid; b) if rcount < rTable, then the statement item is said to be invalid. The table above shows that all statements on the Kaffah question model instrument are greater than 0.729, so this instrument is valid. Student Worksheet, Degree of freedom is df = n-2 = 6-2 = 4 so that the r table value is 0.729. The decision-making criteria for the validity test refer to the following conditions: a) if rcount> rTable, then the statement item is said to be valid; b) if rcount < rTable, then the statement item is said to be invalid. The table above shows that all statements on the student worksheet instrument (LKMCG) are greater than 0.729, so this instrument is valid. Kaffah Learning Observation Sheet, Degree of freedom is df = n-2 = 6-2 = 4 so that the r table value is 0.729. The decision-making criteria for the validity test refer to the following conditions: a) if rcount> rTable, then the statement item is said to be valid; b) if rcount < rTable, then the statement item is said to be invalid. The table above shows that all statements on the Kaffah learning observation sheet instrument are greater than 0.729, so this instrument is valid. Kaffah learning that has been developed is assessed by expert lecturers, promoters and co-promoters. Expert lecturers came from Padang State University (UNP), Mataram State Islamic University (UIN) and Mataram University. The results of the assessment of expert lecturers, promoters and co-promoters are used as a basis for declaring the product feasible or not feasible to use in learning. Product reliability is carried out to determine the extent to which measurements remain consistent after being carried out repeatedly on the subject and under the same conditions. This means that the instrument is said

to be reliable if used to measure the same right at different times the results will be the same or close to the same. The assessed products are: a) Kaffah learning structure and its syntax; b) Kaffah learning implementation plan; c) Kaffah learning model book; d) loving ALLAH with science book; e) Kaffah science kit book; f) Kaffah science kit; g) metagcognition questionnaire; h) character questionnaire; i) scientific attitude questionnaire; j) Kaffah question model; k) student worksheet; l) Kaffah learning observation sheet.

Effectiveness Test

Effectiveness is a condition that shows the level of success or achievement of a goal as measured by quality, quantity and time in accordance with what was previously planned. The effectiveness test is a test conducted on the product that has been developed by involving potential users of the product. The product developed in the form of Kaffah learning is validated and then implemented in learning. The implementation of Kaffah learning was carried out in the form of a limited trial on third semester students of class E PGMI UIN Mataram, totaling 38 people. This trial was conducted to determine the effectiveness of Kaffah learning on fluid concepts on metacognition, character and scientific attitudes of students.

Evaluation of Kaffah Learning

The moderation technique applied to prospective students of PGMI UIN Mataram is able to explain what their responses and opinions are and very meaningful input on Kaffah science learning. This technique appreciates all the proposed thoughts from them, there are no prospective students who have no opinion so that it can be an indicator of the implementation and quality of Kaffah science learning. The results of the evaluation of Kaffah science learning by using moderation techniques get a meaningful overview and input in the implementation and improvement of the quality of Kaffah science learning.

Kaffah science project is conducted as an alternative to Kaffah learning that has not had time to do activities for the application aspect. This Kaffah science project uses project-based learning. The tasks given to students are project-based, as for the steps are: 1) preparing questions or project assignments, this stage is the first step for students to observe more deeply the questions that arise from existing phenomena; 2) designing project planning, as a real step to answer existing questions, a project plan is prepared; 3) preparing a schedule as a real step of a project; 4) monitoring project activities and developments; 5) testing and providing assessments of projects made. In accordance with the Kaffah learning that has been carried out, there are 6 Kaffah science projects divided into six groups, namely group 1) simple submarine project; group 2) hydraulic jack project; group 3) air pressure water pump project; group 4) simple barometer project; group 5) airplane lift project and group 6) water rocket project. Students make their project reports with systematics 1) project title; 2) project objectives; 3) tools and materials; 4) Images of tools; 5) how to make; 6) procedures for use; 7) explanation of religion, concepts of science, technology, environment, art and mathematics.

Dissemination of Kaffah Learning

The dissemination of Kaffah learning development research products was carried out in five places representing various schools, namely PGMI UIN Mataram, PGSD University of Mataram, Aletheia Christian Elementary School, Pesantren Alam Sayang Ibu and SDN 23 Cakranegara. Dissemination at PGMI UIN Mataram is given to all third semester students so that the dissemination of research products is more effective because product testing is also carried out in one of the classes in this semester. The number of students in this dissemination activity was 74 people.

Fluids in the Quran

The best among you are those who study and teach the Qur'an. This section presents scientific theories about fluids and relates them to those found in the Qur'an and Hadith. One of the branches of science is physics. Physics is a science that seeks to formulate and take into

account all its dimensions (size / units) as well as science in general, understand and witness the behavior or character of nature outlined or determined by ALLAH who created this universe through the natural laws of empirical laws of physics. Through the empirical laws of physics even physicists can develop the problem of natural processes to build human civilization through the development of science and technology, in the Qur'an itself has been stated that ALLAH spread out the earth and made it mountains and immediately grew everything according to size.

This is the nature of nature and this is the natural system that has been created by the Creator, namely ALLAH SWT, in confronting the thoughts that underlie all efforts and various conceptions in the field of physics in the teachings of the Qur'an, we will study several verses that are relevant to the development of physics itself. It is very important to consider that we study physics not only limited to the analysis of physical facts alone, but also need to understand what is the wisdom behind it all.

Physics as a science can only reveal physical or real symptoms, but physics is not able to scientifically investigate things that are occult or not physical. So in evaluating or understanding the Qur'anic verse, physics can only study specific verses about fluid in the parentheses of the real world, but physics is not able to examine or study the verses of the Qur'an related to the invisible or the hereafter. In Sharia, the Qur'an is the holy book of Islam and in Islam is taught the guidelines for human life in the real world to the unseen world, so physics is only able to study part of the study of Islam, the study of Islam is broader than the study of science.

ALLAH SWT is the omniscient of all His creations and human beings are given very little knowledge. on this basis, Islamizing science is more appropriate than typifying Islam. It's wrong to typify Islam, Islamizing philosophy is more meaningful than philosophizing Islam. Islamic philosophy is not a philosophy of science because man must be aware and realize that human knowledge is limited. by realizing this, man even though working scientifically as a scientific expert will glorify ALLAH for His greatness and power.

Kaffah Fluids

Kaffah's fluid concept means that students gain overall competence in a fluid concept. Comprehensive competence is illustrated in the Kaffah aspects of religion, process, concept, application, and meaning. The combination of Islam and science contains three messages for students, teachers and people. First, the Qur'an teaches that learning science is not only to develop science, but also to instill, grow, and develop the character of students, teachers, and people. They are expected to recognize the Creator of nature and all its phenomena through the laws of nature and the scientific theories they learn. The recognition of ALLAH through scientific studies is expected to make students, lecturers and people feel astonished or amazed about HIM. This feeling makes them believe in Him and obey Him so that it affects their character in everyday life. Second, the cultivation of character in students is not done by teaching doctrine alone; character and positive attitudes cannot be imparted by lectures alone, but must be imparted. It requires a model for students to imitate. Characters that are planted by modeling become strong and not easily shaken. The Qur'an dialogues with people through their minds about the truth of Islam and all its teachings, using the media in the form of nature and all the phenomena that occur to it. Third, integrated learning of science and Islam is a very good learning model. This learning provides students with two important knowledge, namely Islam and science. Therefore, teachers and other educators are expected to adopt this learning model. Kaffah learning is an example of a model that develops such integration, because in Kaffah learning the aspects of religion, process, application, and meaning are combined to obtain comprehensive learning that arises from the motivation of the Qur'an. The Qur'an talks about natural phenomena that are associated with faith and Shari'ah that have an impact on character. Natural phenomena or science is only a medium in character cultivation. This

integrated learning of science, especially with religion, is very relevant to the goals of national education. Law No. 20 of 2003 on the National Education System states, among other things, that the purpose of education is to train people with faith, devotion, and noble character. This goal is achieved through comprehensive learning (Kaffah) with a combination of religion, process, science, application, and meaning. Teachers should be able to explain the aspects contained in the learning material so that the material presented can lead students to the formation of their character. This makes the integration of science, religion, process, application, and meaning a necessity. This model is not only being used, but is being developed. One model that has been developed is the Kaffah Learning Model.

Discussion

The development stage of the Kaffah learning model begins with conducting an initial study of students' metacognition, character, and scientific attitudes. The results of distributing questionnaires to third semester students in classes C, D and E of PGMI at the State Islamic University (UIN) Mataram, the average of class 3E is lower than classes 3C and 3D, namely 2.91 against 2.94 and 2.98 on a scale of 4. This stage provides input for designing and planning the developed product because this stage provides an overview of metacognition, character and scientific attitudes of students. This stage is also the basis for determining the class for product testing, namely class 3E, which has the lowest average. The second stage is the design of the product to be developed. Mulyatiningsih (2016) explains that in the planning stage, researchers have created initial products (prototypes) or product designs. The product designed is the Kaffah learning model to improve students' metacognition, character, and scientific attitudes. At this stage, the researchers also designed Kaffah learning tools and other support devices. The third stage is the product development stage. At this stage, the Kaffah learning model is built and ready to be validated before use. The validation results become the basis for product improvement before being used in learning. The fourth stage is testing, testing is done in the place where the research takes place. The developed product was tested for practicality and effectiveness of the product. This product was tested on students of the 3E PGMI class at the State Islamic University (UIN) Mataram, a total of 38 people. The result is that Kaffah learning model is able to improve students' metacognition, character and scientific attitude. The final stage is the revision of the final product, this stage usually takes place during the product development process, each input from the promoter and validator is followed up to produce a better product than before. Kaffah aspects include religion, process, science, application and meaning, which means that in a concept found in learning students get the concept's connection to religion, the process of getting it, science, applications that include technology, environment, art and mathematics, and meaning, which is associated with explaining the application of concepts according to the environment in which students live, interpreting the concept from the Quran / Hadith perspective and interpreting the formula. The Kaffah Learning Model provides all of this for each concept taught. The development of the Kaffah Learning Model begins with the creation of its learning structure. The Kaffah learning structure consists of the main stage, the learning stage, the selection of activities that can be done, and the Kaffah aspect. The main stage includes initial activities, core activities and final activities. The learning stages in the initial activities are introduction and motivation, core activities are problem formulation, hypotheses, activities, observations, and final activities are informing the connection of concepts with religion, technology, environment, art and mathematics and explaining their meaning. Each activity in the core stage has a purpose. The initial activity is designed to motivate students to participate in the learning that will take place. In this initial activity, it is preceded by conveying the word of ALLAH SWT / hadith / story / inspirational story / real story and then proceeding with motivational activities. There are several activities that teachers can choose to motivate students, including demonstrations with tools in the Kaffah Science Kit or tools made by the teacher; stories/events; playing videos related to concepts; presenting

phenomena; reviewing previous lessons; observing technical applications in the environment; conveying goals or exploring initial knowledge (apperception). This activity provokes students to ask questions, which are learning problems that will be carried out. The emergence of problems is an indicator that educators are beginning to move into core activities. Problems need to be formulated and written on the board. The problem should not be answered directly by the educator, the educator asks for hypotheses from the students, the hypothesis should not be justified and blamed, but accommodated, if necessary, rewarded. Teachers continue to guide students through activities to answer problems. Through observation, explanation by students (guessing-discussion), and reasoning, students are expected to be able to come to conclusions. The conclusions obtained answer the problems that arose at the beginning of the core activities. After the conclusion is reached, the teacher looks at the students to see if they understand the conclusions reached. If students are still noisy and ask a lot of questions here and there, it indicates that there are still many students who do not understand, which means that an explanation by the teacher is needed. The final activity is characterized by an explanation of the application of the concepts and their meaning in everyday life and from the perspective of the Qur'an / Hadith. Based on the validated Kaffah learning structure, seven phases of Kaffah learning syntax were found, namely: observing, questioning, guessing, doing, concluding, applying and interpreting. This syntax does not limit the innovation and creativity of educators in teaching but on the contrary, because of the phases actually implied activities that can be selected. For example, in the observing phase in this phase based on the Kaffah learning structure, there are several alternative activities that can be chosen by educators such as conveying the words of ALLAH SWT, hadith, stories about stories in the days of the Prophet or his friends, inspirational or real stories, demonstrations with tools in the Kaffah science kit or tools made by educators, stories / events, play videos related to concepts, present phenomena, review previous lessons, observe technical applications in the environment, convey goals or explore initial knowledge (apperception). So the Kaffah learning syntax provides flexibility for educators to innovate and be creative in teaching, because learning is not something rigid but learning is an art. Learning as an art is the result or process of work and ideas that involve skillful, creative, sensory sensitivity, sensitivity of heart and mind that produce beautiful, harmonious and valuable works. The product validation stage is the stage of assessing the feasibility of the product design developed. Validation was carried out by six expert validators. The product developed is a Kaffah learning model along with its supporting devices. Product feasibility is assessed based on product construction, content and language. The assessment includes validation of Kaffah learning structure and its syntax, Kaffah lesson plan, Kaffah learning model book, loving GOD with science book, Kaffah science kit book, Kaffah science kit, metacognition questionnaire, character questionnaire, scientific attitude questionnaire, Kaffah question model, student worksheet, and Kaffah learning observation sheet. Suggestions and input from validators as the main basis in revising the product to get a product that is feasible and can be used in learning (Mahromah et al., 2018). Products and learning devices are said to be feasible if they fulfill content and construct validation (Ramadhani, 2023). The educator's response is intended to determine the practicality of the product that has been developed. This educator's response is related to the observation of the implementation of learning in the classroom with the Kaffah learning model on fluid material. Observation of the implementation of learning using the Kaffah learning model was carried out six times in class. The aspects assessed during the Kaffah learning process include religion, science, application, meaning, educator activities, and the use of Kaffah science kits. The results of observations of the implementation of Kaffah learning in the category of very practical. The practicality aspect according to (Nieveen, 1999) is fulfilled if the expert validator states that what is developed can be applied. Reality shows that what is developed can be applied. Student responses are intended to determine their impression of the Kaffah learning model on fluid material that has been developed. The aspects assessed are classified into 3

indicators, namely happy, easy to understand, and useful. Students' metacognition can be said to be increasing by looking at the results of the initial test and the final test of the students' metacognition instruments. The test is given in the form of a description with a maximum score of five and a minimum score of zero. The test was given to 38 students of the experimental class (experiment) class 3E PGMI State Islamic University (UIN) Mataram. The total score of the initial test was 339 and the final test was 1177 with an N-gain value of 0.710 with a high category. These results are supported by the distribution of metacognition questionnaires with N-Gain results of 0.77 in the high category. An independent t-test was performed to determine the mean difference between two samples. The difference indicates the effect of learning Kaffah on students' metacognition. The comparison class is class 3J PGSD Mataram University with 27 students. The total score of the initial test was 272 and the final test was 739 with an N-gain value of 0.576 with a moderate category. Independent t-test results of two samples on student metacognition obtained sig value. 0.001, which means the value of siq. <0.05 then Ho is rejected and Ha is accepted, that is, there is a difference in the metacognition ability of the test class (experimental) with the comparison class. The result is that learning Kaffah improves students' metacognition. The N-gain results of the comparison class are in the medium category, the researcher assumes that this happens because the comparison class is not given any treatment at all, so they are not used to Kaffah learning. Students' scientific attitudes can be said to increase by looking at the results of the initial test and the final test of the student scientific attitude instrument. The test was given in the form of a description with a maximum score of five and a minimum score of zero. The test was given to 38 students of the experimental class 3E PGMI State Islamic University (UIN) Mataram. The total score of the initial test was 372 and the final test was 1211 with an N-Gain value of 0.725 with a high category. These results are reinforced by the distribution of metacognition questionnaires with N-Gain results of 0.63 in the medium category. Independent t-test was conducted to determine the average difference of two samples. The difference indicates the effect of Kaffah learning on students' scientific attitudes. The comparison class is class 3J PGSD Mataram University with 27 students. The number of initial test scores is 300 and the final test is 750 with an N-Gain value of 0.575 with a moderate category. Independent t-test results of two samples on student metacognition obtained sig value. 0.000, meaning the value of siq. <0.05 then Ho is rejected and Ha is accepted, that is, there is a difference in the ability of the scientific attitude of the test class (experimental) with the comparison class. The result is that Kaffah learning improves students' scientific attitudes. The N-Gain results of the comparison class are in the medium category, the researcher's assumption is that this happens because the comparison class is not given any treatment at all so it is not used to Kaffah learning. The effect of Kaffah learning model on metacognition, character and scientific attitude of students is seen by conducting manova test. The difference between the two classes between the experimental class and the comparison class indicates the effect of Kaffah learning in improving students' metacognition, character and scientific attitude. Based on the results of the manova test on the metacognition test data, character and scientific attitudes of students, the sig. value on all measurement indicators according to Pillai's Trace, Wilk's Lambda, Hotelling's Trace and Roy's Largest Root is 0.000, so the sig value. <0.05, it can be said that Ho is rejected and Ha is accepted. This means that there are differences in metacognition, character and scientific attitudes due to Kaffah learning between the experimental and comparison classes. So the Kaffah learning model is able to improve metacognition, character and scientific attitudes of students. Kaffah learning is learning that provides comprehensive competence to students for one concept obtained. Kaffah aspects obtained by students are religion, process, science, application and meaning. The concepts obtained in learning are discussed from a religious point of view, namely the Qur'an, hadith, stories / stories at the time of the apostle and companions, inspirational / real stories. This is inspired by the holistic approach that maximizes students' abilities from all aspects in harmony including spiritual, intellectual, physical,

emotional, social and aesthetic. According to Krupar & D'Sa (2024), the holistic approach also identifies learners' learning needs so that educators can provide appropriate learning to learners according to their needs. Hassan et al. (2010), Islamic education, holistic approach and Islamic education philosophy, this integration will be able to achieve every aspect of life. The results of comprehensive research data analysis become a reference for the development of the Kaffah learning model. Considering the characteristics of the Kaffah learning model, advantages, limitations and ways to overcome limitations and pay attention to effective, fun and meaningful learning, a hypothetical model of Kaffah learning can be designed by developing the main stages of learning, namely: (1) Initial activities; (2) Core activities; and (3) Final activities.

From the three development focuses above, it can be formulated comprehensively in the form of a learning structure as follows: (1) Broadly speaking, the Kaffah learning model has learning stages in the initial activities, namely: (a) introduction and (b) motivation; (2) Core activities, namely: (a) problem formulation, (b) conjecture, (c) activities, (d) observation, (e) answers to problem solving questions; (3) Final activities, namely: (a) applying, and (b) interpreting. The Kaffah learning structure serves as a guideline for educators who will develop their learning to stay on track. This structure inspires the phases in the Kaffah learning model, namely: (1) observing; (2) questioning; (3) guessing; (4) doing; (5) concluding; (6) applying and (7) interpreting. These phases seem to limit the creativity and innovation of educators, but actually not at all because in each phase there are various alternative activities that can be chosen by educators in creating and innovating in their learning. The structure of Kaffah learning and its syntax is what is called the Kaffah learning model. The results of the analysis of the initial test and the final test found that there was an increase in metacognition, character and scientific attitudes of students in class IIIE PGMI State Islamic University (UIN) Mataram as in table 4.63 with a high category. Modeling results in increased metacognition of students in class III E PGMI State Islamic University (UIN) Mataram. The aspects that most influence the improvement of metacognition are religion, process and application. The religious aspect is the internalization and appreciation of an individual for religious values that are believed in the form of obedience and understanding of these values to be implemented in daily behavior. For Muslims, the basic bonds that are held and obeyed as guidelines for human life are the Al-Qur'an and Hadith. The process aspect is a series of steps or actions taken to achieve certain goals. The process carried out in the scientific-based Kaffah aspect is in accordance with the syntax of observing, questioning, guessing, doing and concluding. These scientific stages form the mindset of students in solving problems systematically and independently. Applications in the Kaffah aspect consist of technology, environment, art, and mathematics. This aspect provides a comprehensive competency in the field of science discovered and will increase students' knowledge in problem solving. Technology is the overall means to provide goods necessary for the survival and comfort of life. The environment is the space used for activities and living including water, soil, air, solar energy, minerals, and flora and fauna that grow on the land and in the oceans. Art is all things created by humans that contain elements of beauty and can affect one's feelings, while mathematics is a science that includes the study of topics such as numbers, formulas, structures, shapes and spaces. This comprehensive knowledge supports the metacognition of students who receive Kaffah learning modeling. The research recommends a Kaffah learning model that includes its structure and syntax. This model is supported by supporting tools and learning tools. Supporting devices consist of reading materials and equipment such as Kaffah learning model books, loving GOD with science books, Kaffah Science Kit books and Kaffah Science Kits. Learning tools consist of syllabus, lesson plan (rpp), student worksheets and Kaffah question models.

CONCLUSIONS

According to results of research and discussion, developed learning model is valid and reliable as judged by expert validators and is suitable for improving metacognitive, character and scientific attitude of students. The developed Kaffah learning model is classified as practical based on the implementation of Kaffah learning and students' responses. The developed Kaffah learning model is effective in improving students' metacognition, character and scientific attitudes. The Kaffah learning model is valid, reliable, practical and effective, so it is feasible to use in learning. The Kaffah learning model includes a Kaffah learning structure which has five aspects, namely 1) Religion, with a choice of activities that can be done: conveying the words of ALLAH SWT / Hadith, stories about stories at the time of the Prophet / his friends, inspirational / real stories; 2) Process, with learning stages: Motivation, Problem Formulation, Hypothesis, Activity, and Observation; 3) Science, with learning stages of explanation by students (guessing-discussion), rationale, and formulation of conclusions; 4) Application, by giving project assignments to find concept links with technology, environment, art, and mathematics; 5) Meaning, with learning stages of explaining the application of concepts in accordance with the environment and life of the students, interpreting the concept from the Qur'an/Hadith perspective, and interpreting formulas/concepts. 6. The syntax of the Kaffah learning model has seven phases, namely 1) Observing; 2) Questioning; 3) Guessing; 4) Doing; 5) Concluding; 6) Applying; and 7) Meaning. The connection between the Kaffah learning structure and its syntax lies in the observing phase, which includes the introduction and motivation learning phases, questioning includes the learning phase of formulating learning questions, guessing includes the guessing learning phase (asking students' opinions), doing includes the activity learning phase, concluding includes the learning phase of answering questions, applying includes the teaching phase of applying, and interpreting includes the learning phase of interpreting.

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REFERENCES

A, S., Sarjan, M., Rokhmat, J., Arizona, K., Sucilestari, R., Syahidi, K., Syamsuddin, S., & Mertha, I. G. (2022). Kebermaknaan Fisika Kuantum Sebagai Solusi Membangun Karakter Peserta Didik. *Jurnal Ilmiah Profesi Pendidikan*, *7*(2b), 672–679. https://doi.org/10.29303/jipp.v7i2b.555

Afifah, G., & Wayan Gunada, I. (2020). Pengembangan Model Pembelajaran Student Oriented dalam Meningkatkan Kemampuan Pemecahan Masalah Fisika Peserta Didik. *In Kappa Journal (Vol. 4, Issue 2)*.

Alberto, J., Gonçalves, P., Arantes Do Amaral, J. A., & Hess, A. (2015). *Creating a Project-Based Learning Environment to Improve Project Management Skills of Graduate Students. 3(2), 2015–2120*. https://doi.org/https://doi.org/10.5278/ojs.jpblhe.v0i0.1178

Derevenskaia, O. (2014). Active Learning Methods in Environmental Education of Students. *Procedia - Social and Behavioral Sciences*, *131*, 101–104. https://doi.org/10.1016/j.sbspro.2014.04.086

Gunada, I. W., Wahyudi, W., Ayub, S., Taufik, M., & Busyairi, A. (2023). Validitas Perangkat Model Project Based Learning Berbasis STEM pada Pokok Bahasan Perubahan Energi untuk Meningkatkan Sikap Ilmiah. *Empiricism Journal*, *4*(1), 134–144. https://doi.org/10.36312/ej.v4i1.1287

Habók, A., & Nagy, J. (2016). In-service teachers' perceptions of project-based learning. *SpringerPlus*, *5*(1), 83. https://doi.org/10.1186/s40064-016-1725-4

Hassan, A., Suhid, A., Abiddin, N. Z., Ismail, H., & Hussin, H. (2010). The role of Islamic philosophy of education in aspiring holistic learning. *Procedia - Social and Behavioral Sciences*, *5*, 2113–2118. https://doi.org/10.1016/j.sbspro.2010.07.423

Hidayat Yuyun Elizabeth Patras Kata Sambutan, R., Rubini, B., & Kata pengantar, M. (2015). *Berani Bicara Pendidikan, The Findings Of Educational Research. LPP FKIP UNPAK*.

Hindarto, N., Jurusan Fisika, M., & Matematika dan Ilmu Pengetahuan, F. (2013). *UPEJ 2 (2) (2013) Unnes Physics Education Journal Pendidikan Karakter Terintegrasi Dalam Pembelajaran Ipa Guna Menumbuhkan Kebiasaan Bersikap Ilmiah*.

Hung, W., Jonassen, D. H., & Liu, R. (2008). *38 Problem-Based Learning*.

Krupar, A., & D'Sa, N. (2024). Measuring learning during crises: Developing and validating the Holistic Assessment of Learning and Development Outcomes (HALDO). *International Journal of Educational Research Open*, *6*, 100320. https://doi.org/10.1016/j.ijedro.2024.100320

Kumaidi, K. (2016). Interpretasi Koefisien Korelasi Skor-Butir dengan Skor Total Uji Kebermaknaan Koefisien Reliabilitas KR-20 dalam Penelitian Pendidikan dan Psikologi. *Jurnal Ilmu Pendidikan, 11(2).*

Lidiana, H., Gunawan, G., & Taufik, M. (2018). Pengaruh Model Discovery Learning Berbantuan Media PhET Terhadap Hasil Belajar Fisika Peserta Didik Kelas XI SMAN 1 Kediri Tahun Ajaran 2017/2018. *Jurnal Pendidikan Fisika Dan Teknologi*, *4*(1), 33–39. https://doi.org/10.29303/jpft.v4i1.519

Lulu, M., Usman1, L., & Gustalika2, A. (2022). *Pengujian Validitas dan Reliabilitas System Usability Scale (SUS) Untuk Perangkat Smartphone*.

Mahromah, L. A., & Manoy, J. T. (2013). *Mahasiswa Prodi S1 Pendidikan Matematika Unesa 2 Dosen Pembimbing Prodi S1 Pendidikan Matematika Unesa Identifikasi Tingkat Metakognisi Siswa Dalam Memecahkan Masalah Matematika Berdasarkan Perbedaan Skor Matematika*.

Mason, L. A., Thomas, A. K., & Taylor, H. A. (2022). On the proposed role of metacognition in environment learning: recommendations for research. *Cognitive Research: Principles and Implications*, *7*(1), 104. https://doi.org/10.1186/s41235-022-00454-x

Nur'aini, N. (2020). Upaya Meningkatkan Kemampuan Metakognisi Melalui Strategi Pembelajaran PAI Berbasis DDCT Pada Mahasiswa Sekolah Tinggi Agama Islam Ibnu Sina Batam. *Jurnal Pendidikan Agama Islam Al-Thariqah*, *5*(1), 10–18. https://doi.org/10.25299/al-thariqah.2020.vol5(1).4682

Purwanto, H., Aminah, S., Ramadhani, W., & Azim, F. (2020). Penerepan Model Pembelajaran Problem Based Learning untuk Meningkatkan Sikap Ilmiah dan Hasil Belajar Kognitif Mahasiswa pada Mata Kuliah Ekologi Tumbuhan. *Journal of Natural Science and Integration*, *3*(2), 151. https://doi.org/10.24014/jnsi.v3i2.9355

Ramadhani, R., & Izzati, N. (2023). Keefektifan dan Kepraktisan Modul Dasar Pemrograman. *Journal of Mathematics Education and Science*, *6*(1), 47–53. https://doi.org/10.32665/james.v6i1.1142

Rolina, N. (2014). Developing Responsibility Character for University Student in ECE through Project Method. *Procedia - Social and Behavioral Sciences*, *123*, 170–174. https://doi.org/10.1016/j.sbspro.2014.01.1411

Supriadi, S., Wildan, W., & Laksmiwati, D. (2020). Implementasi Model Pembelajaran Berbasis Masalah dan Pengaruhnya terhadap Perkembangan Karakter Mahasiswa. *Jurnal Penelitian Pendidikan IPA*, *6*(1), 63–68. https://doi.org/10.29303/jppipa.v6i1.323

Suprianto, S., Kholida, S. I., Andi, H. J., & Mahardika, I. K. (2018). The Effectiveness of Basic Physics Experiment Module Based on Guided Inquiry Model in Improving Hard Skills and Soft Skills of Prospective Physics Teachers. *Jurnal Pendidikan Fisika Indonesia*, *14*(2), 52–59. https://doi.org/10.15294/jpfi.v14i2.11579

Virtue, E. E., & Hinnant-Crawford, B. N. (2019). “We’re doing things that are meaningful”: Student Perspectives of Project-based Learning Across the Disciplines. *Interdisciplinary Journal of Problem-Based Learning*, *13*(2). https://doi.org/10.7771/1541-5015.1809

Zhao, L., Zhao, B., & Li, C. (2023). Alignment analysis of teaching–learning-assessment within the classroom: how teachers implement project-based learning under the curriculum standards. *Disciplinary and Interdisciplinary Science Education Research*, *5*(1), 13. https://doi.org/10.1186/s43031-023-00078-1