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Article

Developing Flipbook on Aromatherapy Candle Making from Used Cooking Oil to Strengthen Pancasila Student Profile in Hydrocarbon Lesson

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ABSTRACT

This research aims to develop a flipbook on making aromatherapy candles from used cooking oil, integrated with the Project to Strengthen the Pancasila Student Profile (P5). The flipbook is designed not only to enhance students' conceptual understanding of hydrocarbon materials but also to instill essential P5 values. The development of aromatherapy candle flipbooks from used cooking oil integrates the value of sustainable lifestyles in the P5 by encouraging learners to manage household waste creatively and environmentally friendly as part of contextual learning. The study employed a Research and Development (RnD) approach using ADDIE model, which includes five stages: Analyze, Design, Develop, Implement, and Evaluate. The development process focused on aligning learning content with students' needs and incorporating multimedia features to support independent and engaging learning. A total of 35 students in grade XI of MAN 3 Jakarta were selected for the limited trial of the flipbook implementation. The results of the validation and implementation phases demonstrated that the flipbook is highly effective, receiving an overall interpretation score of 88%, consists of 89% for visual design quality, 87% for content relevance, and 88% for ease of media access which are all in the excellent category. The flipbook not only presents hydrocarbon concepts and step-by-step instructions for candle making but also integrates P5 values, environmental awareness through waste management solutions, fun facts, reflection activities, and interactive multimedia. Based on these findings, the developed flipbook highly effective to be a suitable and innovative digital teaching material that can enhance student engagement, improve understanding, and serve as a model for integrating character education into science learning.

INTRODUCTION

Education is a paradigm in society that is designed as a place to inculcate knowledge, character, and behavioral patterns. Quality education is proven to contribute significantly to the improvement of literacy, the development of 21st century skills, and the formation of moral and social values that support the progress of individuals and society as a whole (OECD, 2018). The rapid progress of science and technology in the era of globalization requires the

improvement of the quality and scope of education in accordance with current developments. The world of education is a social system that ultimately feels the impact of globalization as a whole so that educational institutions must ensure that society receives a decent education (Tohri et al., 2022). Education is an investment in the future. It can determine the progress and future of students as the next generation of the nation (Fausta et al., 2024). Character education in schools is the main key to the success of the national educational goals of developing the capabilities and forming the character and civilization of a dignified nation in order to educate the life of the nation.

In Indonesia, an independent curriculum is being implemented through the Pancasila Learner Profile Strengthening Project (P5). This curriculum emphasizes the development of the learner's character and competence (Aini & Adiyono, 2023). P5 is a co-curricular activity designed with the aim of shaping characters, abilities and competencies that can be inculcated in students through the school culture (Nurdyansyah et al., 2022; Widarini & Suterji, 2023). This P5 activities can be carried out through various activities of habituation, inculcation of values and norms, interaction and communication, as well as learning experiences, in order to form individuals with character. In chemistry, the integration of P5 in learning can strengthen students' understanding of chemical concepts through the application of collaborative values, contextualization of materials such as chemical reactions and environmental issues, and the development of critical thinking skills in analyzing chemical phenomena scientifically.

Students' character can be developed through classroom learning activities. When learning, it will involve various existing learning resources, such as teaching materials. In the midst of the rapid evolution of Education 5.0, learning must be sustainable, flexible, and collaborative with multiple stakeholders through the use of technology. Education 5.0 is a revolutionary term for the integration of advanced technologies into the education system to promote personalized learning, collaboration and well-being through the use of digital tools (Kamal et al., 2019; Lantada, 2020). The main goal of Education 5.0 is to create an adaptive, efficient and equitable education system that meets the needs of society in the era of the Industrial Revolution 5.0 (Ahmad et al., 2023). Education 5.0 emphasizes character and moral education, which should be applied to all subjects, including chemistry where students are expected to solve various problems by thinking deeply and utilizing technology (Ningrum & Suprihatiningrum, 2024). One of the uses of technology that can be done is the provision of electronic teaching materials that are easily accessible anywhere and anytime. In addition, teaching materials developed for students should contain information and concepts that can hone knowledge and skills so that they are relevant to everyday life.

Flipbook is an interactive digital book. It contains various types of multimedia such as animation, video, and audio. The integration of digital technology into learning has been widely used, including in science, where its development and implementation can support students' digital literacy (Andini & Fitriana, 2018; Vidakis et al., 2019; Papadakis, 2020). Flipbooks have a big role as digital learning media because they have an attractive appearance and interactive features compared to printed books (Lakapu et al., 2023). The design and layout of the flipbook is easier for learners to understand. The flipbook developed in this research highlights its ability to integrate project-based contextual learning with P5 character values, thus encouraging the formation of students' holistic competencies through an interactive, innovative, and environmentally friendly approach. The variety of flipbook components can stimulate and foster a person's interest in learning without coercion. Research shows that flipbooks can improve learning activities, reading habits, metacognitive skills, concept mastery, critical thinking, and reasoning (Prasetyono & Hariyono, 2020; Ristanto et al., 2020; Damayanti et al., 2024). The use of flipbook media has the effect of improving the quality of learning, allowing students to actively participate in learning, thus making difficult concepts easier to understand (Ekaputra et al., 2024).

Several studies have shown that there have not been many flipbooks developed that specifically integrate chemistry content with the values in P5, even though this approach is important to form holistic 21st century competencies (Sugianto et al., 2024). In addition, although flipbooks offer various advantages, this digital media also has limitations, such as dependence on devices and internet connections and lack of direct social interaction (Susilo et al., 2025; Cho et al., 2024). Digital media, including flipbooks, sometimes fail to accommodate kinesthetic learning styles or the special needs of certain students. Therefore, the development of flipbooks in the context of chemistry learning should consider the integration of character values as well as accessibility and diversity of learning styles of students.

Chemistry, as a branch of science, is closely related to the phenomena of everyday life. Hydrocarbons as part of chemistry are closely related to everyday life. Used cooking oil as a hydrocarbon material contains triglyceride compounds that are flammable, high-energy, and suitable for use as an environmentally friendly alternative fuel in the form of candles. Learning hydrocarbon material is suitable to be developed with flipbook media with the characteristics of students who like visual, contextual, and applicable learning, so as to increase engagement and strengthen the values of the Pancasila Student Profile. Students believe that chemistry is a complex subject to learn because of the abstract characteristics of chemistry and its unique language (Chen & Liu, 2020). Many things related to chemistry in life can be applied to create a fun, creative, innovative and sustainable learning process. This can be expressed in a digital media such as a flipbook so that more people can learn about chemical phenomena and utilization that can be easily and flexibly. Digital media as an independent learning resource will be very helpful in the learning process because it is flexible and can be used anywhere and at any time (Astuti et al., 2020). Thus, digital flipbooks are the right solution to unify the mastery of chemical concepts and the cultivation of P5 values because through an interactive design that contains self-reflection features, contextual projects, and collaborative activities, flipbooks are able to bridge cognitive and affective aspects holistically, thus supporting meaningful, fun, and character-oriented chemistry learning for students.

Chemistry education in the 21st century promotes the retention of knowledge and prepares students for the development of essential skills that include chemical literacy as it relates to science (Rahmawati et al., 2024). Chemistry related activities will certainly train and enhance 21st century skills that are in line with the cultivation of Pancasila learner profile values in students. In this way, the excellent, innovative, creative and virtuous character will be formed. Therefore, this study developed flipbooks to create innovative, interactive, and contextual learning media to support the understanding of the concept of hydrocarbons in chemistry, and integrate the values of the Pancasila Student Profile through an environmentally friendly project-based approach and relevant to the daily lives of students.

METHODS

The Research and Development (RnD) method with the ADDIE model is used in this research. This design is best suited in providing a systematic and structured framework that enables the development of valid, practical and effective flipbook products through clear stages according to learning needs. There are 5 stages of the ADDIE model: analyze, design, develop, implement, and evaluate. The product developed is a flipbook on how to make aroma therapy candles from used cooking oil. It is integrated into the project to strengthen the Pancasila student profile (P5). The flipbook product was tested on 35 students in class XI MAN 3 Jakarta during the implementation phase. An overview of the stages of the RnD - ADDIE model can be seen in Figure 1.
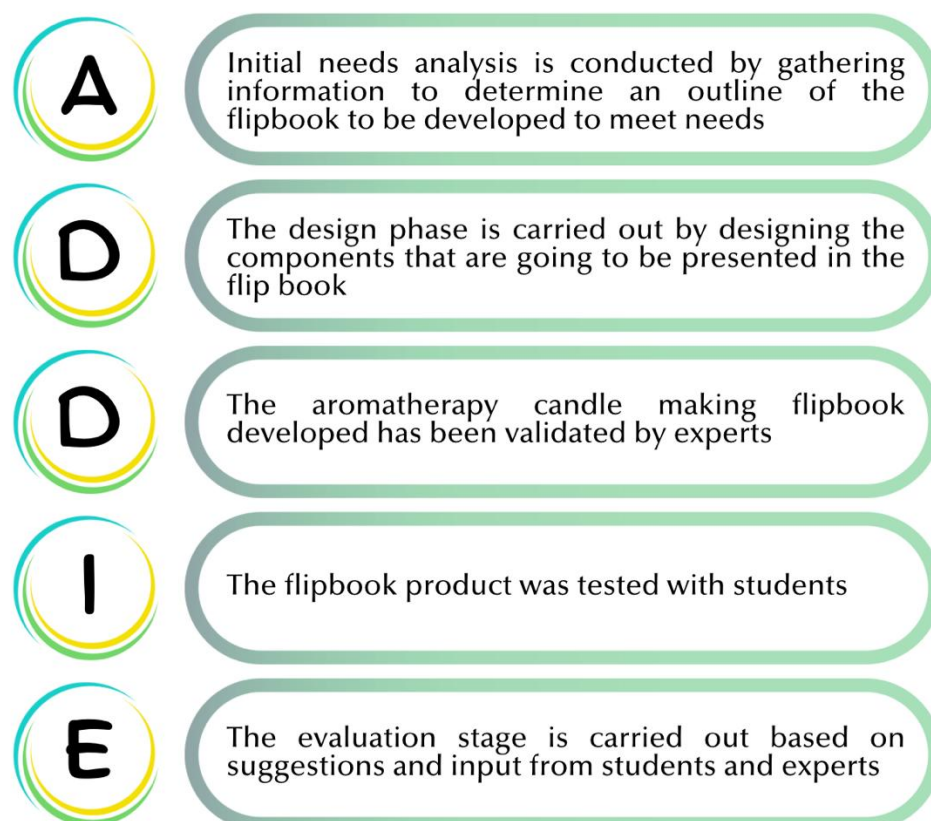
Figure 1. Stage of R&D – ADDIE Model

Data collection was conducted using interviews and questionnaires. Interviews were conducted for initial needs analysis and questionnaires were used to assess the feasibility of the flipbook. The interview guide contained 6 questions and the questionnaire contained 8 statements. Validation was carried out by expert content and media validators. Content validation was carried out by analyzing using Aiken's V formula to assess validity, practicality, and effectiveness.

$$V = \frac{\sum s}{[n(c-1)]} \qquad \text{(Aiken, 1985)}$$

s = r – lo
r = number of raters
lo = lowest validity score
c = highest validity score
r = number given by raters

The result of calculating Aiken's V compared with the value of the validity coefficient based on the guideline for interpreting uncorrected correlation coefficients in the predictive validity study (Hayward, 2017) presented in Table 1.

Table 1. The Interpretation Guideline of Uncorrected Correlation Coefficients on Predictive Validity Study

Validity Coefficient	Interpretation
> 0.35	very beneficial
0.21 – 0.35	likely to be useful
0.11 – 0.20	depends on circumstances
< 0.11	unlikely to be useful

The data collected on the feasibility of the flipbook was then analyzed using a descriptive analysis with a percentage using the formula:

$$Percentage = \frac{total\ score}{score\ maximum}\ x\ 100\%$$

The percentage interpretation of analysis results (Sugiyono, 2014) presented in Table 2.

Table 2. Interpretation of Flipbook Feasibility Analysis Results

Percentage	Interpretation
81% – 100%	excellent
61% – 80%	good
41% – 60%	fair
21% – 40%	poor
0% – 20%	very poor

RESULTS AND DISCUSSION

The product development research conducted was included in research and development (RnD). The development of flipbooks for aromatherapy candle making as digital learning media was done in 5 stages according to the ADDIE development model. The ADDIE model is an instructional model widely used by many educational designers and training programmers to design and develop educational and training programs as learning experiences with stages: analysis, design, development, implementation, and evaluation (Spatioti et al., 2022).

Analysis Stage

The analysis stage is the initial stage of development, which aims to identify problems and needs in the field. The initial needs analysis was done by conducting literature studies from various journals, observations, administering questionnaires and interviews with teachers and students. Based on the results of interviews with teachers, it is known that the chemistry learning process at MAN 3 Jakarta still uses very basic teaching materials, such as teaching materials made independently by teachers and teaching materials obtained from the Internet. However, especially for the teaching materials integrated with P5, teachers are still unfamiliar with them. As a result, teachers rely only on P5 teaching materials provided by the school.

Meanwhile, the results of the student needs analysis conducted on 101 respondents from Classes X and XI revealed some important information related to students' needs in the chemistry learning process. The results of the analysis showed that as many as 8.9% of the respondents strongly agreed that they had difficulties in learning chemistry. In addition, as many as 20.8% of the respondents strongly agreed that printed books can facilitate them in learning chemistry. Furthermore, the analysis also showed that 37.6% of the respondents strongly agreed that they often use the Internet to find learning resources for chemistry. This is because it can help them understand the material faster. A total of 54.5% of the respondents also agreed that they would be more motivated to study chemistry if there was a learning module.

Overall, the results of the needs analysis show that students most need learning materials that are filled with hands-on activities to help them understand chemistry learning concepts and materials. In addition, respondents also indicated that they prefer modules that are illustrated, brief, concise, clear and interactive. This is most desired and needed because it is able to present material in the form of visual images and is attractive and easy to understand. By addressing the needs of these students, the development of instructional materials is expected to be an effective solution to overcome barriers to learning chemistry and help students better understand the material. Students learn easily when the material presented is fun, easy to understand, and easy to remember by incorporating audio-visuals and simple games that can be applied to everyday life (Hung et al., 2017; Bringman-Rodenbarger & Hortsch, 2020; Nisa'Sirait & Daulay, 2024). Therefore, this research was conducted to develop a flipbook on how to make aromatherapy candles from used cooking oil, which is integrated with the Pancasila Student Profile Strengthening Project (P5).

Design Stage

The design stage aims to design and prepare the learning materials to be developed. In this stage, the application storyboard is designed in accordance with the content designed in the previous stage, starting from the layout for the material, various types of learning multimedia, and practice questions. The profile of Pancasila students (P5) is integrated in the

design of the layout and each sub learning material. The P5 design integrated in the flipbook is to develop students' understanding and skills on sustainable and environmentally friendly lifestyles, as part of strengthening Pancasila values. This project aims to encourage students to become agents of change in protecting the environment by adopting a lifestyle that is responsible for nature and resources. Some applications that are used are the Canva application as the basic media in creating modules and the Flipbook Builder application to create flipbooks. The developed educational content should prioritize the utilization of information technologies and comprehensive digital resources, encompassing interactive tools, forms, and methodologies for educational activities in an interactive information environment. These resources should be designed to mirror the nature and pace of social changes within society (Biletska et al., 2021). The process in the design stage is explained as follows:

Identification and Search for Reference Materials

The initial step in the development process is to search and select various sources of relevant literature or references. This reference is used as a theoretical basis and as a context reference in product development. By referring to valid and reliable literature, the materials compiled will have a strong scientific basis and are in accordance with user needs. This process also helps developers understand the trends, pedagogical approaches and content that match the learning objectives.

Preparation of Learning Materials

After the references are collected, the next step is to design and compile the content of the teaching materials. This material is organized systematically based on the results of the needs analysis and the applicable curriculum structure. Content writing is done by paying attention to the integration of theory and practice and adapted to the characteristics of students. The aim is to produce teaching materials that are not only informative but also communicative and easy to understand.

Development of Textbooks in Electronic Format

This stage is a concrete form of the development process, where the material that has been compiled begins to be poured into digital form. The preparation of electronic-based textbooks (e-books) includes display design, selection of visual media, preparation of interface navigation, and integration of interactive elements. The initial product produced at this stage is usually still a prototype or rough draft but has begun to show the structure and final appearance of the expected textbook. In this process, it is important to consider aspects of visual appeal and ease of use, in order to increase students' interest in learning.

Initial Product Design (Prototype)

Initial design is the stage of preparing the conceptual design of the electronic textbook to be developed. In this phase, the developer creates a prototype that contains a comprehensive description of the content, navigation structure, and user interface. This prototype will then be validated by experts to obtain constructive feedback. This validation aims to ensure that the product design is not only visually appealing, but also pedagogically and functionally appropriate.

Development Stage

The development stage aims to develop the flipbook thoroughly, and the finished product is validated by material and media experts. At the beginning of the flipbook, several materials relevant to the implementation of P5 are presented, namely the relevance of the project, the content flow of the implementation of the P5 integrated independent curriculum, sustainable lifestyle, and the implementation of the values contained in the project. The appearance of the initial part of the flipbook can be seen in Figure 2 and Figure 3.
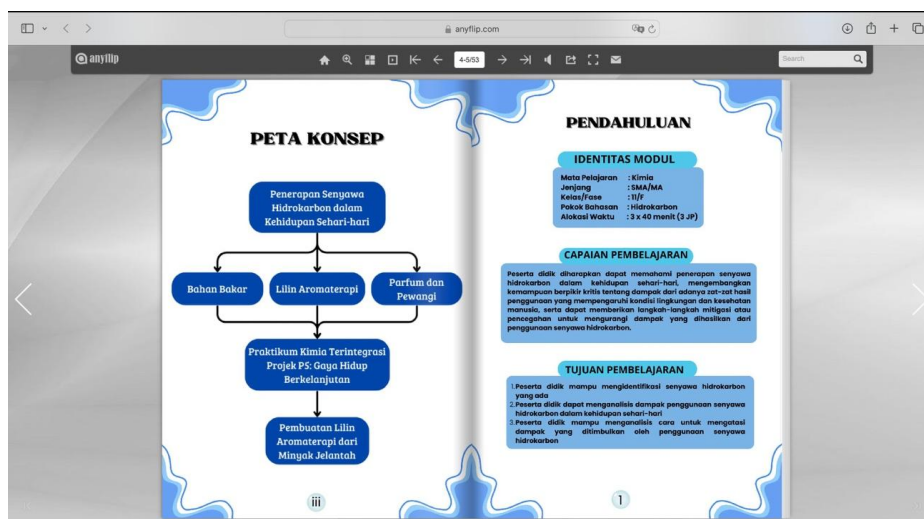
Figure 2. Initial Display

Figure 3. Integrating P5 in Learning

The next section presents several activities related to the topic of hydrocarbon compounds: the concept of hydrocarbon compounds, the application of hydrocarbon compounds in everyday life, and the hands-on activity of making aromatherapy candles from used cooking oil. This flipbook is equipped with student worksheets, fun facts, and learning reflections to better understand the information contained in the materials presented. The core part of the flipbook can be seen in Figure 4 and Figure 5.
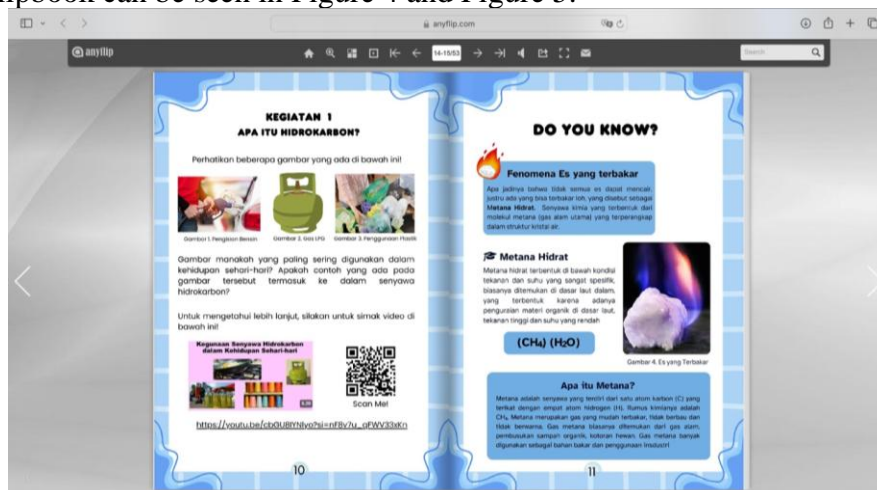
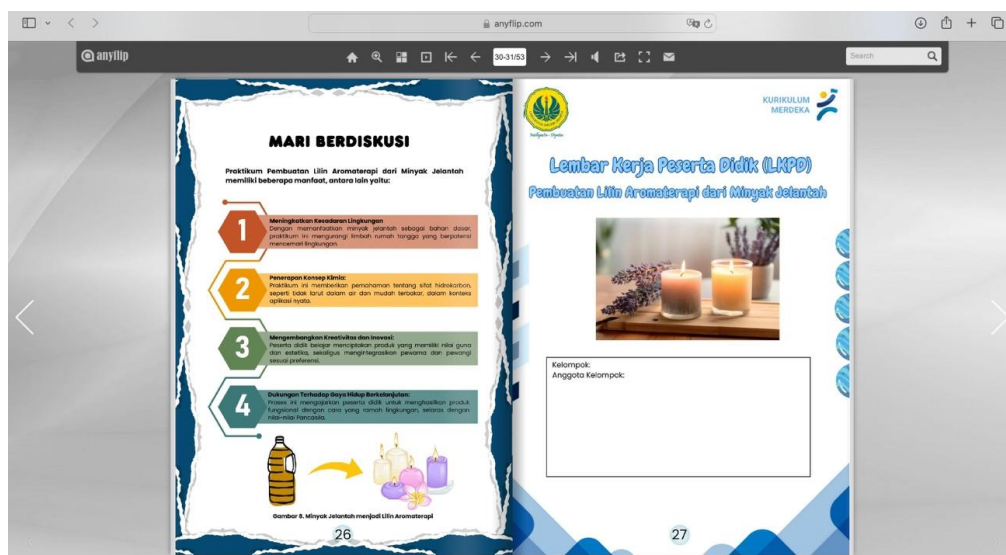

Figure 4. Hydrocarbon Materials

Figure 5. Aromatherapy Candle Making

The developed flipbook is then validated by material experts and media experts and analyzed using Aiken's V. The analysis results show that the Aiken's V value is greater than the validity coefficient value of 0.35, which means that it has a very beneficial interpretation. Based on the results of the validation analysis, it can be said that this digital flipbook media is valid and can be used for students' learning.

Implementation Stage

The implementation stage was conducted on 35 students of Class XI MAN 3 Jakarta. Students learn about hydrocarbon materials using aromatherapy candle flipbooks. The learning design was adapted for the integration of P5 to observe the readability and understandability of the material, the practicality of using the media, and its effectiveness in helping students understand the concept of hydrocarbons in context. During the implementation process, students followed a series of project-based learning activities integrated into the flipbook. These activities included an introduction to the concept, an exploration of how to make aromatherapy candles from used cooking oil, and a reflection on the values of the Pancasila Student Profile.

Furthermore, students were given a questionnaire to assess the flipbook that had been developed. Implementation was conducted as a series of limited trials to assess the practicality and feasibility of the flipbook. The practicality test is carried out to evaluate the product in terms of functionality, ease of use, and user satisfaction so that it can be determined whether the product is suitable for use or not (Kushendriawan et al., 2021; Hajesmaeel-Gohari et al., 2022). The results of the analysis can be seen in Table 3.

Table 3. Flipbook Analysis Result

Indicators	Percentage	Interpretation
Design and display	89%	excellent
Material relevance	87%	excellent
Ease of access	88%	excellent
Average percentage	**88%**	**excellent**

The questionnaire is divided into 3 evaluation components, namely flipbook design and display, material relevance, and ease of media access. The results of the analysis show that the flipbook for making aromatherapy candles has a percentage of 89% in the flipbook design and display category, 87% in the material relevance category, and 88% in the media accessibility category. Based on these results, an average percentage of 88% is obtained, which has an excellent interpretation, so that this flipbook is suitable to be used as a teaching material in learning.

Evaluation Stage

Evaluation is carried out based on the results of implementation according to suggestions and input from both teachers and the rest. Improvements are made with the aim of getting product results that are easier for users to use. The students stated that the flipbook for making aromatherapy candles facilitates understanding, detailed explanations, flexible use, and is interesting to use as a learning resource. Some feedback suggested included more videos, interactive games, fun facts and the need to improve ease of navigation, such as adding options to go directly to certain pages in the module.

The developed aroma therapy candle flipbook product meets the valid category in terms of content and structure, practical for classroom use, and effective in improving conceptual understanding and character building of students aligned with the Pancasila Student Profile. The results showed that students found the flipbook helpful in understanding complex hydrocarbon concepts due to its clear explanation, flexible use, and attractive visual design. They also appreciated the environmental relevance of the project-based approach, which links chemistry concepts to real-life issues such as waste oil management. Moreover, the activity of making aromatherapy candles not only serves as an application of hydrocarbon chemistry but also promotes values such as environmental stewardship, self-reliance, and creativity-elements that are at the core of the Pancasila Student Profile.

The use of flipbooks as digital mearning media is proven to improve students' learning experience through the presentation of interesting material, critical thinking, challenging learning activities, and interactive practice questions (Ikhsan et al., 2020; Aptana et al., 2024). The combination of visual and verbal components in the form of text, images and videos in flipbooks can add attractiveness to reading the information that has been presented and provide learning motivation for students (Nadifah et al., 2023). Meanwhile, this flipbook supports teachers in creating an effective and innovative learning environment so that it becomes one of the alternative solutions for effective chemistry learning and in accordance with educational needs in the digital era. Similar digital learning media can be developed and applied to learning with other materials to improve students' cognitive abilities, attitudes, and skills. However, the limitation of this study is that it was conducted in a limited classroom environment so that further trials can be conducted on a larger scale. Future studies are encouraged to expand this model to other chemistry topics or science subjects, supported by quantitative indicators such as learning outcomes, motivation scales, and project-based performance assessments to ensure continued relevance and measurable impact.

CONCLUSION

The development of the P5-integrated flipbook for making aromatherapy candles from used cooking oil has successfully supported project-based learning in hydrocarbon chemistry by contextualizing scientific concepts with real-life environmental issues. The evaluation results, which indicate an excellent score of 88%, reflect the media's validity and relevance in facilitating meaningful learning. More than just an instructional tool, the flipbook functions as a medium for integrating cognitive learning, such as students' improved ability to analyze hydrocarbon structures and their combustion properties with affective learning dimensions, particularly students' awareness of environmental sustainability and active participation in waste-to-product project activities. Implementation data also showed increased student engagement in group discussions, enthusiasm in project execution, and better articulation of the links between chemistry content and the values embedded in the Pancasila Student Profile especially sustainable lifestyle and creative, collaborative problem-solving. These findings are in line with the initial research objective to create an effective, character-based digital learning media that enhances both scientific understanding and student values in accordance with 21st-century education goals. Therefore, the development of this flipbook not only contributes to

innovation in chemistry learning resources but also offers a model for integrating character education with environmental literacy.

REFERENCES

Ahmad, S., Umirzakova, S., Mujtaba, G., Amin, M. S., & Whangbo, T. (2023). *Education 5.0: Requirements, Enabling Technologies, and Future Directions.* http://arxiv.org/abs/2307.15846

Aini, Q., & Adiyono. (2023). Implementation of an Independent Curriculum in Supporting Students' Freedom to Create and Learn. In *JSRET (Journal of Scientific* (Vol. 2, Issue 3).

Andini, S., & Fitriana, L. (2018). Developing Flipbook Multimedia: The Achievement of Informal Deductive Thinking Level. *Journal on Mathematics Education*, *9*(2), 227–238.

Aptana, R., Faisal, A., Lisdiana, H., & Astuti, T. N. (2024). Pengembangan e-Modul Hidrokarbon Berbasis Inquiry Based Learning untuk Meningkatkan Pemahaman Siswa SMA. *Jurnal Pendidikan*, *25*, 154–165. https://doi.org/10.52850/jpn.v25i2.18425

Astuti, T. N., Sugiyarto, K. H., & Ikhsan, J. (2020). Effect of 3D visualization on students' critical thinking skills and scientific attitude in chemistry. *International Journal of Instruction*, *13*(1), 151–164. https://doi.org/10.29333/iji.2020.13110a

Biletska, I., Paladieva, A., Avchinnikova, H., & Kazak, Y. (2021). The Use of Modern Technologies by Foreign Language Teachers: Developing Digital Skills. *Linguistics and Culture Review*, *5*, 16–27. https://doi.org/10.21744/lingcure.v5nS2.1327

Bringman-Rodenbarger, L., & Hortsch, M. (2020). How students choose E-learning resources: The importance of ease, familiarity, and convenience. *FASEB BioAdvances*, *2*(5), 286–295. https://doi.org/10.1096/fba.2019-00094

Chen, S.-Y., & Liu, S.-Y. (2020). Using augmented reality to experiment with elements in a chemistry course. *Computers in Human Behavior*, *111*, 106418. https://doi.org/10.1016/j.chb.2020.106418

Cho, N. S., Le, V. L., Sanvito, F., Oshima, S., Harper, J., Chun, S., Raymond, C., Lai, A., Nghiemphu, P. L., Yao, J., Everson, R., Salamon, N., Cloughesy, T. F., & Ellingson, B. M. (2024). Digital "flipbooks" for enhanced visual assessment of simple and complex brain tumors. *Neuro-Oncology*, *26*(10), 1823–1836. https://doi.org/10.1093/neuonc/noae097

Damayanti, A. M. S., Nurmayanti, N., & Syamsunir, S. (2024). Development of science flipbook to increase student learning activities. *Journal of Research in Instructional*, *4*(2), 333–344. https://doi.org/10.30862/jri.v4i2.424

Diaz Lantada, A. (2020). Engineering Education 5.0: Continuously Evolving Engineering Education. *International Journal of Engineering Education*, *36*, 1814–1832.

Ekaputra, F., Fuldiaratman, F., & Syahri, W. (2024). Development of Learning Module Flipbook with STEAM Approach in Philosophy Course Education. *EduLine: Journal of Education and Learning Innovation*, *4*(4), 531–536. https://doi.org/10.35877/454RI.eduline3144

Fausta, T. E., Muslihati, M., & Indreswari, H. (2024). Percentage of Pancasila student profile dimensions in the Merdeka curriculum and the implications for high school guidance and counseling programs. *Journal of Research in Instructional*, *4*(2), 314–323. https://doi.org/10.30862/jri.v4i2.416

Hajesmaeel-Gohari, S., Khordastan, F., Fatehi, F., Samzadeh, H., & Bahaadinbeigy, K. (2022). The most used questionnaires for evaluating satisfaction, usability, acceptance, and quality outcomes of mobile health. *BMC Medical Informatics and Decision Making*, *22*(1). https://doi.org/10.1186/s12911-022-01764-2

Hayward, C. (2017). *Validating Placement Systems Comprising Test and Multiple Measure Information.* www.rpgroup.org

Hung, Y. H., Chen, C. H., & Huang, S. W. (2017). Applying augmented reality to enhance learning: a study of different teaching materials. *Journal of Computer Assisted Learning*, *33*(3), 252–266. https://doi.org/10.1111/jcal.12173

Ikhsan, J., Sugiyarto, K. H., & Astuti, T. N. (2020). Fostering student's critical thinking through a virtual reality laboratory. *International Journal of Interactive Mobile Technologies*, *14*(8), 183–195. https://doi.org/10.3991/IJIM.V14I08.13069

Kushendriawan, M. A., Santoso, H. B., Putra, P. O. H., & Schrepp, M. (2021). Evaluating User Experience of a Mobile Health Application Halodoc using User Experience Questionnaire and Usability Testing. In *Journal of Information System)* (Vol. 17, Issue 1).

Lakapu, P. A., Djara, J. I., Lakapu, D. E., & Nifus, D. A. (2023). Application Of Flip Book Media to Increasing Elementary Children's Learning Interest. *International Journal of Educational Sciences and Development*, *1*(1), 22–29. https://doi.org/10.54099/ijesd.v1i1.671

Nadiah Mustafa Kamal, N., Haimi Mohd Adnan, A., Ariffuddin Yusof, A., Khairul Ahmad, M., Arifuddin Yusof, A., & Anwar Mohd Kamal, M. (2019). *Immersive Interactive Educational Experiences-adopting Education 5.0, Industry 4.0 learning technologies for Malaysian universities*. https://www.researchgate.net/publication/334823709

Nadifah, I., Fikriyah, A., Ahied, M., Hadi, W. P., & Yasir, M. (2023). *Development of an Integrated Ethnoscience Educative Magazine in the Theme of Madura Bamboo Shells Paste*. https://jurnal.iainponorogo.ac.id/index.php/insecta

Ningrum, S., & Suprihatiningrum, J. (2024). The Effect of Chemo-Entrepreneurship-Based Chemistry Learning Integrated with Values Education on Eleventh-Grade Students' Learning Outcomes and Motivation. *Journal of Tropical Chemistry Research and Education*, *6*(1), 24–36. https://doi.org/10.14421/jtcre.2024.61-03

Nisa'Sirait, R. N. M., & Daulay, E. (2024). Junior High School Students' Perception of the Using Fun Easy Learn Application in Vocabulary Learning. *IJECA (International Journal of Education and Curriculum Application)*, *7*(1), 27. https://doi.org/10.31764/ijeca.v7i1.22331

Nurdyansyah, F., Muflihati, I., Muliani Dwi Ujianti, R., Novita, M., Kusumo, H., . M., & Charles Ryan, J. (2022). Indonesian Character Building Strategy: Planning the Pancasila Student Profile Strengthening Project in Kurikulum Merdeka. *KnE Social Sciences*. https://doi.org/10.18502/kss.v7i19.12456

OECD. (2018). *The Future of Education and Skills: Education 2030*. https://www.oecd.org/education/2030-project/contact/E2030_Flyer_2019.pdf

Papadakis, S. (2020). Evaluating a game-development approach to teach introductory programming concepts in Secondary Education. *International Journal of Technology Enhanced Learning*, *1*, 1. https://doi.org/10.1504/IJTEL.2020.10024287

Prasetyono, R. N., & Hariyono, R. C. S. (2020). Development of flipbook using web learning to improve logical thinking ability in logic gate. *International Journal of Advanced Computer Science and Applications*, *11*(1), 342–348. https://doi.org/10.14569/ijacsa.2020.0110143

Rahmawati, Y., Nanda, E. V., Khairani, A., & Mardiah, A. (2024). A Close Look at Chemistry in Real Life: Analyzing Students' Chemical Literacy through the Integration of an Ethical Dilemma-STEAM Teaching Model. *AIP Conference Proceedings*, *2982*(1). https://doi.org/10.1063/5.0183350

Ristanto, R. H., Rusdi, R., Mahardika, R. D., Darmawan, E., & Ismirawati, N. (2020). Digital Flipbook Imunopedia (DFI): A Development in Immune System e-Learning Media. *International Journal of Interactive Mobile Technologies (IJIM)*, *14*(19), 140–162. https://doi.org/10.3991/ijim.v14i19.16795

Spatioti, A. G., Kazanidis, I., & Pange, J. (2022). A Comparative Study of the ADDIE Instructional Design Model in Distance Education. In *Information (Switzerland)* (Vol. 13, Issue 9). MDPI. https://doi.org/10.3390/info13090402

Sugianto, R., Muhammad, J., Rahman, Z., & Seituni, S. (2024). Bridging 21st-Century Skills And Pancasila Values: Insights from the Implementation of the P5 Project in Indonesian Education. In *Review and Educational Innovation* (Vol. 2).

Susilo, D. R., Wiyanarti, E., Mulyana, A., & Darmawan, W. (2025). Innovation in Digital based History Learning through Flipbooks for Elementary School Students in Lembang District. *Primaryedu: Journal of Elementary Education*, *9*(1).

Tohri, A., Rasyad, A., Sururuddin, M., & Istiqlal, L. M. (2022). The urgency of Sasak local wisdom-based character education for elementary school in East Lombok, Indonesia. *International Journal of Evaluation and Research in Education*, *11*(1), 333–344. https://doi.org/10.11591/ijere.v11i1.21869

Vidakis, N., Barianos, A. K., Trampas, A. M., Papadakis, S., Kalogiannakis, M., & Vassilakis, K. (2019). Generating education in-game data: The case of an ancient theatre serious game. *CSEDU 2019 - Proceedings of the 11th International Conference on Computer Supported Education*, *1*, 36–43. https://doi.org/10.5220/0007810800360043

Wayan Wini Widarini, N., Ketut Suterji, N., Negeri, S., & Tinggi Agama Hindu Bhatara Guru Kendari Sulawesi Tenggara, S. (2023). Implementation of The Profile Strengthening of Pancasila Student Profile (P5) in Building Student Character in First Middle School. *International Journal of Multidisciplinary Sciences*, *1*(2). https://jayapanguspress.penerbit.org/index.php/IJMS