

Development of Learning Media Chemistry Puzzle Based on Islamic Integration of Science on Petroleum Materials

Ilma Amalia¹, Setia Rahmawan²

^{1,2}Universitas Islam Negeri Sunan Kalijaga Yogyakarta, Indonesia

¹setia.rahmawan@uin-suka.ac.id

Abstract

Integrating Islamic science and science can form positive student qualities, such as discipline and faith. However, there are still areas for improvement in teacher readiness and the creation of learning media that combine religion and science, especially chemistry lessons. This study aims to determine the feasibility of chemistry puzzle media based on the integration of Islamic science into petroleum materials. Development using the ADDIE model consists of analysis, design, development, implementation, and evaluation. The instruments in this study are validation sheets, product assessments, and student questionnaires. Products are validated by material and media experts, assessed by chemistry teachers, and in the responses of grade XI MIPA Madrasah Aliyah students. Qualitative data were tabulated and analyzed using the ideal assessment category to determine the quality of the media. The validation results by material and media experts on the media are considered very valid. The results of teacher assessment from the aspect of content and aspects of integration percentage of assessment 91.6%, percentage of 97.2% assessment of aspects of presentation and aspects of language and communication, 88.8% percentage of display aspects, 90.2% percentage of assessment aspects of typographic use and percentage of 95.8% assessment aspects of media organization. The results of the student response questionnaire get a very decent category. It was concluded that the media is considered very good and can be used as an innovation or alternative to learning integrated chemistry of petroleum materials. Based on an assessment of the overall ideal percentage of 92.6%.

Keywords: Learning media, chemistry puzzle, Islamic integration of science, chemistry, petroleum.

Introduction

Integration combines disciplines that are usually considered different to produce an integrative understanding of the concept of science (Rifai et al., 2014). Integrating science and religion means trying to unite aspects of both (Zhulfarani et al., 2022). The involvement of science and Islam in this integration is caused by scientific advances that increasingly forget religion, even though all knowledge is based on Oneness (Lubis, 2022). At this time, science and religion were taught separately. According to (Aminah, 2017), science is considered physical, while religion is considered metaphysical. Therefore, many attempts were made to reharmonize between science and religion.

Rene Descartes defines the concept of Islamization of science, which represents Islamization as an effort to give a religious dimension to science while realizing that science can be developed in religious and non-religious contexts (Rachman, 2020). To integrate science education and moral values in learning philosophically, it is necessary to give the burden of fundamental values, giving Qur'anic verses, for example, about fields of study/subjects that are prophetic, universal, and humanistic (Latipah et al., 2020). This is a process of realizing that whatever knowledge does not stand alone, it can be exemplified in Islam, reminding humans to

pay attention to various natural events that occur and reflect on the multiple beauties that Allah SWT created, such as all creatures of the universe, soul, Earth, and sky (Anggereni et al., 2019).

This phenomenon is the reason for the need for integration between two sciences, namely religion and science, so that a comparison of the characteristics of students in Madrasah Aliyah with students in high school can be seen. Integrating Islamic science and science can show several qualities in students, such as discipline, faith, honesty, and so on (Amin, 2020). The science subjects studied in Madrasah Aliyah are essentially the same as learning general sciences, which are different from learning religious sciences (Chasanah et al., 2019). In Madrasah Aliyah, religious subjects are taught in depth without neglecting general subjects (Tahir, 2021). Based on observations (Sholahuddin, 2022) in several Madrasah Aliyah, students' public and religious knowledge does not run simultaneously, and some teachers also cannot teach learning by combining the two sciences. One of the lessons closely related to Islam is chemistry lessons. However, many teachers of science subjects, especially chemistry, still need Islamic insight, which causes the application of Islamic science-based chemistry learning (E. P. Putra et al., 2021).

Chemicals that are closely related to natural events (Ayat Kauniyah) are petroleum materials (Hidayati et al., 2018). Natural resources result from the Earth in the process of something according to His rules; one example is petroleum, which is material in the form of theories and facts (Hartami et al., 2017). Empirical facts about petroleum, such as the types of petroleum, the different physical and chemical properties, and how petroleum is extracted, processed, and used in various applications, such as fuels, lubricants, and industrial chemicals (Safitri et al., 2023). These theories and facts help us understand this critical natural resource, as well as how we can manage it sustainably and minimize its negative impact on the environment (Budiman, 2017); in learning petroleum chemistry, learners will learn the basics of chemistry and its application in the context of petroleum.

Students will quickly forget theoretical learning material because most teachers convey theory only through the lecture method (Sitorus et al., 2022). In learning like this, teachers must be able to create or use fun learning media, make students more active, understand the material being studied, and still pay attention to achieving learning objectives, with the concept of learning while playing so that students can be interested in continuing to learn (Nurseto, 2012). One of the supports for more quality success is increasing the use of learning media (Karo-Karo & Rohani, 2018). This is in line with the understanding of learning media according to Kustandi and Bambang (Anggereni et al., 2019) explained that learning media is a tool that can support the teaching and learning process and clarify the meaning of the message conveyed so that learning objectives can be achieved better and as a whole. However, the development of chemistry learning media that links science subject matter with Islamic science with fun concepts still needs to grow (Wijayanti et al., 2021).

Learning media in the form of games can be used to create a fun learning atmosphere (Neteria et al., 2020). Learning media in the form of games in teaching and learning activities can support the learning process to be more active. Besides that, the use of learning media in the form of games can also provide fun learning experiences for students so that they can foster interest in learning (Hartanti, 2019). Learning media in the form of games can be used by teachers to deliver learning materials in the form of theory (Dewi & Kurniawan, 2021) because game-based learning can help learners remember information better. After all, they are involved in direct decision-making and problem-solving experiences (Indriasih, 2015). Not only in problem-solving and decision-making, but learning media in the form of games can also foster interaction between students, both fellow and instructors, so that they can collaborate,

communicate, and learn from others (Nataliya, 2015). Puzzles can mean a game or a problem-based toy that must be solved to sharpen the player's intelligence (Bulqis, 2022).

The puzzle is a game with specific rules that show a problem to be solved through patience and ingenuity (Patricia & Zamzam, 2020). The puzzle game developed contains material and chemical problems of petroleum material that are packaged interestingly and are played in groups. This research seeks to build chemistry learning media by integrating Islam and science, namely, chemistry puzzles based on the integration of Islamic science on petroleum materials. This media is expected to be a reference for teachers in creating fun learning and helping students understand the subject matter with the application of the integration of Islam and science. In addition, the game is designed to develop social skills, critical thinking, and decision-making.

Method

Research procedures are needed so that the research carried out runs in a structured and systematic manner (Pranowo et al., 2021). The method used in research and development (Research & Development) with the ADDIE development model has several stages: analysis, design, development, implementation, and evaluation (Najuah et al., 2021). This study also carried out a literature review referring to the method used. Here are the main steps:

1. At the analysis stage, researchers begin to observe the needs of students and curriculum analysis. Analysis is carried out to obtain information related to the problem.
2. At this design stage, a design was made to develop learning media in games containing petroleum material content, with an integrated approach to Islam and science, and compile product assessment instruments.
3. In the Development phase, researchers develop products or learning media according to the specifications set out in the instructional design. After the product development has been completed, validation will be carried out by media and material experts.
4. Implementation stage: at this stage, researchers only carry out limited implementation for final product trials after going through product validation. In addition, at this stage, there is also a need for an assessment from the teacher and the student's response to the media developed.
5. The evaluation phase, including formative evaluation, is intended to meet the needs of revision if there are suggestions or input from each stage, and summative assessment after implementation completion to measure the final product.

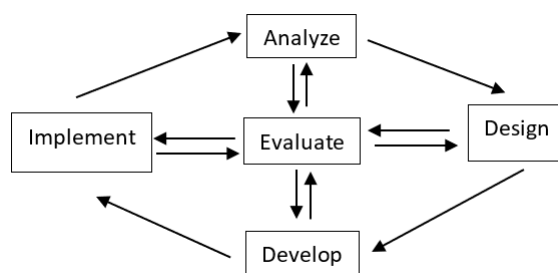


Figure 1. Tahap model ADDIE

The subject of this study was a chemistry puzzle based on the Islamic integration of science, which was tested on 34 class XI MIPA students in Madrasah Aliyah. Data collection techniques in this study were carried out by:

1. The first data collection stage used observation methods and interviews with teachers and students, becoming the primary basis for developing products. In addition, literature studies are also carried out to provide a theoretical basis for such development.

2. In the second stage, data is collected by conducting product validation involving material experts for content aspects, aspects, integration aspects, and presentation aspects by material experts and involving media experts for validation of display aspects, typographic aspects, media organization aspects, language, and communication aspects.
3. In the third stage, data was also collected through an overall assessment of the product by three reviewers who are high school / MA chemistry educators.
4. Data collection in the fourth stage is also done by obtaining student responses to the tested products.

Data analysis techniques are carried out with quantitative and qualitative approaches. The evaluation of product validation results by material experts and media experts is then interpreted according to the categories listed in Table 1.

Table 1. Validation data criteria

Achievement Rate %	Category
90-100	Very Valid
80-89	Valid
55-79	Quite Valid
0-54	Invalid

Three chemistry teachers conducted product assessments through assessment sheets using a modified Likert scale with four alternative answers, namely excellent (with weight 4), good (with weight 3), less (with weight 2), and significantly less (with weight 1) (Saputra et al., 2018). The overall score of the product assessment by chemistry teachers is calculated by adding the sum of the scores of each aspect of the evaluation using the following formula:

$$\bar{X} = \frac{\sum x}{n} \quad (1)$$

Information:

\bar{X} = average score

$\sum x$ = number of scores

N = number of appraisers

The scores obtained are converted into qualitative data based on the ideal assessment criteria in Table 2.

Table 2. Ideal assessment criteria

Vulnerable Score	Category
$x \geq \bar{x} + SBi$	Very Good
$\bar{x} + SBi > x \geq \bar{x}$	Good
$\bar{x} > x > \bar{x} - SBi$	Less
$x < \bar{x} - SBi$	Very Less

Calculate the ideal percentage of the quality of learning media as a whole with the formula:

$$\% \text{ overall ideality} = \frac{\text{average score} - \text{average across aspects}}{\text{Ideal High score in all aspects}} \times 100\% \quad (2)$$

Data analysis on learner responses: qualitative data is converted into quantitative data based on the Guttman scale consisting of 1 (yes) and 0 (no) scores. Then, the average of all aspects is calculated using formula (1), and the percentage of overall product ideality and each

element is using formula (2). furthermore, interpreting the ideality percentage results in data into a category as in Table 3 (Kartini & Putra, 2020).

Table 3. Product qualification level criteria

Achievement Rate %	Category
0-40	Not Worth It
41-60	Less Worth It
61-80	Worth It
81-100	Very Worth It

Results

Analyze

The analysis stage is a necessary foundation that allows development to understand needs, target audiences, and learning objectives in depth before entering the design stage (Arifin et al., 2023). The analysis creates a solid basis for planning and developing learning programs that can be adapted according to the needs and characteristics of students (Suyetno, 2020). The analysis is carried out on needs analysis and curriculum analysis. Needs analysis is conducted through interviews with learners. The results showed that the lecture method used in the learning process by teachers on material that was explicitly only theoretical, according to them, made the learning atmosphere monotonous and sometimes made them feel sleepy. In addition, learners only do reading activities and develop little of their thinking through active interaction. Teachers also cannot produce many learning media to create a more exciting learning atmosphere for students.

Curriculum analysis was conducted using the 2013 curriculum syllabus. In any material that students consider, teachers have yet to be able to deliver the material maximally. Then, it is condensed into one chapter of material, namely petroleum material, because in that chapter, students are only asked to read and understand the theory written in the package book. The petroleum material chapter has several sub-chapters named the process of petroleum formation, petroleum fractions, petroleum refining, and the impact of burning hydrocarbons. All existing subchapters are then adapted to integrate Islamic material and interconnected science.

Design

In the planning stage of the ADDIE model, it is essential to formulate diverse teaching strategies, relevant training materials, and learning approaches that suit the needs of students to achieve learning objectives (Cahyadi, 2019). The focus is on determining the order of the material and planning learning activities per the objectives set (Alwan, 2017). At this stage, planning is carried out in the form of design to develop learning media in the form of games related to petroleum material, with an integrated approach to Islam and science. The steps taken in the stages include designing puzzle learning media and compiling game instructions and questions. The game developed is called Chemistry Puzzle. The initial design of chemistry puzzle game media products was based on the concept of conventional puzzle games, where players had to put together pieces of images to form a complete picture.

The cut image is modified to include petroleum material problems in the sub-material by the essential competencies to be achieved, including the formation of petroleum, petroleum fractions, petroleum refining, and the impact of hydrocarbon combustion and related to the verses of the Qur'an, verses integrated into this material include suras An-Nahl: 13, Al-Isra: 49-51, Al-Hijr: 28 and Al-A'la: 1-5. Drafting game rules contains components such as the game set, number of players, game duration, score rules, how to play, and how to determine the winner. Games allow for competition between the two teams, creating opportunities for better group work experiences and enhancing learners' cognitive and affective abilities. The rectangular puzzles assist players in composing, and their compact shape is also designed to be easy to

carry. The material used in manufacturing is thick cardboard to ensure the product's durability. Assessment instruments have a vital role in assessing product quality. The instrument is designed based on literature research on the criteria of effective learning media. Before use, this instrument goes through validation by experts.

Development

In the Development phase, the development team will start creating content or learning media according to the specifications set out in the instructional design (Febriyanti & Ain, 2021). The primary role at this stage is to translate instructional design into concrete learning materials (Halim & Munthe, 2019). The stage carried out is the realization of the product that has been designed. Making puzzle designs using the Canva application to produce the desired design for the primary material for making puzzles in the form of acrylic that has been cut; this material is chosen based on durability and safety when the product is used, materials that are not easily broken or damaged if used repeatedly and can be ensured durability for a long time. The puzzle consists of questions created based on sub-materials from the petroleum chapter. Each puzzle box includes one sub-chapter of material; there are four puzzle boxes that learners must solve in the game; the subchapters covered are the process of petroleum formation, petroleum fraction, petroleum refining, and the impact of hydrocarbon combustion. Preparing puzzle answer corrections involves using different Qur'anic verses on each side of the puzzle piece. These verses pertain to petroleum matter, either impliedly or directly written. If the arrangement of the puzzle pieces is correct, then the verses will be arranged correctly and can be read clearly. However, if the arrangement of the puzzle is not valid, the verse pieces will be random, so they cannot be read correctly.

After the product has been completed, material and media expert validation is carried out in Table 4 to determine the product's shortcomings that have been made to improve the validation results and if there are revisions, suggestions, and input.

Table 4. Results of expert validation

Validator	Aspects	VTR	VDR	TV	Result	Category
Media	Display	100%	0%	0%	100%	Very Valid
	Typography	100%	0%	0%	100%	Very Valid
	Uses	100%	0%	0%	100%	Very Valid
	Language	100%	0%	0%	100%	Very Valid
Material	Others	50%	50%	0%	100%	Very Valid
	Integrasi	75%	25%	0%	100%	Very Valid
	Presentation	100%	0%	0%	100%	Very Valid

From the results of validation by media experts, there is nothing to improve; all have met the assessment criteria. It can be seen in Table 4 validation by material experts that several aspect criteria need to be improved in the content aspect, which required revision to be able to write the essential competencies of the material learned before the game instructions.



Figure 2. Before revision



Figure 3. After revision

The following note concerns the integration aspect of the Qur'anic verses listed in QS. Al Isra Verses 49-51 to be written the meaning, but due to limited space available, the meaning of the verse can be accessed using the barcode found at the bottom of the verse. The results of the improvement can be seen in Figure 5.



Figure 4. Before revision



Figure 5. After revision

Implementation

The implementation stage involves the implementation of the lesson plan that has been prepared, including the use of media, materials, teaching, and interaction with students (Putra et al., 2020). The media that has been developed will be introduced to students through various teaching strategies that have been designed (Uno & Ma'ruf, 2016). At this stage, researchers only carry out limited implementation for trials of the final product results after going through the validation results. At this stage, it is necessary to assess the teachers' and students' responses to the media developed. This media was used in class XI MIPA at Madrasah Aliyah, with 34 students. Then, the children were divided into eight groups, all involved in a puzzle preparation competition. In this competition, they must collaborate to assemble each puzzle piece.

Each team member must participate in the puzzle preparation process with solid collaboration, and each member takes turns arranging the pieces. This game demands skills in teamwork, quick and meticulous thinking, and the ability to put together puzzle pieces carefully. After a limited trial is carried out, students and teachers provide an assessment of the product that has been developed.

Table 5. Teacher Assessment Results

Aspects	Indicator	Criteria Number	Reviewer			Result	Score Max	% Ideal
			I	II	III			
Others	Material	1	4	4	3	44	48	91.6%
		2	4	4	4			
		3	3	4	4			
		4	3	4	3			
Integration	Contextualization	5	3	4	4	44	48	91.6%
		6	3	4	4			
		7	3	4	4			
		8	3	4	4			
Presentation	Presentation of material	9	4	4	4	35	36	97.2%
		10	4	4	4			
		11	3	4	4			
		12	3	4	4			
Display	Visual Design	13	3	3	4	32	36	88.8%
		14	3	4	4			
		15	4	3	4			
		16	4	4	4			
Typography	Picture	17	4	2	4	65	72	90.2%
		18	4	4	3			
		19	4	4	4			
		20	3	3	3			
Organizing	Uses	21	3	4	4	23	24	95.8%
		22	4	4	4			
Language and Communication	Language Writing rules	23	4	4	3	35	36	97.2%
		24	4	4	4			
		25	4	4	4			
Result Average		25	88	95	95	278	300	92.6

Table 6. Categories of teacher assessment results

Vulnerable Score	Result	Category
$x \geq 62.5 + 12.5$	$x \geq 75$	Very Good
$62.5 + 12.5 > x \geq 62.5$	$75 > x \geq 62.5$	Good
$62.5 > x > 62.5 - 18.5$	$62.5 > x > 44$	Less
$x < 62.5 - 18.5$	$x < 44$	Very Lacking

The average score achieved is 92.6, at a vulnerable score of $x \geq 75$, so the teacher's assessment of the developed product is included in the outstanding category.

$$\% \text{ ideality} = \frac{92.6}{100} \times 100\% = 92.6\%$$

With an overall ideality percentage of 92.6%.

After the trial was carried out to the students, students were asked to fill out the questionnaire distributed at the end of the trial. The results of student responses to the developed products are then converted into percentage form and interpreted based on categories in Table 3 and results obtained in Table 7.

Table 7. Results of student responses

Aspects	Σ score	Max skor	% ideal	Category
Material	102	102	100%	Very Worth It
Media	134	136	98%	Very Worth It

Integration	100	102	98%	Very Worth It
Result	336	340	98%	

Based on the information in Table 7, all aspects can be achieved well after limited trials are carried out. The results of students' responses to the developed media reached a percentage of 98%. The selection of learning media that matches the material and its innovative impression can motivate students to try actively, resulting in unexpected learning. The suitability of the media used avoids boredom and encourages students' enthusiasm to follow all learning materials.

Evaluation

The evaluation phase helps identify successes and areas of improvement needed to improve the quality of media or subsequent learning (Muhajir et al., 2022). This stage is the last phase of each process, including formative evaluation during the process and summative evaluation after completion of implementation to measure the entire program (Usman et al., 2023). Evaluation is intended to meet the needs of revision if there are suggestions or input from each previous stage; the final result of the puzzle can be seen at <http://gg.gg/PuzzleIntegrasi>. The evaluation results obtained from this media teacher assessment can be disseminated to teachers as an alternative to integrated petroleum material learning media; besides that, it is also an alternative learning to overcome teacher problems in delivering petroleum material.

Discussion

Islamic Integration of Science

Integrating science and Islamic teachings is essential in media development (Sari & Vebrianto, 2017). There are two crucial markers in this aspect; the first puzzle provides a point of view of integration between Islam and science. Second, integrating Islam and science is relevant in the puzzle media. The development of this learning tool managed to achieve 91.6% of the ideal standards that are considered good, showing that the press can combine concepts between science and Islam. In addition, this media helps students to understand the importance of science in the context of Islamic teachings. Quranic verses associated with the material in the development of this media include:



Figure 6. Exterior view



Figure 7. Inside view

﴿سَبِّحْ اسْمَ رَبِّكَ الْأَعْلَى﴾ الَّذِي خَلَقَ فَسَوَّى ﴿وَالَّذِي قَدَّرَ فَهَدَى﴾ ﴿وَالَّذِي أَخْرَجَ الْمَرْعَى﴾ فَجَعَلَهُ غُثَاءً أَحْوَىٰ

"Sanctify the name of your Lord the Most High, who created and perfected (His creation), who determined (each) and instructed, and who grew (the grass) of the pasture, and made it blackish dry." (QS. Al-A'la verses 1-5)

The verse talks about the majesty of Allah Almighty, who created all things with wisdom. Although there is no direct connection between the verse and the chemistry of the process of petroleum formation, we can see its connection through the perspective of God's greatness and wisdom in creating everything in the universe. The verses in surah Al-A'la remind us of the majesty of His creation and the wisdom in making all things with a beautifully arranged and perfect purpose (Firdaus, 2015).

﴿وَمَا ذَرَأَا لَكُمْ فِي الْأَرْضِ مُخْتَلِفًا أَلْوَانُهُ﴾ إِنَّ فِي ذَٰلِكَ لَآيَةً لِّقَوْمٍ يَذَّكَّرُونَ ۝ ۱۳

"And (He also controls) what He created for you here on earth with its various kinds and colors. Indeed in such there is indeed a sign (of the greatness of God) for those who take lessons." (QS. An-Nahl verse 13)

Surah An-Nahl describes the miracle of Allah's creation through the diversity of His Creation. Although not directly related to petroleum fractions, the verse reminds us of God's greatness in creating various life forms and complex natural phenomena. In the context of the formation of petroleum, we can see it as one example of the complex and varied wonders of God's creation; the verse reinforces the observation of the diversity of God's creation that we can see in many natural phenomena, including in the complexity of petroleum fractions.

﴿وَقَالُوا إِذَا كُنَّا عِظَامًا وَرُفَاتًا﴾ ءإِنَّا لَمَبْعُوثُونَ خَلْقًا جَدِيدًا ﴿قُلْ كُونُوا حِجَارَةً أَوْ حَدِيدًا﴾ ﴿أَوْ خَلْقًا مِّمَّا يَكْبُرُ فِي صُدُورِكُمْ﴾ ۖ فَسَيَقُولُونَ مَنْ يُعِيدُنَا قُلِ الَّذِي فَطَرَكُمْ أَوَّلَ مَرَّةٍ ۖ فَسَيُنْغِضُونَ إِلَيْكَ رُءُوسَهُمْ وَيَقُولُونَ مَتَىٰ هُوَ قُلْ عَسَىٰ أَنْ يَكُونَ قَرِيبًا

"And they said, "When we become broken bones and things, will we be resurrected as new beings?" Say (Muhammad), "Be ye stone or iron, or become a great being (who cannot come back to life) according to your mind." Then, they will ask, "Who will bring us back to life?" Say, "Who created you first." Then they will shake their heads at you and say, "When will it happen?" Say, "Maybe the time is near." (QS. Al-Isra verses 49-51)

These verses underscore the importance of knowledge and wisdom in managing the resources God has given man. Refining technology in the context of petroleum refining is an example of how humans use knowledge and understanding to utilize God-given natural resources more efficiently. We can see it as implementing the values emphasized in these verses, namely, using knowledge and wisdom to make good use of natural resources by established provisions (Putri, 2022).

﴿وَإِذْ قَالَ رَبُّكَ لِلْمَلِكَةِ إِنِّي خَالِقٌ بَشَرًا مِّنْ صَلْصَالٍ مِّنْ حَمَإٍ مَّسْنُونٍ﴾ ۝ ۲۸

"And (remember), when your Lord said to the angels, "Truly, I will create a man out of dry clay out of form-shaped black mud." (QS. Al-Hijr verse 28)

Sura Al Hijr:28 speaks of the creation of man from the land and the life that Allah created before. The verse does not directly discuss the burning of hydrocarbons or their effects. However, we can look at the relationship or relevance from a broader perspective on creation and human responsibility towards nature. We can relate it to man's responsibility as caliph on Earth; man is responsible for safeguarding and caring for nature and using natural resources wisely without disturbing the balance of nature and harming himself or other creatures. In this context, the impact of burning hydrocarbons is an example of how human actions in using natural resources must be directed to maintain the balance of nature and avoid its adverse effects following the teachings contained in religious teachings.

Specifically, these verses speak of how God created his various creations and natural resources for the benefit of man. Petroleum is a critical and chemically complex natural resource (Endriani et al., 2018). In chemical studies, petroleum is a complex mixture of hydrocarbons resulting from the biological processes of organisms that have been captured in the layers of the Earth for millions of years (Wardhani & Titah, 2021). By reflecting on these verses, we can see that petroleum is one of the clear examples of God's power and wisdom in creating everything with a specific purpose, including the chemical properties present in petroleum. By integrating the two, students are expected to appreciate better the wonders of God's creation and how these natural resources can be utilized for human needs, such as in the energy industry, chemical industry, and many more.

The combination of hydrocarbon and petroleum concepts here instills spiritual values such as faith and piety in students (Faeha et al., 2019). In this context, the learning material is applied through habituation of attitudes such as deliberation, cooperation, discipline, etc. The integration of noble Islamic values in students in hydrocarbon and petroleum materials includes several things, such as analysis of Quranic verses that explain petroleum, full use of attitudes that reflect the values of piety to create superior students through appreciation and reflection on the use of petroleum (Hidayati et al., 2018). The integration aspect of the media produced by researchers has reached 91.6% in the "very feasible" category; this confirms that the concept of integration designed on this media can be presented well. It combines verses of the Quran as a source of positive value or foundation in instilling faith and piety in students (Rosnawati et al., 2022).

This is in line with the results of research (Zamhari et al., 2022). The integration aspect of the developed media reached a percentage of 90.00%, which confirms that learning media can present good integration between science and Islam and that it can also help students to know the virtues of science in Islam. Similar to the research conducted by (Hatimah et al., 2020), the aspect of integration with Quranic verses with the material in the modules developed reached a percentage of 85%. This shows that the integrated module of Quranic verses is in an outstanding category to be used as a learning resource. Based on the findings and presentation of previous research, the results of the assessment of integration aspects obtained in this study are not much different from previous studies.

Learning Media

In presenting petroleum material in chemistry learning with an Islamic science integration approach, using learning media as puzzles can be an exciting choice. The media puzzle developed is based on assessing seven aspects: content, integration, presentation of material, display, use of typography, media organization, language, and communication. With one indicator, the content aspect obtained a percentage result of 91%, which is considered very good because it has been adjusted to the learning objectives. The integration aspect of Islamic science consists of two indicators, namely contextualization and relevance to the integrated material, with a percentage of 91.6% included in the excellent category. This aspect is a core

aspect of the developed media; this confirms that the media can present an integration between science and Islam and help students to know the virtues of Islam and science (Suprianingsih et al., 2022). Giving the material gets a percentage of results of 97.2%, which is considered very good. This confirms that the developed media can cover the sub-materials in petroleum materials in sequence. Excellence in presenting material in the media can add value to the generated media (Deadara & Suyanto, 2017). The display aspect, consisting of two indicators, namely images and text in the press, was assessed with a percentage of 88.8% with a perfect assessment category; the display aspect is one of the essential aspects in media development because, through an attractive media display, students can increase learning motivation (Putri et al., 2021).

Using typography with two indicators, including images and text in the developed media, got a percentage of 90.2%, which meets the perfect criteria. Learning media using images or text can provide a relaxed and informal learning situation, free from tension and anxiety (Ariyati, 2013). Students are actively involved and required to provide responses and make decisions. Aspects of media organization with media usability indicators get a percentage result of 95.8%, which is considered very good; this proves that the media developed has met the criteria for effective media to be used repeatedly. Language and communication aspects with linguistic assessment indicators and writing rules were assessed with a percentage of 97.2% in the outstanding category. The results stated that the media developed had met the linguistic criteria and authorship rules to avoid causing misconceptions in learning. The most dominant factor in the occurrence of misconceptions is the attractive factor that exists in students, namely the processing of the knowledge they receive and becomes newly formed knowledge so that the concept of his study at the beginning dominates the error of misconception (Rohmah et al., 2023).

It compares this research with previous research on developing learning media about petroleum materials. Research conducted by (Nurjanah et al., 2017) developing animation media using video scribe software obtained the results of the overall ideal percentage of video scribe media of 95%, including in the very good category; overall it can be concluded that video scribe-based learning media is feasible to be used as a learning media. Research conducted by (Devtiarani et al., 2022) developed interactive learning media medley Malay With the overall ideal results showing a percentage of 81.25% with perfect criteria, based on the results of the study, it can be concluded that interactive learning media medley Malay is suitable for use in learning. Research conducted by (Hanafi, 2023) developing science modules that are integrated with Islamic values obtained an ideal percentage result of 81.42% with excellent quality, so overall, it can be concluded that the modules developed are worthy of being used as learning resources.

The development of puzzle media carried out in this study obtained the results of an overall ideal percentage of 92.6% with an outstanding category; based on the results, it can be concluded that the development of chemistry puzzle media based on Islamic integration of science is feasible to be used as an alternative learning media on petroleum material. The difference between this research and previous research is the result of the product, namely chemistry puzzles, based on the integration of science with the application of gameplay so that at the time of learning, students are led to be more interactive in the learning process. The developed products have advantages: puzzle chemistry can help interactive learning that allows students to engage in the learning process, acrylic base materials used in making puzzles can be recycled and have relatively high sustainability compared to other materials, supporting environmentally friendly principles. The drawback of the developed products is that sometimes the integration of Islamic science can limit the breadth of material that can be included in the

puzzle, so some concepts of science may not be covered properly and are prone to scratches, especially if not treated or used carefully.

Conclusion

Based on a series of research and development activities that adopt the ADDIE model, information was obtained that the media chemistry puzzle based on the integration of Islamic science on petroleum materials has been considered very valid by experts in the field of media and materials from various aspects. Supported by teacher assessment results from each element, content aspects, and integration aspects with an assessment percentage of 91.6%, a percentage of 97.2% for evaluation of presentation aspects and aspects of language and communication, 88.8% percentage of results for display aspects, 90.2% percentage of assessment aspects of typography use and a percentage of 95.8% for assessment of aspects of media organization. The results of the student response questionnaire also got a percentage result of 98%, with the media category developed very feasible. The media that has been designed is viable/excellent and can be used as an innovation or alternative in integrated chemistry learning on petroleum materials. Based on the assessment results, the overall ideal percentage obtained is 92.6%.

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