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DIFFERENTIATED LEARNING WITH PROJECT BASED LEARNING MODEL IN TERMS OF STUDENT LEARNING STYLE

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Abstract: According to Ki Hajar Dewantara, good learning is learning that guides students to develop according to their abilities. This is in line with the objectives of the Independent Curriculum which implements differentiated learning. This differentiated learning objective is implemented to facilitate the diverse characteristics of students in the classroom. This research aims to determine the application of differentiated learning in terms of student learning styles. The research method used is a qualitative descriptive method. The results of the research show that differentiated learning has a positive impact on students. Learning becomes more meaningful because students can create a variety of products that are tailored to their learning styles.

Keywords: Differentiated learning; PjBL; learning styles

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INTRODUCTION

The development of the curriculum in Indonesia from year to year certainly adapts to current developments. The curriculum currently in effect in Indonesia is the Merdeka Curriculum which will start in 2022. The focus of the Merdeka Curriculum is differentiated learning, namely learning that adapts to students' abilities, interests, motivation and learning readiness. Differentiated learning is applied so that learning is more student-centered and makes students more independent (Wahyuninsih & Lestari, 2023). Teachers must consider three factors when mapping students' needs: 1) student learning readiness; 2) student enthusiasm in learning; and 3) student learning profile, before deciding on the best learning technique. Teachers can implement differentiated learning techniques, such as content differentiation, process differentiation, and product differentiation, after mapping students' requirements based on the three aforementioned components (Trifatmasari et al., 2023).

Process differentiation includes the use of various teaching strategies and materials to enhance and motivate various student learning styles (Kashdan et al., 2018). Based on learning style theory, it states that different students have different ways of learning and learning approaches must facilitate students' diverse learning styles. A learning approach may be effective for some students but not effective for other students because students have diverse characteristics. If students are provided with appropriate environments and instruction, they will likely achieve better learning outcomes (Hourdakis et al., 2000).

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Identifying learning styles is not an easy thing. One of the well-known models for categorizing learning styles is the VAK (Visual, Auditory and Kinesthetic) model which was famous from Neil Flemming in 2001 (Malacapay, 2019).

A teaching and learning approach known as "visual learning" links concepts, ideas, facts, and other information to visual aids and methods. A person who learns by hearing is said to have an auditory learning style. Speaking and hearing are the main modes of learning for an auditory learner. Written instructions may be challenging for auditory learners, who need to be able to hear what is being spoken in order to understand. In order to filter through the information that is delivered to them, they also employ listening and repetition techniques. Kinesthetic learning is a type of learning where students actually engage in physical activities rather than only watching demonstrations or listening to teachers (Sreenidhi & Helena, 2017). Differentiated learning will be more meaningful by using projects. Project-based learning is considered capable of making students set their own learning goals, plan the learning process so that students can choose the method and completion of the product they create (Chen & Kong, 2022).

The project-based learning model involves fundamental changes that transform teacher-centered learning into more student-centered learning. This learning can change the way teachers teach, the way students learn, and the way educators and students interact (Maros et al., 2023). Based on research by Issa & Khataibeh (2021), project-based learning provides significant results on creative thinking, reflective thinking, communication and collaboration skills for students. The same research was conducted by Zhang & Ma (2023) who said that project-based learning improves student learning outcomes and has a positive impact on achievement, attitudes and thinking skills.

Chemistry subjects as one of the natural sciences that study the changes in matter and energy that accompany them are deemed appropriate to be implemented using a project-based learning model (Masbukhin et al., 2023). One of the chemistry materials in class X that is implemented in the independent curriculum is the development of the atomic model. Based on the background that has been explained, this research aims to implement differentiated learning using a project-based learning model based on differences in student learning styles in the atomic model development material.

METHOD

The method used in this research is descriptive qualitative. The three primary components of qualitative research are the construction process, the initial reaction, and the conclusion. In qualitative research, the first reaction is to be sensitive to environmental issues, to desire to investigate them thoroughly, and to capture the significance of occurrences, events, perceptions, attitudes, thoughts, social activities, and ideas. Scientifically stated, explained, and illustrated facts, data, and information from informants are collected as part of the building process in qualitative research. In qualitative research, conclusions are reached via interpreting each occurrence, identifying novel knowledge principles, and developing fresh techniques (Pahleviannur et al., 2022). The subjects in this research were 35 class X students at a public high school in Depok City, consisting of 14 men and 21 women. This research began with a needs analysis consisting of students' learning readiness, learning interests, and learning styles. The

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learning style test uses the VAK (Visual, Auditory and Kinesthetic) Model from Neil Flemming. The next activity is planning differentiated learning based on the results of students' learning style tests. The final step is to evaluate and reflect on the learning that has been carried out.

RESULT AND DISCUSSION

Differentiated learning with a project-based learning model based on differences in learning styles in class This needs analysis uses a Google form which is filled in by students. Student responses regarding questions in the needs analysis can be seen in the following table:

Table 1. Results of student needs analysis

Number	Question	Answer
1.	If you were given a choice regarding where to study chemistry at school, which place would you choose and would you prefer?	77.8% class 19.4% laboratories 2.8% of the environment around the school
2.	Which method do you like the most and makes you enthusiastic about chemistry learning activities?	77.8% practicum/project 16.7% listened to the teacher's explanation/lecture 5.5% read books/teaching materials
3.	In learning chemistry, you will be more enthusiastic if you work collaboratively...	77.8% individuals 22.2% were in groups
4.	Do you have a smartphone and can you take it to school for learning activities?	100% Yes
5.	Are you able to make simple videos using video editing applications?	58.3% Yes, you can but not yet proficient 33.3% Yes, you can 8.3% No
6.	Are you able to create simple graphic designs (posters/labels/IG, etc.) using Canva, Corel Draw, Photoshop, etc.?	61.1% Yes, you can but not yet proficient 30.6% Yes, you can 8.3% Can't

Table 2. Results of analysis of student learning styles

Number	Learning style	Result (%)
1.	Visual	37%
2.	Auditory	29%
3.	Kinesthetic	34%

Based on the results of student responses to the needs analysis, it can be concluded

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that most students choose learning in class using the project method. Students are happier when working in groups and are able to create videos and simple graphic designs using certain applications. The results of the analysis of student learning styles showed that 37% of students had a visual learning style, 29% of students had an auditory learning style, and 34% of students had a kinesthetic learning style. After analyzing needs and learning styles, the next step is planning differentiated learning activities based on differences in student learning styles. The differentiation carried out is content, process and product differentiation.

The content differentiation carried out is preparing different learning resources for students with visual, auditory and kinesthetic learning styles. The visual learning style prepares teaching materials in the form of PPTs, modules and e-books. For the auditory learning style, teaching materials are prepared in the form of learning videos. For the kinesthetic learning style, teaching materials are prepared in the form of video tutorials for making three-dimensional atomic models. All teaching materials given to students with different learning styles are included in Google Classroom so that students can access them more easily.

According to Liou et al., (2023) both the content that students learn and the method by which they acquire it are components of differentiated content. Flexible groupings allow students to work independently or in small groups to reinforce content. They can also use color or illustrations to highlight or summarize key points in the material. Video recordings of lectures can be used to present material visually, auditorily, or kinesthetically. Books, pictures, and the internet can be used to develop understanding and knowledge of topics or concepts. Finally, examples relating to the student's experience or knowledge can be used to practice a situation or explain the material.

The process differentiation carried out is to free students to choose how to complete the atomic model development project. Process means making meaning, or in other words, it is a forum for students to process the content, ideas or input they have learned. According to Abu Hassan & Ajmain (2022) students tend to be motivated in processing input or knowledge content when class activities are interesting, trigger them to engage in higher level thinking and when these activities help students use their skills. Product differentiation in this research is liberating the products produced by students. The resulting products can be in the form of posters, PPTs, animated videos, podcasts, three-dimensional atomic models that are adapted to students' learning styles. The product or output in learning aims to help students rethink, use and expand the knowledge learned after a long period of time (Abu Hassan & Ajmain, 2022).

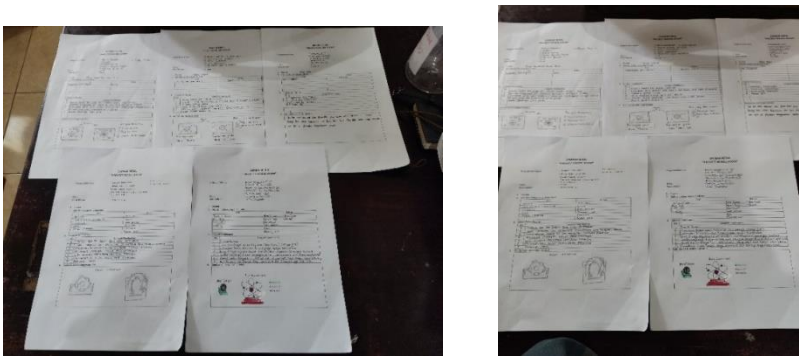

Figure 1. Student Worksheet (LKPD) for Student Groups

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The differentiated learning carried out is integrated with a project-based learning model. Project-based learning takes into account a variety of student learning styles. Students can choose how to learn and practice the learning they do in the final product they create (Bell, 2010). There are three stages in project-based learning, namely planning, testing, and reflection. At the planning stage there is a problem solving stage that will be resolved, the testing stage is the process of working on the project until the product is produced, and the final stage is reflection and evaluation (Hawari, Ahmad & Noor, Azlin, 2020). The planning stage carried out in the learning process is that students search for information related to the atomic model theory that they have obtained, then design products that will be made based on differences in learning styles. At this stage, students in groups write their product designs on the worksheets that have been distributed. The testing stage is the stage when students create a previously designed product and then present it. Students are given one week to design their group's product based on differences in learning styles. After completing the presentation, other friends give an assessment to the group that has made the presentation.

Figure 2. Differentiated learning products based on differences in learning styles

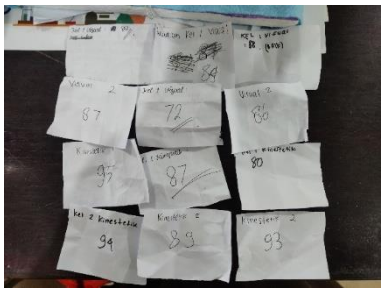

Figure 3. Group assessment results

Reflection stage, namely at the end of the lesson students are asked to fill out a Google form. Questions on the Google form contain descriptions of the groups they have worked with, responses to the products they have worked on, difficulties in the project work stage, and benefits obtained during the project work process. Based on students' responses, the difficulties they faced included collaboration between friends which was sometimes difficult and difficulties when creating three-dimensional models for groups with a kinesthetic learning style. The benefits that students get from differentiated learning with this project-based learning model are training cooperation between friends in groups, apart from that, students become more understanding about various atomic

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model theories because they search for information and create products based on learning styles. According to Alsalhi et al., (2021) differentiated learning is very important to apply to every subject because it is considered a modern learning strategy and is widely used in many countries by looking at differences in students' needs, interests and levels of understanding.

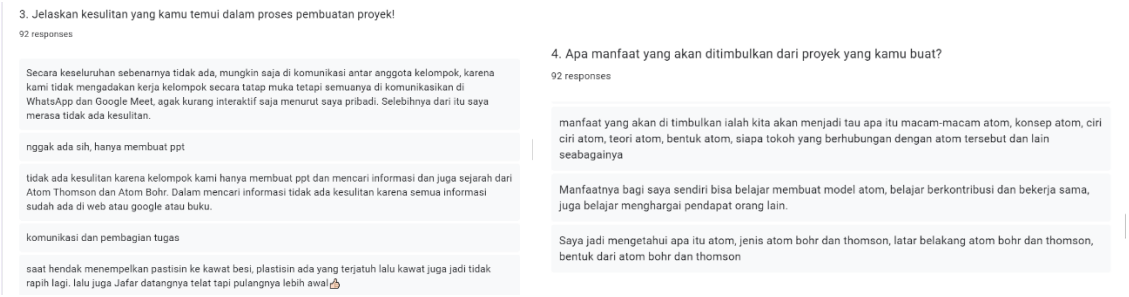

Figure 4. Student responses to learning

CONCLUSION

Differentiated learning using a project-based learning model which is based on differences in student learning styles provides meaningful learning. Different learning styles by applying content, process and product differentiation enable students to work together in groups, react to the products they create, train thinking skills and communication skills. It is hoped that this learning can be applied to each subject with different learning models.

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