Journal of Natural Science and Integration
P-ISSN: 2620-4967 | E-ISSN: 2620-5092
Vol. 8, No. 1, April 2025, pp 130-139

Available online at:
http://ejournal.uin-suska.ac.id/index.php/JNSI
DOI: 10.24014/jnsi.v8i1.36263

The Development of Teaching Materials for Chemical Bonding Course Integrated with Islamic Values: Need Analysis

Elvi Yenti[1]*, Nazir[2], Mas'ud Zein[2]

[1]Department of Chemistry Education, Universitas Islam Negeri Sultan Syarif Kasim Riau, Indonesia
[2]Department of Master of Islamic Religious Education, Universitas Islam Negeri Sultan Syarif Kasim Riau, Indonesia

**Correspondence Author: elviyenti@uin-suska.ac.id*

ABSTRACT
This study aims to identify the need for the development of teaching materials for the Chemical Bonding course in the form of textbooks that integrate Islamic values. The needs analysis was conducted through an open-ended questionnaire distributed via Google Forms, which was accessible online to respondents. The subjects of this research included lecturers teaching Chemical Bonding, Basic Chemistry, and Organic Chemistry, as well as Chemistry program students who had previously studied chemical bonding concepts. A qualitative descriptive data analysis method was employed. Responses from the questionnaire were categorized and analyzed to calculate the percentage of respondents supporting the need for the development of integrated teaching materials. The results revealed unanimous agreement among lecturers (100%) on the necessity of developing chemical bonding teaching materials that incorporate Islamic values. Additionally, 95% of students expressed strong support for the development of such materials, while 5% indicated that the development of self-learning resources would also be beneficial. Based on these findings, it is evident that there is a substantial demand for a Chemical Bonding textbook integrated with Islamic values to enhance the learning experience and bridge the gap between scientific knowledge and Islamic principles.

Keywords: *analysis, teaching materials, chemical bonds, integration of Islamic values*

INTRODUCTION

The National Education System Law No. 20 of 2003 articulates that: "National education aims to develop the potential of students to become individuals who are faithful and devoted to God Almighty, possess noble character, are healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens" (*UNDANG-UNDANG REPUPLIK INDONESIA No 20 Tahun 2003*, 2003). This directive emphasizes that education in Indonesia should not solely concentrate on cognitive development but also on the cultivation of character and spiritual values. The formation of individuals who are both faithful and devout is not merely the responsibility of Religious Education, but a collective mandate that must be shared by all components of education, including science disciplines such as Chemistry, Physics, Biology, and Mathematics.

Science, as a field that elucidates natural phenomena, possesses substantial potential to foster a deeper awareness of the greatness of God, the order of His creation, and values such as honesty, perseverance, and responsibility in the pursuit of knowledge. Education aims to instill an understanding of the values of goodness, nobility, decency, truth, and beauty in life. In the context of science education—specifically chemistry—the primary objective is to cultivate students' belief in the harmony of nature as a creation of God, while simultaneously strengthening their appreciation of the grandeur of God Almighty (Khoiri et al., 2017). In this light, the Islamic perspective on education includes several key concepts: the formation of pious and God-fearing individuals, the encouragement of lifelong learning, and the integrated development of the soul, intellect, and physical capabilities. Moreover, education should prepare individuals to fulfill their roles as servants of Allah, as caliphs (representatives) on Earth, and as stewards and prosperers of the universe (Cahyo et al., 2019).

To realize the vision of nurturing individuals of faith and piety, it is essential to integrate Islamic values into science courses such as Chemical Bonding, as argued by Muslim scholars. For some time, modern Muslim scientists have advocated for the integration of science and religion, or reason and revelation (Fajar & Habibbulloh, 2021). However, in practice, these two domains have often been treated as separate, leading to a dichotomy that affects all aspects of life (Wahyuni, 2020).

Chemical Bonding is a core subject in the Chemistry Education program. A review of several Chemical Bonding curricula in Indonesian universities reveals that the course primarily focuses on theoretical and scientific content. It explores molecular-level material based on quantum mechanics to explain the properties of elements and the types of chemical bonds, such as covalent, ionic, hydrogen, and metallic bonds (Penyusun, 2021). These curricula are predominantly centered on scientific knowledge, with no explicit integration of Islamic values in terms of faith, ethics, or the Islamic worldview of the universe and Allah's creation. Given that educational institutions in Indonesia are mandated to address both academic and spiritual development, this presents both a challenge and an opportunity to develop a learning approach that not only enhances students' understanding of chemical concepts but also instills an awareness of Allah's greatness as the Creator, while embedding spiritual and moral values in every scientific process explored.

The integration of Islamic values into chemistry education, particularly in the area of chemical bonding, is crucial for enhancing the contribution of chemistry learning towards fostering faith and piety. The discourse surrounding the integration of science and Islam has gained significant traction, especially following the transformation of the State Islamic Institute (IAIN) into the State Islamic University (UIN). This institutional shift has spurred efforts to incorporate Islamic values into various academic fields (Yahya & Rosi, 2018). One promising approach to achieving this integration is the development of teaching materials that embed Islamic values within the framework of science education (Kosim, 2024).

Teaching materials are essential components for the success of the learning process. The appropriate selection and design of teaching materials can significantly enhance the effectiveness of education. Teaching materials encompass all resources utilized by instructors to facilitate the teaching and learning process (Prastowo, 2012). When science teaching materials are integrated with Islamic values, they not only promote scientific literacy but also enrich students' understanding of Islam (Emda et al., 2023).

In practice, teaching materials that integrate Islamic values are notably absent. While Islamic values are commonly found in religious education subjects (Sarinami, 2022), the development of Chemical Bonding teaching materials has focused predominantly on enhancing critical thinking and scientific inquiry. Examples include teaching materials that employ inquiry models for Chemical Bonding (Fahrurrozi, 2019), modules based on multiple representations

(Qashdi et al, 2023), and materials designed using the PLOMP development model to support the independent Indonesian curriculum (Alamanda et al., 2023). Additionally, there are initiatives such as the development of teaching modules for ionic bonds integrated with values of religious moderation (Ardhana, 2024), and numerous high school-level resources, including guided inquiry-based e-modules for teaching Chemical Bonds to Class X students (Qashdi et al., 2023). Some modules also incorporate Contextual Teaching and Learning (CTL) through experimental methods (Takim, 2021).

Although various instructional design models can be applied to develop learning media, the initial step in creating teaching materials is typically a needs analysis. Needs analysis is a process that involves gathering information to identify the specific needs of a learner group (Mehdi Haseli Songhori, 2008). It serves as the foundational stage in designing educational structures, syllabuses, and teaching materials, helping to ensure that these resources meet the essential requirements of the learners (Wati, 2024). In the context of developing teaching materials that align with students' character values and spirituality, research on needs analysis for integrating Islamic values into teaching materials remains scarce. This research is crucial, as it aims to produce materials that are not only academically sound but also support the development of students' noble character and piety, in line with the national education goals.

Given these challenges, it is imperative to analyze the needs for teaching materials in Chemical Bonding that integrate Islamic values. By conducting this needs analysis, educators and curriculum designers can better understand the gap between the desired educational outcomes and the existing knowledge and skills of the learners (Ardiansyah et al., 2019). Such an approach will ensure that the learning media developed aligns more closely with the identified needs, ultimately creating resources that are both effective in academic instruction and supportive of character and spiritual development.

METHODOLOGY

This research employs both quantitative and qualitative approaches, utilizing a descriptive method for data analysis. A questionnaire, either open-ended or closed, was selected as an efficient data collection technique, particularly when the researcher has a clear understanding of the variables to be measured and the expected responses from participants (Sugiyono, 2019). Questionnaires can be distributed directly to respondents, mailed, or sent electronically, depending on the research setup. The study was conducted between July and September 2023 within the Chemistry Education study program at Suska Riau State Islamic University. The data sources for this research include the semester lecture plan curriculum (RPS) for the Chemical Bonding course, as well as the responses from the research sample.

The needs analysis process began with a literature review of the Chemical Bonding course curriculum (RPS) for the Chemistry Education Program at UIN Suska Riau. This was followed by the distribution of questionnaires to the study subjects, which included 7 lecturers who teach Chemical Bonding, Basic Chemistry, and Organic Chemistry courses in the program. These lecturers were selected because they cover chemical bonding material in their courses. Additionally, 60 students from the Chemistry Education program who had previously taken the Chemical Bonding course participated in the survey. The instrument for data collection was an open questionnaire distributed through Google Forms. Prior to distribution, the questionnaire was validated by an expert, a doctoral-qualified lecturer with expertise in educational development. The results of this validation were interpreted based on the criteria outlined in Table 1 (Diana et al., 2018).

Table 1. Questionnaire Eligibility Criteria

Score Percentage (%)	Interpretation
P > 84%	Very decent/Very Interesting
68%< P ≤ 84%	Decent/ Interesting
52% < P ≤ 68%	Decent Enough/ Interesting Enaough
36% < P ≤ 52 %	Less Approprite/Less Interesting
P ≤ 36%	Very less feasible/ Very less attactive

Description: P is the percentage of feasibility

The data collected from the needs analysis questionnaire were processed using descriptive analysis. The questionnaire used a nominal scale to measure respondents' opinions. This scale categorizes data based on the number of respondents selecting each answer choice, rather than measuring any numerical or ordinal value. Data obtained from the completed questionnaires in Google Forms were analyzed according to the responses provided by the participants. Each section of the form automatically generated a diagram along with the percentage of respondents who selected each answer option. The responses for each option are calculated by finding its percentage thus quantifying each response option in terms of its proportion relative to the total number of respondents, which provides insight into the needs and preferences expressed in the questionnaire.

RESULT AND DISCUSSION

To assess the extent of the need for teaching materials on Chemical Bonding integrated with Islamic values, a needs analysis was conducted in two stages. The first stage involved reviewing existing literature and the curriculum for the Chemical Bonding course to understand the current state of teaching materials. This helped identify gaps in the integration of Islamic values within the existing educational framework. The second stage involved distributing a questionnaire to both educators and students involved in the Chemistry Education program. The questionnaire aimed to gather insights into the perspectives of both groups regarding the importance and necessity of integrating Islamic values into the teaching of Chemical Bonding. This stage helped quantify the demand for such teaching materials and provided valuable data on the specific needs of the respondents.

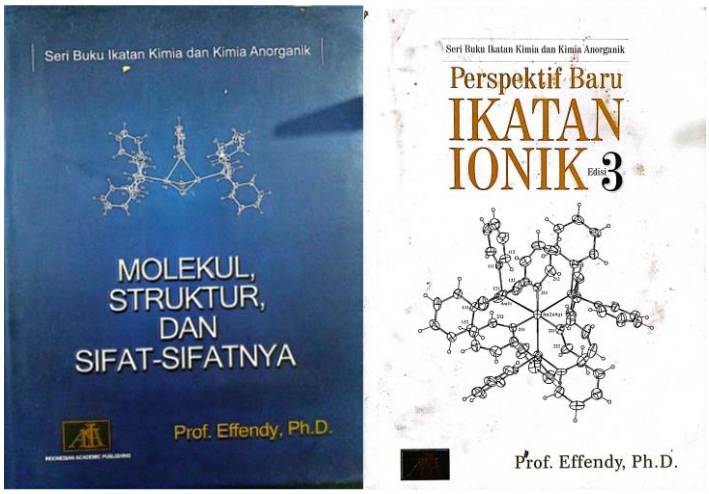
Stage One: Literature Study on Chemical Bonding Learning

The initial stage of this study involved identifying the curriculum for the Chemical Bonding course, followed by an analysis of the Chemical Bond RPS (Semester Lecture Plan). The final step was to examine the teaching materials currently used in the learning process of Chemical Bonding. The analysis of the curriculum in the Chemistry Education Study Program revealed that the Chemical Bonding course is offered in the third semester, with a credit load of 2 credits. The results from the RPS analysis showed that the Graduate Learning Outcomes (LLO) aim to instill a reverence for God Almighty and demonstrate a religious attitude. The Course Learning Outcomes (CPMK) include analyzing the fundamentals of quantum theory to understand chemical bonds as an interconnected science that supports the advancement of chemistry, as well as examining chemical bonds using both classical and quantum theories.

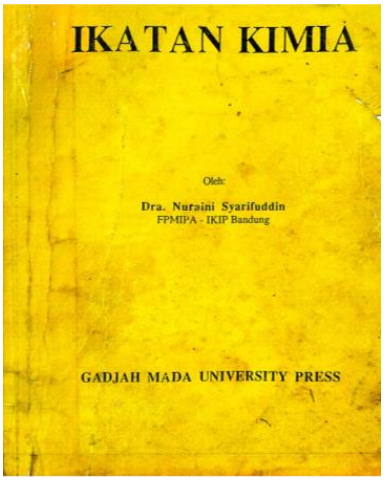
The material covered in the Chemical Bonding course includes the basic theory of quantum mechanics, quantum theory for hydrogen atoms, the Schrödinger equation for hydrogen and multi-electron atoms, covalent bonds, ionic bonds, intermolecular forces, hydrogen bonds, and metal bonds. This content provides a foundation for understanding organic chemistry, inorganic

chemistry, and other chemistry courses. The teaching materials for this course rely on three primary textbooks: those by Effendy, Nuraini Syarifuddin, and Elvi Yenti. The language in these books is relatively easy to understand for students learning about chemical bonding. However, it can be observed that there is little to no connection made between the material and Islamic values or piety. In Effendy's book, there is a mention of intermolecular hydrogen bonding as one of the blessings of Allah Subhanahu wa Ta'ala, which students are encouraged to be grateful for (Effendyy, 2017). However, beyond this brief mention, the textbooks do not explore or integrate Islamic values in the context of chemical bonding.

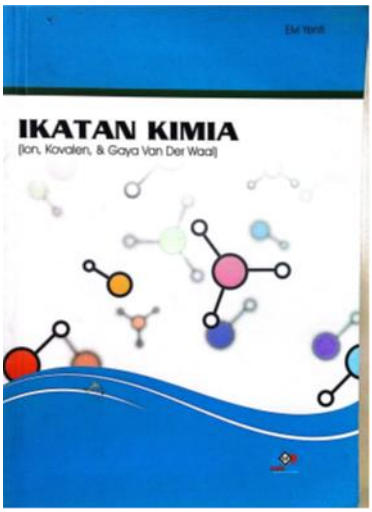
The use of existing textbooks in learning Chemical Bonding fails to support students in discovering or developing their own spiritual values. As a result, these books do not contribute to fostering or enhancing students' faith and piety. This highlights the necessity for developing teaching materials that not only convey scientific knowledge but also link general science to Islamic values and the Qur'an, thereby enriching students' spiritual and academic experiences (Hartato & Saputri, 2024).Therefore, it is essential to create teaching materials for the Chemical Bonding course that are integrated with Islamic values. Such materials should be designed to be both effective and efficient, enabling students to benefit from them fully. These integrated teaching materials would serve to enrich students' understanding of chemistry while simultaneously strengthening their faith and piety. The cover of the existing Chemical Bond book used in this course is shown in Figure 1.



(a) Chemical Bonding Book by Effendy



(b) Chemical Bonding Book by Nuraini Syarifuddin



(c) Chemical Bonding Book by Elvi Yenti

Figure. 1 Chemical Bond Book Used

Phase Two: Distribution Results

The second stage in the needs analysis involved distributing questionnaires to gather information regarding the learning of Chemical Bonds. This stage aimed to obtain insights from both lecturers and students about the current learning materials and the potential integration of Islamic values. The results of the questionnaire validation are presented in Table 2, which provides an assessment of the instrument's reliability and validity based on expert review. This validation process ensured that the questionnaire was suitable for gathering relevant data and meeting the research objectives effectively.

Table 2. Results of Expert Validators on Questionnaires

Stage Validation	Results	Description	Advice
I	65%	Decent Enough	Correct Writing there are some typos, Add statements related to Islamic intergrated teaching material that have beeb used.
II	90,1 %	Very Decent	Please Use

The results of the first-stage validation, as presented in Table 2, show that the questionnaire initially achieved a feasibility score (P value) of 65%, indicating it was only moderately suitable for use. One identified weakness was the lack of items related to whether the existing teaching materials had been integrated with Islamic values. As a result, the questionnaire was revised to include statements addressing this issue. After revision and re-validation, the instrument received a P value of 90.1%, categorized as "very feasible" for data collection. The validated questionnaire was then distributed to the research participants, consisting of lecturers who had taught Chemical Bonding, Organic Chemistry, and Basic Chemistry courses, as well as students who had taken the Chemical Bonding course. Distribution was conducted via Google Form.

The study aimed to identify the need for teaching materials in Chemical Bonding that are integrated with Islamic values. Responses were collected from seven Chemistry Education lecturers and 60 fourth-semester Chemistry Education students. The results were obtained from the open-ended Google Form questionnaire and are presented in Table 3.

Table 3. Experience of using Chemical Bond Teaching Materials

No	Questionnaire Content Categories	Lecturer	Student
1.	Never Used Islamic values integrated chemical bond teaching material	28.6 % ever	73.3 % ever
2.	Are there teaching materials for Chemical bond teaching materials	0 % ever	50% ever
3	If now there is a development of Chemical Bond Book integrated with Islamic values as an learning to support the learning process of Chemical Bond, how do yespond	100% yes, very necessary	95% yes, very necessary 5 % Yes in favour

Use of Teaching Materials

Based on Table 1, it can be observed that 28.6% of lecturers reported having used teaching materials for chemical bonds that are integrated with Islamic values. In contrast, 73.3% of students indicated that they have used such integrated materials. This suggests that a greater proportion of students have accessed Islamic values-integrated teaching materials compared to lecturers. This finding aligns with interview results indicating that students often learn chemical bonding from lecturers who provide Islamic values-integrated materials in the form of PowerPoint presentations and teaching modules.

Students tend to be more flexible in accessing diverse sources of learning materials, particularly through digital platforms (Marintan, 2024). This includes materials integrated with Islamic values, which may have been introduced during lectures or made available online. Furthermore, many students actively seek supplementary resources, especially those that incorporate spiritual perspectives to enhance their comprehension of scientific concepts. Teaching materials integrated with Islamic values are often more accessible to students, as some lecturers provide them as additional learning aids to promote a deeper understanding of the integration between religion and science.

Availability of Teaching Materials at the University

Data obtained from the questionnaire revealed that all lecturers stated that no official teaching materials integrated with Islamic values were available, while 50% of students reported that such materials were not available. This discrepancy indicates a gap in perception or information between lecturers and students. Students may have accessed Islamic-integrated teaching materials through various informal sources, such as lecturer-prepared PowerPoint slides, internet resources, or independently sourced materials. In contrast, lecturers tend to refer to formally published or institutionally approved teaching materials when assessing availability.

Currently, the teaching materials predominantly used are conventional chemistry textbooks, which do not incorporate Islamic values. This presents a challenge for students in relating scientific learning to aspects of faith and piety. Such a condition is inconsistent with the broader educational objectives outlined in the national education goals, which emphasize the formation of individuals who are both knowledgeable and spiritually grounded. Therefore, there is a clear and pressing need to develop teaching materials that effectively integrate Islamic values into the study of chemical bonding (Fajar & Habibbulloh, 2021).

Response to the Development of Chemical Bonding Book Integrated with Islamic Values

The data presented in Figure 2 shows that all respondents (100%) unanimously stated that it is highly necessary to develop teaching materials for Chemical Bonds that are integrated with Islamic values. Such integration is perceived as essential not only for enhancing students'

conceptual understanding of chemical bonding, but also for fostering a deeper Islamic understanding, ultimately contributing to the strengthening of faith and piety in Allah.

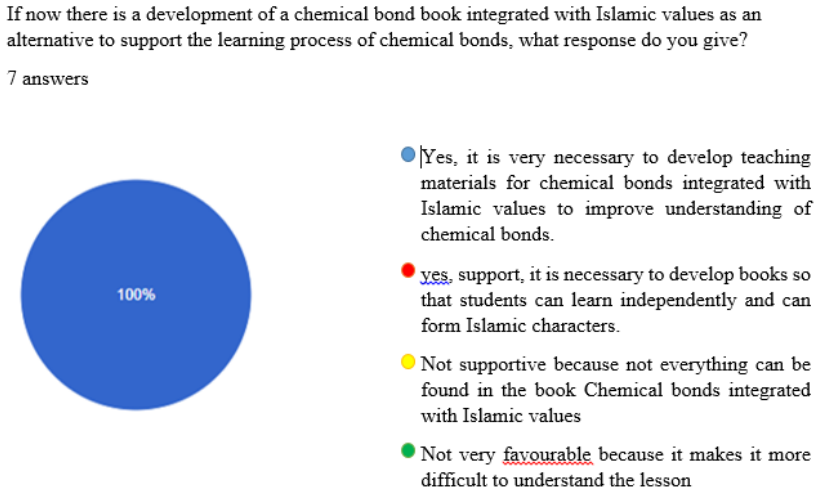


Figure 2. Lecturer Response to Teaching Material Development

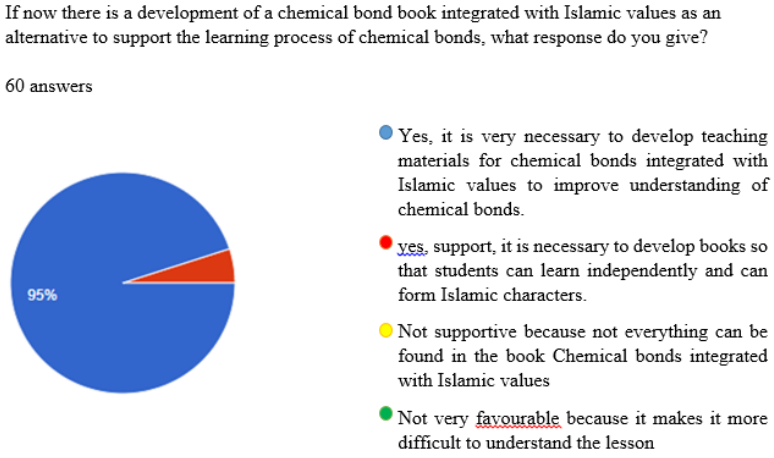


Figure 3. Student Response to The Development of Teaching Materials

Figure 3 shows that all 60 student respondents (100%) acknowledged the need for the development of teaching materials for Chemical Bonds integrated with Islamic values. Of these, 95% stated that such development is *very necessary* to enhance both Islamic understanding and conceptual comprehension of chemical bonds, which in turn is expected to strengthen faith and piety toward Allah. Meanwhile, 5% of the students indicated that the development of these teaching materials is necessary to support independent learning and to foster Islamic character. These findings underline the urgent need for teaching materials that integrate Islamic values in order to enhance students' religious attitudes (Susilowati, 2017). This is in line with the findings of Fenti Nurjanah et al.(2018), which showed that the development of Islamic values-integrated teaching materials is effective in improving students' religious character.

CONCLUSION

The results of the study indicate that 100% of lecturers reported the absence of teaching materials on Chemical Bonds integrated with Islamic values, while 50% of students also stated they had not encountered such materials. The existing teaching resources primarily focus on chemical concepts without establishing any connection to Islamic values. This gap results in teaching materials that do not effectively support the achievement of Graduate Learning Outcomes (LLOs), particularly in the aspect of religious attitudes—namely, devotion to God Almighty and the demonstration of a religious character. Therefore, it can be concluded that there is a significant and urgent need for the development of Chemical Bonding teaching materials that integrate Islamic values to enhance both academic understanding and spiritual development.

REFERENCES

Ardhana, I. A. (2024). Development of Chemistry Teaching Modules on the Topic of Ionic Bonding by Integrating Religious Moderation Values. Dalton: Journal of Chemistry Education and Chemical Sciences, 7(1), 40. https://doi.org/10.31602/dl.v7i1.13962

Ardiansyah, R., Corebima, A. D., & Rohman, F. (2019). Analysis of the Needs for Development of Teaching Materials for Genetic Material Changes in Genetics Subjects at State University of Malang. National Seminar on Education and Science and Technology, 2016, 1. http://publikasiilmiah.ums.ac.id/handle/11617/8009

Cahyo, S. D., Muslim, M. R. U., Rahman, A. N., & Pratolo, B. W. (2019). Needs analysis of Islamic-based English reading material for the Muhammadiyah junior high school. International Journal of Evaluation and Research in Education, 8(2), 286-292. https://doi.org/10.11591/ijere.v8i2.18647

Compiler, P. (2021). Chemistry Education Study Programme Curriculum 2021 Sriwijaya University.

Diana, M., Netriwati, N., & Suri, F. I. (2018). Islamic Nuanced Mathematics Learning Module with Inquiry Approach. Decimal: Journal of Mathematics, 1(1), 7. https://doi.org/10.24042/djm.v1i1.1906

Effendyy. (2017). Molecules Structure, and Properties (First). Indonesian Academic Publishing.

Emda, A., Adam, M., & Jannah, M. (2023). Development of Inquiry-Based Environmental Knowledge Modules and Islamic Values. Journal of Natural Science and Integration, 6(2), 209. https://doi.org/10.24014/jnsi.v6i2.19392

Fahrurrozi, F. et al. (2019). Development of Teaching Materials for Chemical Bonding Inquiry Model with Cognitive Conflict Strategy towards Critical Thinking Ability Teaching materials for chemical bonding that are more varied, innovative and practical will certainly be very lecture in the field of chemistry, especially bonding material. 7(1).

Fajar, D. M., & Habibbulloh, M. (2021). Development of IPBA Module on Earth-Moon System Material Based on Science-Islam Integration. Journal of Natural Science and Integration, 4(1), 126. https://doi.org/10.24014/jnsi.v4i1.11796

Fenti Nurjana. Retno Triwoelaandari, M. K. N. (2018). Development of Thematic Teaching Materials Integrated with Islamic Values and Science to Improve Students' Religious Character. III(2), 17-26.

Hartato, S. M., & Saputri, W. (2024). Needs Analysis of PBL-SSI Biology Teaching Materials integrated with Qur'anic Verses at Muhammadiyah Senior High Schools in Palembang. 06(03), 17707-17726.

Khoiri, A., Agussuryani, Q., & Hartini, P. (2017). Islamic Character Development through Physics Learning Based on Science-Islam Integration. Tadris: Journal of Teacher Training and Tarbiyah Science, 2(1), 19. https://doi.org/10.24042/tadris.v2i1.1735

Kosim, A. (2024). Development of Science Teaching Materials Integrated with Islamic Values to Improve Science Learning Outcomes. Journal of Science Education Research, 10(7), 4256-4263. https://doi.org/10.29303/jppipa.v10i7.7547

Marintan, M. A. (2024). Comparison of the Use of Physical and Digital Library Materials by Students of the Faculty of Adab and Language. 7(2), 173-193.

Mehdi Haseli Songhori. (2008). Introduction to Needs Analysis. English for Specific Purposes World, 7(20), 1-25.

Prastowo, A. (2012). Creative Guide to Making Innovative Teaching Materials. Diva Press.

Qashdi, A., Susilawati, S., & Rery, R. U. (2022). Development of Chemical Bonding Module Based on Multiple Representation. Journal of Educational Sciences, 263-274.

Sarinami, P. et. a. (2022). Needs Analysis of Booklets Integrated with Islamic Values as Teaching Material Supplements on Virus Material for Class X SMA/MA. 4, 252-257.

Sugiyono. (2019). Educational Research Methods (Quantitative, Qualitative, Combination, R&D and Educational Research). alfabeta.

Susilowati, S. (2017). Development of Science Teaching Materials Integrated with Islamic Values to Improve Students' Attitudes and Science Learning Achievement. Journal of Science Education Innovation, 3(1), 78. https://doi.org/10.21831/jipi.v3i1.13677

Takim, R. R. (2021). Development of Chemical Bond Module Based on Contextual Teaching and Learning (CTL) Through Experimentation Method. Journal of Tropical Chemistry Research and Education, 3(2), 53-62. https://doi.org/10.14421/jtcre.2021.32-01

Wahyuni, A. (2020). Integration of Islamic Values in Science Education 'A Reconstruction Effort in Education.' Halaqa: Islamic Education Journal, 4(2), 163-168. https://doi.org/10.21070/halaqa.v4i2.1000

Wati, N. S.. K. (2024). Integrating English Language Materials and Islamic Values: Research and Development in Islamic Higher Education. Journal of Scientific Research, 8(1), 112=122.

Yahya, M., & Rosi, R. I. (2018). Mapping out the Implementation of Science-Islam Integration on University Students' Thesis at UIN Maulana Malik Ibrahim Malang 2011-2016. Icri 2018, 1349-1355. https://doi.org/10.5220/0009927513491355