Kafah Science Test Model to Improve the Quality of Prospective Teachers

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Abstract *- This research aims to create and analyze a comprehensive science question model (Science Kafah) to enhance the quality of prospective teachers. The quality of prospective teachers refers to their comprehensive abilities in a specific science subject being taught. These abilities encompass conceptual understanding, religious connections, application, and meaningfulness. The research instrument consists of Science Kafah questions with various developed models. The analysis is conducted on the question models and individual items to assess validity, reliability, discrimination power, and difficulty index. The research findings reveal that the Science Kafah question model consists of 1) questions measuring conceptual understanding, 2) questions measuring religious abilities, 3) questions measuring application skills, 4) questions measuring meaningfulness, and 5) questions measuring social skills. Analysis of the instrument shows that out of the 25 tested questions, 20% were deemed inadequate, while 80% met the criteria for good questions. The Science Kafah question model can assess comprehensive abilities in science, its connection to religion, application skills (technology, engineering, environment, arts, and mathematics), and the meaningfulness of the taught concepts.*

Keywords*: Kafah; Kafah Science Test; Prospective Teachers*

INTRODUCTION

Assessment is the process of gathering and making decisions based on that information. According to Abidin (2014), assessment is a systematic process that involves collecting and interpreting learning outcome data to make decisions about prospective teachers. Educator assessment can include tests and non-tests conducted through exams and assignments to measure the competence of prospective teachers continuously, monitor progress, and improve learning outcomes. Sani (2016) states that assessment is an integral part of the learning process and can determine the quality of learning. Assessment is the most important part of the learning process. Authentic assessment is a comprehensive assessment that should include knowledge, attitude, and skills. However, prospective teachers still face difficulties in assessing attitudes, including scientific ones. Teachers have not yet used instruments to assess scientific attitudes and still rely on subjective assessments (Suryani, 2016).

Kafah learning is comprehensive learning that links a concept with religion, application, and meaningfulness, so prospective teachers acquire knowledge and skills comprehensively, impacting their attitudes in daily life. It aligns with the goal of national education, which aims to produce prospective teachers who are devout to Allah SWT and possess comprehensive competencies as their life preparation (Muspiroh, 2014).

Anggraeni (2018) shows that the level of interconnection between each component in the Lesson Plan (RPP) used in the learning process in Sumedang Elementary Schools is categorized as high. Each component of the Lesson Plan has been well-structured according to the interconnection indicators. Similarly, the interconnection between components within the Lesson Plan is also high. Each component is interconnected,

from learning objectives, materials, methods / models / approaches /strategies, learning resources / media, processes/activities, time allocation, and learning evaluation. The learning process has three main elements: objectives, learning process, and assessment. These three elements must be mutually interrelated, meaning the objectives, process, and assessment must be aligned. For example, if learning is conducted comprehensively, the objectives and assessment should also be comprehensive. If these three elements are not aligned, it will create imbalances in the learning process. The assessment results will not accurately measure the actual outcomes based on the process, and vice versa. Prospective teachers must understand and comprehend this as they prepare for their careers.

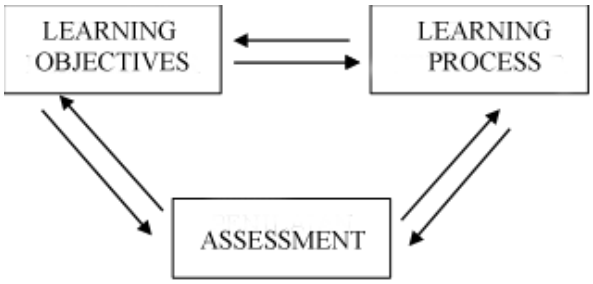


Figure 1. Relationship Objectives, Process, and Assessment (SEQIP, 2010)

Figure 1 illustrates the close relationship between learning objectives, the learning process, and assessment (SEQIP, 2010). Effective assessment implementation indicates the quality of an educator or prospective teacher. Hidayat (2015) demonstrates that the teaching and learning process is suitable for assessment, especially in efforts to improve the quality of education. The improvement of educational quality is based on the assessment results of the teaching and learning process.

The comprehensive assessment will be reflected in the Science Kafah questions, which are the products of this research. The assessment conducted is a comprehensive assessment (kafah assessment) following the comprehensive science learning process (kafah learning model for science), which includes: 1) measuring conceptual understanding, 2) measuring religious abilities, 3) measuring application skills, 4) measuring meaningfulness, and 5) measuring social skills (Syahrial, 2022).

Kafah's learning outcomes encompass the five aspects mentioned above. Conceptual understanding is the ability of prospective teachers to comprehend a concept or fact and express it in their own words without altering the intended meaning of the concept. Measuring religious abilities involves the ability to relate discovered concepts to Allah SWT's words, the Prophet Muhammad's hadiths, real-life stories during the time of the Prophet and his companions, and real-life situations in everyday life. Measuring application skills entails understanding and utilizing acquired concepts for everyday life, including science, technology, engineering, arts, environment, and mathematics. The ability to derive meaning involves interpreting concepts with religion and their application in life (Rifai, 2011). Social skills refer to the ability to interact with others following religious norms. This skill manifests in attitudes, such as a prospective teacher's positive inclination to help others. Assessing attitudes in the classroom can involve the teacher, students, teaching methods, or instructional programs. Attitudes in learning can pertain to attitudes towards the subject matter, the subject teacher, or the topics being taught.

The science Kafah question model is developed from Kafah learning, which links science concepts with religion, application, and meaningfulness (Syahrial et al., 2022). Prospective teachers should always strive to

expand their knowledge and skills in preparation for becoming professional teachers. Science concepts should be acquired through discovery and processes and impact the character of prospective teachers. Based on discovery learning and character education orientation, science learning generates active engagement from prospective teachers (Hamidah, 2018). Meanwhile, Ibrahim (2000) states that integrating process skills in science with character development improves cognitive learning outcomes. Process skills in science form the basis of the scientific approach in the 2013 curriculum (Hassan et al., 2010). Through experiments, prospective teachers can identify problems, formulate hypotheses, conduct experiments to gather information, collect and analyze data, and ultimately find solutions to the identified problems (Swary, 2020). Problems that arise through experiments provide a high potential stimulus for further learning. Conducting experiments leads to physics learning with actual scientific content (Orion, 2007).

RESEARCH METHODS

The science Kafah question model developed in this research was obtained through a literature review and the researcher's experience conducting activities to improve the quality of prospective teachers. The literature review method involves various activities related to collecting literature data, reading and taking notes, and managing research materials (Sugiyono, 2017). Suarta & Rahayu (2018) suggest that literature review refers to collecting data by conducting a study and reviewing books, literature, notes, and reports on the problem being addressed. According to Rohman (2016), a literature review is a research conducted by collecting several books and magazines related to the research problem and objectives. J. Supranto, as cited by Ruslan in his book "Metode Penelitian Public Relations dan Komunikasi," defines literature review as the process of finding research data or information through reading scientific journals, reference books, and available publications in the library (Murfiah, 2017).

Analyzing the science Kafah question instrument involves testing its validity, reliability, difficulty index, and discrimination power. The questions have been statistically tested and validated based on the researcher's analysis.

RESULTS AND DISCUSSION

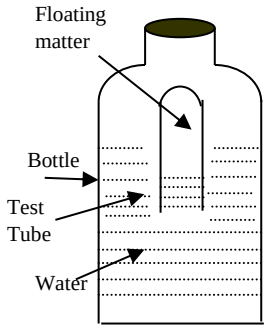
Based on the literature review conducted and the analysis of the questions, the findings of this research are as follows:

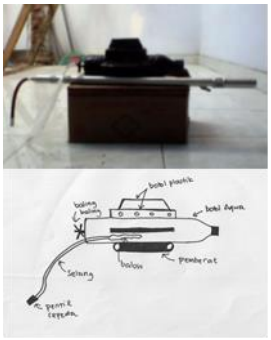
Results

The research findings in the form of the science Kafah question model can be seen in the following Table 1.

Table 1. The science Kafah question model

The Kafah question model	The Kafah question example
CONCEPT	
1. Questions that measure discovery and understanding of concepts: a) Questions related to experimental procedures or experiments (including performance tests)	-Create a diagram illustrating the observation results of an experiment on how a buoyant substance's size affects an object's buoyancy and sinking. Complete the diagram with the names and components of the apparatus. -Explain the experiment's steps on how a buoyant substance's size affects the buoyancy and sinking of an

The Kafah question model	The Kafah question example
b) Questions to assess students' absorption of information about previous experiments.	object. Mention the scientific concept(s) discovered by conducting this experiment.
2. Questions to measure students' skills in planning new experiments that have not been conducted before.	-An ABK (crew member) has three life jackets made of the same material but different sizes: small, medium, and large. He wants to choose one of the life jackets for a mother who wants to cross the river on her boat. Help the ABK make the selection and suggest a way to do it.
3. Questions related to predictions/hypotheses about experiments that have not been conducted.	-Ani is playing with a device called a Cartesian diver, as shown in the picture below,  When Ani presses the bottle, the reaction flask sinks. What happens to the reaction flask when the bottle cap is opened, and the bottle is pressed? Explain your answer!
4. Questions about analytical skills and concluding.	- A piece of modelling clay and a piece of cork are provided. Budi is asked to shape the modelling clay into a ball of any desired size. Budi puts the modelling clay ball into the water and finds it sinks. What action should Budi take to make the modelling clay ball float and stay on the water's surface?
RELIGION	
The questions that measure religious ability include the connection of concepts with the Quran, concepts with Hadith, the connection with stories from the time of the Prophet Muhammad and his companions, and the connection with real-life stories in daily life.	The word of Allah SWT in Surah Al-Baqarah, verse 164, is: اِنَّ فِيْ خَلْقِ السَّمٰوٰتِ وَالْاَرْضِ وَاخْتِلَافِ الَّيْلِ وَالنَّهَارِ وَالْفُلْكِ الَّتِيْ تَجْرِيْ فِى الْبَحْرِ بِمَا يَنْفَعُ النَّاسَ وَمَآ اَنْزَلَ اللّٰهُ مِنَ السَّمَآءِ مِنْ مَّآءٍ فَاَحْيَا بِهِ الْاَرْضَ بَعْدَ مَوْتِهَا وَبَثَّ فِيْهَا مِنْ كُلِّ دَآبَّةٍ ۖ وَّتَصْرِيْفِ الرِّيٰحِ وَالسَّحَابِ الْمُسَخَّرِ بَيْنَ السَّمَآءِ وَالْاَرْضِ لَاٰيٰتٍ لِّقَوْمٍ يَّعْقِلُوْنَ *Indeed, in the creation of the heavens and the earth, the alternation of night and day, the ships sailing in the sea with beneficial cargo for mankind, the water sent down by Allah from the sky reviving the earth after its death, and the spreading of various creatures therein, and the directing of the winds and clouds controlled between*

The Kafah question model	The Kafah question example
	the sky and the earth—there are true signs for people who have knowledge (Quran 2:164). What is the connection between this verse and the concept of factors influencing the buoyancy and sinking of an object concerning the type of object, its shape, and the size of the buoyant material?
IMPLEMENTATION	
Questions that measure application skills. For example, create a simple boat with a model like the one below:	Create a simple boat with a model like the one below:  After it is finished, please try the simple submarine and explain how it can happen! - Have you ever helped your mother clean fish at home? What did you find inside the fish that can be related to the concepts of floating, sinking, and buoyancy? How can fish do it? Please explain!
MEANINGFULNESS	
The question that measures meaningfulness.	The questions in this model link religion and application with the concepts discovered to achieve desired outcomes and influence the attitudes of prospective teachers.

The significance of important concepts should be given and explained to prospective teachers, as this is what makes holistic learning meaningful. It contributes to the understanding of religion and character, which affects prospective teachers' attitudes. For example, in the equation:

$$s = \frac{W}{F} \qquad (1)$$

In science, s represents displacement, w represents work, and F represents force. The application of this equation in life can be seen in s as "moving on." It means that if we want to change for the better, we should make a lot of effort and avoid unnecessary force. This relates to the verse from the Quran, Surah Ar-Ra'd (13:11):

لَهُ مُعَقِّبَاتٌ مِنْ بَيْنِ يَدَيْهِ وَمِنْ خَلْفِهِ يَحْفَظُونَهُ مِنْ أَمْرِ اللهِ إِنَّ اللهَ لَا يُغَيِّرُ مَا بِقَوْمٍ حَتَّى يُغَيِّرُوا مَا بِأَنْفُسِهِمْ وَإِذَا أَرَادَ اللهُ بِقَوْمٍ سُوءًا فَلَا مَرَدَّ لَهُ وَمَا لَهُمْ مِنْ دُونِهِ مِنْ وَالٍ

Meaning: "For each one are successive [angels] before and behind him who protect him by the decree of Allah. Indeed, Allah will not change the condition of a people until they change what is in themselves. And when Allah intends for a people ill, there is no repelling it. And there is not for them besides Him any patron."

This verse is motivational, stating that Allah will not change a person's destiny for the better unless they make their efforts and hard work (Agus, 2015). The description above clearly shows the close connection between concepts, religion, and the realities of daily life for prospective teachers. It is expected to influence the social lives of prospective teachers and be implemented in their attitudes. 5) Questions that measure social skills. These skills are related to the attitudes of prospective teachers towards others around them. Assessing attitudes is part of the assessment process aimed at observing someone's personality or success in learning activities, particularly for prospective teachers who may not have a natural inclination or interest in a specific subject, making it challenging for them to grasp the material easily. Attitude assessment can be done through questionnaires using a rating scale, as shown in Table 2.

Table 2. Assessment of Attitudes Towards the Science Subject

No	Question	Assessment Scale						
		7	6	5	4	3	2	1
a	I am happy to learn about science							
b	The science subject is beneficial.							
c	I always attend every science lesson.							
d	I always make an effort to have a science book.							
	Total							

Table 2 shows statements related to attitudes towards the science subject, and the criteria for these attitudes can be determined using a scale.

Discussion

The results of the trial for science literacy questions based on Islamic values and Indonesian culture, using a contextual approach, obtained an average score of 75.67 for the assessment of Islamic values, 73.33 for the assessment of cultural values, and an average of 65 for the assessment of science literacy skills (Asyhari, 2019). Asyari's research indicates that scientific abilities based on religion are lower than others. Many factors contribute to the low science abilities. One of them is the mismatch between the given question models and the learning process. In particular, the competencies acquired by prospective teachers are only moderate, not comprehensive.

Kafah-based learning with the science kafah question model provides comprehensive abilities to answer the questions correctly (Suparno, 2022). The science kafah question model is based on religion, application, and meaningfulness. Muslih (2017) stated that the urgent reconstruction of the methodology of developing knowledge based on religion is necessary, on one hand, to provide answers to doubts about its compatibility with Islamic sciences, and on the other hand, to refute concerns about the loss or erosion of Islamic values. Islam should be a guide in the development of modern life, especially in the field of education (Muslih, 2017). The science kafah question model enables prospective teachers to understand the solutions to high-level questions that require in-depth analysis. Islamic religious education based on Higher Order Thinking Skills can be integrated by providing ample opportunities for students to explore and present information (Muthoharoh, 2020). Therefore, kafah-based learning with its question model is also suitable for the current independent curriculum in Indonesia.

Item analysis includes validity, reliability, difficulty index, and

discrimination index of questions for prospective teachers with low, moderate, and high abilities. The 25 kafah model questions analysis found that 20 questions met the criteria for good questions, while five questions were considered ineffective. These criteria were determined based on four item analysis conducted (Fatimah & Alfath 2019). The five questions that were deemed ineffective, accounting for 20% of the total questions, were due to prospective teachers not being accustomed to concept-based questions (including experimental, procedural, and skill-based questions), questions based on religion, application (including technology, engineering, environment, arts, and mathematics), and expressing meaningfulness. Prospective teachers are usually only exposed to cognitive-based questions that are purely computational. It was revealed through interviews with several prospective teachers, who mentioned that the mid-semester and final semester exams only consisted of written tests based on calculations.

It is in line with Arikunto's statement (2011) that good questions are those that have a moderate difficulty index. A question with an easy or difficult difficulty index is considered poor and needs revision or replacement. Sudijono (2006) stated that the difficulty index of each item could determine the quality of test questions. A question item is considered good if it has a moderate difficulty index. Question items should not be too easy or difficult because overly easy questions can decrease students' interest in learning, while overly difficult questions can demotivate students (Susanna, 2020).

CONCLUSION

The science kafah question model consists of the following types of questions: 1) questions that measure conceptual understanding, 2) questions that measure religious abilities, 3) questions that measure application skills, 4) questions that measure meaningfulness, and 5) questions that measure social skills. The analysis of the questions resulted in 80% of the 25 tested questions meeting the good and statistically acceptable criteria.

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