



# Anatomy Learning Technology Innovation Based on the Integration of Islamic Values on Student Learning Outcomes and Characters

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**Abstract.** The pandemic era impacted the decline in learning outcomes and the character of Islamic Kemuhammadiyah, which was the hallmark of the UNISA Nursing Study program. Knowledge transfer and character-building experience many problems with online lecture meetings. This study aimed to determine the effectiveness of anatomy learning media innovation based on integrating Islamic values into the learning outcomes of anatomy and the formation of Islamic character. The research design used a mixed method: explanatory sequential strategies, starting with a quantitative approach and then a qualitative approach to obtain comprehensive results. The sample used is 227 students. The instrument in this research is the innovation of reproductive anatomy learning media that integrates Islamic values, questionnaires, and interview sheets. The results showed that the provision of pre-posttest material using various learning media improved student learning outcomes and Islamic character ( $p < 0.05$ ). However, there was no significant difference between learning outcomes and student characteristics when compared between various learning media ( $p > 0.05$ ). There are 12 themes: obedience to God, brave and confident, rational, critical, creativity and innovation ability, trustworthiness, love of science, working hard and persevering, thinking positively, anticipatory, dynamic, and productive. Learning innovations that integrate Islamic values must be developed to achieve students' hard and soft skills.

**Keywords:** Anatomy learning innovations · videos · augmented reality · integration of Islamic values · learning outcomes · Islamic Character

## 1 Introduction

The Covid-19 pandemic impacts various sectors of life, including the education sector, such as the nursing learning process [1–3]. Different online learning innovations have been carried out to support the achievement of nursing learning goals during the Covid-19 pandemic by utilizing existing technology media. Aisyiyah University (UNISA) Yogyakarta is one of the Muhammadiyah-Aisyiyah universities, which has a vision of education to realize professional and Qur'anic graduates. To realize this vision,

UNISA tries to add the content of Islamic Kemuhmadiyah Education to the learning curriculum. Nursing learning innovations developed in the learning process cannot be separated from the framework of Islamic values. However, online learning cannot run well through knowledge transfer and characteristic-building aspects. A 3D anatomy video learning media integrated with Islamic values and augmented reality has been developed to overcome these conditions.

Learning video media is considered appropriate to use during the Covid-19 pandemic because it is easy to use and can be followed by all students [4]. During the pandemic, lecturers cannot meet students directly, so learning video media is considered appropriate to make it easier for lecturers to explain learning materials [5]. Learning video media is also considered to overcome students' boredom when studying at home [6]. Learning videos can also be played repeatedly whenever students want to deepen the material. The learning video media developed will be integrated with progressive Islamic values to target two targets: a comprehensive understanding of the material and the formation of the Islamic character of Muhammadiyah, which can be internalized in various aspects of life. It is hoped that this understanding of Islam can increase gratitude for His gifts, increase motivation in learning, and apply this knowledge in daily morality.

One of 3D learning by utilizing technology is using augmented reality (AR). Augmented reality integrates computer-generated 2D and 3D objects into the real world. Augmented reality offers an innovative learning space by combining digital learning materials into physical space. AR technology can improve teaching and learning because it has the entertainment to arouse student interest [7].

Many previous studies have used anatomy and augmented reality learning video media. However, previous research has focused more on pure anatomy videos using various technologies such as augmented reality [8], lecture-based anatomy videos [9], and demonstration videos. The main difference between this study and previous research is the development of video technology for learning anatomy, especially the reproductive system, which is integrated with Islamic values and compared with augmented reality. This study aimed to determine the effectiveness of anatomy learning videos based on integrating advanced Islamic values. It augmented reality on the learning outcomes of anatomy and character building of Aisyiyah students.

## 2 Methods

The type of research used is a mixed method explanatory sequential design, which begins with a quantitative approach followed by a qualitative approach to obtain comprehensive results. The population in this study were all students who took the subject of Biomedical Nursing in the 2021/2022 academic year, a total of 227 students. The sample in this study was taken by the total sampling method, preceded by an informed consent provision.

Interview instrument to measure the quality of students' Islamic character. A questionnaire on reproductive anatomy and Islamic character is used to measure learning outcomes. The researcher used the content validity test technique through expert assessment by three experts for the Islamic character questionnaire and Islamic character interviews. As for testing.

on anatomy through item development and item review by a team of subject Biomedical lecturers equipped with item analysis using Moodle, the average discrimination index was 49.00% (sufficient discrimination).

Univariate analysis was conducted to determine the frequency distribution of the percentage of demographic factors, learning outcomes of anatomy, and Islamic character. Before the bivariate analysis, the data normality test was conducted using Kolmogorov Smirnov. Pretest and post- test data analysis were conducted to determine the effect of learning videos based on the integration of Islamic values on the learning outcomes of anatomy and character development of students. Bivariate analysis to test the difference in post-test results in the experimental and control groups using t-test, Wilcoxon, and Kruskal Wallis. Colaizzi's data analysis method will be used to perform qualitative data analysis.

### 3 Result and Discussion

This research was conducted for six weeks, involving 227 respondents. In which the 227 respondents were divided into three groups in the form of:

- Group 1 (control) consisted of 89 respondents who received an explanation of the material using PPT only through zoom;
- Group 2 (augmented reality) consisted of 74 respondents who received material explanations using PPT only through zoom and augmented reality supplements;
- Group 3 (Islamic integrated anatomy video) consisted of 64 respondents who received an explanation of the material using PowerPoint only through zoom and an integrated Islamic learning video supplement

This research has received permission from the Ethics Commission of UNISA Yogyakarta, with the number: 1941/KEP-UNISA/II/2022, dated January 8, 2022.

Based on Table 1, it was found that the highest pretest results were in the Islamic integrated anatomy video (IIAV) group, which was indicated by a mean value of 45.570

**Table 1.** Data Pretest Posttest Student Learning Outcomes.

Grouping (n = 227)	Pretest			Posttest	
	n	Mean ± SEM	Median (minimu-maximum)	Mean ± SEM	Median (minimu-maximum)
Control group	89	37.303 ± 1.430	40.00 (4–68)	54.921 ± 1.894	56.00 (8–88)
Augmented reality group	74	37.892 ± 1.432	36.00(12–68)	53.027 ± 2.026	52.00(16–84)
Islamic integrated anatomy video group	64	45.750 ± 1.640	48,00 (12–68)	55.750 ± 2.385	56.00 (16–88)

and a median of 48.00; while the lowest value of the pretest was in the control group with a mean of 37.303 and a median of 40.00.

Learning outcomes after treatment were obtained that the group with the highest mean was the IIAV group, namely 55.750 with a median of 56.00; As for the post-test results, the lowest was in the Augmented reality (AR) group with a mean of 53.027 and a median of 52.00.

Based on Table 2, it was obtained data that the AR group pretest (0.168), AR group post-test (0.200), and IIAV group post-test (0.200) were considered standard because the p value > 0.05. The normality test on all of these data uses the Kolmogorov-Smirnov test because each sample in the group is > 50 respondents.

Based on the data in Table 3, it was found that for the different tests in the paired group before and after treatment, all three had a significance < 0.05, namely the control group (p = 0.000), the AR group (p = 0.000), and the IIAV group (p = 0.002). So it can be concluded that the hypothesis is accepted; namely, the treatment significantly impacts learning outcomes afterwards. However, the different test results in the three groups did

**Table 2.** Normality Test of Student Learning Outcomes

<b>Group data</b>	<b>Normality test</b>	<b>p-value</b>	<b>Interpretation</b>
Control group pretest	Kolmogorov-Smirnov	0.007	Abnormal
Augmented reality group pretest		0.168	Normal
Islamic integrated anatomy video group pretest		0.009	Abnormal
Control group posttest		0.049	Abnormal
Augmented reality group post-test		0.200	Normal
Islamic integrated anatomy video group post-test		0.200	Normal

**Table 3.** Paired and Unpaired Group Difference Tests on Learning Outcome Data

<b>Group data</b>	<b>Different test</b>	<b>Group</b>	<b>Count value</b>	<b>P value</b>	<b>Interpretation</b>
Pair group	Wilcoxon	Control group pre-posttest	Z count = -6.512	0.000	Different means
	Paired t-test	AR group pre-posttest	T count = 6.252	0.000	Different means
	Wilcoxon	IIAV group pre-posttest	Z count = -3,108	0.002	Different means
Unpair group	Kruskal Wallis	Control group vs. AR group vs. IIAV group	Z count = -0.590	0.555	No different meaning

**Table 4.** Pretest and Posttest Data of Student Character

Group	Pretest			Posttest	
	<i>n</i>	<i>Mean ± SEM</i>	<i>Median (minimu-maximum)</i>	<i>Mean ± SEM</i>	<i>Median (minimu-maximum)</i>
Control group	89	81.38 ± 0.896	80.50 (67–100)	86.41 ± 1.167	84.00 (68–108)
AR group	74	80.80 ± 0.748	80.50 (68–99)	86.86 ± 0.916	86.00 (70–105)
IIV group	64	81.53 ± 0.696	81.00 (70–93)	86.36 ± 1.068	83.00 (75–108)

not have a significant impact on learning outcomes, indicated by the  $p$ -value  $> 0.05$ , namely the control group (0.555), AR group (0.770), and IIV group (0.383). So it can be concluded that the hypothesis is rejected, which means that learning supplements cannot improve student learning outcomes.

Table 4 shows that the results of the student character pretest with the highest score were obtained in the IIV group with an average of  $81.53 \pm 0.696$  and a median of 81.00 (70–93). The results of the student character pretest with the lowest score were obtained in the AR group with a mean of  $80.80 \pm 0.748$  and a median of 80.50 (68–99).

Table 4 also shows that the results of the post-test character of the students with the highest scores were in the AR group with an average of  $86.86 \pm 0.916$  with a median of 86.00 (70–105). The results of the student character post-test with the lowest score were obtained in the IIV group with a mean of  $86.41 \pm 1.167$  and a median of 84.00 (68–108).

Based on Table 5, it can be seen that the data that are typically distributed are in the pretest group of students who received AR treatment with a  $p$ -value of 0.683 ( $p > 0.05$ ) and the IIV group with a  $p$ -value of 0.090 ( $p > 0.05$ ). The distribution was not normal for the other data groups with  $p < 0.05$ .

**Table 5.** Hasil Uji Normalitas Data Pretest Posttest Karakter Mahasiswa

Group data	Normality test	<i>p</i> -value	Interpretation
Control group pretest	Kolmogorov-Smirnov	0.006	Abnormal
Augmented reality group pretest		0.683	Normal
Islamic integrated anatomy video group pretest		0.090	Normal
Control group posttest		0.003	Abnormal
Augmented reality group post-test		0.049	Abnormal
Islamic integrated anatomy video group post-test		0.000	Abnormal

**Table 6.** Test of Paired and Unpaired Group Differences on Islamic Character Formation Data

<i>Group data</i>	<i>Different test</i>	<i>Group</i>	<i>Count value</i>	<i>P value</i>	<i>Interpretation</i>
Pair group	Wilcoxon	Controul group pre-posttest	Z count = -6.512	0.000	Different means
	Paired t-test	AR group pre-posttest	T count = 6.252	0.000	Different means
	Wilcoxon	IIVAV group pre-posttest	Z count = -3,108	0.002	Different means
Unpair group	Kruskal Wallis	Control group vs. AR group vs. IIVAV group	Z count = -0.590	0.555	No different meaning

Based on Table 6, it was obtained data that there were significant differences in the results of the pretest and post-test characters of students in the control group;  $p = 0.000$  ( $<0.05$ ), in the AR group with a  $p$ -value of  $0.000$  ( $<0.05$ ), and the IIVAV group with a  $p$ -value of  $0.000$  ( $<0.05$ ). Based on these results, it can be concluded that the hypothesis is accepted. Namely, the student's character becomes better after receiving additional knowledge. However, there was no significant difference in the results of the post-test character of students in the control group with the AR group and the IIVAV group with  $p = 0.452$  ( $p > 0.05$ ). Based on these results, it can be concluded that the hypothesis is rejected, which means that the provision of learning supplements in the form of AR and IIVAV has no impact on the Islamic character of students.

## 4 Discussion

The effect of anatomy learning technology innovation based on the integration of Islamic values on learning outcomes Innovation in education is a broad concept covering science and technology in learning, infrastructure, economics, social, law, administration, and other innovations. Educational innovation is a procedure or method of significantly different activities to increase efficiency in a competitive learning environment [10]. Educational innovations include pedagogical innovations, scientific and methodological innovations, and educational and technological innovations.

Learning innovation by applying digital technology is a breakthrough being developed in the era of the Covid-19 pandemic. Social restrictions have resulted in some learning methods being carried out online. The results in this study indicate that although learning is carried out online through the lecture method using zoom meetings, the results significantly increase knowledge of the anatomy of the reproductive system. This course will have an impact on student learning outcomes.

This study uses a breakthrough in providing augmented reality media supplementation and integrated Islamic learning videos. All learning outcomes conducted before and after treatment had a significance value of  $p < 0.05$ , concluding that all learning methods increased students' knowledge (Table 3). However, the provision of the two

**Table 7.** Theme formulation

No	Theme	Conversation Augmented		
		<i>Control group</i>	<i>reality group</i>	<i>Islamic integrated anatomy video group</i>
1	Obedience to Allah	Grateful that Allah created us so perfect..... Through charity and worship	Multiply worship, pray 5 times and continue to be grateful, pray to Allah, may you be given health	I am very grateful, if for example every time I study anatomy, I am very grateful to have been created like this by God, so I am more obedient...
2	Confident and brave	I'm more confident	More grateful because we were created perfectly more than other creatures	I am more grateful that the first one is more grateful that it has been given to a complete body member and God willing,
3	Rationale		The belief that exists in society may be because of something like that, but now that I have studied anatomy and physiology, I can explain it medically or scientifically	then I can be more confident ...As long as I was studying this anatomy, at first, I was rational, so I became more logical...
4	Critical	...dig more about anatomy and physiology...	.. His curiosity is more...	If it's critical thinking or critical thinking, after learning this anatomy, thank God I started to increase my critical thinking power too

*(continued)*

**Table 7.** (continued)

No	Theme	Conversation Augmented		
		<i>Control group</i>	<i>reality group</i>	<i>Islamic integrated anatomy video group</i>
5	Creativity and innovation		...more creativity, you can draw in detail, so you know the shapes in detail because that is also given in the assignment...	I am reading, observing, and writing. When we read, we need three iterations. The first time skimming, second rereading, now the third time is if there are words you don't understand, there is a Latin word, that's a problematic Latin word, ah I understand that I was searched on Google.
6	Responsible and I more diligently to study trustworthy	physiology.... my responsibility is to take care of my health	We already know its functions, so we have to take care of it through you taking care of our health like regular exercise worshipping Allah asking for health. Be more disciplined to manage your time smarter to manage your time My way of learning has become	I'm better able to take care of myself in everyday life; for example, what do I keep from keeping my distance from the opposite sex
7	Love science		more active because I am a curious person I learned to memorize more	.....I love science even more; I want to explore that.....

(continued)



**Table 7.** (continued)

No	Theme	Conversation Augmented		
		Control group	reality group	Islamic integrated anatomy video group
8	Work hard and persistent		especially Latin terms I become more positive because I already	Not only from the material provided by the lecturer himself but through other social media because the material from the lecturer is not enough if it is not added to read the articles that are out there
9	Positive thinking		know the rationale for how the human body works I take great care of my body..... I	I try to think positively about anything in my life because I believe God
10	Anticipatory		do some exercise. Exercise can balance our body, continue to do physical exercise. Besides exercise, I also drink water to maintain my metabolism... The learning model is not rigid;	I have studied anatomy and physiology, so I will be more careful when dealing with viruses because we study the immune system in this anatomy and physiology.
11	Dynamic		more fun	After the learning is over, it will be later that night, or the day after the lesson, I will start learning over and over again

learning supplements did not significantly differ from the control group ( $p > 0.05$ ; Table 3). This study's results are not similar to previous research [11], which said that learning anatomy using videos had better learning outcomes than power points (63.06 vs. 56.96); it positively impacted increasing memory retention. Namely (83.28 vs. 78.03) with a significance value ( $t = 2.728$ ;  $p = 0.008$ ).

Although the results of this study are not by the underlying theory, based on the results of interviews, data obtained that the provision of video supplements integrated with Islamic values and augmented reality media can increase student independence

in learning, improve interpretation of the material in their brains, strengthen learning memory and increase confidence (Table 7). The results showed that the 3D video integrated with Islamic values had a better impact (mean 55,750; Table 1) than the scores of students who used augmented reality supplements (mean 53,027; Table 1). The reason is that augmented reality media focuses more on the anatomical organs' structure without explaining their physiology.

The results of this study also reveal that explaining the material carried out through lectures using PPT media by teaching lecturers is a substantive activity that cannot be abandoned until now. Some of the reasons behind this are: First, PPT learning media are made exciting and interactive, thereby increasing student enthusiasm in learning [12]; Second, there is a direct connection with lecturers, making it easier for students to ask things that are not understood in learning [13]; Third, online lectures through zoom meetings provide opportunities for interaction between fellow students. Many claims that getting together with classmates every day, even if they are far away, helps them maintain a sense of community and mental well-being [14]; Fourth, the availability of lecture recordings uploaded on YouTube provides an opportunity for students to repeat lessons, exceptionally if during lectures students are constrained by the network [15]. In the interview session, students expressed gratitude for the opportunity to continue learning online even though the world around them had stopped.

Video and augmented reality have been handy as a learning supplement to clarify students' basic understanding. Through the visual learning method, student's knowledge will be more complete and comprehensive [16]. Learning supplements can also be developed through social media, namely Instagram.

In this study, anatomy learning is enriched by online quizzes as a medium for student training and can be used to help increase student motivation in learning. Previous research revealed that online quizzes could improve student achievement. Repeated and formative quizzes can aid memory or knowledge retention [17].

The effect of anatomy learning technology innovation based on the integration of advanced Islamic values on the formation of student character. The character of UNISA Yogyakarta students has three main elements: Islamic character to Allah SWT. Islamic character to fellow human beings and Islamic character to the environment. The values and indicators of Islamic character are obedient, confident, sincere, rational, critical, creative and innovative, responsible and trustworthy, love of knowledge, caring and self-sacrificing, fair, humble and unpretentious, working hard, positive thinking, anticipatory, visionary, dynamic, productive, tolerant and together [18].

The noble character includes knowledge of goodness, then creates commitment towards, and finally, actually doing. These are the three pillars of character that are expected to become habits, namely habits of mind, habits of the heart, and habits of action. In other words, a character refers to knowledge about knowledge (cognitive), attitudes, motivation, behavior, and skills [19]. Character is an attitude or character that exists in every human being that can be formed through activities that are applied in the daily environment, both in the family environment or in the school and play environment [20].

The intervention in this study is part of character building through activities implemented in the campus environment when students are learning with various learning

media. Based on the results of the study, it was found that there were significant differences in student character scores before and after treatment, both in the intervention group with augmented reality and with learning videos ( $p = 0.000$ ; Table 6).

The results showed that the post- test results of the three groups had an increase in the value of Islamic character by a mean (84.33; Table 4), compared to the average pretest score, which was 81.24 (Table 4). Based on these results, it can be concluded that knowledge accompanied by good understanding, if done regularly, can form a noble character known as character.

The results of this study indicate that various variations of learning media can be used to improve student character. This study is in line with previous research, which found that the application of active learning with video-based tasks could shape students' character values. Integrating character values in education is a strategy to produce graduates who can compete and get along healthily in the global era. On this basis, learning innovation by integrating character values is essential [21]. In the learning process, lecturers must create a learning atmosphere that actively involves students. Active learning is learning that encourages and facilitates students to be actively engaged in constructing.

competencies. They are actively involved in reading, writing, problem-solving, discussing, presenting, and so on. Learning encourages students to actively engage intellectually and mentally to develop cognitive, motor, and social skills [21].

Several factors influence character formation: (1) instinct factor. An instinct is a set of traits that humans carry from birth. Attitudes, actions, and human actions are motivated by the potential of the will driven by one's instincts. Psychologists explain that instinct (instinct) functions as a driving motivator that encourages the delivery of behavior; (2) customary/habit factors. Customs/habits are every act and deed of a person that is done repeatedly in the same form so that it becomes a habit. (3) heredity. Directly or indirectly, heredity dramatically influences the formation of a person's character or attitude (4) milieu or environmental factors. One aspect that also plays a role in the construction of a person's mood and behavior is the factor (environment) in which a person is located. The milieu is divided into two types, namely, the natural environment and the social environment. The social environment includes the environment where a person studies, for example, a school or college [20].

The development of learning media is significant in shaping the character of students. This research implements character building through learning media development, namely through anatomy learning videos based on the integration of advanced Islamic values. So far, the development of learning media and teaching materials is still based on the suitability of the material with the curriculum, the correctness of the concept, the order of presentation, the consistency of symbols, and the suitability of the material with the target users and learning objectives. These have all supported the need for teaching but have not reinforced the need for character education. Therefore, the procedure still lacks the integration of media with character education. There are several ways to develop learning media based on character building, namely:

- linking media materials into character education;
- Including exemplary figures

- Providing assignment materials whose solutions require character growth [22].

Therefore, this study developed the intervention by connecting anatomical material with Islamic values according to the Qur'an and Hadith. In addition, after receiving the intervention, students also got a task they had to do, namely compiling a mind map related to the material already in the learning video.

The development of learning media using multimedia, one of which is video, is part of a strategy to strengthen character education. Table 6 shows that the results of this study support previous research, which found that the development of video learning methods has not affected the overall dimensions of students' character ( $p > 0.05$ ). However, the interview results show that the learning media can stimulate the growth of Islamic characters, which are summarized in 12 themes (Table 7). Learning media with multimedia combines many media, including music, narration, animation, and pictures. Research proves that learning through a combination of multiple media is more effective in stimulating the achievement of learning goals and sequential memories. Using multimedia and facilitating teachers also promotes students' cognitive abilities and the character values they want to form [23].

## 5 Research Limitations

This research is limited to the anatomy of the reproductive system and has not been developed in other system materials. The online quizzes used are only limited to online quizzes facilitated at UNISA Yogya e-learning and have not implemented online quizzes that are mobile applicative.

## 6 Conclusion

Learning media innovations such as PowerPoint, augmented reality, and anatomy video integrated with Islamic values can improve learning outcomes but cannot build students' Islamic character.

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