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Curriculum principles in ICT subjects at Al-Hidayah Primary School

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ABSTRACT

The development of digital technology requires primary education to implement a curriculum that equips students with relevant ICT skills. In this context, this study aims to examine the application of curriculum development principles in the Information and Communication Technology (ICT) subject at Al-Hidayah Primary School, focusing on the principles of relevance, flexibility, continuity, efficiency, and effectiveness. A qualitative approach was used, with data collected through semi-structured interviews conducted online via video calls and direct observation. The results show that the Kurikulum Merdeka implemented in the 2024-2025 academic year includes relevant content, such as digital ethics and social media. Teachers demonstrated adaptive capabilities in designing flexible, continuous learning across grade levels, particularly in grades 4-6. Although there remain limitations in computer equipment, the learning strategies were considered reasonably efficient and effective. These findings emphasize that the success of curriculum implementation largely depends on teachers' ability to translate curriculum principles into practices that are appropriate to the school context. Therefore, teacher training and support are essential to ensure the sustainability of ICT learning.

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ABSTRAK

Perkembangan teknologi digital menuntut pendidikan dasar untuk menghadirkan kurikulum yang mampu membekali murid dengan keterampilan TIK yang relevan. Dalam konteks ini, penelitian ini bertujuan mengkaji penerapan prinsip-prinsip pengembangan kurikulum dalam mata pelajaran Teknologi Informasi dan Komunikasi (TIK) di Sekolah Dasar Al-Hidayah, dengan fokus pada prinsip relevansi, fleksibilitas, kontinuitas, efisiensi, dan efektivitas. Pendekatan kualitatif digunakan dengan pengumpulan data melalui wawancara semi-terstruktur yang dilakukan secara daring melalui video call serta observasi langsung. Hasil penelitian menunjukkan bahwa Kurikulum Merdeka yang diterapkan pada tahun ajaran 2024-2025 telah memuat materi yang relevan, seperti etika digital dan media sosial. Guru menunjukkan kemampuan adaptif dalam menyusun pembelajaran yang fleksibel dan berkesinambungan antar jenjang, terutama di kelas 4 hingga 6. Meskipun masih terdapat keterbatasan perangkat komputer, strategi pembelajaran dinilai cukup efisien dan efektif. Temuan ini menekankan bahwa keberhasilan implementasi kurikulum sangat bergantung pada kemampuan guru dalam menerjemahkan prinsip-prinsip kurikulum ke dalam praktik yang sesuai dengan konteks sekolah. Oleh karena itu, pelatihan dan dukungan terhadap guru menjadi hal penting untuk menjamin keberlanjutan pembelajaran TIK.

Kata Kunci: *adaptasi teknologi; kurikulum merdeka; kurikulum TIK; prinsip-prinsip kurikulum*

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INTRODUCTION

The rapid development of Information and Communication Technology (ICT) has brought about significant changes in various aspects of life, including the education system. In the global context of the Society 5.0 era, technology is no longer seen merely as a tool but has become an integral part of everyday human life. Consequently, the educational paradigm has also changed, with ICT mastery becoming a fundamental competency that students must master from an early age. At the elementary school level, a systematic introduction to ICT is necessary so that students cannot only operate digital devices but also understand the ethics of their use and utilize them productively in learning activities (Nirmala *et al.,* 2024; Taufik *et al.*, 2024).

The Independent Curriculum, implemented in 2022, responds to the need for contextual and adaptive learning. This curriculum provides teachers with flexibility to design learning tailored to students' characteristics and needs, emphasizing differentiated learning and character building through the Pancasila Student Profile Strengthening Project. This flexibility is crucial in ICT learning, where materials must be continuously updated to keep pace with technological developments (Nasution *et al.*, 2023; Taufik *et al.,* 2024). However, implementing ICT learning at the elementary school level still faces challenges, particularly in terms of human resources and infrastructure. Many teachers lack adequate competency in mastering ICT-based media. Furthermore, limited facilities such as computers, internet access, and other supporting infrastructure are significant obstacles to optimizing ICT learning (Amalia *et al.,* 2022).

This research examines Al-Hidayah Elementary School, which has implemented the Independent Curriculum and strives to integrate ICT into its learning process. Based on observations and interviews, this school has implemented ICT curriculum development principles such as relevance by making social media ethics issues a contextual learning material and flexibility, where teachers have almost 70% freedom in developing materials that follow the latest technological developments. Furthermore, there is continuity in material between grades 4 and 6, indicating continuity in curriculum planning.

However, Al-Hidayah Elementary School also faces several challenges, including minimal computer facilities. Two students often use a single computer in turn, which can affect the effectiveness of the learning process. Although the allocation of ICT learning time is appropriate, namely two hours of lessons per week (one lesson hour = 30 minutes), these limited facilities remain a barrier. Therefore, teachers' strategies for managing the classroom and for using a simple project-based learning approach are key to overcoming these limitations.

Against this backdrop, this study aims to examine the extent to which the principles of curriculum development—relevance, flexibility, continuity, effectiveness, and efficiency—are implemented in ICT learning at Al-Hidayah Elementary School. It will also identify the challenges faced and the efforts made by the school and its teachers to optimize ICT learning. It is hoped that the results of this study will contribute to the development of contextual, adaptive, and sustainable ICT curriculum practices at the elementary school level.

LITERATURE REVIEW

ICT Curriculum Development in Elementary Schools and Its Relevance to the Independent Curriculum

Kurikulum Merdeka, as an educational framework designed to address the dynamics of contemporary learning needs, offers a more flexible and student-centered approach. This orientation is crucial when developing an ICT curriculum at the elementary school level (Nirmala *et al.*, 2024). The flexibility inherent in the Independent Curriculum grants educational units autonomy to formulate and develop their own

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operational curricula, including the design of how ICT learning will be integrated and implemented. This independence allows schools to move beyond a nationally uniform ICT approach and instead design a much more contextual ICT learning experience.

This adjustment to ICT learning can be achieved by carefully considering each student's unique needs and potential, as well as the availability and limitations of technological resources in each school, both in urban and limited-access areas. Although the Independent Curriculum has begun to be implemented in various elementary schools with adjustments to the conditions of the educational unit and the needs of students, the implementation of important aspects such as differentiated learning which is highly relevant to accommodate the diverse levels of ICT skills of students is often not fully seen optimally in daily teaching practices in the field (Taufik *et al.*, 2024).

Furthermore, the integration of ICT learning within the Independent Curriculum framework goes beyond mastering technical skills, emphasizing practical and meaningful application through the Proyek Penguatan Profil Pelajar Pancasila (P5). Students' involvement in these thematic projects provides an ideal platform for them to apply the various ICT skills they have learned, from searching for and processing information to digital collaboration to creating technology-based products or presentations. This approach aligns with the view that ICT should provide students with new understanding and broader perspectives in their learning process, while also serving as a dynamic, interactive learning resource rather than a passive tool (Roza *et al.*, 2023).

The Merdeka Curriculum, with its core characteristics, is expected to restore and enrich the learning process. These characteristics include an emphasis on project-based learning, which is highly conducive to the development of soft skills and character building; a focus on essential materials that allow for in-depth understanding of concepts, including ICT; and the adoption of a more flexible curriculum structure (Nasution *et al.*, 2023). All of these elements are highly relevant and support the effective, impactful integration of ICT. Accordingly, the Independent Curriculum concept is essentially an innovation aimed at improving the quality of learning comprehensively (Sholeh, 2022). In the context of ICT, this is reflected in the flexibility given to teachers to choose a variety of teaching tools and technology platforms that best suit students' needs and learning objectives, as well as the optimization of intracurricular learning time, allowing students sufficient time to explore ICT concepts in greater depth and without rushing. However, it is important to note that the implementation of the Independent Curriculum in several pilot schools, although showing quite good progress in the first year and continuing to be refined, is still in a stage where several schools are actively designing and searching for the most appropriate formula for its implementation in the field (Pertiwi *et al,* 2022; Susilana *et al.*, 2023). This process of adaptation and search for the best formula also applies to the development and implementation of an integrated ICT curriculum.

Fundamental Principles in ICT Curriculum Development

The development of an effective ICT curriculum in elementary schools must be based on general curriculum development principles, including relevance, flexibility, continuity, efficiency, and effectiveness (Prasetyo & Hamami, 2020; Setiyadi *et al.*, 2020). The principle of relevance requires that the ICT curriculum be aligned with student needs, current technological developments, and the demands of the digital society. The selection of ICT-based learning media must be based on learning objectives and their relevance to student needs. This means ICT materials must cover current issues such as cybersecurity, digital literacy, and ethical technology use. The principle of flexibility is crucial given the rapid pace of ICT development, requiring the curriculum to be adaptable and regularly updated. This is supported by the structure of the Merdeka Curriculum, which allows for adjustments to ICT content and learning methods to suit the local context and student abilities (Miftah & Rokhman, 2022; Salabi, 2020).

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The principle of continuity ensures continuity of ICT material and competencies across grade levels, from the introduction of basic hardware and software in lower grades to the use of more complex applications in higher grades. Ideally, ICT should not be taught as a separate subject but rather integrated into various other subjects to support thematic and project-based learning. Finally, the principles of efficiency and effectiveness, or practicality, demand the optimization of existing resources, though in practice, schools often face constraints in providing adequate ICT facilities and infrastructure. While curriculum implementation in educational institutions may utilize different principles, general principles such as relevance, flexibility, and continuity remain important guidelines. Understanding and applying these principles are key to implementing an ICT curriculum effectively and positively impacting students (Awalludin *et al.*, 2024; Prasetyo & Hamami, 2020). The development of the Jaringan Sekolah Islam Terpadu (JSIT) curriculum also emphasizes the importance of planning based on guidelines, integrated implementation with values, and periodic evaluation, which reflect these principles in a specific context (Bhayangkara *et al.*, 2024).

The Role and Utilization of ICT in Elementary Education: Teacher and Student Perspectives

ICT plays a vital role in transforming the landscape of primary education, catalyzing modern development, and is an essential medium for teaching and learning. The use of ICT in primary school learning not only has the potential to improve the quality of educational interactions but also significantly impacts student motivation and learning outcomes (Suparjan, 2021). Teachers have a very positive perception of ICT integration, believing it can make the learning process more effective, engaging, and varied. They view ICT as a tool that facilitates the delivery of material, supports student-centered learning, and encourages active student participation in the classroom (Hidayah & Fauziah, 2025). ICT is considered to simplify and enhance learning, making it more effective and enjoyable. The presence of ICT allows teachers to access information effectively and efficiently, and expands the learning space beyond the physical boundaries of the classroom (Hidayah *et al*., 2020).

From the student perspective, the use of ICT in learning has been shown to increase interest and motivation significantly (Lasut *et al.*, 2023). When teachers use ICT-based media, students demonstrate greater enthusiasm and focus, and are more active in lessons. The use of media such as instructional videos, PowerPoint slides, images, and audio can make abstract material more concrete and understandable, while creating a more enjoyable learning atmosphere. Basic ICT training, such as an introduction to hardware, software, and Microsoft Word, can broaden elementary school students' knowledge and insight. The ICT device introduction activity conducted at Muhammadiyah 4 Elementary School, Palembang, also showed that children enjoyed it and gained new experiences, knowledge, and skills in using ICT as a learning medium. This indicates that teacher use of ICT has a significant impact on student learning outcomes, with higher levels of teacher ICT use associated with better student learning outcomes. Furthermore, ICT provides a variety of learning resources that students can access independently, supporting the development of independent learning and deeper exploration of knowledge. The use of ICT also contributes to the development of various 21st-century skills, such as critical thinking, collaboration, and communication, which are essential outcomes of the modern education process (Amalia *et al.*, 2022; Wardani *et al.,* 2022).

Teachers' Digital Readiness and Competence as Key Factors in ICT Curriculum Development

Although teachers' perceptions of ICT are generally positive, implementation in the field is often suboptimal. One crucial factor influencing the success of ICT integration is teachers' digital readiness and competence. Various challenges in the implementation of the Independent Curriculum, which are also relevant to ICT curriculum development, include teachers' lack of understanding of the new curriculum

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concepts, difficulties in developing innovative Lesson Plans (RPPs) or teaching modules, and a lack of innovation in teaching methods, which pose significant obstacles (Karlina *et al*., 2024). The implementation of ICT media has not been fully implemented because teachers have not yet mastered the technology, and most teachers still use textbooks as teaching materials with the lecture method. Teachers still lack technological expertise and predominantly use the lecture method in the Merdeka Curriculum (Ningrum & Awi, 2023). The role of teachers is then important in mastering ICT skills, as well as in helping students choose media and understand the principles of their appropriate use (Nirmala *et al*., 2024). Furthermore, internal and external challenges have emerged, particularly for teachers and students, regarding their adaptation and readiness in implementing the Merdeka Curriculum (Alimuddin, 2023; Rusmiati *et al*., 2023).

Teachers' competency in using various ICT devices and applications also varies. Teachers' knowledge of ICT-based media and their ability to create them remains relatively low. Although teachers report being accustomed to using ICT media, their frequency of use may be limited, for example, only once a week or even only during supervision. This indicates that ICT mastery has not yet fully become a pressing need for some teachers. Other factors that pose obstacles include limited school facilities and infrastructure, such as a lack of projectors, unstable internet connections, an inadequate number of computers, time constraints, a lack of knowledge of supporting software or websites, and issues with electricity supply. These limitations are exacerbated by the lack of practical, ongoing teacher training, primarily offline training that enables direct interaction and intensive mentoring (Solihah *et al*., 2022). Therefore, improving teachers' ICT competencies through comprehensive professional development programs and providing adequate facilities and infrastructure are absolute prerequisites for the successful implementation of the ICT curriculum in elementary schools (Novita *et al*., 2021). Teachers then act as learning leaders who can utilize the Merdeka Mengajar Platform and encourage project-based learning in the implementation of the Merdeka Curriculum, which emphasizes adaptation to advances in educational technology (Cholilah *et al*., 2023; Suparjan, 2021).

Challenges and Solutions in Implementing ICT Curriculum in Elementary Schools

Implementing an ideal ICT curriculum in elementary schools, especially within the Merdeka Curriculum framework, which demands innovation and adaptation, poses various multidimensional challenges. One of the main challenges that frequently arises is limited resources, including adequate technological infrastructure and teaching materials (Karlina *et al*., 2024). The implementation of ICT media is often suboptimal because teachers have not fully mastered the technology and still predominantly use conventional methods, which is exacerbated by limited ICT facilities and media in schools. This challenge is also supported by other research, which emphasizes that various internal and external constraints, including limited resources and access to technology, hinder the effective implementation of the Merdeka Curriculum (Ningrum & Awi, 2023; Suparjan, 2021).

Besides infrastructure issues, teacher readiness and competence are other challenging determinants. Problems implementing the Independent Curriculum in elementary schools are often related to teachers' lack of understanding in developing innovative lesson plans and in adopting innovative teaching practices (Alimuddin, 2023; Nirmala *et al*., 2024). This is relevant to the implementation of ICT, where teachers are not only required to operate technology but also to design engaging ICT learning that meets students' needs. The lack of in-person teacher training is one of the obstacles to understanding and implementing the Merdeka Curriculum, including in the ICT aspect. Even though the Merdeka Curriculum has been implemented, many teachers still lack technological expertise and revert to lecture-based teaching, indicating an urgent need for continuous teacher capacity-building (Rusmiati *et al*., 2023). The previous national curriculum also highlighted tensions between global policies and local interests, as well as

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inconsistencies in the policy-making process that could impact implementation at the teacher level (Puad & Ashton, 2022).

Facing the challenges mentioned above, comprehensive and sustainable strategies and solutions are needed. Improving teacher competency through practical and relevant training, both online and offline, is a top priority. Even on a small scale, basic ICT training and the introduction of ICT tools for students and teachers in elementary schools can improve basic knowledge and skills (Amalia *et al*., 2022). Furthermore, teachers play an important role in developing ICT skills and in selecting and using learning media appropriately to meet students' needs and learning objectives (Miftah & Rokhman, 2022). Policy support from the government and schools in providing facilities, developing easily accessible teaching tools, and creating learning communities among teachers to share best practices is also crucial to ensuring a more effective and equitable implementation of the ICT curriculum across all elementary schools (Wardani *et al*., 2022).

The Effect of ICT Development on the Quality of Learning and the Development of Computational Skills

The development and integration of ICT into elementary school learning has had a significant positive impact on improving the overall quality of education. ICT catalyzes change, enabling the creation of a more dynamic, interactive, and responsive learning environment to student needs and the demands of the times (Lasut *et al.*, 2023). The use of ICT supports the shift toward student-centered learning, where students are encouraged to be more independent, active, and creative in their learning process. This aligns with the essence of the Independent Curriculum, which prioritizes learning freedom and optimal development of student potential. The use of ICT is efficacious in improving performance and retention, and multimedia can convey information more effectively (Esather dan Amam, 2024).

The use of ICT-based learning media, such as educational videos, interactive presentations, and learning apps, has been proven to increase students' interest and motivation in learning. Learning materials presented through ICT tend to be more engaging and easier to understand, enabling students to focus and actively participate in learning. Consequently, students' conceptual understanding improves, and learning outcomes improve. Furthermore, ICT integration also facilitates the development of various 21st-century skills, including computational thinking (Endah *et al.*, 2020; Solihah *et al.*, 2022). These skills are relevant not only to the field of informatics but also to problem-solving in general. Previous research has shown that introducing basic ICT devices to elementary school children can provide students with new experiences and knowledge, enabling them to use ICT as a learning tool. The quality of learning is also improved through expanded access to diverse, up-to-date learning resources, enabling students to learn anytime, anywhere, and transcending traditional space and time constraints (Wardani *et al.*, 2022).

Optimizing ICT-Based Interactive Learning Media and Its Implementation in Elementary Schools

The integration of interactive ICT-based learning media is a crucial component of modernizing basic education, particularly in supporting the implementation of the Independent Curriculum, which emphasizes active, participatory learning. Interactive media such as digital quizzes (e.g., Quizizz), educational animated videos, Augmented Reality (AR), and educational software-based simulations, including game-based platforms like Wordwall and Wheel of Names, are highly relevant for creating immersive and meaningful learning experiences. Students enjoy game-based learning media, and teachers can use familiar game-based media to deliver material (Miftah & Rokhman, 2022). These media allow students to interact directly with learning materials, provide instant feedback, and facilitate independent learning that adapts to each individual's learning style. The use of ICT as a learning resource and medium can be achieved through computers and mobile devices/smartphones, which serve as innovative learning tools.

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The use of Scratch also demonstrates how a visual programming environment can help students learn to create animations or games, ranging from simple to complex, thereby supporting creativity and computational thinking (Nirmala *et al.*, 2024; Solihah *et al.*, 2022).

Interactive learning media can increase students' interest in learning, extend attention spans, and deepen understanding of topics (Rosyiddin *et al.*, 2023). In the context of effective curriculum implementation, the use of interactive media supports the principles of differentiation and personalized learning. While students can learn at their own pace, teachers can efficiently conduct technology-based formative assessments to identify learning gaps. With ICT, teachers can supplement teaching materials, find appropriate learning method references, and deliver material in a way that is more easily understood by students (Hidayah & Fauziah, 2025). However, the success of this integration depends heavily on the availability of digital infrastructure in schools and on teachers' ability to select and use appropriate media (Suparjan, 2021). Many elementary schools still face challenges in implementing the Independent Curriculum, particularly due to a lack of teacher training, limited facilities, and limited understanding of new learning approaches (Rusmiati *et al.*, 2023). Adapting teachers' use of technology to a child's cognitive development stage is also important for increasing participation and understanding, in line with Piaget's theory (Kilag *et al.*, 2022). Teacher enthusiasm for ICT remains high, although facilities and training remain a challenge. Therefore, ICT curriculum development strategies must encourage the adoption of interactive media as part of a flexible and inclusive teaching toolkit, along with ongoing teacher competency development (Febriani *et al.,* 2023; Ningrum & Awi, 2023).

METHODS

This study uses a descriptive qualitative approach to describe the implementation practices of curriculum development principles in Information and Communication Technology (ICT) subjects at Al-Hidayah Elementary School. This approach was chosen because it can provide an in-depth explanation of the empirical realities occurring in the field through direct observation of curriculum practices.

This study collected data through three main techniques: interviews, document analysis, and documentary observation. Online interviews were conducted on Monday, April 28, 2025, at 1:00 PM WIB, with Ibu, an ICT teacher at Al-Hidayah Elementary School. The interviews focused on the five principles of curriculum development (relevance, flexibility, continuity, effectiveness, and efficiency) to explore teacher practices in developing and implementing the ICT curriculum. Document analysis involved examining the first and second semester teaching modules for grades 4-6, the ICT syllabus, and the 2024-2025 academic year's Core Competencies (SKKD) to match the interview findings with the formal structure of the school curriculum. Meanwhile, documentary observation was conducted indirectly during the online interviews, recording teachers' visual and narrative descriptions of ICT facilities and learning processes.

The research instruments in this study included a list of interview questions, structured according to curriculum development principles, to guide the information-gathering process. Furthermore, ICT curriculum documents, such as teaching modules (e.g., modules for grades 4, 5, and 6 covering themes such as Computational Thinking, Information and Communication Technology, Computer Systems, Computer Networks and the Internet, Data Analysis, and Algorithms and Programming), syllabi (e.g., the grade 4 syllabus detailing Microsoft Word learning, grade 5 for Microsoft PowerPoint and Excel, and grade 6 for more advanced Microsoft Excel), and the ICT Competency Standards and Basic Competencies (SKKD) (which show the progression from hardware introduction in grade 1 to presentation creation in grade 6), were used as primary sources for structural and content analysis. Finally, digital field notes served as an essential tool for recording direct quotes from interviews, descriptions of relevant facilities and tools, allocation of learning time, and actual teacher practices in implementing the ICT curriculum in the field.

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The data analysis in this study was conducted in three systematic stages. First, the data reduction stage, which involves sorting, filtering, and simplifying data from interviews, documents, and observations to focus on information relevant to the five principles of curriculum development. Second, the data presentation stage, in which the reduced data is grouped into categories such as relevance, flexibility, continuity, effectiveness, and efficiency, and then arranged in narrative or tabular form to facilitate interpretation. Third, the conclusion-drawing stage, which integrates findings from the data to produce a meaningful understanding of curriculum implementation practices in ICT subjects at Al-Hidayah Elementary School. This process is interactive and ongoing throughout data collection and processing, allowing researchers to revise or strengthen findings based on data suitability.

RESULTS AND DISCUSSION

The following are findings from curriculum development in Information and Communication Technology (ICT) subjects at Al-Hidayah Elementary School, specifically regarding the principles of relevance, flexibility, continuity, effectiveness, and efficiency. The results of interviews with ICT teachers, along with analyses of curriculum documents such as teaching modules for grades 4, 5, and 6, syllabi, and SKKD, are presented and analyzed as follows.

Table 1. Implementation of the Principles of ICT Curriculum Development at Al-Hidayah Elementary School

No	Principle	Findings from the Interview	Supporting Data (Modules/SKKD)	Brief Analysis
1	Relevance	The curriculum follows the 2024-2025 Merdeka Curriculum. Material is adapted to current issues, such as social media ethics.	Teaching Modules for Grades 5-6, SKKD ICT 2024	The curriculum content is quite contextual and adaptive to digital developments and students' social needs (for example, social media ethics).
2	Flexibility	Teachers stated that the curriculum is up to 70% flexible, and can adapt tools and methods to the school situation.	Teaching Modules for Grades 4-6; various methods (discussion, card sort), ICT Syllabus	Teachers are given space to adapt their teaching approaches to be responsive to classroom conditions and local school resources.
3	Continuity	The material between grades (4-6) is interrelated. The material is gradually developed from basic to application.	Teaching Modules for Grades 4-6; ICT Syllabus and Competency Standards	There is vertical continuity from the introduction of basic computing to digital presentation practices that support each other across grade levels.
4	Effectiveness	The material is easy to understand and can be directly applied in students' lives (for example, practicing social media ethics).	Teaching Modules for Grades 5 and 6; SKKD ICT	Learning is considered adequate because it connects theory and practice directly, though constraints on technical facilities slightly hamper effectiveness.
5	Efficiency	The time allocation for ICT 2 JP (2 x 30 minutes) is considered sufficient. However, the number and condition of computers remain a constraint (two students use one computer).	Teaching Module (designed for 60 effective minutes); ICT Syllabus; field observation results	Learning time is quite optimal, but efficiency decreases because hardware limitations hinder individual student practice.

Source*: 2025 Research at SD Al-Hidayah*

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Table 1 presents field findings on the implementation of the five main principles of curriculum development in ICT subjects at Al-Hidayah Elementary School. Interviews with teachers and curriculum documents indicate that the principles of relevance and flexibility have been well implemented. Curriculum materials not only reflect students' actual needs but also allow for adaptation to local conditions. Continuity between classes is maintained through a progressive sequence of materials. Learning content is quite effective because the materials are applicable, although technical effectiveness is reduced due to limited facilities. Time efficiency is adequate, but implementation effectiveness still requires better support from facilities.

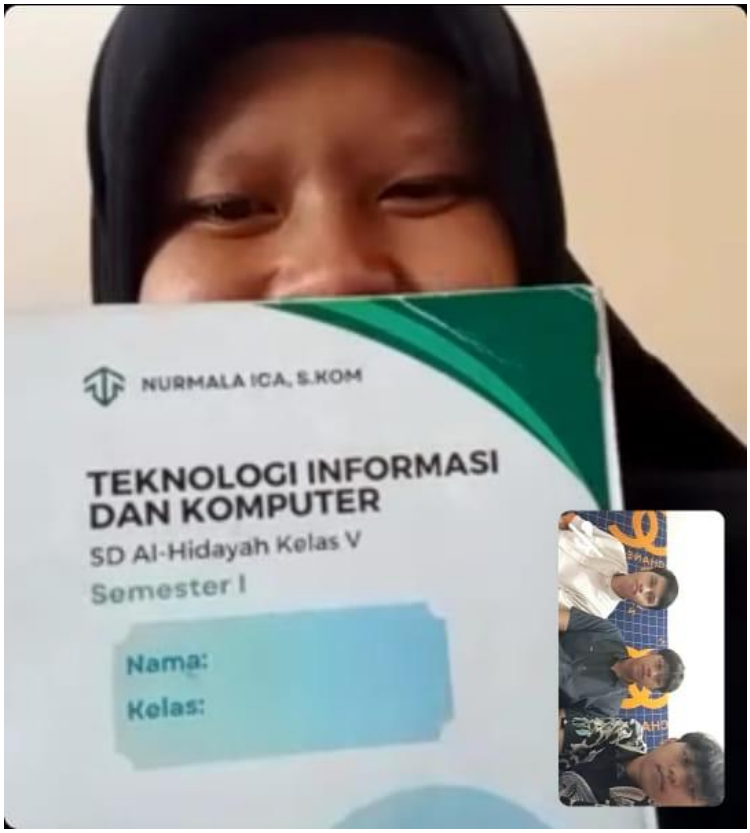

Figure 1. Documentation of an Interview with the ICT Teacher of Al-Hidayah Elementary School
Source: Author Documentation, 2025

Figure 1 demonstrates the online interview process with ICT teachers using video calls. These interviews served as the primary source of qualitative data, which were then analyzed alongside learning documents to understand the application of ICT-based curriculum principles at Al-Hidayah Elementary School. This study examines the application of curriculum development principles in ICT subjects at Al-Hidayah Elementary School. Based on interviews with ICT teachers and the analysis of learning documents such as syllabi, SKKD, and teaching modules for grades 4 to 6, the following principles were found to be applied.

Relevance

The application of the principle of curriculum relevance in ICT subjects at Al-Hidayah Elementary School is evident in teachers' ability to develop materials aligned with technological developments and students' real-life needs. Learning materials are not limited to technical understanding but also incorporate social and ethical aspects, such as the wise use of social media. This makes learning contextual and meaningful, as students can relate the material to their personal experiences.

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Flexibility

The principle of flexibility is reflected in teachers' freedom to adapt ICT content and learning methods to suit student characteristics and technological developments. Teachers reported that approximately 70% of the material can be modified and developed independently, allowing for innovation in delivery. This flexibility is a strength of the Merdeka Curriculum, enabling it to foster responsive, adaptive learning in changing times.

Continuity

The principle of continuity is evident in the structured and interconnected ICT subject matter for grades 4, 5, and 6. The material is structured with gradually increasing levels of difficulty, allowing students to develop their competencies systematically. Teachers also ensure that each learning phase builds on the understanding of previous material, forming a strong foundation for the next level of education.

Effectiveness

The achievement of learning objectives measures the effectiveness of the ICT curriculum despite limited resources. Teachers can adapt learning strategies to maintain meaning by using a contextual approach and reinforcing basic digital literacy. This way, students can still understand basic ICT concepts without relying entirely on digital devices.

Efficiency

ICT learning at Al-Hidayah Elementary School also demonstrates the principle of efficiency, as evidenced by adequate time and resource management. Two hours of lessons per week are optimally utilized, although limited computer equipment remains a challenge. Teachers address this obstacle with rotating learning strategies and group work, ensuring that all students receive equal learning opportunities.

Discussion

The research results show that the ICT curriculum at Al-Hidayah Elementary School has incorporated five important principles in its development: relevance, flexibility, continuity, efficiency, and effectiveness. The application of the principle of relevance is evident in teachers' efforts to link learning materials to current digital phenomena, such as social media usage and internet ethics. This strategy strengthens the curriculum's role as a bridge between knowledge and students' realities. ICT-based learning media in the Merdeka Curriculum enable more contextual, relevant, and needs-based learning (Nirmala *et al*., 2024; Novita *et al*., 2021).

The principle of flexibility is demonstrated by the degree of freedom teachers have in adapting teaching content. This indicates that the implemented curriculum is not rigid, but allows for adjustments to student needs and dynamic technological developments. Teachers play a central role in interpreting the curriculum to ensure it remains contextual (Miftah & Rokhman, 2022). High teacher ICT utilization contributes significantly to student learning outcomes, demonstrating the effectiveness of flexibility in the learning process (Lasut *et al*., 2023).

In terms of continuity, the relationship between grade 4 and grade 6 material demonstrates a hierarchical structure that supports students' progressive cognitive development. This is important to prevent material skipping that could hinder student understanding (Bhayangkara *et al*., 2024). The development of the ICT

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curriculum must be tiered and integrated with student characteristics, and aligned with the demands of the times and the profile of Pancasila students (Taufik *et al*., 2024).

The principles of efficiency and effectiveness appear to go hand in hand in learning practices. Despite limited computer equipment, time management, and collaborative learning strategies, the achievement of basic competencies was ensured. Teachers addressed these limitations with a group-based approach and strengthened digital literacy through class discussions. Although elementary school teachers faced obstacles such as limited facilities, their attitudes toward ICT remained positive, and they adopted creative strategies to overcome these limitations (Prasetyo & Hamami, 2020; Suparjan, 2021).

These findings reinforce the point that the success of ICT curriculum development lies not only in written documents but also heavily depends on the creativity and policies of its implementation in the field. This means that teachers' role as curriculum implementers is crucial to the practical application of these principles in teaching and learning. Therefore, support for improving teacher competency in ICT management and utilization needs to be continuously strengthened so that curriculum principles can be optimally achieved.

CONCLUSION

This study shows that the Information and Communication Technology (ICT) curriculum at Al-Hidayah Elementary School in the 2024-2025 academic year has been implemented in accordance with the Merdeka Curriculum, which emphasizes relevant materials, such as digital ethics and the wise use of social media. Teachers demonstrated high adaptability in developing flexible and sustainable learning, especially in grades 4 to 6, as demonstrated by the continuity of material and adjustments to teaching methods across levels.

The implementation of the five main principles of curriculum development—relevance, flexibility, continuity, efficiency, and effectiveness—is evident in learning practices. Materials are adapted to technological developments and students' contextual needs. Despite limited facilities, teachers are able to optimize learning strategies through a rotating approach and project-based learning, which supports the principles of effectiveness and efficiency.

Overall, the successful implementation of the ICT curriculum in this school is heavily influenced by the role of teachers as the primary implementers. The curriculum, as a reference document, requires in-depth understanding and adaptive skills from teachers to be implemented meaningfully and contextually. Therefore, improving teacher competency in curriculum and technology literacy is crucial for the sustainability of relevant, adaptive, and future-oriented ICT learning. This finding can be used as a topic suggestion for further research, particularly regarding specific training for teachers in using learning media platforms for ICT learning in schools.

AUTHOR'S NOTE

The author declares that this article is based on independent research and is free from plagiarism. There are no conflicts of interest that could influence the research process or results. This article was written with the highest standards of scientific honesty and academic responsibility.

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