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LITERATURE REVIEW: THE USE OF TECHNOLOGY IN DIFFERENTIATED INSTRUCTION ON PRODUCT AS LEARNING MEDIA

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Abstract
The purpose of this research is to look through journal articles to discover credible sources about the use of technology in differentiated instruction on products as learning media. Differentiated instruction learning is defined as learning that accommodates, serves, and recognizes students' variety in learning based on readiness, interests, and students' learning preferences. This research was written using the literature review process. The research process begins with the search for papers relating to the research topic. Criteria scientific publications utilized as data are gathered from national and international journals worldwide, with updates for the last five years, particularly from 2018 to 2023. The results of an examination of ten journal articles revealed that developing types of PTK research and literature reviews were more prevalent than other categories of research. The tools employed then tend to measure learning outcomes, learning styles, and students' interests, without venturing into other domains. There aren't many articles that expressly explain the use of technology in differentiated instruction on products as learning media.
Keywords:* *Differentiated instruction, Learning media, Technology

Introduction

Currently, education in Indonesia focuses on implementing an independent curriculum. This is one of the independent learning programs that is expected to help improve learning loss after the COVID-19 pandemic. The government is trying to launch the program which is then followed by national implementation at all school levels in Indonesia. The independent curriculum or we can call new paradigm learning is an educational standard that has begun to be applied to learning in schools today. The new paradigm focuses on education that favours learners, considering various characteristics of learners. This new paradigm of learning changes the learning approach that was previously teacher-centred to a student's centred approach. New paradigm learning ensures that learning practices are students centred (Ade Sintia Wulandari, 2022). The new paradigm of learning allows teachers to create lesson plans and evaluations that match the characteristics and needs of students.

With adequate infrastructure from the school, teachers can meet the needs of students. By conducting diagnostic assessments or profiling students, teachers can find out the various learning styles of students which are then applied to the differentiation learning process in the classroom. There are 3 kinds of differentiated learning, namely, differentiation of content, process, and product. Teachers need to pay attention to the condition of students with differentiated learning of contents, processes, products, and customized learning environments. Teachers can facilitate the learning process of students by using innovative learning models such as the PjBL learning model. Knowledge independently (self-directed) and peer-mediated (Peer Mediated Instruction) is what is possible for students to obtain with the use of innovative learning models (Isma, 2021).

Differentiated learning in product aspects is certainly appropriate if it is associated with the use of technology. Teachers can facilitate students by giving them the freedom to make products from the material that has been taught in accordance with learning objectives using the technology they have. The use of technology as a learning medium can change the material and activities in it to be more interesting which has a good impact on the learning process in the classroom (Aprima, 2021). When technology is used in everyday life, teachers must use it as a learning medium that can help students more easily access learning materials or

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assignments of learning activities. This can be done by giving learners the opportunity to use technology to learn, so that they can develop their skills and creativity.

The focus of the article compiled is literature review regarding product differentiation learning using technology as a learning media. Some researchers focus on the analysis and implementation of differentiated learning in a general context (Ade Sintia Wulandari, 2022; Astria et al., n.d.). As a result, this study focuses on product differentiated learning characteristics with the goal of examining the use of technology in differentiated instruction using a literature review method.

Method

This research utilized a literature review methodology to collect data from scientific journals focusing on the implementation of technology in differentiated instruction as a learning media in schools, aligned with the new paradigm of learning. Our research methodology is totally guided by Kitchenham and Charters' (2007) criteria for completing systematic literature review. The gathered data was thoroughly analysed and synthesized to identify key findings concerning the crucial role of differentiated instruction in enhancing students' learning experiences. Criteria scientific publications utilized as data are gathered from national and international journals worldwide, with updates for the last five years, particularly from 2018 to 2023. Using the search keywords such as “differentiated instruction”, “technology on differentiated instruction” and “technology in differentiated instruction on product”, the first stage of the search found 10 journal articles.

Findings and Discussions

Below is the outcome of the analysis conducted on the collected articles:

Table 1. An analysis of the ten articles.

No	Researcher	Journal/Year	Title	Findings
1	(Aprima, 2021)	Jurnal Pendidikan dan Riset Matematika Vol. 5 No. 2 (2023)	PENGEMBANGAN MEDIA PEMBELAJARAN MATEMATIKA BERDIFERENSIASI BERBASIS ANDROID	The ADDIE model is used for learning media development, and it has five stages: analysis, design, development, implementation, and evaluation, and it creates products in the form of android-based differentiated mathematics learning media. According to implementation results, because it is user-friendly, students are comfortable with the application.
2	(Ekaningtiass et al., 2023)	Journal on Education, Volume 06, No. 01, September-Desember 2023, hal. 841-847	Pengembangan Media Pembelajaran Berdiferensiasi Berbasis Teknologi pada Materi Teks Prosedur untuk Siswa Kelas VII SMP	The research method employed is the Research and Development (R&D) approach based on Borg and Gall, which consists of four levels of development. This development research only reaches the first level, namely the creation of product designs, and does not proceed to testing. The results revealed that the percentage of

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				validation results from media experts, material experts, and practitioner experts was in the valid category, with an average rating of 88.43%. Based on the study's findings, it is possible to infer that technology-based differentiated learning media is appropriate for use in procedural text material for class VII.
3	(Astria et al., n.d.)	Jurnal Penelitian Matematika dan Pendidikan Matematika Halaman 112 dari 119 Volume 6 Nomor 2, Tahun 2023	ANALISIS PEMBELAJARAN BERDIFERENSIASI UNTUK MENINGKATKAN KEMAMPUAN BERPIKIR KREATIF MATEMATIS	The study adopts a systematic literature review as its methodology. The findings of this research demonstrate a positive correlation between the implementation of differentiated learning and the improvement of students' mathematical creative thinking skills. As a consequence, educators are encouraged to integrate differentiated learning strategies into their teaching practices, with the expectation of fostering and enhancing students' mathematical creative thinking abilities.
4	(Ade Sintia Wulandari, 2022)	Jurnal Pendidikan MIPA Vol. 12, No. 3, September 2022	Literature Review: Pendekatan Berdiferensiasi Solusi Pembelajaran dalam Keberagaman	This article adopts a literature review methodology to investigate the concept of differentiated learning. Based on the findings of various reviewed sources, it can be deduced that differentiated learning refers to an educational approach that takes into account the diverse needs of students, tailoring instruction to align with their individual readiness levels, interests, and learning preferences. The analysis of 17 journal articles revealed a predominance of action research (PTK) and literature reviews concerning differentiated learning. However, the instruments employed in these studies primarily focused on measuring learning outcomes, learning

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				styles, and student interests, without extensively exploring other domains.
5	(Miqwati et al., 2023)	Jurnal Pendidikan Sekolah Dasar Vol. 1 No. 1 April (2023) Hal. 30-38	IMPLEMENTASI PEMBELAJARAN BERDIFERENSIASI UNTUK MENINGKATKAN HASIL BELAJAR ILMU PENGETAHUAN ALAM DI SEKOLAH DASAR	The method of Classroom Action Research was applied in the qualitative research methodology. Finally, it was discovered that using various learning approaches can enhance the average science score while also raising students' activeness in studying.
6	(Agus & Sedana, 2023)	Jurnal Pendidikan Ekonomi, Vol. 11, No. 1, 2023, pp. 131-142	Penerapan Model Pembelajaran Flipped Classroom dengan Integrasi Diferensiasi Produk untuk Meningkatkan Aktivitas dan Hasil Belajar Ekonomi Siswa Kelas XII IPS 1 SMA Negeri 2 Busungbiu	The research gathered data through methods such as observation, questionnaires, and tests to examine the impact of implementing the flipped classroom learning model, combined with product differentiation, on the economics topic study. The results of the study revealed a notable improvement in both learning activity and learning outcomes. Thus, it can be concluded that the integration of the flipped classroom approach with product differentiation can effectively enhance students' engagement and understanding in the subject of economics.
7	(Gibbs & McKay, 2021)	International Journal of Educational Research 109 (2021) 101799	Differentiated teaching practices of Australian mainstream classroom teachers: A systematic review and thematic analysis	The systematic literature review methodology was employed in this paper. The results of the review revealed that teachers demonstrated successful utilization of differentiated pedagogical practices within their regular mainstream classrooms.
8	(Putriana Naibaho, 2023)	Journal of Creative Student Research (JCSR) Vol.1, No.2 April 2023	Strategi Pembelajaran Berdiferensiasi Mampu Meningkatkan Pemahaman Belajar Peserta Didik	The article utilized the systematic literature review method. Through an analysis of five articles and observations conducted in a learning environment, it was found that differentiated learning has the potential to enhance students' understanding of the subject

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				matter. This conclusion is supported by the observations made during the learning process when employing differentiated learning strategies.
9	(Hassan et al., 2019)	Journal of Educational Sciences & Research Spring-2019, Volume 6, No.1, pp. 47-62	Teachers' Practices of Differentiated Instructions, Fair Interactions and Fair Assessment of Students in Sargodha	The study followed a quantitative and descriptive approach, gathering data through a self-developed questionnaire distributed among primary school teachers. The findings revealed that although teachers in primary schools implement differentiated instructions, the level of satisfaction with its application is relatively low. The study highlighted the necessity for teachers to acquire more knowledge and orientation regarding the significance and need for utilizing differentiated instructions in their classrooms. Additionally, the research uncovered that teachers tended to be less equitable in their assessment of students and did not fully engage with students in a fair manner during classroom interactions and within the school environment.
10	(Förster et al., 2018)	Learning and Instruction 56 (2018) 98–109	Short-and long-term effects of assessment-based differentiated reading instruction in general education on reading fluency and reading comprehension	The study took place in German elementary school classrooms and aimed to examine the outcomes of integrating learning progress assessment (LPA) as an educational tool. The research investigated both short- and long-term effects of this approach. Interestingly, students with lower reading skills demonstrated greater improvements from the treatment. However, no significant effects on reading comprehension were observed. The study's outcomes are discussed in the context of teachers' utilization of data to

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	implement differentiated instruction strategies.

Table 2. The three most relevant articles.

Researcher	The technology used
(Aprima, 2021)	Android-based differentiated mathematics learning media application.
(Ekaningtiass et al., 2023)	Learning videos that contain pictures, sounds, and audiovisuals.
(Agus & Sedana, 2023)	Implementing the flipped classroom learning model, combined with product differentiation, on the economics topic study, learning material presented in pdf form and learning videos.

The analysis of 10 articles on differentiated instruction revealed a predominant focus on examining the impact of this instructional approach on both teaching and learning practices within the classroom. These articles employed various research methods, including literature reviews, classroom action research (CAR), participatory action research (PTK), and quantitative research. The collective findings shed light on the effectiveness and implications of differentiated instruction as an instructional method for enhancing the teaching and learning process.

Most of the instruments used in the articles that being analyzed were students score from test before and after using the differentiated instruction approach or you can call it learning outcomes (Ade Sintia Wulandari, 2022; Agus & Sedana, 2023; Miqwati et al., 2023), observation (Agus & Sedana, 2023; Putriana Naibaho, 2023), and questionnaires (Agus & Sedana, 2023; Hassan et al., 2019). Based on the information provided, it appears that the implementation of differentiated instruction has been found to have a significant positive impact on students' abilities, fitting the teaching approach to match their specific needs. This approach acknowledges the diverse learning styles, strengths, and weaknesses of students, and it aims to provide individualized support and challenges accordingly. As a result, students are more likely to experience improvement in their academic performance and overall learning outcomes. As explained by Afida (2022), students have diversity in terms of abilities, talents, interests, and background socio-cultural background. Therefore, a different learning strategy is needed to meet Students' learning needs.

Upon analyzing 10 articles, it was discovered that only three of them are highly relevant to the research, as they either share the same title or align with the aim of the study. The findings of the three most relevant articles do not effectively clarify how technology is utilized to implement differentiated instruction and generate diverse products based on students' learning styles. The articles explained about how to develop their own technology to use as learning media or the tools to assist the differentiated instruction learning, and the use of technology as learning media to conduct differentiated instruction in the teaching and learning process, not necessarily about produce differentiated product based on students learning styles and interests.

In order to provide the students' learning profiles, the instructor is expected to adjust the classroom instructions, thereby maximizing the learning potential of the students (Hassan et al., 2019). Teachers play a crucial role in implementing differentiated instruction to fully maximize students' potential. They should have their own approach to making differentiated instruction effective, ensuring it provides the diverse needs and abilities of each students, thus optimizing their learning experience to the fullest. Afida (2022) also stated that teachers should have the

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ability to individually observe and analyse students' capabilities, interests, and needs. This empowers them to design appropriate learning strategies fitted to each students' learning needs.

Technology serves as one of valuable tools in harnessing students' abilities and creativity. By utilizing technology, students can channel their creativity to bring their ideas to life and transform them into tangible and practical products. It empowers them to explore, experiment, and innovate, unlocking their full creative potential and fostering a deeper understanding of various subjects. Indeed, it is crucial for teachers to integrate technology effectively while implementing differentiated instruction in the teaching and learning process. By doing so, they can address the diverse needs of their students more efficiently and create a more personalized learning experience. Utilizing technology in the learning process can support both independent curriculum learning and differentiation, contributing to an enhanced quality of education (Aprima, 2021). Through thoughtful integration of technology, teachers can enhance the learning environment, promote active participation, and foster a deeper understanding of the subject matter for all students.

Conclusion

In conclusion, the analysis of 3 out of 10 articles indicates that differentiated instruction, supported by technology, positively impacts students' abilities and learning outcomes. Integrating technology thoughtfully enhances the personalized learning experience, fostering creativity and maximizing students' potential. Teachers play a crucial role in implementing differentiated instruction, fitting strategies to meet individual needs and ensuring a high-quality education. However, only a small number of articles specifically discuss how technology is used as learning media in differentiated instruction for products.

The limited number of articles found in this research regarding the integration of technology with product-based differentiated instruction suggests a need for further research in this area. As a result, future studies may explore this topic in greater depth to understand its implications and potential benefits more comprehensively.

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