



## Development of A Floating Market-Based BioPhy Magazine to Train the Religious Characters of Pre-Service Science Teachers

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**Abstract:** This study aimed to describe the validity of the integration of religious values in BioPhy magazine and the religious character of pre-service science teachers when using the Floating Market-based BioPhy magazine. These religious values are related to the concept of fluidity, biodiversity, ecosystem, and the local character of South Kalimantan society, namely *kayuh baimbai*. This research was development research with Tessmer formative evaluation model. The test subjects to determine the religious character of students were 10 students from the Chemistry Education Department in the small group trial and 43 students from Biology Education Department in the field test. Both subjects were currently attending Fluid lectures in the 2021/2022 academic year in the Basic Physics course. Data were obtained through validation sheets, a self-evaluation inventory of religious characters, and observation sheets. Data were analyzed quantitatively and qualitatively. The results showed that integrating religious values in magazines was valid, with the Aiken validity coefficient ranging from 0.92 to 1.00. In addition, pre-service chemistry teachers have a religious character with an average score of 4.71, and pre-service biology teachers have a religious character with an average score of 4.77 in the affective domains A1 to A5 based on Bloom's taxonomy. The religious character of the two test subjects was categorized as very good. Thus, the Floating Market-based BioPhy magazine can be used to train the religious character of Pre-Service Science teachers. The developed magazine can be used in the Basic Physics course. Future research could be piloted for a larger sample as this research was limited to a not-so-large sample, and the magazine was developed only on fluid topics in the Basic Physics course.

## INTRODUCTION

The Floating Market is the legendary local wisdom of South Kalimantan. This market was established since the Banjar Kingdom existed about 400 hundred years ago as a response to the geographical condition of South Kalimantan, which is surrounded by rivers (Abdurrahman & Abduh, 2019; Angriani et al., 2021; Budiman et al., 2019; Normelani, 2016). Various unique

things are found in this market, such as trading on the river using *jukung* (traditional Banjar boat) (Abbas et al., 2021; Abdurrahman & Abduh, 2019; Budiman et al., 2019; Normelani, 2016), the majority of the traders are women who usually sell by wearing a *tanggui* hat (a typical hat from South Kalimantan) (Abdurrahman & Abduh, 2019; Arisanty et al., 2020; Zairin et al., 2021), and there is traded a variety of community

plantation, agricultural and fishery products that show the local potential of South Kalimantan (Abbas et al., 2021; Abdurrahman & Abduh, 2019; Arisanty et al., 2019; Normelani, 2016).

Various events in the Floating Market can be related to the concepts and principles of physics, especially regarding static fluids and dynamic fluids (Annur et al., 2018; Hartini et al., 2019; Misbah et al., 2018; Misbah & Wati, 2020). Events in the market can also be related to biological sciences, especially biodiversity and river ecosystems, because this market also functions as ecotourism (Abbas et al., 2021; Normaleni, 2016; Stronza et al., 2019) and nature-based tourism (Normaleni, 2016). The local character that characterizes the people of South Kalimantan can also be studied in this market, namely the *kayuh baimbai*, which means working together to achieve a goal. (Hasani et al., 2019; Humaidi & Adrian, 2017; M Wati et al., 2020). These three things, both physical and biological sciences, and the character of the *kayuh baimbai* have relevance to the religious values listed in the verses of the Qur'an (Lutfiyanti Fitriah & Ita, 2021).

Lecturers must guide their students so that they are not only human beings who are intellectual but also have religious character (C. Anwar et al., 2018; Fahyuni et al., 2020; Kasdi et al., 2020; Usman et al., 2021). Moreover, in areas where Islam significantly influences people's lives, science learning must be linked to religion (Safkolam et al., 2021). Therefore, each learning component is very good for containing religious values (Usman et al., 2021). The benefits of integrating religious values in learning include increasing faith and piety (Mastuang et al., 2019); developing knowledge and instilling character (Fahyuni et al., 2020); improve learning outcomes (Fahyuni et al., 2020; Haviz et al., 2020; Mastuang et al., 2019); help understand the material (Muslimin et al.,

2020), make learning interesting (Mastuang et al., 2019; Muslimin et al., 2020; Sukino & Failasufah, 2019); and make learning more meaningful (Huda et al., 2019; Safkolam et al., 2021).

One of the creative and innovative learning media used in lectures is a magazine. Magazines have their uniqueness. They contain varied writings and images (Jariati & Yenti, 2020). In addition, the magazine is presented in friendly language and full-color design (Akbar & Mukminan, 2019; Tarawi et al., 2020). This is the advantage of this media compared to other learning media.

A lot of research on learning based on local wisdom has been carried out, especially focusing on modules (Ardianti et al., 2019; Navisah et al., 2021; Mustika Wati et al., 2020), learning models (Fadli & Irwanto, 2020; Parmiti et al., 2021; Ramdiah et al., 2020), character assessment instrument (Mustika Wati & Misbah, 2021), and textbooks (L. Fitriah et al., 2021; Lutfiyanti Fitriah, 2020; Lutfiyanti Fitriah & Ita, 2021). It means that research on integrated learning of local wisdom, even those producing teaching materials and media products, has been carried out.

Research on the integration of religious values in learning has also been carried out, especially focusing on modules (Mastuang et al., 2019; Prihandoko et al., 2021), textbooks (Lutfiyanti Fitriah, 2019, 2020, 2021; Lutfiyanti Fitriah et al., 2021; Saparini et al., 2021), learning model (Muslimin et al., 2020; Pahrudin et al., 2019), and learning media (Fahyuni et al., 2020; Saregar et al., 2019). It means that research on integrated learning of religious values, even those producing teaching materials and media products, has been carried out.

However, there are still few who develop magazine media based on the local wisdom of the Floating Market, combining physical and biological sciences, containing local characters, and

simultaneously linking them with religious values contained in the Qur'an. Previous research only discussed the concept of physics in the Floating Market (Misbah et al., 2018) and developed teaching materials in the form of modules based on this local wisdom (Hartini et al., 2019; Misbah & Wati, 2020). Therefore, this study intends to fill the gap by developing a Floating Market-based BioPhy magazine to train the religious character of pre-service science teacher students. The advantage of this developed magazine is that it contains four things at once, namely physics, biology, local wisdom, and religious values. By developing this magazine, it is hoped that students as users will not only master science but also know the local wisdom of their region and be able to have a good religious character.

## METHOD

This research uses two stages of development, namely the preliminary stage and the formative evaluation stage Tessmer (2016). The complete stage of this research can be seen in Table 1. The product developed is in the form of BioPhy magazine. This article only examines the use of magazines developed for the religious character of prospective science teacher students.

The research was conducted from June to November 2021 at the Tarbiyah and Teacher Training Faculty of UIN Antasari Banjarmasin. There are three test subjects: the one-to-one trial subjects were 8 students of the Physics Education Department, the small group trial subjects were 10 students of the Chemistry

Education Department, and the field trial subjects were 43 Biology Education Department students who attended the lectures. Basic Physics in the academic year 2021/2022 on Fluids. However, the religious character was only measured in small group trial subjects and field trial subjects because the one-to-one trial subjects were only asked to respond to the developed magazine before it was finally revised.

The data collection technique used in this study was the distribution of questionnaires in a knowledge integration validation sheet, a religious character self-evaluation inventory sheet, and a religious character observation sheet. Each student fills out this sheet. The self-evaluation inventory sheet is organized from domains A1: receiving, A2: responding, A3: valuing, to A4: organizing based on Bloom's taxonomy (Anderson, 2013), while the religious character observation sheet is to observe the A5: characterizing. Observers observe the religious character of A5 because, in this category, students are said to be characterizing religious character if they show religious behavior. Before using the research instruments, both sheets have been validated by four education experts and declared valid with a coefficient of  $V = 0.92$  to  $V = 1.00$  based on the validity formula of Aiken (1985). Then, the integration of physics, biology, and the character of the *kayuh baimbai* into religious values is validated by three validators who are religious experts. The data analysis technique is that each domain was searched for the average value and then categorized by some categories (Hartini et al., 2018).

**Table 1.** Research Development Stages

Stages	Activities	Results
Preliminary Stage	1. The research team analyzed the need for Floating Market-based learning media that included physics, biology, local characters, and religious values.	1. Prospective science teacher students need such learning media because the fluid learning media in the Basic Physics course does not yet contain physics, biology, local characters, and religious values.
	2. The research team determines the location, test subjects, and research time.	
	3. The research team prepared the initial	2. The research location is at FTK

Stages	Activities	Results
	draft of the magazine and research instruments.	UIN Antasari Banjarmasin, the test subjects observed for their religious character are students of the Chemistry Education Study Program and the Biology Education Study Program who are taking Basic Physics 1 course on the topic of Fluids, and the research was conducted from June to November 2021. 3. Draft 1 of BioPhy magazine and research instruments.
<b>Formative Evaluation Stage</b>		
Self-Evaluation	1. The research team independently evaluated draft 1 of the BioPhy magazine and research instruments. 2. Revise draft 1.	Draft 2 of BioPhy magazine and research instruments
Expert Review	1. Validators validate research magazines and instruments. 2. The research team revised drafts of 2 magazines and instruments based on suggestions and criticisms from validators.	Draft 3 of BioPhy magazine while the research instrument is ready to be used in trials
One to One Test	1. A magazine trial was conducted in 1 meeting for eight students of the Physics Education Department. 2. Revise draft 3 of BioPhy magazine based on trial results.	Draft 4 of BioPhy magazine
Small-Group Test	1. A trial of 5 magazines was conducted for 10 students of the Chemistry Education Department. 2. Measure the religious character in each meeting. 3. Revise the four draft magazines based on the results of the trial.	Student's religious character data and Draft 5 of BioPhy magazine
Field Test	1. A trial of 5 magazines was conducted for 43 students of the Biology Education Department. 2. Revise the draft of 5 magazines based on the trial results so that the BioPhy magazine is ready to be published.	Student religious character data and BioPhy magazine published nationally with ISBN 978-623-353-079-8

## RESULT AND DISCUSSION

### BioPhy Magazine

The resulting product is a magazine titled *BioPhy: Rahasia Indahnya Pasar Terapung*. This magazine is in the form of a printed magazine consisting of a cover, identity of teaching materials, table of contents, 55 rubrics, bibliography, and author profile. The cover of this magazine can be seen in Figure 1.

Religious values are reflected in the prayers students read when studying with this magazine. These prayers are listed in *Petunjuk Penggunaan Bagi Mahasiswa*

(the Instructions for Use for Students). Other religious values are contained in the *Ensiklo Fisika* (Encyclopedia of Physics). This rubric contains reflections on the greatness of Allah SWT. in creating and governing the universe, including rivers, seas, and air. This section is also equipped with technology made by humans by adapting the universe and technology that naturally exists in the universe, such as the mechanism of flying birds and swimming fish. In addition, there is also *Ayat-ayat Fisika* (Physics Verses) rubric. This rubric presents verses explicitly from

the Qur'an related to the concepts and principles of fluid in the Floating Market. Likewise, the *Ruang Baca* (Reading Room) rubric presents verses from the

Qur'an related to water ecosystems and biodiversity. Examples of these sections can be seen in Figure 2.



Figure 1. BioPhy Magazine Cover (Fitriah & Ita, 2021)



Figure 2. Examples of Physics Encyclopedia Rubrics, Physics Verses, Reading Room, Miracles of Physics, Meditation, and Islamic Information The *kayuh baimbai*, which Contains Religious Values (Fitriah & Ita, 2021)

There is also a rubric for Keajaiban Al-Qur'an (Miracles of the Qur'an). This rubric describes the verses of the Qur'an that are relevant to ships and jukung. This rubric also invites students to have more faith and fear of Allah SWT. and be grateful for His blessings. Another rubric that is no less interesting is Renungan (Reflection). This rubric contains an invitation to students to believe in the greatness and majesty of Allah SWT. Because of His power, the jukung can float on the river's surface, and He created various kinds of flora and fauna and river ecosystems that are beneficial for life. Examples of this section can be seen in Figure 2.

Another rubric that contains religious values is *Informasi Islam Kayuh Baimbai* (the Kayuh Baimbai Islamic Information). This rubric describes the attitudes that need to be implemented in daily life based on the meaning of the local character of the *kayuh baimbai*. These attitudes include helping each other, not being arrogant, and sharing knowledge. Furthermore, the explanation of these attitudes is related to the verses of the Qur'an. Figure 2 shows an example of this section of the rubric. Table 2 shows the verses of the Qur'an related to physics, biology, and the character of the Kayuh Baimbai. These verses are relevant to the events in the Floating Market.

**Table 2.** Verses of the Qur'an that are Relevant to Physics, Biology, and the Character of Baimbai's Paddle in the Floating Market

Concepts	Verses in Qur'an
Water as fluid	Q.S. An-Naba': 14, Q.S. An-Nahl: 65, Q.S. 'Abasa: 25, dan Q.S. Al-Mu'minin: 18
Pascal's Law	Q.S. Sad: 36, Q.S. Ar-Rum: 46, dan Q.S. Luqman: 16
Archimedes' law on <i>jukung</i>	Q.S. Al-'Ankabut: 65, Q.S. Al-Jasiyah: 12, dan Q.S. Luqman: 31
<i>Jukung</i> can float	Q.S. Al-Isra': 66, Q.S. Asy-Syura: 32-33, Q.S. Al-Qamar: 13, dan Q.S. Yasin: 41-43
Surface tension and viscosity of water	Q.S. Fatir: 12 dan Q.S. Al-Furqan: 53
Density of water	Q.S. Ar-Rahman: 19-20
Water ecosystem	Q.S. Al Mu'minin: 18, Q.S. Ar Ra'du: 3, dan Q.S. Al Furqan: 48
Biodiversity	Q.S. Al-An'am: 141, Q.S. Al Baqarah: 164, dan Q.S. Fathir: 28
The character of <i>kayuh baimbai</i> (mutual help)	Q.S. Al-Ma'idah: 2, Q.S. As-Saffat: 25, Q.S. Taha: 29-32, dan Q.S. Al-Hujurat: 10
The character of <i>kayuh baimbai</i> (not arrogant)	Q.S. Luqman: 18
The character of <i>kayuh baimbai</i> (share knowledge)	Q.S. Al-Baqarah: 159

### The Validity of the Integration of Religious Values in BioPhy Magazine

The results of the validation of the integration of physics, biology, and the character of the *kayuh baimbai* in the

Floating Market on the verses of the Qur'an and various daily prayers listed in BioPhy magazine are based on the assessment of 3 validators. These results can be seen in Table 3.

**Table 3.** Results of the Validation of the Integration of Religious Values in BioPhy Magazine

No	Rated aspect	V	Category
1	Integrating the material discussed with the verses of the Qur'an	0.92	Valid
2	Ability to explain the relationship between physics and the verses of the Qur'an in training students' religious character	1.00	Valid
3	Ability to explain the relationship between biology and the verses of the Qur'an in training students' religious character	0.92	Valid
4	The ability to explain the relationship between the character of the <i>kayuh baimbai</i> and the verses of the Qur'an in improving the religious character of	0.92	Valid

No	Rated aspect	V	Category
	students		
5	The correctness of the verses of the Qur'an, which is integrated with physics	0.92	Valid
6	The correctness of the verses of the Qur'an, which is integrated with the biological sciences	0.92	Valid
7	The correctness of the verses of the Qur'an, which is integrated with the character of the <i>kayuh baimbai</i>	0.92	Valid
8	The correctness of the writing of the verses of the Qur'an	0.92	Valid
9	The correctness of writing the translation of the verses of the Qur'an	0.92	Valid
10	Ease of integrating religious values in magazines for students to understand	0.92	Valid
11	The ability of prayers in magazines to train students' religious character	0.92	Valid
12	The accuracy of the prayers listed in the magazine with the activities that students will carry out	0.92	Valid
13	The correctness of writing prayers	0.92	Valid
14	The correctness of writing translations of prayers	0.92	Valid

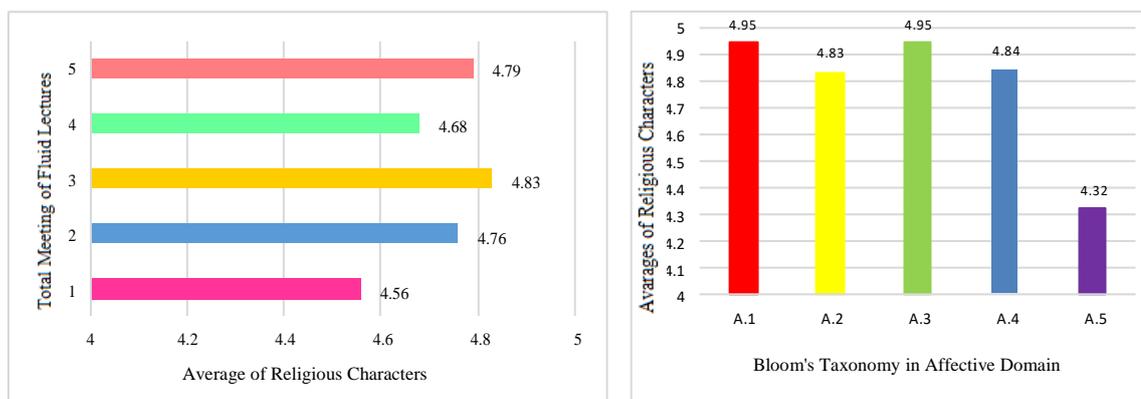
Based on Table 3, it is known that every aspect of the integration of religious values in BioPhy magazine is valid based on the Aiken formula. This means that integrating religious values listed in BioPhy magazine is correct, appropriate, and appropriate. This is in line with what was stated by Rahmadhani & Wahyuni (2020) and Fajar & Habibulloh (2021). In addition, this means that the concepts are integrated, and the verses and interpretations listed are appropriate (Chasanah et al., 2019). This also shows that the learning media is suitable for use in learning (Aulianingsih et al., 2021; Permadi & Khotim, 2018; Rahmadhani & Wahyuni, 2020), qualify (Husna et al., 2020), and can instill a religious character in the classroom (Idris, 2021). The developed media can be used because it has the quality of integration of knowledge, coverage, and suitability of

the verses of the Qur'an (Diani & Hartati, 2018; Fajar & Habibulloh, 2021; Idris, 2021). So, the developed BioPhy magazine is very good to use.

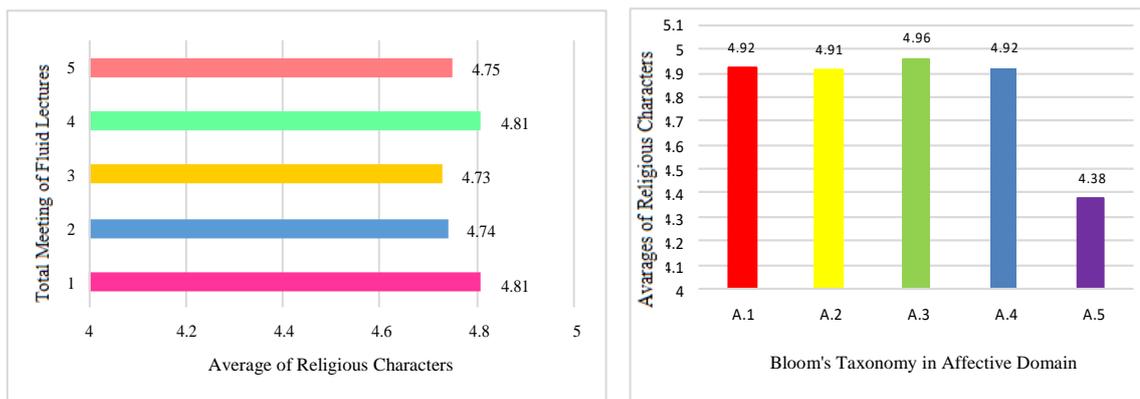
Previous research by Lutfiyanti Fitriah et al. (2021) shows that religious values integrated with science listed in the products developed are suitable for use in lectures and are of high quality. Previous research by Fitriah (2020) has also shown that integrating Islam, science, and local wisdom can be used in learning because it has very good validity.

### Achievement of Religious Character

The achievement of the religious character of the test subject in 5 meetings and the average achievement of religious character in the realms of A1: receiving, A2: responding, A3: valuing, A4: organizing, and A5: characterizing can be seen in Figure 3 and Figure 4.



**Figure 3.** Average Religious Character of Chemistry Education Department Students in Every Meeting and Average Religious Character in Each Affective Area



**Figure 4.** The Average Religious Character of Biology Education Department Students in Every Meeting and the Average Religious Character in Each Affective Area

Based on the analysis results, it is known that the average religious character of students of the Chemistry Education Department is 4.71, and the average religious character of the students of the Biology Education Department is 4.77. Both of these average values are in the very good category. Judging from the average religious character in each meeting of the Chemistry Education Department and the Biology Education Department, it is also in the very good category. It means the BioPhy Magazine effectively promotes the religious character of Chemistry Education Department and Biology Education Department students.

Based on the results of data analysis, it is known that the average religious character A5: characterizing is lower than other affective domains. A5 was measured using an observation sheet by 2 observers, which included answering the lecturer's greetings, praying before learning, praying before doing assignments, and praying after learning. So, this character is in the form of student behavior during learning. However, learning was done online using google meet. This caused observations to be not optimal because online learning has a lack. Students did not participate in learning (Kyewski & Krämer, 2018), and students lacked discipline in following the learning stage (Hermanto & Srimulyani,

2021; Mese & Sevilen, 2021). Both of these were caused by internet connection problems experienced by students so that their learning activities were not carried out properly (Hermanto & Srimulyani, 2021; Mese & Sevilen, 2021; Yan et al., 2021). The connection disruption itself was caused by limited internet access in several places where students were located (Hermanto & Srimulyani, 2021). This was what makes the observer's observations of religious behavior not optimal so that the affective domain of A5 gets the lowest average value. This is different from the affective domains A1 to A4. These four domains were measured by self-evaluation inventory sheets filled out by students via google forms, so they were not affected by internet interference.

This study indicates that religious values inserted into physics, biology, and local characters in BioPhy magazine can train students with a religious character. This also shows that media containing religious values can help students understand religion well (Amin et al., 2021). Students then read the verses of the Qur'an listed in BioPhy magazine at each meeting according to the material discussed. Reading the Qur'an itself is one way to instill a noble character and is proven to be able to make students have *akhlakul karimah* (good character) (Amri et al., 2019). Previous studies support this result that the integration of science-Islam

can improve religious character (Lutfiyanti Fitriah et al., 2021; Usman et al., 2021); instill various noble characters (Muslimin et al., 2020); give a better understanding of Islam (Fahyuni et al., 2020); provide learning experiences and knowledge that are meaningful, factual, and related to the miracles of the Qur'an (Fahyuni et al., 2020); and encourage gratitude to Allah SWT. for all his creation (Haryandi et al., 2021).

More than that, this integration is part of efforts to prevent the dichotomy of science (S. Anwar & Elfiah, 2019; Diani & Hartati, 2018; Muslimin et al., 2020; Pahrudin et al., 2019) and reduce the religion-science conflict (Haryandi et al., 2021; Safkolam et al., 2021) because Islam and science are closely related (Pahrudin et al., 2019). Al-Qur'an is a way of life for humans that also contains some facts and scientific explanations related to science so that Islam and science can be linked to each other (Haryandi et al., 2021). Integrating Islamic values with science is primarily aimed at developing character and knowledge of ethics (Fahyuni et al., 2020) and introducing science from an Islamic perspective (Muslimin et al., 2020; Safkolam et al., 2021).

In BioPhy magazine, it is also explained the relationship of local wisdom in the form of the character of the kayuh baimbai with the verses of the Qur'an. The analysis results show that these local characters are relevant to Islamic teachings. The integration of the two influences students, as evidenced by their very good religious character during the lecture. This is similar to the results of the study by Mastuang et al. (2019), Fitriah (2020), and (Haryandi et al., 2021), which show the values of local wisdom of South Kalimantan relevant to Islamic teachings. Integrating the two can grow gratitude and increase faith and piety to Him (Mastuang et al., 2019). Pembelajaran pun menjadi bermakna dan berhasil membuktikan bahwa Islam tidak

hanya mengajarkan tentang cara beribadah, melainkan pula mengajarkan karakter mulia kepada umat manusia (Haryandi et al., 2021).

Local wisdom does need to be linked to religious values. Religion and local wisdom are two different things but cannot be separated because they are both equally important and closely related to people's lives (Ahmad et al., 2020). Thus, Islam can be taught with a cultural approach (Erawati & Rahmayanti, 2021). Furthermore, local wisdom combined with Islamic values can create religious moderation (Kasdi et al., 2020). In addition, the integration of the two makes them mutually reinforcing (Putri, 2019) and inline (Mastuang et al., 2019) and reduce religious-cultural conflicts (Eko & Putranto, 2019). Local wisdom close to life is needed to bridge the community with various good teachings taught by Islam to give birth to humans with noble character (Putri, 2019).

## CONCLUSION

Based on the study results, it is known that the integration of religious values in magazines has validity with the Aiken validity coefficient of 0.92 to 1.00. In addition, the use of BioPhy magazine succeeded in training the religious character of pre-service chemistry teacher students with an average religious character score of 4.71 and pre-service biology teachers with an average religious character score of 4.77. Each religious character is categorized as very good. Thus, the Floating Market-based BioPhy magazine developed can be used to train the religious character of pre-service science teachers, especially in the Basic Physics course on the topic of Fluids. Future research can develop similar magazines on topics other than fluid and test them out on a larger sample size. This research is limited to the number of not-so-large samples and only to certain physical materials, namely Fluids.

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