Literature Review: Differentiated E-Worksheets to Boost Primary School Learning Outcomes Between 2020-2025

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Abstract: This article was written to present a literature review on the effectiveness of using differentiation-based E-worksheets in improving the learning outcomes of elementary school students. The method used is Systematic Literature Review (SLR), with a literature review approach to 17 articles and one proceeding indexed by Google Scholar and published between 2020 and 2025. Data were obtained using Harzing's *Publish or Perish* application. The differentiation-based E-worksheets were developed to adapt learning to students' readiness, interests, and learning styles, and to promote inclusive and adaptive learning. The study results show that consistently using this media can increase student motivation, engagement, and academic achievement. E-worksheets allow teachers to design flexible and contextualized learning materials while supporting various visual, auditory, and kinesthetic learning styles. In addition, this approach also fosters independent, collaborative, and problem-solving-based learning. The findings confirm that differentiation-based E-worksheets are an effective and relevant learning tool in the digital era. The implication is that this media needs to be continuously developed as an innovative solution to the limitations of conventional teaching methods and to better support students' learning needs.

Abstrak Artikel ini ditulis dengan tujuan untuk menyajikan tinjauan literatur mengenai efektivitas penggunaan Electronik Lembar Kerja Peserta Didik berbasis diferensiasi dalam meningkatkan hasil belajar siswa sekolah dasar. Metode yang digunakan adalah *Systematic Literature Review* (SLR), dengan pendekatan literature review terhadap 17 Artikel dan 1 prosding yang terindeks Google Scholar dan diterbitkan antara tahun 2020 hingga 2025. Data diperoleh menggunakan bantuan aplikasi *Harzing's Publish or Perish*. E-LKPD berbasis diferensiasi dikembangkan untuk menyesuaikan pembelajaran dengan kesiapan, minat, dan gaya belajar siswa, serta mendorong terciptanya pembelajaran yang inklusif dan adaptif. Hasil kajian menunjukkan bahwa penggunaan media ini secara konsisten dapat meningkatkan motivasi, keterlibatan, dan capaian belajar siswa. E-LKPD memungkinkan guru menyusun materi yang fleksibel dan kontekstual, serta mendukung berbagai gaya belajar—visual, auditori, dan kinestetik. Selain itu, pendekatan ini juga mendorong pembelajaran mandiri, kolaboratif, serta berbasis pemecahan masalah. Temuan ini menegaskan bahwa E-LKPD berbasis diferensiasi merupakan media pembelajaran yang efektif dan relevan di era digital. Implikasinya, media ini perlu terus dikembangkan untuk menjawab tantangan pembelajaran konvensional dan mendukung kebutuhan individual peserta didik.

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A. Introduction

Learning at the primary school level is an important foundation in building students' literacy, numeracy, and critical thinking skills. One of the essential competencies that students must master is the ability to understand and interpret various types of information and teaching materials, both in the form of text, numbers, and symbols. Pertiwi & Rokhmaniyah (2024) explained that, in practice, the learning process in the classroom is still often one-way, uniform, and pays little attention to students' individual learning needs. When students face complex material, many experience difficulties in understanding the content, structure, and meaning. This is generally due to learning approaches that are not yet relevant, less contextualized, and not fully adapted to the characteristics and background of students. The reality in the field shows that teachers face students with different levels of learning readiness, interests, and learning styles in one class. Some students quickly grasp the material, while others need more time and different approaches to understand the same concept. Learning that generalizes to all students can leave some learners behind or unmotivated. Therefore, it is necessary to have an approach that is responsive to the different characteristics of learners, one of which is through differentiated learning. Ningsih (2024) stated that differentiated learning is a teaching method that accommodates student diversity by adjusting learning content, processes, and products based on their readiness, interests, and characteristics during learning activities. This approach aims to create an equal but not the same learning experience, where each student has fair access to achieve learning objectives according to their abilities. Thus, learning is no longer teacher-centered, but moves to student-centered learning.

Basic education plays an important role in shaping the foundation of students' knowledge and character. Sofiah & Hikmawati (2023) stated that the lecture model is still often used as the main approach in learning at the elementary school level. Although this method has become a standard part of educational practice, the one-way approach is considered less effective in accommodating the diversity of students' learning styles. Several studies have shown that using uniform and unvaried methods tends to reduce students' learning motivation and make it difficult for them to understand the material, especially if it is complex. Understanding and analyzing various types of information is an important aspect in training critical thinking and improving the quality of students' literacy. The mismatch between learning methods and student characteristics is one factor that hinders the optimal achievement of learning objectives. Therefore, a learning strategy that is more flexible, contextual, and responsive to individual learning needs is needed. Sanulita (2023) argues that a solution to overcome challenges in learning. Differentiated learning approaches are designed to tailor learning content, processes, and products to each student's unique needs, interests, and characteristics. It aims to provide an equitable and relevant learning experience, where each student can access materials according to their readiness and ability, to achieve learning objectives most effectively.

Teachers must also integrate technology into the learning process in the digital era. One of the developing and relevant media used is the E-worksheet. E-worksheets are

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digitally based worksheets accessed through various devices such as laptops, tablets, and smartphones. E-worksheets' advantages lie in their flexibility, interactivity, and ability to present materials and exercises tailored to students' needs. Anggraeni et al (2024) explained that E-worksheets provide flexibility in delivering materials tailored to students' level of understanding and offer advantages in terms of accessibility and interactivity, which can increase students' motivation and engagement in learning. Combining the differentiation approach with E-worksheet media can effectively enhance student motivation and involvement in the learning process. With differentiation-based E-worksheets, teachers can develop varied content and activities according to students' learning needs, allowing for customization regarding question complexity, activity types, and how students demonstrate their understanding of the material. In line with this, Azizah et al (2024) research shows that differentiation-based E-worksheets effectively improve learning outcomes and student independence because the material is delivered by considering variations in students' abilities and interests.

Technology-based learning media are also inevitable in today's digital era. One form of media that is considered adequate is the Electronic Learner Worksheet, which allows interactive presentation of learning materials and activities. Sellier & An (2020) It is argued that this media supports both distance and face-to-face learning and has proven to increase students' independence and participation in learning. E-worksheets developed with a differentiated approach can be an innovative solution to overcome limitations in conventional learning. Kandukoori et al (2024) said that using differentiation-based E-Worksheets in mathematics learning can improve learning outcomes and active student involvement. Johler & Krumsvik (2024) argues that E-worksheets are based on students' learning needs, helping them more easily understand complex material. However, to date, few studies have specifically analyzed the effectiveness of differentiation-based E-worksheets in Indonesian language learning at the primary school level. The differentiation approach holds great potential for improving the quality of learning by adapting the learning process to students' individual needs.

This study analyzes the use of differentiation-based E-worksheets in Indonesian language learning in elementary schools. Its benefit is to review the effectiveness of E-worksheets in supporting learning processes that are responsive to differences in student readiness, interests, and learning profiles, thereby creating more meaningful and inclusive learning.

B. Method

This writing uses the Systematic Literature Review (SLR) method. According to Lean, this method aims to collect, review, and analyze various previous research findings relevant to the topic of using differentiation-based E-Worksheets to improve student learning outcomes in elementary schools from 2020–2025. This approach seeks to review the latest developments in this field comprehensively. The article draws from various sources, including scientific journals, research reports, and conference proceedings published

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between 2019 and 2024. These sources were gathered through Google Scholar and Harzing's Publish or Perish (PoP). The data collection began with keyword searches such as "E-Worksheets Based on Differentiation in Learning Outcomes."

This search resulted in 161 pieces of literature related to the research topic. Of these, 80 articles were further analyzed based on the relevance of their titles and abstracts, narrowing the selection to 25 suitable articles. After a more detailed examination of their relevance to the topic, 18 articles met the final criteria. These selected articles were analyzed in depth to identify main themes, conclusions, and implications.

For qualitative research such as classroom action research, ethnography, phenomenology, case studies, and others, it is necessary to add the presence of researchers, research subjects, informants who help along with ways to explore research data, location and length of research and a description of the checking the validity of the research results. For more details, the research flow can be seen in Figure 1.

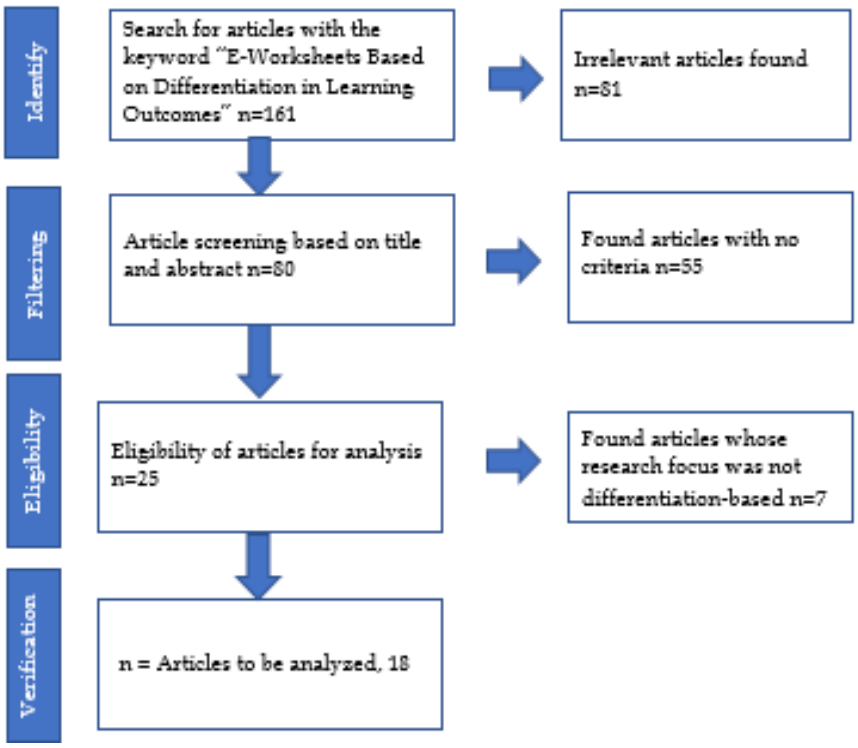

Figure 1. Research Flow

The results of the literature review can provide a comprehensive picture of Differentiated E-Worksheets to Boost Primary School Learning Outcomes, which adapt learning to students' readiness, interests, and learning styles, and encourage the creation of inclusive and adaptive learning to improve learning.

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C. Result and Discussion

Result

Data Analysis

Based on the search for research articles on Differentiated E-Worksheets to Boost Primary School Learning Outcomes in the range of 2020-2025, 17 articles and one proceedings were found. The articles and proceedings were published in journals indexed by Google Scholar. Figure 2 shows that the research trend on Differentiated E-Worksheets to Boost Primary School Learning Outcomes grows in its interactive media every year. From the 18 articles read, we can see the publication of articles on E-worksheet media between 2020 and 2025. In Figure 2

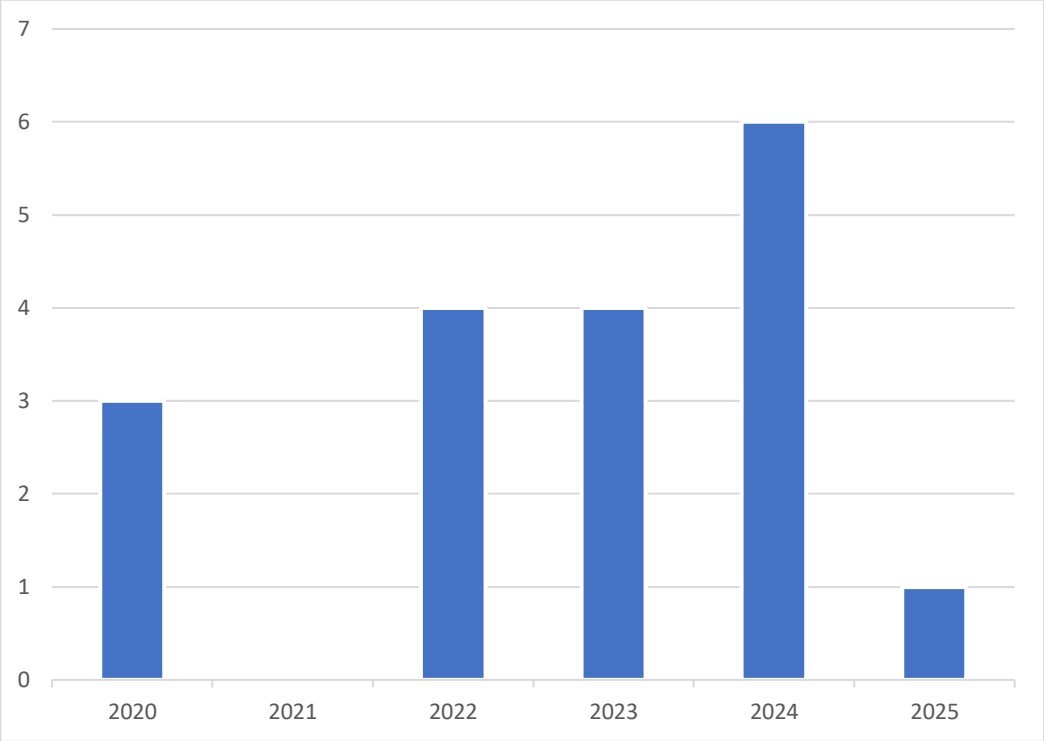

Figure 2. Graph of Research on Differentiated E-Worksheets to Boost Primary School Learning Outcomes

Literature Review Results

Based on the findings from the review of 18 articles, it was found that E-workshops with a differentiated learning approach are effective in improving the learning outcomes of elementary school students. The findings show that students better understand learning with flexible and contextualized materials, as we support earning styles—visual, auditory, and kinesthetic. In addition, this approach also encourages independent, collaborative, and problem-solving-based learning. This finding confirms that differentiation-based E-LKPD is a practical and relevant learning medium in the digital era.

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Table 1. Data Analysis Matrix of Articles Used in the Literature Review

Author, Title, Journal	Method	Result
Heindl, M. (2020). Inquiry-Based Learning and its Possibilities for Primary Schools with Fewer Digital Resources – A Qualitative Study. *Pedagogical Research, 3*(3), 1–8.	Mix Methods	Research comparing digital and analog groups shows that digital groups are more independent, active, and collaborative, even with technological limitations, producing more effective solutions. Differentiation was seen in the flexibility of roles and approaches according to learning styles, proving the effectiveness of the digital inquiry approach.
Abdullah, A. H., Mun, S. H., Mokhtar, M., Ashari, Z. M., Jumaat, N. F., Ali, D. F., Samah, N. A., & Abdurrahman, M. S. (2020). Using Active Learning with Smart Board to Enhance Primary School Students' Higher Order Thinking Skills in Data Handling. Universal *Journal of Educational Research, 8*(10), 4421-4432.	Research and Development	Online media facilitates active learning through interactive activities such as discussions, presentations, and digital exploration, which increases student motivation, engagement, and understanding. Technology also supports differentiation of learning styles and flexible interaction, creating a participatory and enjoyable learning environment.
Stanford, P., Crowe, M. W., & Flice, H. (2010). Differentiating with Technology. *Teaching Exceptional Children Plus*, *6*(4), n4.	Kualitatif	Technologies such as blogs, podcasts, e-portfolios, PowerPoints, and educational websites support differentiated learning by customizing materials and methods according to students' needs, increasing learning engagement and independence, and making it easier for teachers without increasing workload.
Saputra, I. A., & Kurnianti, E. M. (2022). Pengembangan Lembar Kerja Peserta Didik Elektronik Berbasis Literasi Sains Pada Pembelajaran IPA Kelas V SDN Grogol 05 Pagi. *Innovative: Journal Of Social Science Research*, *2*(1), 637-645.	Research and Development	The results show that the media is feasible and effective in increasing understanding and motivation to learn. Differentiation is applied through interactive multimedia (images, video, audio) tailored to student characteristics, making learning more interesting, accessible, and relevant to 21st-century needs.
Fitriya, Y., & Kurniawan, H. L. (2022). Integrasi Model Polya dalam LKPD Interaktif Menggunakan Liveworksheets untuk Meningkatkan Kemampuan Eksplorasi Ide Siswa Sekolah Dasar dalam Penyelesaian Soal Cerita Matematika. In *Prosiding Seminar Nasional Matematika Dan Pendidikan Matematika*, *7*, 73-79.	Research and Development	Interactive e-worksheets based on live worksheets with Polya's steps are proven to increase students' exploration of ideas in mathematical story problems, especially in accuracy, creativity, and idea representation. These e-worksheets apply process and product differentiation, giving freedom in solving and representation. As a result, 60% of students were more enthusiastic and confident, showed increased ability, and were considered feasible and effective by experts.

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Author, Title, Journal	Method	Result
Johler, M., & Krumsvik, R. J. (2024). Increasing Inclusion Through Differentiated Instruction in A Technology-Rich Primary School Classroom in Norway. *Education 3-13*, *52*(8), 1207-1221.	Mix Methods	The results show that teachers in Norway utilize digital technologies such as adaptive apps, multimodalities, and one-on-one devices to implement differentiated learning. Technology enables customization of content, processes, and products to student needs, with varied tasks, diverse media, and the freedom to display results. This approach increases participation and reduces exclusion in diverse classrooms.
Oikarinen, R. M., Oikarinen, J. K., Havu-Nuutinen, S., & Pöntinen, S. (2022). Students' Collaboration in Technology-Enhanced Reciprocal Peer Tutoring as an Approach Towards Learning Mathematics. *Education and Information Technologies, 27*(6), 7519–7548.	Research and Development	Research in Finland shows that implementing technology-based Reciprocal Peer Tutoring encourages mathematical discussion, critical thinking, and utilization of digital tools such as GeoGebra. The tutored student's role is prominent in providing support and feedback. Differentiation is seen in the freedom to choose learning tools and strategies, creating a collaborative, adaptive, and inclusive environment.
Astuti, R., Prayito, M., & Qibtiyah, Q. (2023). Upaya Peningkatan Hasil Belajar Siswa Kelas II SD 2 Mijen Melalui Pembelajaran Berdiferensiasi dengan Model Problem Based Learning. *Jurnal Pendidikan Guru Profesional, 1*(1), 73–83.	Classroom Action Research	Implementing differentiated learning assisted by e-worksheet media in the Problem-Based Learning model improved student learning outcomes, from 73% classical completeness in cycle I to 93% in cycle II. The e-worksheet media supports differentiation of process, content, and product according to students' needs, making them more active, collaborative, think critically, and achieve meaningful learning.
Friska, S. Y., Nanda, D. W., & Oktaria, I. (2023). Pengembangan E-Lk Matematika Materi Luas Berbantukan Aplikasi Live Worksheets Kelas Iv Sekolah Dasar Berorientasi Merdeka Belajar. *Jurnal IKA PGSD (Ikatan Alumni PGSD) UNARS*, *13*(1), 13-24.	Research and Development	The development results show that this e-worksheet is valid, practical, and effective in improving learning outcomes, with student learning completeness reaching more than 90%. In addition, the use of these e-worksheets also supports differentiated learning, as it allows students to learn at their own pace and learning style through interactive tasks that are interesting and easily accessible.
Ghaisani, N. R. T., & Setyasto, N. (2023). Development of Liveworksheets-Based Electronic Student Worksheets (E-LKPD) to Improve Science Learning Outcomes. Jurnal Penelitian Pendidikan IPA, 9(8), 6147–6156	Research and Development	This research shows that Liveworksheets-based e-worksheets are valid, practical, and effective. They increased student learning outcomes from 58 to 84 and had an N-Gain of 0.62. The use of multimedia such as text, images, audio, and video allows differentiation according to students' learning styles, increasing their engagement and understanding in science learning.
Rofi'ah, S. N. H., Saputra, H. J., & Sofiati, R. N. (2025). Penerapan Pembelajaran	Kuantitatif	The results showed a significant increase in learning outcomes, from an average score of 65 to 88.21 after treatment. The N-Gain test showed

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Author, Title, Journal	Method	Result
Diferensiasi untuk Meningkatkan Hasil Belajar Peserta Didik Kelas III SD Supriyadi 02 Semarang. *Jurnal Pendidikan Tambusai*, *9*(1), 146–152.		a moderate increase. In its implementation, differentiated learning is supported by using media such as e-worksheets based on student needs, so that the material is more accessible, according to learning styles. It helps students learn more actively and independently. This strategy is proven to make learning more interesting, increase motivation, and improve student learning outcomes.
Anggrayni, M., Darniyanti, Y., & Amal, I. (2024). Pengembangan Elektronik Lembar Kerja Peserta Didik (E-LKPD) Mata Pelajaran IPAS di Kelas IV SDN 07 Sitiung. *Innovative: Journal of Social Science Research*, *4*(3), 17302-17324.	Research and Development	This research successfully developed e-worksheets that are valid, practical, and effective. The validation results by experts showed valid and very valid categories. Next, the practicality results from teachers and students showed convenient categories. The effectiveness test conducted in two schools showed that the e-worksheets improved student learning outcomes in the photosynthesis material. The e-worksheets developed are adapted to students' learning styles (visual, audio, kinesthetic) and are interesting and easy to use, thus encouraging interest in learning and understanding the material.
Kadek Aprilia Sri Wulandari, & Putu Ari Dharmayanti. (2024). E-LKPD Berbasis Model OPPEMEI Untuk Meningkatkan Hasil Belajar IPAS Kelas IV. *Journal of Education Action Research*, *8*(2), 198–208.	Research and Development	The results showed that OPPEMEI-based e-worksheets are highly valid, practical, and moderately effective. Expert validation and student trials proved their practicality and effectiveness in improving learning outcomes. These e-worksheets help students understand IPAS material better and make learning more interesting and meaningful.
Kumalasari, I. D., Setiawan, A., Al-Masjid, A., & Khosiyono, B. H. C. (2024). Pengaruh E-LKPD Berbasis Model Problem Based Learning (PBL) terhadap Hasil Belajar Pembelajaran IPAS Kelas IV Sekolah Dasar. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, *9*(3), 31-42.	Kuantitatif	Applying these e-worksheets successfully improved student learning outcomes, with the average score rising from 56 to 84. These e-worksheets integrate process and content differentiation, allowing students to solve real problems through multimedia investigation activities. The freedom to explore digital resources according to their learning styles makes learning more interactive, increasing learners' engagement, motivation, and critical thinking skills.
Ningsih, F. D., & Al Masjid, A. (2024, August). Penggunaan E-LKPD Literasi Membaca Berbasis Diferensiasi untuk Meningkatkan Hasil Belajar Kelas VI Siswa Sekolah Dasar. In *Prosiding Seminar*	Research and Development	Differentiation-based E-Worksheet is proven effective in improving grade VI students' reading literacy learning outcomes at SD N Cangkringan 1. Learning tailored to students' abilities (low, medium, high) makes students more active and enthusiastic. Learning outcomes improved significantly from cycle to cycle, indicating that this approach successfully

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Author, Title, Journal	Method	Result
Nasional Pendidikan Dasar, 2, 166-17.		met diverse learning needs. E-Worksheet helps students understand the material more deeply and supports active and independent learning.
Susilawati, W. O., Marlianda, R., & Rizkia, D. P. (2024). Pengembangan Elektronik Lembar Kerja Peserta Didik (e-LK) Berbantu Liveworksheets pada Pembelajaran Pendidikan Pancasila Kelas V di Sekolah Dasar. *Innovative: Journal Of Social Science Research*, *4*(3), 14686-14699.	Research and Development	This study developed e-worksheets for learning Pancasila Education in grade V SD with the 4-D model. Five experts' validation results show that these e-worksheets are very valid, practical, and effective. Differentiation is applied through multimedia-based interactive questions tailored to students' learning styles, thus increasing enthusiasm and learning outcomes.
Pertiwi, M., & Rokhmaniyah, R. (2024). Peningkatan Minat Belajar Peserta Didik melalui Penggunaan LKPD Berbasis Liveworksheet di Sekolah Dasar Kelas IV. In *Social, Humanities, and Educational Studies (SHES): Conference Series, 7*(3), 1059-1065.	Mix Methods	The results showed that using Liveworksheet as LKPD positively affects the learning interest of fourth-grade students, with an average percentage of learning interest of 72.83%. Interviews also revealed great interest from learners and teachers in using this media. This finding can guide educators to choose learning media to increase students' interest in learning.
Hardiansyah, H., Asmawi, U. S., Kamil, N., Miftakhuddin, M., & Darmansyah, A. (2025). *Jurnal Pendidikan dan Sains Pengembangan Interaktif Untuk Pembelajaran Berdiferensiasi*. *3*(2), 49–54.	Research and Development	The research shows that interactive E-Worksheets based on Liveworksheet effectively support differentiated learning in grade IV SD, especially in science subjects. This media improves learning outcomes, with the average student score rising from 64.07 to 80.56. Differentiation is reflected in the flexibility of using E-Worksheets, which allows students to learn according to their individual needs and pace. Student responses to the clarity of the material, ease of use, and design of the E-Worksheets were also very positive, above 89%.

Analysis of Differentiation-Based E-Worksheet Development

Based on 17 articles and one proceeding research on differentiation-based E-LKPD in improving elementary school learning outcomes. It has been analyzed that the kinds of differentiated learning are carried out by adjusting the needs of students. This is done to make student learning more organized and efficient in improving learning outcomes. As for which is presented with a pie chart, it can be seen in Figure 3.

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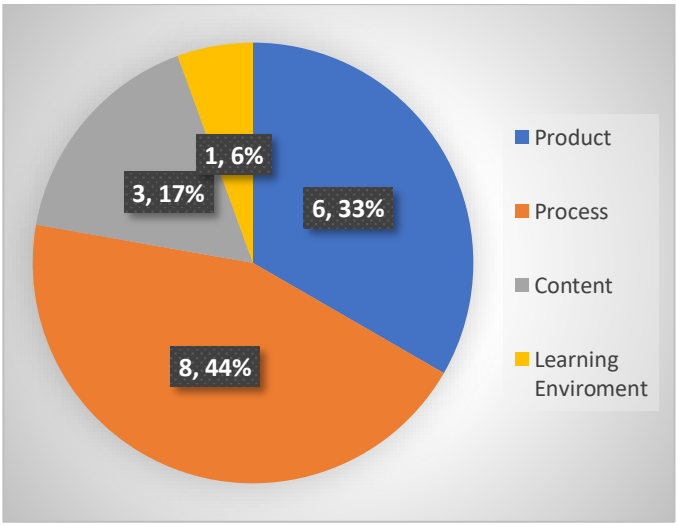

Figure 3. Pie Chart of the Types of Differentiated Learning

Analysis of Applications or Platforms used in Differentiation-based E-LKPD Development

Table 2. Digital Tools and Platforms Utilized in Educational Studies

Author	Applications or Platforms
Stanford, P., Crowe, M. W., & Flice, H. (2010)	Blogs, podcasts, e-portfolios, PowerPoints, and educational websites
Fitriya, Y., & Kurniawan, H. L. (2022)	liveworksheets
Oikarinen, R. M., Oikarinen, J. K., Havu-Nuutinen, S., & Pöntinen, S. (2022)	GeoGebra
Ghaisani, N. R. T., & Setyasto, N. (2023)	Liveworksheets
Hardiansyah, H., Asmawi, U. S., Kamil, N., Miftakhuddin, M., & Darmansyah, A. (2025)	Liveworksheets
Susilawati, W. O., Marlianda, R., & Rizkia, D. P. (2024)	Augmented Reality

Of the 17 articles and one proceedings analyzed, 12 studies of differentiation-based e-worksheets in improving learning outcomes in elementary schools did not detail the applications used. The applications in this e-worksheets research are adjusted to the needs of students and are easily accessible to produce good and quality products. Differentiation-based e-worksheets make it easy for learners to work on them according to their characteristics, and can be used anytime and anywhere. For example, PowerPoint-based e-worksheets only need to be downloaded once to be accessed offline, while other types simply go through the link without downloading. The use of differentiation-based e-worksheets has also proven to impact classroom learning positively. The differentiation approach allows learners to learn according to their learning styles, interests, and needs. Differentiation-based e-worksheets are attractively designed with many illustrations,

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learning videos, cultural content close to students' lives, and communicative and simple presentations on computers and mobile phones.

Discussion

Technology-based differentiated learning increasingly shows its potential in improving primary school students' learning outcomes. As explained by Ningsih (2024), differentiation is a teaching method structured to accommodate the diversity of student characteristics in terms of their readiness, interests, and learning profiles, thus creating an equal but not uniform learning experience. This approach brings learning from teacher-centered to student-centered, which aligns with the needs of 21st-century education. In line with this concept, various studies have shown that technology integration through e-worksheets based on live worksheets is one of the effective strategies in implementing process, content, and product differentiation. Heindl (2020) and Abdullah et al (2020) emphasized that using digital tools and online media, even under limited resources, can increase students' independence, engagement, and understanding through collaborative and explorative activities. This shows that the flexibility of digital-based learning can meet the needs of students with various learning styles.

Research by Stanford et al (2020) reinforces this, showing how the use of digital platforms such as blogs, e-portfolios, and podcasts can facilitate differentiation strategies, allowing students to access materials in ways that suit their preferences. Saputra & Kurnianti (2022) implemented this by developing science literacy-based e-worksheets incorporating interactive multimedia to match students' visual, auditory, and audiovisual characteristics.

In the realm of mathematics learning, Fitriya & Kurniawan (2022) proved that e-worksheets based on live worksheets with the integration of Polya's steps can encourage students' exploration of ideas and strengthen accuracy and creativity. Johler & Krumsvik (2024) even added that the use of adaptive technology not only increases participation but also creates a more inclusive learning environment.

The digitally based Reciprocal Peer Tutoring model developed by Oikarinen et al (2022) further confirms that 21st-century skills such as critical thinking and collaboration can be optimally developed through learning technology. Research by Astuti et al (2023), Friska et al (2023), and Ghaisani & Setyasto (2023) shows the consistency of the effectiveness of e-worksheet media in increasing student engagement, motivation, and learning outcomes.

Rofi'ah et al (2025) and Anggrayni et al (2024) confirmed that the application of differentiation assisted by e-worksheet significantly impacts the average student score, showing that the use of digital-based media can bridge the ability gap in diverse classes. Several other studies, such as Kumalasari et al (2024) and Susilawati et al (2024), underline the importance of e-worksheets design that is adaptive to student learning styles, as well as integrating the Problem-Based Learning (PBL) approach to strengthen critical thinking

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skills. This aligns with the opinion of Pertiwi & Rokhmaniyah (2024), who stated that live-worksheet media can significantly increase students' interest in learning.

These research results show that e-worksheets based on Liveworksheets play an important role in realizing differentiated learning that is adaptive and effective, and can increase student motivation, participation, and learning outcomes at the basic education level. Technology support in differentiation not only expands access to learning but also ensures that every student can learn in the best way according to their potential.

D. Conclusion

Based on the results of a literature review of various studies between 2020 and 2025, it can be concluded that the use of differentiation-based e-worksheets significantly contributes to improving primary school students' learning outcomes. E-worksheets designed according to students' learning needs-in terms of readiness level, learning style, and interests-can create a more personalised, relevant, and meaningful learning experience. This approach allows students to learn at a pace and in a way that suits their characteristics, thus positively affecting their academic engagement and achievement.

The implications of the results of this study indicate that the successful implementation of differentiated e-worksheets is not only determined by the quality of the digital content used, but also highly dependent on the competence of teachers in understanding the principles of differentiation and mastering educational technology. Therefore, support is needed from various parties, especially educational institutions and policymakers, in the form of teacher training, provision of ICT infrastructure in schools, and a curriculum that is adaptive to diverse learning needs. Differentiated e-worksheets can be a learning strategy that bridges the gap in students' abilities and creates more inclusive and equitable learning.

For future development, it is suggested that future research not only focus on improving cognitive learning outcomes but also explore the effect of differentiated e-worksheets on non-cognitive aspects, such as learning motivation, learning independence, and 21st-century skills. In addition, experimental or quasi-experimental research needs to be conducted to obtain stronger quantitative data on the effectiveness of this strategy. Future research can also be directed at developing specific subject-based differentiated e-worksheet models or devices that suit the needs of primary school students.

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