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The Development of Booklet about Making TPACK-Oriented Learning Videos Integrated with Islamic Science and 21st Century Learning

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ABSTRACT

21st century learning is a paradigm in strengthening educational process. The making of learning video takes a big role in digital technology development in this era. The purpose of this research is to develop a learning video booklet which is integrated with Islamic science and 21st century learning. The method used in this research was 4D type development (Define, Design, Develop and Dissemination) with technical analysis of expert validation testing using Aiken's V criteria and questionnaires for respondents. The content of the booklet is the form of 21st century science learning, Technological Pedagogical and Content Knowledge (TPACK), the integration of science and Islamic science, the making of learning video, microteaching video and inquiry learning video. The booklet has gone through a validation process from various experts, was declared to meet the standards validity and has through the dissemination stage to students with response of very feasible. The booklet can be used as a guide in making learning videos because it has an explanation of the technology used and the provisions recommended in making learning videos.

Keywords: booklet, TPACK, islamic and science integration

INTRODUCTION

Increasing the quality of learning today is expected to fulfil the needs competence of 21st century. The first one is learning skills and innovation such as critical thinking, being able to solve a problem, being creative, innovative, able to communicate and collaborate. Secondly, skilled at using media, technology, information and communication (ICT). The next one is having ability to live a life and career, including the ability to adapt, being flexible, taking initiative, being able to develop self ability, having social and cultural abilities, being productive and trustworthy, having a leadership spirit and being responsible (Kemendikbud, 2017).

The Making learning videos is part of the current trend in technological developments in education. The results of observations made by researchers in making learning videos in

innovative science learning and microteaching courses developed by some students have paid good attention to the content, but some also do not have a good way of delivering the material. Some are influenced by less interesting recording techniques and locations. It is hoped that learning videos can provide a stimulus to develop problem-solving, creative and innovative abilities, so that they do not just provide information in one direction. Sofyan et al., (2019) explained micro-teaching videos that illustrate the steps of appropriate teaching models such as prepare lesson plans, learning materials, media and evaluation instruments; serve teaching tools; and the implementation of micro teaching was successful.

Technological Pedagogical and Content Knowledge (TPACK) is a framework providing a theoretical perspective to show that teachers can effectively design and carry out a technology development (Dikmen & Demirer, 2022). The lack of content knowledge foundation hinders student development to be a teacher. Recommendations include more targeted integration of PCK at the preservice level, utilization of tools such as the content representations (CoRe) (Wooditch et al., 2018). In general, preservice teachers still do not utilize more varied technology, because their learning design plans are without learning technology. Pre-service teachers still need to increase their self-confidence in learning, using a variety of technologies in learning, and learning modeling videos for prototypes such as problem-based learning model videos. The TPACK framework can be a consideration for learning practices in integrating content, pedagogy and technology (Jamaludin, et al., 2022). So the making of TPACK-oriented learning video skills is needed.

Integration and interconnection ideas between religion and science is not a new phenomenon in Islamic science epistemology. This is because Islam doesn't dichotomy religion and science. Scientific building structure must be based on Alquran and Hadith, because it will become prophetic such as prophetic natural sciences and prophetic humanities. Ideas related to the integration-interconnection between religion and science cannot be separated from self-actualization struggle of Muslims towards modernization process on a global scale. The research results of most teachers do not specifically organize to integrate biological knowledge with Islamic science, especially in teaching materials and learning activities. This is because the preparation of learning activities refers to the Curriculum policy direction which does not require the integration of Biology and Islamic knowledge (Jamaludin, 2019). Meanwhile, Islamic higher education curriculum policies provide encouragement to be able to integrate religion and science. Science which is integrated with Islamic values in this booklet is the innovation form in this research.

Previews research had been widely developed in the development of booklet as a teaching material such as movement system chapter (Syamsurizal et al., 2021) and a booklet of bacterial chapter (Apriyeni et al., 2021). In general, booklets have been developed a lot in compiling biology teaching materials. In general, booklets have been developed a lot for preparing teaching materials such as biology materials. Based on this, a booklet for making learning videos needs to be developed to support competence in video documentation of learning practices. The booklet developed provides advantages because it has the TPACK framework as

a guide in making learning videos by paying attention to being oriented towards 21st century learning, Islam and inquiry-based learning.

Research studies on the TPACK development, the integration of Islam and 21st century learning are very important to increase students awareness that will be teachers in several study programs of Tarbiyah Faculty. This means that learning video does not only require technological devices, but also the content and pedagogy of the students. The reason for choosing booklet is because the color full interesting design form of this booklet is simpler than an ordinary book. Therefore, studying the development of TPACK-oriented booklet that is integrated with Islamic science and 21st century learning as a guide for making learning video is something necessary.

METHOD

The research and development (R&D) model was used in this research, consists of 4D (define, design, develop and dessiminate) refers to Thiagarajan *et al.*, (1974). R&D was carried out through the development of a TPACK-oriented bokklet which is integrated with Islamic science and 21st century learning as guide in making learning videos. This booklet will help alot to make learning video documents and microteaching video.

There are some analysis stages to determine the needs to make this booklet. They are :

Define Stage

Define stage includes literature analysis on learning video media, 21st century learning, TPACK, integration of Islamic science by reviewing national and international journals and books.

Design Stage

a. Develop a content framework
   The content framework was developed by referring to the teacher competency, 21st century learning, TPACK, integration of Islamic science, microteaching video context and inquiry learning.
b. Document activities
   Booklet development activities were documented directly during the practical learning in the classroom or outdoor learning activities.
c. Design the booklet
   Booklet was designed by Canva application by choosing the combination of colors, font style and adding some images to make it more interesting and easier to understand.
d. Organize literary sources
   Several literacy sources was included into booklet design by selecting the essential sources.

Develop Stage

a. Validation
   The validation process was carried out as an effort to get suggestions from validator in the terms of content, design and writing of the booklet. Validation analysis used was from Aiken's V, the formula is $V = \sum s / [n(c-1)]$.

b. Revision

Booklet revision has been done based on the suggestions from the validator.

Disseminate Stage

The dissemination was carried out by giving the product in the form of a booklet to several respondents such as students and teachers. This activity was also used to get responses of the booklet. There were 25 students. The test was carried out through percentages on the booklet assessment scale and questionnaire.

Analysis of the booklet assessment items with the value conversion by referring the the score obtained per assessment item compared with the total assessment score, and then the percentage was created. Description of the level of eligibility by referring to an assessment scale of 1-5 adapting from Arikunto & Jabar, (2009) with the criteria including; very feasible = 81%-100%; feasible = 61%-80%; fairly feasible = 41%-60%; not feasible = 21%-40% and very unfeasible = 0%-20%. This analysis is a consideration in assessing the booklet that has been created.

RESULT AND DISCUSSION

Needs assessment analysis from the microteaching performance and microteaching video from the student of Biologi Education in Tarbiyah Faculty, the results were some of the students didn't take the video optimally, the less knowledge of using media and less knowledge about the integration between Islam and science. Based on the needs assessment analysis, problem identification was obtained in the form of a booklet as an interesting guidebook which can be used as a reference in making learning videos for both learning activities and documentation of learning pratices. Jamaludin, et al., (2022) explained that students who want to be a teachers still need to improve their competence, such as increasing their self confidences, understanding the curriculum used and contextual material, understanding the assessment process in learning using various technologies and using learning video effectively.

Making learning videos is often carried out directly through training activities on making learning videos with Bandicam for elementary school teachers (Herayanti et al., 2019) and training on editing learning videos through community service (Lathifah et al., 2022). Meanwhile, making learning videos through booklet media needs to be developed further. Syamsurizal et al., (2021) explained that the booklet was developed on human movement system material by focusing to the aspect needed, such as content, language, presentation and the graphic.The booklet is important for teachers and students as supporting media in teaching-learning process. Apriyeni et al., (2021) developed bacteria material booklet for senior high school student with an excellent category. Based on some booklet development, it can be used to support the learning process.

The design of the booklet referred to the TPACK theme that has been arranged, science integration, Islamic science and 21st centutry learning by developing the content framework, included 1) 21st century learning, 2) Technological, Pedagogical, and Content Knowledge (TPACK), 3) Integration between Islamic science and Science, 4) The making of learning video,

5) Microteaching video, 6) Inquiry learning video. The result of booklet development through the validation of 5 validators can be seen on the Table.1. Development stage was carried out by doing discussion directly or Focus Group Discussion (FGD). Some corrections and suggestions from the validators are, 1) use standart font for the table description, 2) put the source link of the learning video. Based on the Aiken's V with the 5 validators, the validation is ≥ 0,8, so it can be said that this booklet development is valid.

Table 1. Validation of the TPACK-oriented booklet integrated with Islamic science and 21st century learning

No	Assessment items	Validator					Validation
		I	II	III	IV	V	V = ∑ s / [n(c-1)]
A.	Material						
1	Theoretical framework	4	5	5	5	4	0.9
2	Content validity	5	5	5	5	4	0.95
3	Compatibility with teacher education development	5	5	5	5	5	1
4	The explanation of 21st century learning	4	5	4	5	4	0.85
5	The explanation of content, pedagogy and technology/ TPACK correlation	5	5	5	5	4	0.95
6	The explanation of Islam and Science correlation	4	5	5	5	4	0.9
7	The explanation of the making learning video	5	5	4	5	5	0.95
8	The explanation of microteaching learning video	5	5	5	5	5	1
9	The explanation of inquiry learning video	5	5	5	5	5	1
B.	Design						
10	Page design	4	5	5	5	4	0.9
11	Color	4	5	5	5	5	0.95
12	Image	5	5	5	5	4	0.95
C.	Writing						
13	Scientific writing	4	5	4	5	4	0.85
14	Language	5	5	5	5	4	0.95
15	Font style	5	4	5	5	4	0.9
16	Font size	4	4	5	5	4	0.85
17	Table	4	5	5	5	4	0.9

The explanation of the booklet begun with the explanation about 21st century learning which contains teacher competency on accordance with the regulations and characteristics of

21st century learning. This discussion can be used as the foundation of competency and perspective in 21st century learning, so it can be inspiration for teachers to develop their professionalism, TPACK knowledge and the integration between Islam and science.

Science learning is very important to prepare student in the future (Fig. 1), so teacher competency can achieve 3 aspects, including; The first, learning and innovation skills, critical thinking, communication, collaboration and creativity in problem solving. The second, digital literacy skills, namely skills in using technology and information media in learning. The third, career and life skills: flexibility and adaptability in work and life.

Figure 1. 21st Century Learning Framework
https://www.battelleforkids.org/networks/p21

Zain et al., (2016) explained that 21st century learning skills need to be developed by involving 21st century students activities, global awareness, financial literacy, economics, business and entrepreneurship, citizenship literacy, health literacy, health literacy and environmental literacy. In addition, students need to be flexible, adaptive, initiative, self-direction, social and cultural skills, productivity, and responsibility that is integrated in learning. Mishra & Mehta, (2017) explained that 21st century learning needs 3 knowledges, such as: The first, foundational knowledge such as digital literacy/technology information knowledge, cross-diciplinary knowledge. The second, meta knowledge such as creativity and innovation, problem solving and critical thinking, also communication and collaboration. The third, humanistic knowledge such as work/life skills, emotional/ethical awareness and cultural competence.

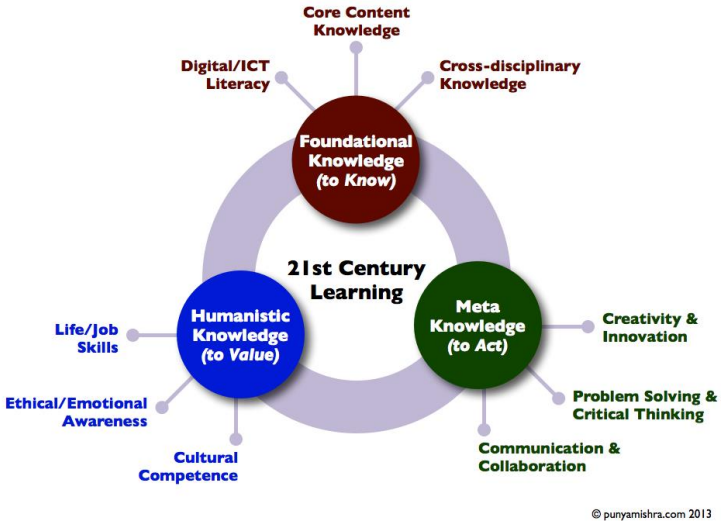


Figure 2. 21st century learning characteristics (Mishra & Mehta, 2017)

Uyar (2023) explained that collaboration and coordination are needed among stakeholders to ensure students who want to be teachers are better equipped with 21st century learning skills. Teachers can play an important role in providing all necessary things in school, while students and their parents can contribute to develop these skills by their own ways. Bureaucrats and stakeholders have responsibility to prepare all necessary things to support 21st century skills for the next teacher generations. By all those responsibilities among stakeholders, comprehensive and effective approach will be easier to be implemented. Bernhardt, (2015) explains that 21st century learning tells us about the ability to interact with others from any backgrounds to increase our communication skills; the use of technology integration; processing information from various forms of media to make decisions; authenticity and usefulness; think critically, creatively, innovatively; problem solving; take responsibility for oneself and society; work collaboratively. Those competencies are school's responsibility to provide direct experience for students.

Professional teacher development as one of the specific and effective programs to increase teacher competency in teaching knowledge and facilitating new skills to understand TPACK. TPACK is a framework used in this era to play an important role in the transformation of professional teacher development through the education (andragogy) (Chaipidech & Srisawasdi, 2021). All materials in this booklet explain several types of technology that can be used in learning, such as online assessment, Google Lens, media design technology, laboratory technology, online labs, and visualization data technology.

Pedagogical knowledge emerged is an important factor in technology integration and it is an ability to articulate how technology is used in teaching and learning process. It is important that pedagogical knowledge and the ability to discuss this knowledge in the context of TPACK to increase the use of technology effectively (Benson *et al*., 2015). This pedagogic becomes a

main part to maintain the transformative of TPACK (Mishra *et al*., 2011). Therefore, pedagogy knowledge and the content become basic knowledge in developing TPACK abilities, here are the designs of booklet cover and the introduction (Fig.3)

(a) (b)

Figure 3. (a) Booklet Cover (b) Introduction

The learning process in higher education need to be more focus on the regulations of education in 2022, including competency understanding students, competency in learning practices, competency in mastering scientific fields and competency in attitude and personality (Kemendikbud, 2022). Biology education in Tarbiyah Faculty provides learning outcomes so that they can integrate science with Islamic knowledge, so the booklet is very needed in education system for preservice teachers based on the integration of science and Islam and using TPACK framework.

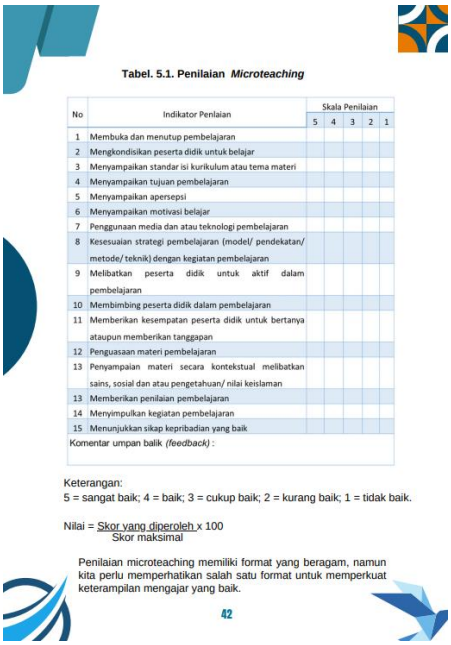
Jamaludin et al., (2022) explains that the integration of Biology and science learning with Islamic science includes two domains in the affective and cognitive aspects. Therefore, learning context teachers can integrate various affective and cognitive aspects. Cognitive aspect integration can be linked to the integration pattern of science learning with Islam; in the form of connecting Islamic knowledge by interpreting science with Al-Qur'an, hadith and other relevant Islamic knowledge. Affective aspects include: confidence, admiration, humility, gratitude, motivation and self-awareness (Fig.4. (a)).

(a) (b)

Figure 4. (a) Example of Islam and Science integration (b) Inquiry learning gallery complete with the link and barcode

One example of knowledge developed in the content of this booklet is the integration between religious knowledge such as "and your God inspired bees, "make nests in the mountains, in wooden trees, and in the places made by human, then eat from all (kinds of) fruit then follow the lead path of your God which has been made easy" From the stomach of the bees, there is a drink (honey) in various colors, there is also medicine that can heal human. Indeed, there really a sign (the greatness of Allah) for those who think (QS An Nahl: 68-69). And then, learning can be direct explained in bees taxonomy, ethology or building good character from bees.

21st century learning based on the integration of Islamic knowledge, has relevance to build a good religious knowledge culture. Kereluik *et al*., (2013) explained that cultural competence also includes personal aspects, intercultural competence proven trough out effective communication, collaboration and appreciation of ideas and emotions from some types of individuals. Cultural competence, such as ethical awareness is considered essential for social and economic success in the 21st century as the result of the increasing of cultural diversity from globalization. This booklet is well equipped with microteaching assessment (Fig.5. (a)), this is an effort for self-assessment to build teacher professionalism.



Tabel. 5.1. Penilaian *Microteaching*

No	Indikator Penlaian	Skala Penilaian				
		5	4	3	2	1
1	Membuka dan menutup pembelajaran					
2	Mengkondisikan peserta didik untuk belajar					
3	Menyampaikan standar isi kurikulum atau tema materi					
4	Menyampaikan tujuan pembelajaran					
5	Menyampaikan apersepsi					
6	Menyampaikan motivasi belajar					
7	Penggunaan media dan atau teknologi pembelajaran					
8	Kesesuaian strategi pembelajaran (model/ pendekatan/ metode/ teknik) dengan kegiatan pembelajaran					
9	Melibatkan peserta didik untuk aktif dalam pembelajaran					
10	Membimbing peserta didik dalam pembelajaran					
11	Memberikan kesempatan peserta didik untuk bertanya ataupun memberikan tanggapan					
12	Penguasaan materi pembelajaran					
13	Penyampaian materi secara kontekstual melibatkan sains, sosial dan atau pengetahuan/ nilai keislaman					
13	Memberikan penilaian pembelajaran					
14	Menyimpulkan kegiatan pembelajaran					
15	Menunjukkan sikap kepribadian yang baik					
Komentar umpan balik *(feedback)* :						

Keterangan:
5 = sangat baik; 4 = baik; 3 = cukup baik; 2 = kurang baik; 1 = tidak baik.

Nilai = Skor yang diperoleh x 100
Skor maksimal

Penilaian microteaching memiliki format yang beragam, namun kita perlu memperhatikan salah satu format untuk memperkuat keterampilan mengajar yang baik.

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(a) (b)

Figure 5. (a) Microteaching assessment (b) Technical explanation for taking learning videos

This booklet is also equipped with the making of learning video menu about inquiry learning, which is expected to provide reinforcement of natural science as 1) products such as concepts and laws, 2) process such as observing, trying and concluding, and 3) attitudes or values such as thoroughness and cooperation. Qomariyah et al., (2021) explained inquiry learning provides benefits for students, including; The first students learn to be responsible for gaining knowledge and assignment that given; The second students are free to use various media, sources, and technic of constructing knowledge; and The third students learn to develop his ability and solve the problem on his way.

Inquiry-based learning is a learning process that involves students by connecting the to the real world through exploration and high-level questions. A learning approach that encourages students to be involved in problem solving and learning experiences. There are so many things happening in our world that are worth to be discovered and experienced by students (www.sac.edu). The inquiry learning model provides students with the opportunity to construct their own knowledge by using the concepts they already have to solve problems they encounter, in other words, and students have the opportunity to connect new information with existing cognitive structures so as to produce meaningful learning. The teacher's role in learning biology using the inquiry model is as a facilitator and mediator, who helps students to learn and use their process skills to gain more knowledge. This is in harmony with 21st century learning (Andrini, 2016).

Developing a booklet for making learning videos that is oriented towards the TPACK framework, integrating Islam and 21st century learning has benefits in making videos of microteaching and inquiry practices. Distribution of booklets in biology learning classes as a product dissemination phase received the following response (Table 2).

Table 2. Respondent's response to the booklet

No	Assessment items	Scale					Rating scale conversion	Description
		Excellent	Very good	Good	Normal	Weak		
1	Booklet page design	32%	56%	12%	0%	0%	91,30	Very feasible
2	Color selection on the booklet	32%	40%	28%	0%	0%	87,82	Very feasible
3	Images	20%	48%	28%	0%	0%	85,22	Very feasible
4	Scientific writing	28%	64%	8%	0%	0%	91,30	Very feasible
5	Language	28%	40%	12%	0%	0%	90,43	Very feasible
6	Font style	24%	64%	12%	0%	0%	89,56	Very feasible
7	Font size	36%	44%	20%	0%	0%	90,43	Very feasible
8	Table	20%	64%	16%	0%	0%	87,82	Very feasible
9	The explanation of 21st century learning	20%	64%	16%	0%	0%	87,82	Very feasible
10	Penjelasan hubungan konten, pedagogi, dan teknologi/ TPACK	20%	72%	8%	0%	0%	91,30	Very feasible
11	The explanation of Islam and Science correlation	32%	64%	4%	0%	0%	93,04	Very feasible
12	The explanation of the making learning video	20%	68%	12%	0%	0%	88,70	Very feasible
13	The explanation of microteaching learning video	28%	64%	8%	0%	0%	91,30	Very feasible
14	The explanation of inquiry learning video	16%	72%	12%	0%	0%	87,83	Very feasible

Respondents' assessment mostly have very valid category in design, color, writing and the content (Table 2). In general, this booklet is very suitable to use because it has a good content explanation about 21st century learning, explanations of TPACK, explanations of the relationship between science and religion, explanations for making learning videos (Fig.5. (b). Here is respondents response about the booklet based on their learning practice.

> "In my opinion, making learning videos is quite important, as an alternative for students to be able to review learning at any time. Because at one meeting the discussion may not necessarily be discussed again at the next meeting. Through learning videos, we can repeat the lesson over and over again until we really understand. To make the video itself, we also need to pay attention to several things to be able to produce a decent video, including learning objectives, strategies, techniques for making learning videos.
>
> After reading the booklet, a lot of knowledge was gained, including how to make learning videos, it explained starting from the types of applications that can be made to make learning videos and even how to do it. After reading, I think that for making learning videos that want good results, it is more suitable to use the Capcut application because it has complete features.
>
> Video creation guidelines help me create videos that are more varied, interesting and developed. If you make a learning video without using guidelines, the resulting video will not develop, because there is no new knowledge or guidelines to use as a reference. Another respondent also said that the benefits of video making guidelines were to get ideas when making learning videos and to be more focused when making learning videos."

The respondent assessment stage is to determine the respondent's response to the learning video booklet through a questionnaire sheet. This can provide information on experiences in making learning videos and perceptions of the contents of the booklet. The respondent assessment stage can also be part of the dissemination stage. The booklet is distributed to student teachers and science teachers through research results dissemination activities. It is hoped that the booklet will also stimulate science teachers to become a means of creating learning videos for personal learning activities, competition activities and academic assignment document activities.

CONCLUSION

21st century learning provides an education orientation that develops learning and innovation skills regarding critical thinking, communication and collaboration, be creative in problem solving, skilled in using technology and information media in learning. TPACK as a framework for making learning videos by focusing to the pedagogical content knowledge component. The integration of biology and Islam has dimensions development in cognitive and affective aspects. Developing a booklet for making learning videos that is oriented towards the TPACK framework, integrating Islam and 21st century learning has benefits in making videos of microteaching and inquiry practices. The booklet has gone through a validation process from various experts and was declared to meet the standards validity and has through the dissemination stage to students with response of very feasible. Another assessment of respondents is that the booklet provides guidance in selecting recommended video making applications and provides insight into making more developed learning videos, so that the booklet can be used as a guide in making learning videos because it has an explanation of the technology used and the provisions recommended in making learning videos.

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