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Analysis of Students' Entrepreneurial Motivation and Responses Based on Entrepreneurship-Oriented Project-Based Learning

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Abstract

An effective and valid learning device for chemoentrepreneurship-based projects was produced for solve the one of many problems learning in Indonesia, especially about environment-managed thinking skill. This is important to optimize to increasingly explore education during senior high school and to earn a living after graduation. By this research, we can be overcome by STEM-integrated project-based learning on the topic of environmental management in the form of teaching materials and chemoentrepreneurship oriented. This research aimed to produce chemistry teaching materials: ecological management based on project-based learning-oriented chemoentrepreneurship. This research was developed using the method Analyze, Design, Develop, Implement, and Evaluate shortened to ADDIE model and using 8 expert validators to provide validation of material and media content. The results of the research showed that the validation of materials and media was declared valid because the V_{count} obtained was 0.90 exceeding 0.75 in the Aiken's test. As well as 90% declared that the device is feasible to use to learn. This statement is reinforced by the results of 63 students as responses who studied at an islamic senior high school were used for limited testing. They said that this new device of teaching materials obtained a percentage of 90% and was categorized as very good for study material about entrepreneurship-based environments.

Keywords: Teaching materials, Chemistry, Environmental management, Chemoentrepreneurship

INTRODUCTION

Pandemic Covid-19 that occurred in Indonesia also affected the education sector, the competence of students achieved also experienced differences due to learning lag and learning crisis. The government then gives freedom to each educational institution to choose which curriculum best meets the learning needs of students in schools. At the high school level, the independent curriculum has two phases, namely phase E for class X and phase F for class XI and class XII (Khoirurrijal et al., 2022). Chemistry lessons at the Phase E or grade X high school level one of the learning objectives is to apply chemical concepts in environmental management including explaining global phenomena. One of the problems associated with environmental management is related to waste.

According to the Indonesia National Action Plan (NPAP) report, as much as 4.8 million tons or 70% of the total plastic waste in Indonesia is unmanaged with an estimated 0.62 million tons or 9% of this unmanaged plastic waste ending up in Indonesian marine waters (Maskun et

al., 2022). Efforts to overcome this waste problem can be started from school by providing understanding through learning, one of which is chemistry learning.

The learning process in its implementation still requires teaching materials so that students can learn smoothly. Teaching materials can also foster students' activeness, creativity, and skills during the learning process. Teaching materials need to be continuously developed because there must be teaching materials that are in accordance with the curriculum, as an educator must also prepare the right teaching materials according to the demands of the independent curriculum (Suryani et al., 2023). Providing awareness related to environmental management especially waste management, would be better if also equipped with entrepreneurial motivation, because entrepreneurship can be an alternative for students to get income and can do it event in education, so at least students no longer make dropping out of school as an option when they have economic limitations.

The concept of entrepreneurship can be associated with learning, including chemistry, with the Chemoentrepreneurship (CEP) approach. CEP aims to improve students' ability to apply chemistry to produce products with economic value, and then motivate them to become entrepreneurs. Students at the high school level are expected to have entrepreneurial skills before entering the workforce and changing their orientation from employees to entrepreneurs (Andrean et al., 2019). Because CEP approach in chemistry can be applied to teaching materials based on Project Based Learning (PjBL) for give another skill for student. PjBL is a learning method that emphasizes giving assignments, especially in projects, so that students have experience in research and finding relevant information (Fahlevi, 2022). The results of research (Inayah et al., 2019) say that the PjBL learning model with the CEP approach has sequential and systematic learning stages. PjBL learning is also suitable for integration with CEP, because (Ishak et al., 2021) states that this learning can develop students' life skills, especially in vocational skills so that students have an entrepreneurial spirit. Entrepreneurship-based teaching materials are also considered effective in learning based on the results of research conducted by (Suticha & Abidin, 2022). Increasing students' creativity in project planning to produce a product needs to be integrated with a more specific approach and combain with describe in teaching material to more build the mindset student for another life skills in the era of independent learning. STEM can be integrated with various learning models, one of which is Project Based Learning (PjBL) (Ningsih et al., 2023). The use of this approach is also suitable for the era of independent learning (Prasetyo et al., 2023). Project-based learning integrated with STEM is also recommended because it can improve students' ability to solve problems,

train students in defining problems and analyzing solutions using science, technology, engineering and mathematics knowledge (Kartini et al., 2021).

There has been a lot of research on PjBL-based teaching materials and CEP-oriented teaching materials, but there is still no information that develops chemistry teaching materials for the topic environmental management based on PJBL integrated with STEM and CEP-oriented in the era independent curriculum. Based on the background that has been described, research is needed to develop chemistry teaching materials for the topic is environmental management based on Project Based Learning oriented to Chemoentrepreneurship. This research aims to produce chemistry teaching materials: environmental management based on project-based learning oriented chemoentrepreneurship as a solution to the problems described above.

METHOD

The research method used is development or Research and Development (R&D) using the ADDIE model (Analyze, Design, Develop, Implement, and Evaluate). This model is used because researchers conduct product development-oriented research. The ADDIE model is also currently a very effective model to use in developing. The ADDIE model provides an opportunity to evaluate each stage in the process (Figure 1). So that it can have a positive impact on the product (Angko & Mustaji, 2013)

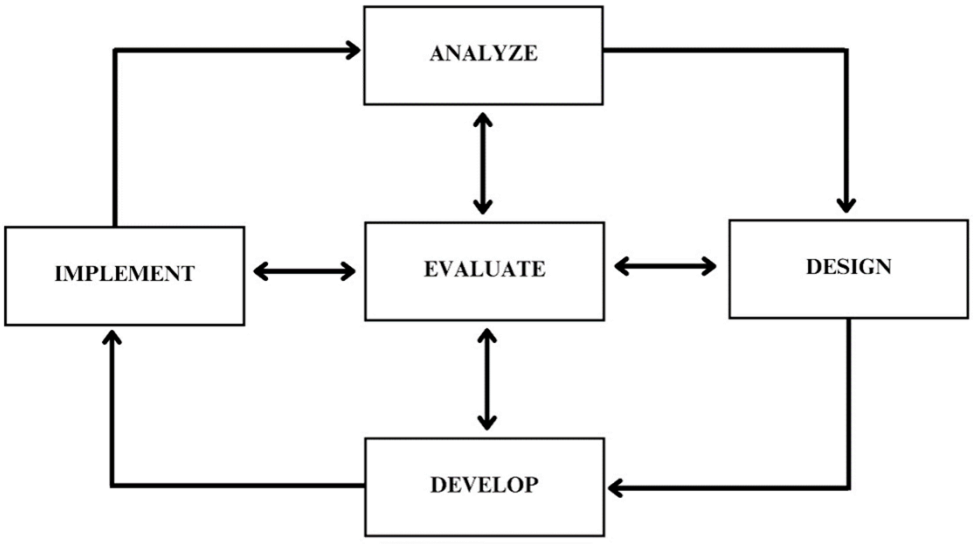

Figure 1. ADDIE Procedure Steps (Angko & Mustaji, 2013)

The research was conducted at an Islamic Senior High School level in Indonesia starting from August 2024 for 2 meetings with a period of 2 weeks. Participants in this study were material and media expert validators, including lecturers and chemistry teachers who were certified and experienced in chemistry learning or media design. Then class X students at

Madrasah Aliyah level as many as 63 people, using purposive sampling technique, namely samples taken based on certain objectives according to the researcher's consideration.

Data collection techniques were needs analysis, validity test, limited trial, and documentation. Data analysis techniques were carried out: (1) Qualitative data analysis includes all data from preliminary analysis results, observation results, criticisms and suggestions given by media expert validators and material experts during the research, the data is converted from percentage form into descriptive qualitative data. (2) Quantitative data analysis, quantitative data analysis is processed based on the results of the assessment of media experts and material experts, student response questionnaires and observation sheets.

RESULTS AND DISCUSSION

The development of teaching materials is carried out using the ADDIE approach (Analyze, Design, Develop, Implement, and Evaluate). The ADDIE approach is a very effective model to use in developing chemistry teaching materials: project-based environmental management learning oriented chemoentrepreneurship, because it provides an opportunity to evaluate at each stage carried out in the process. The research data obtained consists of a needs analysis based on a literature review and distributing questionnaires to teachers, the results of validation of teaching materials developed based on the results of material experts and media experts, data from student response questionnaires after using teaching materials that have been made as well as research results and discussions.

Results

a) Analysis Phase

The analysis stage was carried out by reviewing several journals and the results can be seen in Table 1.

Table 1. Needs Analysis Results

Source	Analysis result
Siahaan, M. (2020). Dampak Pandemi Covid-19 Terhadap Dunia Pendidikan. *Jurnal Kajian Ilmiah*, *1*(1), 73–80.	Pandemic Covid-19 in Indonesia has affected the world of education. So that teachers are required to learn to understand quickly the existing technology so that the learning process can take place as usual, the learning process is less effective because of the many obstacles experienced, parents are confused about how to accompany their children to study at home, students also find it difficult because they are not used to doing online learning. Thus making learning lag behind.
Jojor, A., & Sihotang, H, (2022) Analisis Kurikulum Merdeka dalam Mengatasi *Learning Loss* di Masa	The government introduced the independent curriculum. The independent curriculum makes learning project-based, to encourage learners to

Source	Analysis result
Pandemi Covid-19 (Analisis Studi Kasus Kebijakan Pendidikan). *Edukatif : Jurnal Ilmu Pendidikan*, *4*(4), 5150–5161	collaborate with peers so that they can be encouraged to think critically. The independent curriculum also gives more focus on essential material so that students have more time in the learning process and the learning load is reduced for students.
Suryani, O., Naibaho, S., Aini, F. Q., & Pangestuti, A. D. (2023). Pelatihan Pengembangan Bahan Ajar Mengintegrasikan Praktikum dan Multipelrepresentasi Kimia dalam Pembelajaran Berbasis Masalah bagi Guru Kimia Kota Padang. *Fondatia*, *7*(2), 514–527.	The development of educational policies that occur, makes teachers required to be able to adapt in the implementation of learning. So that the teaching materials prepared before the learning process must be good and appropriate and in accordance with the independent curriculum.
Panjaitan, Y. F. (2022). Pengembangan Bahan Ajar Kimia Berbasis Project Based Learning pada materi Larutan Elektrolit dan Non Elektrolit. *Educenter : Jurnal Ilmiah Pendidikan*, *1*(6), 1–26.	The project-based learning model is student-centered learning so that later students can produce a product in the process of cognitive and students' mindset increases to be more critical.
Kartini et al., (2021). *Promoting Student's Problem-Solving Skills Trough STEM Project-Based Learning in Earth Layer and Disasters Topic*	Project-based learning integrated with STEM is recommended because it can improve students' ability to solve problems, train students in defining problems and analyzing solutions using science, technology, engineering and mathematics knowledge.
Mulyati, B., Ilmi, Y. F., & Basri, A. (2023). Sosialisasi Pengelolaan Sampah sebagai Upaya Peningkatan Peran Masyarakat dalam Mengelola Sampah di Kota Serang. *Bantenese : Jurnal Pengabdian Masyarakat*, *5*(1), 26–34.	The habit of people who have not sorted their waste properly and the lack of socialization are obstacles in the existing waste problem. One type of waste that is very difficult to decompose is plastic, because plastic material consists of hydrocarbons and petroleum derivatives. However, almost all aspects of human life use plastic.
Braggelien, J. J., & Voldsund, K. H., (2023). Entrepreneurship education through sustainable value creation – exploring a project introducing circular economy. *Procedia Computer Science*.	The circular economy approach is considered the right solution to solve the problems of entrepreneurship education in sustainable development challenges, the concepts used are simple to be effective in learning through courses and programs. Circular economy also aims to grow the economy by focusing on reducing, reusing, and recycling.

Questionnaires were also distributed as a form of additional data in analyzing the need to develop teaching materials in this study, conducted to senior high school teachers throughout Indonesia through Google Forms containing 12 questions and filled in by 23 chemistry teachers.

The results of the analysis stage (analyse) that has been carried out, there are problems and gaps that occur starting from curriculum changes, the availability of teaching materials that are in accordance with the curriculum, as well as the conditions faced by teachers and students in schools. Conclusions that can be used as an initial basis for the development of chemistry teaching materials: environmental management based on project-based learning oriented chemoentrepreneurship. In the teaching materials made, there are projects that must be carried out by students at the end of learning activities. The project is the management of waste that has been categorized by type by students based on their respective creativity with a STEM approach. The approach used in this research is an integrated STEM approach by linking to examples of environmental management in everyday life and environmental issues.

b) Design Phase

At this stage, the design of teaching materials is carried out starting from the selection of the media used in making teaching materials, designing storyboards, designing instruments in the form of validation questionnaires and student responses. The media chosen to make teaching materials is canva, because canva has several advantages as described in the journal (Zebua, 2023) that the canva application has a variety of graphic designs, templates and animations. The use of Canva can also increase creativity in developing learning media because it has many supporting features. It is able to save time and is practical in its use because it can be accessed using a laptop or mobile phone.

After knowing the media used, the next step is to design a storyboard. In making this teaching material, the storyboard is used as a guide starting from the main page which contains a cover and then a preface. The introduction section contains instructions for using teaching materials, table of contents, learner stimulus, learning objectives and syntax or learning stages used. Furthermore, the material contains 4 parts in accordance with the learning objectives to be achieved, there are worksheets that must be done by students and the last page contains a glossary, bibliography and about the author. Then design the instrument in the form of a validation questionnaire and student response. The material and media validation sheets made refer to the National Education Standards Agency (BNSP) and are adapted from (Apriyani, 2023) which has been modified according to the needs of the researcher.

c) Develop Phase

Teaching materials are prepared based on the design (storyboard) that has been made (See Figure 2) by referring to the results of the needs analysis from the literature study and the results of the teacher needs questionnaire. The completeness of the components in the teaching materials is also compiled based on the "completeness of teaching materials" guidelines in the Ministry of Education and Culture's teaching independence collaboration space platform (2022), books, and also relevant journals. Making teaching materials is done using the Canva application. For Learning Outcomes (CP), Learning Objectives (TP) and Learning Achievement Criteria (KKTP) are compiled based on the sources described at the curriculum analysis stage. As for the content of the material presented in the teaching materials, it is compiled by mostly referring to journals that are relevant to the topics discussed. Teaching materials on the topic of environmental management use a project-based learning model integrated with STEM so that the learning stages use the STEM - PJBL syntax which consists of 5 learning stages namely reflection, research, discovery, application, and communication. Teaching materials on the topic of environmental management are also oriented towards CEP or chemoentrepreneurship which aims to make students have an interest in entrepreneurship. CEP orientation is in material 4 about waste to rupiah. This material emphasizes more on what alternatives can be done when waste has been sorted based on its organic and inorganic categories.

d) Implement Phase

Testing of teaching materials was carried out at Madrasah Aliyah level with the target being class X students conducted offline for 2 meetings. The trial was conducted on 2 classes, namely X Linguistics and X Sports. The student response questionnaire consists of 5 aspects of the assessment component, namely material aspects, appearance aspects, language aspects, STEM-PJBL aspects and Chemoentrepreneurship aspects. The results of students' responses to the teaching materials developed can be seen in Figure 3.

Figure 2. Teaching materials that have been validated

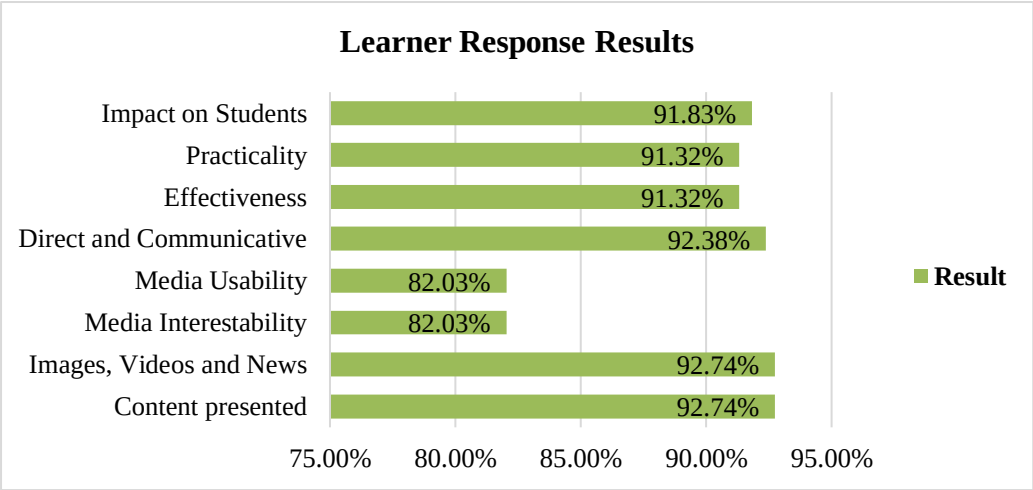

Figure 3. Results of Learners' Response to Teaching Materials

From the graph above, the results of students' responses to aspects of the material get a result Overall the average obtained is 90%, according to (Talib et al., 2021) According to the 81% - 100% range, it is included in the very good category, so the results of student responses to chemistry teaching materials: project-based environmental management learning oriented chemoentrepreneurship get very good results.

The results obtained from the limited trial of chemistry teaching materials: environmental management based on project-based learning oriented to chemoentrepreneurship, students made posters from the material in the teaching materials, students have sorted waste and conducted mini waste banks in class, and made projects accompanied by a cost design including capital to the selling price. The results of the activity can be seen in Figure 4.

In addition, there is an instrument for the implementation of chemistry teaching materials: environmental management based on project-based learning oriented to chemoentrepreneurship. The results of learning implementation can be seen in Figure 5.

Based on Figure 5, overall, the average results were 93% (X Sports) and 85% (X Linguistics) according to the category (Talib et al., 2021) including very good.

Figure 4. Results of Student Activities

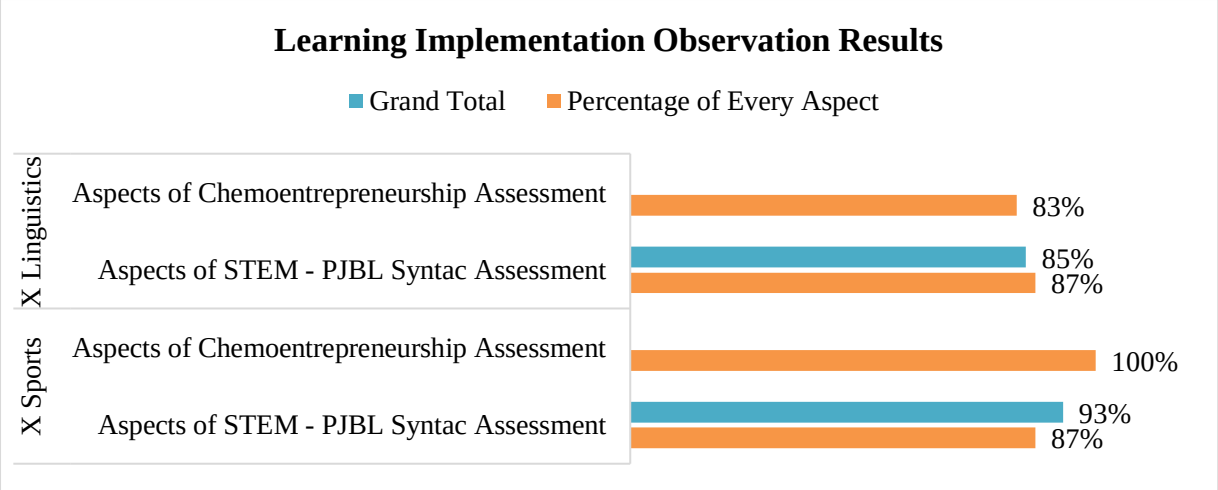

Figure 4. Graph of Learning Implementation Observation Results

e) Evaluate Phase

At the analysis stage, a series of literature studies were carried out through journals, articles, and previous research relevant to the research topic and the needs of researchers. The evaluation carried out is to analyze the independent curriculum in accordance with the learning outcomes used and add international journals in the needs analysis. Make revisions to the teacher needs questionnaire based on the suggestions and input of the supervisor.

The design stage is carried out by making research instruments that will be used such as validation sheets, student response questionnaires and observation sheets. At this stage also make a storyboard or product design of teaching materials that will be used. The evaluation carried out is to adjust the storyboard with the teaching materials developed and revise the instrument according to the suggestions and input of the supervisor before use.

The development stage realizes the design of teaching materials using Canva. Evaluation of this stage is to make improvements according to the suggestions of the validators and input from the supervisor starting from the cover image, the logo listed, the elements used, to the chemoentrepreneurship content that has not been seen to include business references or the success of entrepreneurs in the last material section in teaching materials.

The implementation stage was carried out by carrying out a limited trial in order to find out the student's response to the teaching materials developed after using them. The evaluation of this stage is that the trial was carried out too broadly into 2 classes, then there were several students who did not attend the complete meeting, and there were differences in project assignments between X Sports and X Linguistics. X Sports class made projects per group, while X Linguistics made projects per class due to limited time.

Discussion

Environmental management teaching materials based on project-based learning and chemoentrepreneurship-oriented were developed by researchers, aim to overcome some of the problems found in learning at school. Based on the background already described starting from the problem of waste, the effects of the pandemic that have an impact on learning results and curriculum changes that cause limitations in teaching materials are used in the learning process, economic limitations and student characteristics are the reasons for the need to develop teaching materials that are in accordance with the independent curriculum on the topic of environmental management combined with the STEM-integrated and CEP-oriented PJBL model.

The development was carried out using the Canva application and the content component refers to the Ministry of Education and Culture 2024 which has been modified

according to the needs of the researchers. The contents in the teaching materials include cover, preface, instructions for using teaching materials, table of contents, introduction, learning objectives, syntax used, material consisting of 4 parts, summary, activity sheet, glossary, bibliography and about the author. The colors used in teaching materials for background use white, green, and yellow. The white color is used as a background to minimize distractions that can reduce student focus when reading material (Zulfiya et al., 2023). The green color used in teaching materials on the cover, shape, and writing has a joyful and refreshing meaning. In addition, it is in line with the topic used, namely environmental management, which means it is related to nature. The majority of the writing also uses black color to make it look clearer and easier to read (Zikra et al., 2023). The yellow color is used to make it bright and balance out the other colors. According to (Wijayanti & Ghofur, 2021) the yellow color has the meaning of optimism, enthusiasm and cheerfulness so that it can provide a stimulus for students' minds and mentality. The use of colors, elements, fonts and writing colors in teaching materials is chosen carefully because it can affect student interest later.

Teaching materials are also equipped with pictures, news, videos, data and relevant facts. News and videos are presented in the form of QR codes to make it easier for students to access information. The learning model used in teaching materials is project-based learning integrated with STEM (Science, Technology, Engineering, and Mathematic). This is because the PjBL model integrated with STEM can increase student learning motivation, provide meaningful learning, be able to get solutions to everyday life problems and make students actively involved and explore through project activities (Triprani et al., 2023). In addition, integrating STEM with PJBL is suitable for the era of independent learning (Prasetyo et al., 2023). The syntax used in teaching materials is STEM-PJBL including reflection, research, discovery, application, and communication.

The material contained in the teaching materials consists of 4 (four) parts. The first part is about chemicals around us which explains the chemicals that exist in everyday life ranging from food, medicine, industry and agriculture. The second material explains about the environment polluted by waste with the aim of giving students an understanding of the amount of waste that has been produced. The third material explains about sorting waste in order to save the environment with the aim of students understanding the concept of SDGs or sustainable development which includes the environment by starting to sort waste. The last material explains about waste that can become rupiah. This section aims to motivate and stimulate students that waste can be made into a business. that waste can be turned into a business.

The STEM-PJBL syntax aspect used in this teaching material focuses more on the activity sheet. Activity sheet 1, there are research syntax and science dimensions that ask students to make interesting posters from the topics that have been explained and conduct research as additional information. Activity sheet 2 contains mini waste bank activities or weighing to recording the results of the waste that has been collected by each group. Then students have decided what product they want to make and confirmed it to the teacher and wrote a product plan that contains the purpose, product description, tools and materials, procedures and how the product works. Products are made in groups at home. This activity is included in the syntax of discovery and application and there are dimensions of technology, engineering, and mathematics. Activity sheet 3 contains communication syntax where each group presents the results of the product that has been made. As well as submitting a cost plan that includes initial capital, cost of production to the selling price of the product. This activity sheet includes chemoentrepreneurship and mathematical dimensions.

Validation is the stage of assessing product design by experienced experts. In addition, in order to determine the feasibility of the product and the weaknesses of the product according to the aspects / indicators / references that have been compiled on the validation instrument (Kurnia & Sunaryati, 2023). The validation carried out is media validation and material validation. In the validation process of the teaching materials developed involved 8 validators. Validity value that must be obtained is 0.75 in order to be categorized as valid.

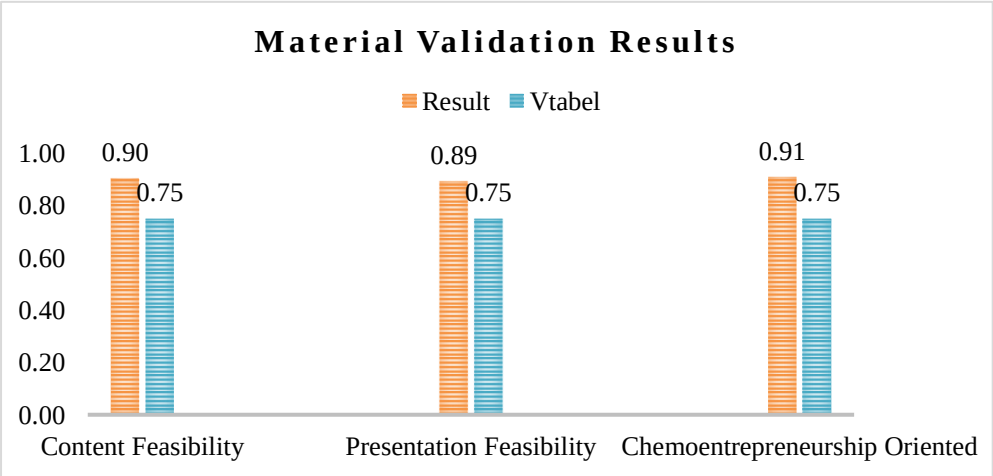

Figure 5 Results of material validation

Based on Figure 6, it shows that in the aspect of content feasibility which includes the suitability of the material with CP, TP and KKTP, the v count is 0.88; then the accuracy of the material v count is 0.91; the recency of the material v count is 0.92. The average v count obtained for the content feasibility aspect is 0.90. The presentation feasibility aspect which

includes presentation techniques obtained a v count of 0.90; supporting presentation v count 0.89; the presentation of learning v counted 0.90.

The average v count on the presentation feasibility aspect is 0.89. Chemoentrepreneurship orientation gets v count of 0.91. The conclusion obtained in the aspect of feasibility of content with v counted an average of 0.90; feasibility of presentation v counted an average of 0.89; and CEP orientation v counted 0.91. CEP orientation v count get 0.91 is that all three have a value of 0.91. v count is greater than v table, which is 0.75, so it can be categorized as valid. valid. Overall, the validity of the material obtained a result of 90% and according to the percentage of feasibility (Arikunto & Jabar, 2018) it is included in the very feasible category. in the very feasible category.

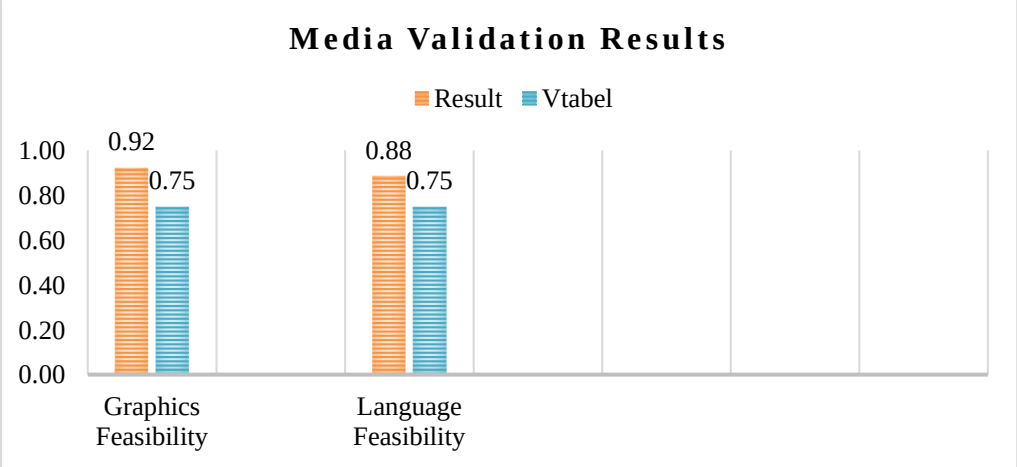

Figure 6 Result Of Media Validation

Based on Figure 7, it shows that in the aspect of feasibility of graphics which includes the cover design of teaching materials, it obtained a v count of 0.93; for the design of the content of teaching materials, it obtained a v count of 0.91. The average v count obtained in the aspect of feasibility of graphics is 0.92. Language feasibility aspects which include straightforwardness obtained a v count of 0.85; for communicative v count 0.88; dialogical and interactive v count 0.90; suitability for learner development v count 0.89; and the use of terms, symbols or icons v count 0.91. The average v count obtained on the language feasibility aspect is 0.88. The conclusion obtained on the feasibility aspect of the graphical v v count average of 0.92 and language feasibility aspects v count average of 0.88 has a value of v count greater than the v table which is 0.75. This can then be categorized as valid, and overall the validity of the media gets a percentage of 90%. overall media validity gets a percentage of 90%. According to category (Arikunto & Jabar, 2018) is declared very feasible.

After the developed teaching materials are declared valid both from the material and media aspects and are suitable for testing, the researchers conduct an implementation stage or

limited trial. Testing of teaching materials was carried out at Madrasah Aliyah Level with the target being class X students. Initially, the trial was carried out only for one class, namely X Sports, but the teacher asked that it also be carried out on X Linguistics to be the same. So that the trial was conducted to 2 classes where the total students per class were 36 people, overall the teaching materials were tested on 72 students. The limited trial process was carried out with a learning process using teaching materials on the topic of environmental management material, after which students filled out a response questionnaire to find out the responses from the use of teaching materials that had been developed. The trial process was carried out offline for 2 meetings. Based on the results of the student response questionnaire which consists of 5 aspects of the assessment component, namely aspects, namely material aspects, appearance aspects, language aspects, STEM-PJBL aspects and Chemoentrepreneurship aspects. The results of student responses to teaching materials developed can be seen graph below:

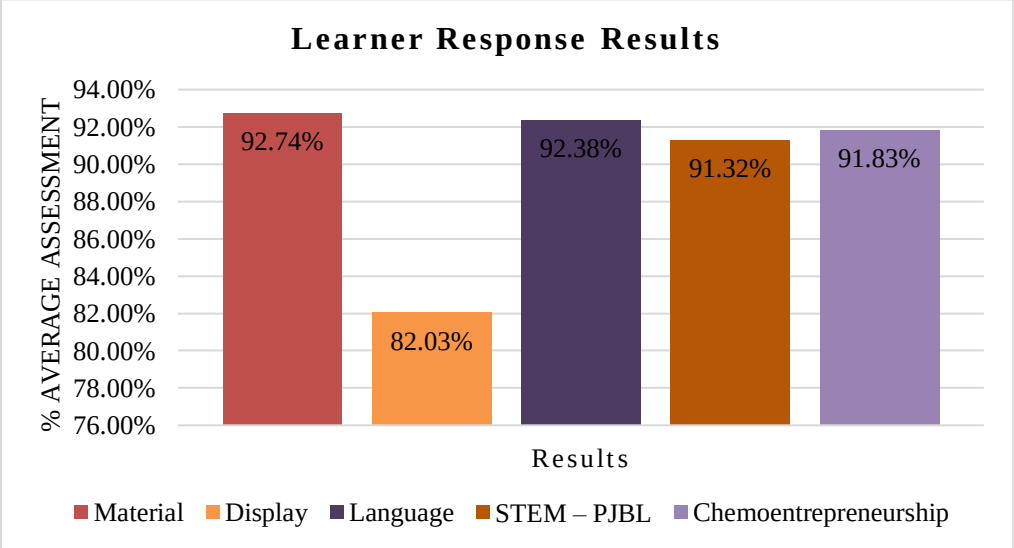

Figure 7 Results of Learners' Response to Teaching Materials

From Figure 8, the results of students' responses to aspects of the material get a result of 92.74% and are categorized as very good. This means that starting from the presentation of content, images, videos and news presented in teaching materials is very good. It is evident in statement number 1 that 92.4% of students feel that the content of the material is in accordance with the learning objectives, in numbers 2 and 3 that 93.7% of students feel that the material in the teaching materials makes it easier for them to learn and understand about environmental management and the material is up to date based on everyday life, statement number 4 as many as 89.2% of students feel that teaching materials attract reading interest and encourage students to study as a whole. As many as 93.3% of students felt that the pictures, phenomena, news and videos used are very well related to the material to make it easier to understand the material in

statement number 4. to make it easier to understand the material in statement 5. For statements 6 and 7, more than 90% of students felt that the teaching materials and activity sheets provided new experiences and encouraged students to understand the material. teaching materials and activity sheets provide new experiences and understand implementation of environmental management.

The display aspect gets a result of 82.03% and is categorized as very good. This means that the attractiveness of the media and the use of the media is very good, as evidenced in the statements from numbers 8 to 12 (except number 11) more than 90% of students feel that the appearance, ease of use, and fonts used are very good. Meanwhile, number 11 received a result of 43.2% because students did not find it difficult to read every letter, element, and command in the teaching materials.

The Language aspect received a result of 92.38% and was categorized as very good. This means that the language used in teaching materials is straightforward and communicative. It is evident in statement number 13 that the results are 94.6% of students feel the language used is easy to understand, 88.6% of students feel there is no double interpretation, and 94% feel the terms presented are easy to understand.

The STEM-PJBL aspect received a result of 91.32% and was categorized as very good. This means that its effectiveness and practicality are very good. It is evident from statement number 16 that 93% of students feel that the teaching materials make them happy because they use the STEM approach so that they can train their ability to apply math and science principles in everyday life. In number 17, 89.8% of students felt that the practice questions or testing of understanding in the teaching materials made them excited. Then 91.1% of students felt that the STEM-PJBL aspect applied to teaching materials helped them in applying environmental management knowledge in everyday life.

The chemoentrepreneurship aspect obtained a result of 91.83% and was categorized as excellent. categorized as very good. This means that the impact on students is very good. It is evident from statements 19 to 22 that more than 90% of students feel that starting from pictures, phenomena, or videos, and projects carried out make them motivated to entrepreneurship and understand the concept of entrepreneurship. Students also feel that the preparation of the final project report provides a new experience because it calculates the capital to the selling price of the product produced. the resulting product.

Overall, the average obtained is 90%, according to (Talib et al., 2021) from the range of 81% - 100% is included in the very good category, so that the results of student responses to chemistry teaching materials: environmental management based on project-based learning

oriented to environment based project-based learning oriented chemoentrepreneurship get very good results. This is in line with with research (Zahirah & Sulistina, 2023) that the application of STEMPJBL to high school students can develop creative thinking skills and improve science literacy skills. and improve science literacy skills. In terms of For the chemoentrepreneurship aspect, the response was very good, giving an impact on students, not only learning the theory but also learning the theory. impact on students, not only learning the theory but students are also taught to learn how to make products with chemoentrepreneurship. students are also taught to learn how the process of making products by utilizing the materials they have so that they become useful products, economic value and motivated to the spirit of entrepreneurship (Juniar et al., 2022).

CONCLUSION

Teaching materials: environmental management based on project-based learning oriented to chemoentrepreneurship produced are also integrated with STEM so that the teaching materials contain a cover page, preface, instructions for using teaching materials, table of contents, introduction containing interesting info equipped with videos, learning objectives, learning syntax, material consisting of 4 parts (chemicals around us, the environment is polluted by waste, sorting waste to save the environment and from waste to rupiah), summary, activity sheets containing 3 activities, glossary, bibliography and about the author. The developed teaching materials are also equipped with news, factual data, and videos that can be accessed via QR Code. To motivate students in entrepreneurship in the field of chemistry, teaching materials are equipped with alternative businesses such as waste banks, making crafts, ecobricks, maggot cultivation, and eco-enzyme. Projects made by students are also integrated with STEM and given entrepreneurial experience, namely by making cost plans ranging from capital to the selling price of products that have been made from waste.

The feasibility of teaching materials: environmental management based on project-based learning oriented chemoentrepreneurship produced, assessed from material and media indicators. Validation was conducted by 8 expert validators with an error rate of 0.05 or 5%. The results obtained for material validation amounted to 0.90 and media validation amounted to 0.90. The overall results of the material and media validation assessment were declared "valid" because the Vtabel was 0.75, so the value of Vhitung ≥ Vtabel. As for the percentage of feasibility, material validity gets 90% and media validity 90%, both of which are included in the very feasible category. So the conclusion obtained is that the teaching materials developed are valid and feasible to use in overcoming problems at school.

The results of student responses to the teaching materials developed get an average percentage of 90% and are included in the very good category. The results of observations of the implementation of learning carried out in class X Sports and X Linguistics have an average percentage of 93% and 85%, which is still included in the very good category. So it can be said that the teaching materials: environmental management based on project-based learning oriented chemoentrepreneurship developed is very good and feasible to use in the learning process.

SUGGESTIONS

Researchers still find shortcomings in the teaching materials developed or in research, after analyzing the results of the study. Therefore, suggestions related to research on the development of teaching materials: environmental management based on project-based learning oriented chemoentrepreneurship are (1) Development of teaching materials based on project-based learning oriented chemoentrepreneurship on other chemical materials is needed (2) Further research is needed related to the application of teaching materials based on project-based learning oriented chemoentrepreneurship on environmental management materials to see its effectiveness (3) Further research is needed related to the application of teaching materials based on project-based learning oriented chemoentrepreneurship on environmental management materials for P5 activities.

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