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Jurnal Penelitian dan Pengembangan Pendidikan
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Email: paedagogy@undikma.ac.id

Vol. 10 No. 2 : April 2023
E-ISSN: 2722-4627
pp. 389-400

Movers Teacher Perceptions of Sensory Learning Styles and Their Implementation in Product Differentiated Learning

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Abstract: This study aims to explore the perceptions of movers of teachers towards sensory learning styles and their implementation in determining differentiated products. This research was qualitative research with a case study method. The data sources in this study were five science mover teachers in Grobogan Regency and product documents produced by students. Data collection used observation, interviews, questionnaires, and documentation—the validity of the data using triangulation of sources and techniques. The study results showed that the teacher's perception of students' sensory learning styles was relevant to their implementation in determining differentiated products. It showed that the teacher's perception was crucial in implementing differentiation learning, especially product differentiation. For this reason, teachers are needed to have the right perception of differentiated learning. The right perception will cause the implementation of differentiated learning to run effectively.

Article History
Received: 31-12-2022
Revised: 29-01-2023
Accepted: 23-02-2023
Published: 07-04-2023

Key Words:
Movers Teacher; Perception; Sensory Learning Style; Differentiated Product.

How to Cite: Helmi, A., Fauziati, E., & Muhibbin, A. (2023). Movers Teacher Perceptions of Sensory Learning Styles and Their Implementation in Product Differentiated Learning. *Jurnal Paedagogy*, *10*(2), 389-400. doi:https://doi.org/10.33394/jp.v10i2.6880

https://doi.org/10.33394/jp.v10i2.6880

Introduction

Human resource development is education's duty and responsibility to optimise each student's potential. Education should facilitate the diverse needs of students. In reality, education still uses a learning system that considers all students to be the same regardless of their uniqueness. Therefore, education should accommodate all differences and meet the needs of every student. In this regard, teachers should be able to design learning that pays attention to the diversity of students so that the learning carried out can meet the learning needs of students, one of which is through differentiation learning (Iskandar, 2021)

In differentiated learning, three aspects can be distinguished by teachers so that students can understand the subject matter they are studying, namely aspects of the content to be taught, aspects of processes or meaningful activities that students in the class will carry out, and aspects of making products that are intended to be taught and carried out at the end which can measure the achievement of learning objectives (Marlina, 2019). The product results from learning to demonstrate students' knowledge, skills and understanding after completing one unit of study or even after discussing the subject matter for one semester. Products are summative in nature and need to be assessed (Purba, 2021). The teacher's strategy for product differentiation can be carried out based on learning readiness, learning interest.

Product differentiation based on student learning profiles can be done by: 1) Encouraging students to work with partners or independently in working on products; 2) Teaching students to use various formats of product completion; 3) Providing choices of product processing in visual, auditory, and kinesthetic forms; 4) Provide product choices that

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are analytical, creative, and practical; and 5) Ensuring connectivity between assignments and cultural diversity/student community (Tomlinson, 2001). Implementing this product differentiation learning depends on the perception of each teacher. Individuals have different learning styles; consequently, they differ in ways of learning, habits, and preferences for absorbing, processing, and retaining new information and skills. The many differences in learning styles and choices students show cause classes to be modified so that different learning needs can be appropriately accommodated (Mokhlis, 2021). For this reason, the teacher's perception of students' sensory learning styles is essential in determining the products produced by students in differentiation learning.

To get the right perception regarding differentiated learning, the government launched a professional development program through training and mentoring that focuses on learning leadership to encourage student growth and development holistically and develop others. This program is called the Teacher Mobilization Education Program (PGP). Participants in the PGP program are teachers who meet the criteria and have passed the selection, called prospective teacher mobilizers. Prospective driving teachers who have graduated from training and mentoring are called driving teachers.

There have been many studies on differentiated learning, including the results of Lailiyah's research (2016), which showed that overall, the improvement in critical thinking skills of students who received differentiated learning was better than that of ordinary learning. Herwina's research (2021) shows that differentiated learning can help students achieve optimal learning results because the products to be produced are according to their interests. The results of Kamal's research (2021) show that differentiated learning involving three elements, namely visual, auditory, and kinesthetic, can increase the activity and results of learning mathematics for class XI MIPA students. Yanti research results et al. (2022) showed that the application of differentiated learning based on students' learning interests and readiness had an impact on changes in student behavior in learning, as seen from the results of observations of students being more active in learning activities and creatively working on assignments so that student learning outcomes matched learning objectives and the products produced varied. The results of Aminuriyah's research, et al. (2022) show that differentiated learning can place students actively and independently and is responsible for the learning that is carried out.

The results of Setiyo's research (2022) show that the application of collaborative, differentiated learning can improve the well-being of students involving parents and the community. The research results by Ferliyanti et al. (2022) show increased student learning outcomes before and after the application of differentiated learning. The results of research by Siagian, et al. (2022) show that differentiated learning accommodates student learning needs. The teacher facilitates students according to their needs. The results of research by Yanti, et al. (2022) show that the application of differentiated learning has an impact on changes in student behavior in learning; it can be seen from the results of observations that students are more active in learning activities and are creative in doing assignments so that student learning outcomes are following learning objectives.

Research from Nurdini (2021) shows that based on the results of the mapping, it was obtained data from class IX students with learning styles; Kinesthetic (movement), Audio (hear), Visual (see), Audio Visual (hear and see), as well as data about each student's hobbies and habits. Made's research (2022) shows that applying Visual, Auditory, and Kinesthetic (VAK) learning models in the learning process can increase student interest and learning

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achievement. The research results from Alhafiz (2022) show that no students rely on only one learning style. Student learning styles show a combination of these three learning styles.

The results of Heng & Song's research (2020) show that mastery of technology is one factor that hinders teacher perceptions and their implementation in carrying out differentiated learning. Jatmiko's research (2022) results show that teachers have carried out differentiated learning in content, process, and product. In learning product differentiation for class XI IPS students, the teacher gives assignments in the form of different products according to their abilities.

The research results of Zelalem, et al (2022) show that most educators do not have training on differentiated learning and are less effective in applying different instructions. The results of Alshareef's research (2022) show that technology were used to differentiated classroom instruction in different ways and for different purposes.Smeth's research (2022) results show that the school student population is becoming more diverse, so teachers need help implementing different instructions.

This research is different from Lailiyah's research (2016); Herwina's (2021); Yanti et al. (2022); and Aminuriyah et al. (2022). The difference lies in the differentiated learning component studied. In this study, the differentiated learning components studied focused on product differentiation learning based on student's learning styles. In their research, differentiated learning was based on learning readiness and students' interests. This research is also different from Setiyo's research (2022); Ferliyanti et al. (2022); Siagian et al. (2022; and Yanti, et al (2022). The difference lies in the research subjects. The subjects in this study were teachers driving science subjects at the junior high school level, while the subjects in their research were students.

This research is different from Jatmiko's research (2022); Zelalem (2022); Alshareef (2022); and Smeth (2022). The difference lies in the research subjects. The subjects in this study were teachers of science subjects at the junior high school level. In contrast, the subjects in Jatmiko's research (2022) were teachers of the Indonesian language at the high school level. Subjects in Zelalem's research (2022), Alshareef (2022), and Smeth (2022) are teachers who have not attended driving teacher education. This research is different from Nurdini's research (2021); Alhafiz (2022); and Made (2022). The difference lies in the subjects and research objectives. This study explores the perceptions of driving teachers towards students' sensory learning styles and their implementation in creating differentiated content. In contrast, their research aims to map students' learning styles. The subjects in this study were driving teachers, while the subjects in their research were students.

Research related to differentiated learning has been carried out, but it is still limited to differentiated learning based on students' learning interests and readiness. There is no research on differentiated learning based on students' sensory learning styles. Differentiated learning research for Islamic Religious Education, BK, and Indonesian has been carried out, but there is no research related to science subjects yet. Research on teachers' perceptions of differentiated learning has been carried out but is limited to teachers who have not received training on differentiated learning. It has not yet been carried out for teachers who have received training. Therefore, this research aims to: (1) explore the perceptions of science subject teachers towards students' sensory learning styles and (2) explore the implementation of students' sensory learning styles in determining differentiated products. Through this research, feedback will be obtained from driving teachers to improve the quality of differentiation learning, especially product differentiation.

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Research Method

This study used a qualitative approach with a case study method. The data sources in this study were five science subject teachers in Grobogan District and product documents produced by students. Data collection techniques used are observation, interviews, questionnaires, and documentation. In-depth observations were made in four state junior high schools. Interviews were conducted with five science subject teachers to obtain data related to teacher perceptions of student learning styles and their implementation in creating differentiated content. Questionnaires were given and filled out by the driving teachers after the interview. Documentation of products made by students was also carried out to obtain accurate data—the validity of the data using triangulation of sources and techniques.

In this study, the data obtained from science subject teachers regarding product differentiation learning through interviews and questionnaires must be tested by checking supporting documents and observations. Data validation uses an expert judgment model by asking for expert opinion. The data validation technique were used interactive technique consisting of three components: data reduction, data presentation and conclusion (Miles & Huberman, 2014). The data reduction was from observations, interviews, questionnaires, and documentation to obtained some basic data. Data presentation were done by compiled the data obtained after being reduced to made it easy to understand.

Results and Discussion

Teachers' perceptions of students' sensory learning styles in determining differentiated products

The research results on teacher perceptions of students' sensory learning styles were described based on three indicators: teacher perceptions of students' visual learning styles, teacher perceptions of auditory learning styles, and teacher perceptions of students' kinesthetic learning styles. The study results showed that movers teachers had the same perception of visual learning styles. *Visual learning style* is a learning style that uses the sense of sight. Students with a visual learning style use their eyesight to absorb information. Students with a visual learning style were more interested in observing pictures or videos. The average percentage of students with a visual learning style was 37%. Products determined by the driving teacher to meet the needs of students with a visual learning style are in the form of posters, power points, models, graphs and curves, and videos. The teacher's perception of the visual learning style can be seen in the following table:

Table 1. Teacher's Perception of Students' Visual Learning Style

Component	Information
Teacher perceptions of style Visual learning	Visual learning style is a learning style that prioritizes the senses vision
The percentage of students who have visual learning style	Average 37 %
Specified product for the assignment of students with learning styles visual	in the formposters, power points, models, graphs and curves, and videos.

The results of the study show that the driving teachers have the same perception of the auditory learning style. Auditory learning style is a learning style that uses the sense of hearing. Students with this learning style find it easier to concentrate through the listening

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mechanism. Students find it easier to concentrate when listening to recordings, lectures, and material from learning videos. The average percentage of students who have an auditory learning style is 33%. The product determined by the driving teacher to meet the needs of students with an auditory learning style is in the form of video. Teacher's perception of auditory learning style can be seen in the following table:

Table 2. Teachers' perceptions of students' auditory learning styles

Component	Information
Teacher perceptions of style Auditory learning	Auditory learning style is a learning style that uses the senses Hearing.
The percentage of students who have auditory learning style	Average 33%.
Product specified for Assignment of students with learning styles auditory	In the form of videos .

The study results showed that movers teachers perceived kinesthetic learning styles similarly. The kinesthetic learning style is a learning style that uses movement (physical/body movements) so that students with this learning style cannot sit still. The kinesthetic learning style guides students to follow the steps made by the teacher in learning activities. The average percentage of students with a kinesthetic learning style was 35%. Products determined by the activating teacher as assignments of students with kinesthetic learning styles are in the form of practicum results reports and models. The teacher's perception of kinesthetic learning styles can be seen in the following table:

Table 3. Teacher's perception of students' kinesthetic learning styles

Component	Information
Teacher perceptions of style Kinesthetic learning	Kinesthetic learning style is a learning style that uses physical movement.
The percentage of students who have kinesthetic learning style	Average 35%
Product specified for assignment of students with learning styles kinesthetic	In the form of reports on the results of practicum and models.

From the description of visual, auditory, and kinesthetic learning styles, it can be summarized in the following table:

Table 4. Teacher's perception of students' visual, auditory, & kinesthetic learning styles

Kinds of learning styles	Component	Information
Visual	Teachers' perceptions of visual learning styles	Visual learning style is a learning style prefer the sense of sight.
	The percentage of students who have a visual learning style	Average 37%.
	Products specified for the assignment of students with a	Products in the form of videos, posters, power points, graphs and curves, and Model.

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	visual learning style	.
Auditory	Teachers' perceptions of Auditory learning styles	Auditory learning style is a learning style who uses the sense of hearing.
	Percentage of students who have style auditory learning	Average 33%
	Products specified for the assignment of students with an auditory learning style	The product is a video.
Kinesthetic	Teachers' perceptions of kinesthetic learning styles	Kinesthetic learning style is a learning style using physical movement.
	The percentage of students who have a kinesthetic learning style	Average 35%
	Products defined for student assignments with kinesthetic learning style	In the form of reports on the results of practicum and models.

Implementation of student sensory learning styles in making differentiated products

The results showed that implementing students' sensory learning styles in determining differentiated products included videos, posters, curves and graphs, power points, models, and practicum results reports.

Videos

Based on observations, video was a product of assignments given by teachers to meet the needs of students with visual and auditory learning styles. Students created it and uploaded it on YouTube then the link is sent via the drive or WhatsApp group. The results of this study are also supported by the following documentation:

Figure 1. Video as a product of students with visual and auditory learning styles

Poster

Based on the observations, posters were products resulting from assignments of students with a visual learning style. Teachers give freedom to students to choose products according to their learning style. The results of these observations are relevant to the results of the following documentation:

Figure 2. Student products in the form of posters

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Power pointt

The results showed that PowerPoint was a product produced by students with a visual learning style. The teacher gives directions to make power points and posters. It turned out that they made activity reports in the form of power points. The results of these observations are consistent with the results of the following documentation:

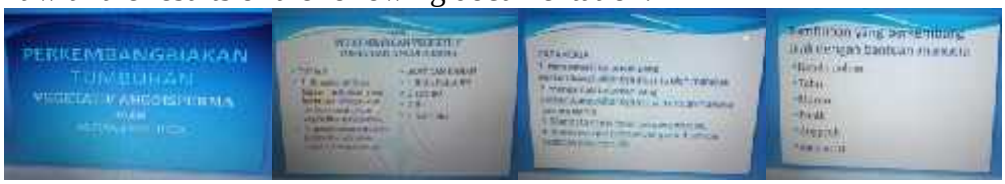

Figure 3. Student products in the form of power points

Model

The results showed that students produced the model with visual and kinesthetic learning styles. Teachers gave freedom to students to choose products according to their learning style. There were students with a kinesthetic learning style who make swings from ice cream sticks, and some students make reports on the results of the experiments. The results of these observations are relevant to the results of the following documentation:

Figure 4. Student products in the form of models

Graphs and Curves

The study results showed that graphs and curves were products produced by students with a visual learning style. Teachers gave freedom to students to determined products according to their learning style. There are several alternatives that students can chose. It turned out that the students collected products were in the formed of graphs and curves, as well as posters. The following documentation results support the results of this observation:

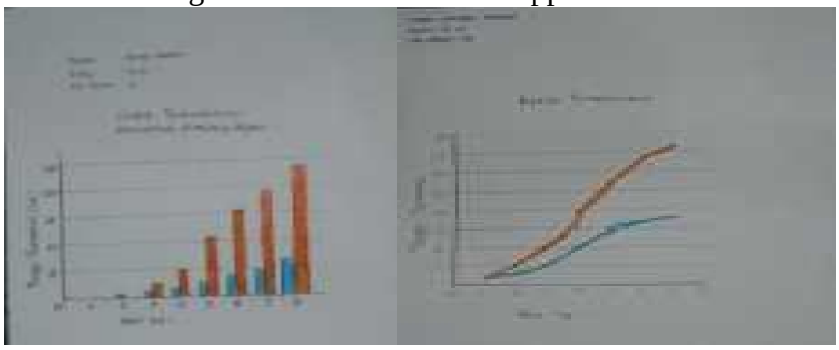

Figure 5. Curves and graphs

Practical results report

The study results showed that the practicum results report was a product produced by students with a kinesthetic learning style. Students made presentations as the final product. The presentation was in the form of a practicum results report. The results of these observations were consistent with the results of the following documentation:

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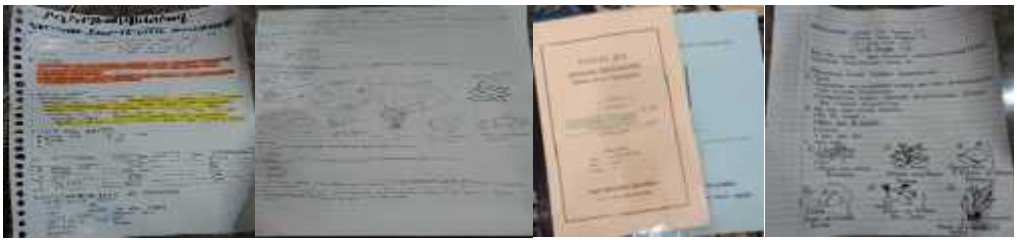

Figure 6. Student products consist of practicum results reports

The exposure above can be summarized in the following table.

Table 5. Implementation of students' sensory learning styles in determining differentiated products

Kinds of content	Information
Videos	Products produced by students with visual and auditory learning styles. Videos Contains biotechnology material. Made in the form of videos and blogs, uploaded to drives or youtube. Link sent to wa group.
Poster	Products produced by students with a visual learning style. There are two kinds Poster is a poster made without an application and with the Canva application. Postercontains material on the human reproductive system and scientific work.
Power point	Products produced by students with a visual learning style contain results Observation.
Model	Products produced by students with a visual learning style contain results observation. In the form of swings from ice cream sticks for vibration material andwaves and animal cell models for the Organizational Structure of Life material.
Graphs and curves	Products produced by students with a visual learning style. Graphic contains sprout growth material. Graphics created with student creations, without using the app.
Practicum Results Report	Products produced by students with a visual learning style, contain the results of observations for material on plant reproduction.

Discussion

Teachers' perceptions of students' sensory learning styles in determining differentiated products

This study's results indicate similarities in the perceptions of driving teachers towards students' sensory learning styles in determining differentiated products. These findings support the research results of Aminuriyah, et al (2022), which state that differentiated learning is a learning strategy that places students actively and independently and is responsible for the learning that is carried out. Participants can develop critical thinking skills, develop a social support system for their learning, choose the most effective learning style and are expected to become and have an entrepreneurial spirit. This finding also supports Ferliyanti's research, et al (2022), who stated that differentiated learning using the Blended Learning's Station Rotation method is an alternative learning that can be applied to Physics subjects. This learning accommodates, serves, and recognizes the diversity of students in learning according to their readiness, interests, and learning preferences.

This finding reinforces the research results of Rudhumbu (2022), which states that differentiation of instruction (DI) has been widely seen as the antithesis of the traditional one-

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size-fits-all approach to teaching. By accepting that students are fundamentally different, DI ensures that lecturers at teacher's colleges adapt their teaching approaches to students' needs, interests, and learning styles. This finding also strengthens the results of Alhafiz's research (2022), which shows that no students rely only on one learning style. Student learning styles show a combination of these three learning styles. Differentiated learning is intended to facilitate the needs of these diverse students.

These findings support the research results of Made, et al (2022), which show that applying Visual, Auditory, and Kinesthetic (VAK) differentiated learning in the learning process can increase student interest and learning achievement. The differentiated learning model displays all the essential intellectual and social dispositions needed to initiate pro-student learning and motivates them to recognize their own identity. By being able to master and apply this learning model, it is hoped that prospective educators and educators will be able to design and organize good learning to optimize learning according to student learning needs.

This finding also strengthens the research results of Siagian, et al (2022), which shows that differentiated learning is learning that accommodates student learning needs. The teacher facilitates students according to their needs. Students have different characteristics, so they cannot be treated the same. In implementing differentiated learning, the teacher needs to think about reasonable actions that will be taken later because differentiated learning does not mean learning by giving different treatment or actions to each student, as well as learning that differentiates between smart and less intelligent students.

However, these findings do not support the results of Haelerman's research (2022) which states that differences occur due to different perceptions of these teachers. This finding also does not support the research results of Usman, et al (2022) which states that teachers in schools that have not implemented an independent curriculum do not have the right perception of differentiated learning.

The results of this study also support the theory of Schiffman and Kanuk (2009), which states that there is a three-component attitude model consisting of cognitive components, affective components, and conative components that are used to predict individual behavior. Cognitive components are knowledge and perceptions obtained from direct experience and attitude objects from various sources. The affective component is a feeling towards a product with an evaluative nature. The conative component is an individual's tendency to act on a product in specific ways. It shows that driving teachers have direct experience of differentiation learning through training, so their perceptions are more precise than teachers who have not received training.

Implementation of student sensory learning styles in determining differentiated products

The results of this study indicated that the implementation of students' sensory learning styles in determining differentiated products includes videos, posters, curves and graphics, sound/audio recordings, Power Points, models, and practicum results reports. This finding supports Herwina's research (2021), which shows that differentiated learning can help students achieve optimal learning results because the products they will produce are according to their interests. Therefore, the differentiated learning process must provide ample space for students to demonstrate what they have learned. Products produced by students can be presented in an article, song, poem, infographic, poster, performance video, animation video or other forms according to the skills and interests of each group.

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This finding reinforces Swandewi's research (2021), which shows that differentiating products can be done by considering students' learning needs before giving product assignments. Product assignments should help students, individually or in groups, redefine or expand on what students have learned over some time (a semester or a year). Products are essential because they represent understanding and application in a broad form. The resulting products are in the form of videos, mind maps, and activity reports.

This finding supports the results of Pidrawan's research (2022), which shows that the variety of products due to assignments by elementary school level students that are uploaded include caricatures, videos, and examples of text impressions on various objects. Products uploaded due to assignments by junior high school students include PowerPoint, pdfs, and videos from various media. This finding also strengthens the research results of Sulistyosari, et al (2022), which stated that the types of products produced by students varied widely. Products include written observations, presentations, videos, and recordings. Making this product aims to determine a broad understanding of students related to the material being studied individually and in groups.

However, these findings do not support the research results of Zelalem, et al (2022) which show that most educators need to have training on differentiated learning, so it is less effective to implement differentiated learning. These findings also do not support the research results of Ismajli, et al (2018), which show that the implementation of differentiated learning in public and private elementary schools is not following the perceptions of each teacher. Teachers pay more attention to content differentiation and pay less attention to product and process differentiation. This finding does not strengthen the results of Smeth's research (2022), which shows that teachers find it challenging to apply differentiated learning into practice, so training is conducted for secondary education teachers to apply differentiated learning in the classroom.

Conclusion

The results of the study showed that: (1) there was a similarity in the teacher's perception of students' sensory learning styles in determining differentiated products; (2) there was relevance between teacher perceptions and implementation of students' sensory learning styles in determining differentiated products including videos, curves and graphs, posters, models, power points, and practicum results reports.

Recommendation

The study results showed that several factors contributed to teacher perceptions and their implementation in determining differentiated products. Therefore, researchers suggest several things: (1) For teachers, the lack of the teacher's ability to manage the class is one of the inhibiting factors in differentiation learning. Teachers should actively participate in continuous professional development activities through training; (2) For researchers, this research is limited to implementing product differentiation learning with science subject teacher respondents. For further researchers, they can conduct research on content differentiation learning by involving more respondents, namely driving teachers from different subject backgrounds. Future research is expected to provide a broader picture regarding teacher perceptions and their implementation in determining differentiated products and the factors that contribute to this.

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