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Teaching Informatics in the Kurikulum Merdeka: An exploratory case study at SMPN 12 Bandung

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ABSTRACT

This study aims to examine the implementation of Informatics teaching within the context of the Kurikulum Merdeka at Junior High School (SMP) Negeri 12 Bandung. This research focuses on three aspects, namely implementing Project-Based Learning (PjBL), developing teaching materials relevant to students' lives, and applying continuous formative assessment. The findings reveal that the PjBL approach significantly increased student engagement and enhanced their basic digital skills, particularly in creating digital presentations and animations. Teachers play a crucial role as learning facilitators, capable of designing responsive learning experiences and adapting materials to students' needs. Despite challenges such as infrastructure limitations and unequal access to technology, adaptive solutions like blended learning and unplugged activities were successfully implemented. This study highlights the need for continuous teacher training in digital pedagogy and strong institutional support to enhance the implementation of the Kurikulum Merdeka. The findings aim to contribute to the development of best practices in contextual Informatics teaching and provide valuable insights for policy development based on the Kurikulum Merdeka.

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ABSTRAK

Penelitian ini bertujuan untuk mengkaji implementasi pengajaran informatika dalam konteks Kurikulum Merdeka di SMP Negeri 12 Bandung. Fokus penelitian ini mencakup tiga aspek utama, yaitu penerapan Project-Based Learning (PjBL), pengembangan bahan ajar yang relevan dengan kehidupan peserta didik, dan penerapan asesmen formatif berkelanjutan. Temuan menunjukkan bahwa pendekatan PjBL secara signifikan meningkatkan keterlibatan peserta didik dan mengembangkan keterampilan digital dasar mereka, khususnya dalam pembuatan presentasi dan animasi digital. Guru memainkan peran penting sebagai fasilitator pembelajaran yang mampu merancang pengalaman belajar yang responsif dan menyesuaikan materi dengan kebutuhan peserta didik. Meskipun dihadapkan pada tantangan seperti keterbatasan infrastruktur dan ketimpangan akses teknologi, solusi adaptif seperti blended learning dan aktivitas unplugged berhasil diterapkan. Penelitian ini menekankan pentingnya pelatihan guru secara berkelanjutan dalam pedagogi digital serta dukungan kelembagaan yang kuat untuk memperkuat implementasi Kurikulum Merdeka. Temuan ini diharapkan dapat berkontribusi pada pengembangan praktik terbaik dalam pengajaran Informatika yang kontekstual serta memberikan wawasan berharga bagi pengembangan kebijakan berbasis Kurikulum Merdeka.

Kata Kunci: *Kurikulum Merdeka; pendidikan informatika; praktik pengajaran*

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INTRODUCTION

The development of information and communication technology has brought fundamental changes to various aspects of life, including education, industry, and society. Technology has become the primary tool for accelerating the flow of information and facilitating global connections between individuals and institutions (Jelimbi et al., 2024). Conventional learning models, which are one-way and static in nature, are being abandoned in favor of approaches that are more dynamic, interactive, and based on digital technology. Technology has become a bridge that expands access to learning resources, enables personalized learning, and creates opportunities for global collaboration among students (Agustian & Salsabila, 2021). In the era of the Industrial Revolution 4.0 and towards the era of Society 5.0, the world of education is faced with the challenge of preparing a generation that is not only competent in academics but also has 21st-century skills, such as critical thinking, problem-solving, creativity, communication, collaboration, and strong digital literacy (Jelimbi et al., 2024).

The Indonesian government, through the Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi (Ministry of Education, Culture, Research, and Technology), launched the Kurikulum Merdeka policy as part of its national education reform. This curriculum was born out of the need to liberate the learning process from the constraints of rigid bureaucracy and provide an optimal space for teachers and students to explore their potential. The Kurikulum Merdeka is designed with the principles of flexibility, differentiation, and contextualization, allowing educational institutions to tailor learning to local characteristics, student needs, and the surrounding socio-cultural dynamics. Its primary focus is on strengthening essential competencies and character development through the implementation of the Profil Pelajar Pancasila, which represents the ideal future graduates of Indonesian education (Ulandari & Rapita, 2023).

One of the important breakthroughs in the Kurikulum Merdeka is the integration of Informatics as a compulsory subject at the junior high school level. Previously, Informatics, formerly known as Information and Communication Technology (ICT), was often only offered as a local content subject or extracurricular activity. Now, Informatics is positioned as a strategic field of study that is essential in shaping students' digital skills from an early age (Lisda et al., 2025; Putranto, 2024). The main objective of teaching Informatics in this curriculum is not only to introduce technology, but also to instill computational thinking, systematic problem-solving skills, and digital literacy that is adaptive to the changing times (Meriyani et al., 2023). Recommended learning approaches in Informatics, such as Project-Based Learning (PBL), have been proven to increase student participation, relate the material to real-life experiences, and develop soft skills like collaboration and creativity (Hikmah, 2020).

However, the implementation of Informatics in the Kurikulum Merdeka is not without challenges. Various studies indicate that significant gaps persist between schools, particularly in terms of technological infrastructure, teacher capacity, and the readiness of educational units to integrate technology into the learning process (Fitriani et al., 2024). Teachers, as the spearhead of curriculum implementation, often face challenges in developing practical teaching modules, utilizing digital media efficiently, and conducting authentic assessments that accurately reflect students' real competencies. Therefore, strengthening teachers' digital literacy, improving technology-based pedagogical competencies, and developing learning communities are key factors in supporting the successful implementation of this curriculum (Andayani et al., 2024).

Although various studies have been conducted on the implementation of the Kurikulum Merdeka and the teaching of Informatics in various educational units, there are still few studies that specifically explore the practice of teaching Informatics at SMP Negeri 12 Bandung. This school was chosen as the location for the study because it represents a type of public school with limited infrastructure. In addition, SMP Negeri

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12 Bandung has also shown a strong commitment to implementing the Merdeka Curriculum since its launch. This is supported by Informatics educators who actively participate in national curriculum training and consistently develop digital learning media and independent teaching modules. Thus, this school is a relevant and rich representation for exploring the dynamics of implementing adaptive, contextual, and innovative Informatics learning.

Based on this background, this study aims to determine the implementation of Informatics teaching in the Kurikulum Merdeka at SMP Negeri 12 Bandung, explain the Informatics learning strategies used by teachers in class, identify challenges that come up in the learning process, and describe the solutions and adaptive practices used by teachers to deal with these challenges. In practical terms, the results of this research are expected to provide concrete guidance for other schools, teachers, and policymakers in designing effective Informatics learning that aligns with the spirit of the Merdeka Curriculum. Theoretically, this research contributes to enriching the academic discourse on curriculum implementation studies, based on real-world cases in the field, particularly in the context of Informatics at the secondary education level.

LITERATURE REVIEW

Kurikulum Merdeka and Computer Science Education in Junior High School

Kurikulum Merdeka places Informatics as a compulsory subject at the junior high school level, a progressive step that reflects the government's commitment to equipping students with 21st-century skills, such as problem solving, creativity, collaboration, and communication. Kurikulum Merdeka explicitly includes this objective by providing space for students to develop competencies in line with global demands and the digital age (Dewi & Sunarni, 2024). The primary focus of Informatics teaching in this curriculum includes the development of digital literacy, computational thinking, collaboration skills, and complex problem-solving. This shows a paradigm shift in education that not only emphasizes conceptual knowledge but also encourages the integration of technological skills and soft skills as part of a comprehensive learning process.

The establishment of informatics as a core subject in the Kurikulum Merdeka is a response to the challenges of digital globalization, which requires students not only to be users but also to be creators of contextual technological solutions (Farhan et al., 2023; Rahardja, 2022). This change reinforces the position of informatics as an essential component in shaping digital life skills that align with the current times. The implementation of informatics as a subject in the Kurikulum Merdeka provides schools with the opportunity to adapt the learning process to local conditions, such as infrastructure readiness, teacher competence, and student characteristics. This flexibility makes informatics learning more contextual and meaningful. Teachers have the freedom to develop materials and choose approaches that are relevant to the social, cultural, and economic backgrounds of their students.

Therefore, mastery of the material can be achieved optimally, even under limited resources (Nabilah et al., 2022). Furthermore, the inclusion of Informatics as a compulsory subject also has implications for the development of a digital education ecosystem in schools. This requires a transformation in the management of facilities and infrastructure, the development of internal curricula, and the role of school principals and local policy makers in supporting the implementation of sustainable digital learning.

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Strategies and Methods of Teaching Informatics

The teaching strategies employed in Informatics subjects are significantly influenced by the characteristics of the competencies to be achieved, particularly computational thinking and problem-solving skills. One approach that has proven effective is Project-Based Learning (PBL), which emphasizes the active involvement of students in completing real-world projects relevant to their lives (Ayunda et al., 2024). In the context of Informatics learning, PjBL is very strategic because it brings students closer to practical experiences that encourage technological exploration, creativity, and collaboration.

This method is considered highly effective because it not only builds conceptual knowledge but also develops practical skills such as teamwork, communication, time management, and innovation. The effectiveness of this approach is supported by findings that the PjBL model has a significant effect on increasing students' motivation and learning outcomes in Informatics, when compared to direct learning methods (Arianta et al., 2024).

The alignment between PjBL and the main principles of the Kurikulum Merdeka is precise, given that this curriculum emphasizes meaningful, experience-based, and learner-centered learning. In addition, PjBL also allows teachers to apply instructional differentiation, which is adjusting the level of complexity of projects to the abilities of each learner.

A significant increase in students' interest in learning was also found when Informatics projects were linked to digital technology and real-life contexts (Ali & Hasanah, 2023; Arianta et al., 2024). The benefits of this approach are also evident in basic programming learning, where students can understand programming logic, develop simple algorithms, and design digital interfaces independently, thereby improving their learning outcomes (Hikmah, 2020).

Additionally, IT-based projects play a crucial role in developing students' metacognitive skills, including the ability to plan, monitor, and evaluate their own thinking processes. These skills are essential in shaping lifelong learners who are adaptable to technological developments and global dynamics.

Teaching Module Development and the Role of Teachers

In the implementation of the Kurikulum Merdeka, teachers are no longer positioned solely as conveyors of information, but rather as designers of flexible learning experiences that are responsive to students' needs. Teaching modules have become the primary instrument, replacing the role of the Lesson Plan (RPP), which is compiled based on learning outcomes, student characteristics, and school context (Fadil et al., 2024; Triana et al., 2023). The process of developing teaching modules requires teachers to have a deep understanding of the principles of differentiated pedagogy, learning technology, and authentic assessment. This condition presents opportunities for teachers to explore various media, methods, and learning approaches that are more innovative and relevant to students' needs.

The use of e-modules designed based on the Kurikulum Merdeka has been proven effective in increasing student motivation and independence in learning (Gusrianto & Rahmi, 2021). They found that the application of e-modules was able to encourage active student engagement and significantly improve their understanding of Informatics concepts. The effectiveness of utilizing technology in teaching modules is also supported by research results that developed Augmented Reality (AR)-based modules for ICT learning, where the application of AR created a more interactive, enjoyable, and meaningful learning experience for students (Andayani et al., 2024).

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Teachers' creativity in designing and developing teaching modules is a key factor in the successful implementation of the Merdeka Curriculum. Therefore, ongoing teacher training in technology, pedagogy, and digital learning design is an urgent need so that they can optimally fulfill the demands of their new roles.

Challenges in Implementing Informatics Education

Although the Kurikulum Merdeka provides flexibility and room for innovation in schools, the implementation of Informatics teaching in the field still faces several complex challenges. One of the main challenges often encountered is a limited technological infrastructure, including an insufficient number of computers, unstable internet connections, and a lack of technical support within the school environment (Caroline & Aslan, 2025; Prinanda, 2025). These conditions make it difficult for teachers to implement practice-based learning, which is at the core of Informatics teaching. As a result, various technology-based projects or activities often have to be postponed, simplified, or even replaced with manual methods that are less than optimal in supporting learning outcomes.

As an alternative solution to these limitations, the development of electronic modules and activity-based learning is considered feasible for implementation. Research indicates that the use of electronic modules can help teachers present material more systematically and visually, eliminating the need for expensive devices or high connectivity (Husna & Yanni, 2022). In addition, approaches such as computing concept simulations without digital devices (also known as unplugged learning) have also been proven effective in helping students understand basic Informatics concepts creatively and engagingly.

This situation shows that innovative teachers can still adapt teaching and learning activities despite limitations. Therefore, schools need to foster a collaborative and adaptive culture to support the implementation of sustainable Informatics learning, even with limited resources.

Learning Evaluation and Reflection

The evaluation aspect in the Kurikulum Merdeka has undergone a fundamental change, from a summative approach to continuous and authentic formative assessment. Evaluation no longer solely measures final results, but is more focused on the process and holistic learning development of students. In Informatics learning, the evaluation strategies used include observation of practical skills, project documentation, presentation of work results, and student self-reflection (Salam, 2024; Wahyuni et al., 2024). This approach enables teachers to gain a more comprehensive understanding of students' competency achievements, while also providing students with the opportunity to evaluate and improve their learning process independently.

The implementation of project-based evaluation has been proven effective in improving students' critical thinking skills and problem-solving abilities. The use of the PjBL model not only increases student learning outcomes in ICT subjects but also encourages active participation in the learning process, which is assessed through direct observation and teacher reflection (Almuzhir, 2022).

Process-oriented assessment, which evaluates not only the final product but also student involvement in each stage of the project, is important (Arianta et al., 2024). This approach is considered capable of increasing students' motivation and sense of responsibility for their own learning outcomes. However, most of these findings still come from classroom action studies with a limited scope. Therefore, the generalization of these results needs to be done carefully and should be reinforced through further research in a broader and more diverse context.

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Teachers' reflections on the assessment process are an integral part of evaluation practices in the Kurikulum Merdeka. By analyzing the successes and obstacles that arise during learning, teachers can design more appropriate and adaptive instructional strategies for the next learning cycle. In practice, this reflection has been implemented through the analysis of learning outcome data and peer discussions, as conducted by teachers in the study (Almuzhir, 2022), which was then used to develop more effective learning plans for the next cycle.

METHODS

This study uses a qualitative approach with an exploratory case study design. This design was chosen because it allows researchers to explore in depth the dynamics and real context of the implementation process of the Kurikulum Merdeka, particularly in teaching Informatics at SMP Negeri 12 Bandung. Exploratory case studies offer the opportunity to understand the experiences, challenges, and adaptive strategies of teachers in complex and authentic situations (Kusumawardani & Fauziah, 2021). The reason for choosing this design was also based on the need to obtain a holistic understanding that cannot be achieved through quantitative approaches or general surveys.

The selection of SMP Negeri 12 Bandung as the research location was based on the consideration that this school has actively implemented the Merdeka Curriculum, including in the subject of Informatics. According to Moleong in the book *"Metodologi penelitian kualitatif,"* this school is categorized as an information-rich case, which is a school that is considered capable of providing rich and relevant data to answer the research focus (Palinkas et al., 2020). The subjects in this study consisted of two Informatics teachers who were selected purposively. The criteria for selecting informants included: 1) having at least two years of teaching experience; 2) having officially participated in Merdeka Curriculum training; and 3) being actively involved in the planning, preparation, and implementation of teaching modules for the subject of Informatics. Although the number of informants was small, it was considered adequate because the research focused on exploring the process, rather than generalizing the results.

Data were collected using two main techniques: semi-structured in-depth interviews and document analysis. Interviews were conducted twice per informant, each lasting 15-20 minutes. The interview questions were compiled based on the learning outcome indicators developed by the Kementerian Pendidikan dan Kebudayaan in the Learning and Assessment Guidelines related to the Merdeka Curriculum, such as computational thinking skills, digital literacy, and collaborative skills (Dewantara et al., 2023). Documentation techniques included collecting teaching modules, assessment sheets, rencana pelaksanaan pembelajaran harian (RPPH), and teacher reflection notes. This data was used to understand actual learning planning and implementation practices and as a basis for triangulation with interview results.

Data analysis was conducted using a thematic analysis approach based on the framework proposed by Braun and Clarke. This procedure consists of six stages, namely: 1) familiarization with the data through repeated reading; 2) initial coding based on important issues; 3) searching for themes from emerging code patterns; 4) review and refinement of themes; 5) clear naming of themes; and 6) writing an interpretive report. This model was chosen for its flexibility in exploring the meaning of qualitative data and its ability to accommodate the complexity of the field context. The analysis was conducted manually to maintain process traceability and ensure that each finding was supported by strong data evidence.

To ensure data validity, researchers conducted concrete source triangulation by matching interview data and learning documents. For example, if a teacher stated that they had implemented project-based learning, this was validated by reviewing teaching module documents and the results of student projects. Additionally, member checking was conducted by presenting a summary of the interview interpretation results to each informant. The researchers requested clarification and confirmation of these

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interpretations, providing space for informants to add or correct any information they considered inaccurate. This process ensured that the analysis results accurately reflected the teachers' perspectives and experiences.

Research ethics were maintained by obtaining informed consent prior to data collection. The identities of informants were disguised throughout the research report to maintain confidentiality and ensure their comfort in participating. With this approach, it is hoped that the research results can make a meaningful contribution to strengthening the implementation of the Merdeka Curriculum, particularly in the teaching of Informatics at the junior high school level.

RESULTS AND DISCUSSION

Implemented Learning Strategies

The computer science teachers at SMPN 12 consistently implement a Project-Based Learning (PjBL) approach that is aligned with the computer science learning outcomes in the Kurikulum Merdeka. Learning is focused on simple projects, such as creating animations using Scratch and designing interactive presentations. These projects are linked to local school themes and students' daily lives, providing contextual and meaningful learning opportunities. This approach aims to foster a sense of ownership over the learning process and increase students' motivation to understand computer science concepts in a practical and applied manner.

Teachers also develop and utilize independent digital teaching modules, which include materials, assignments, and step-by-step project guidelines. These modules are shared through Google Classroom, providing flexibility in task management and communication, both during and outside of face-to-face class hours.

Table 1. Implemented Learning Strategies

No	Learning Strategy	Frequency of Implementation	Description
1	Project-Based Learning (PjBL)	Very often	Used at the end of each learning unit
2	Group Discussion	Often	Used in initial concept exploration and project reflection
3	Simulations and Unplugged	Sometimes	Used when device limitations occur

Source: Interview with the Computer Science Teacher at SMPN 12, 2025

These findings demonstrate that teachers possess the flexibility and creativity to apply adaptive learning strategies in diverse school settings effectively. Although limited facilities remain a challenge, this approach is still able to maintain active student engagement. The implementation at SMPN 12 emphasizes teachers' ability to innovate and align learning strategies with available resources. This illustrates that teachers must have the ability to adapt, particularly in relation to technological developments and the availability of supporting facilities, even before becoming teachers (Hadiapurwa et al., 2021).

Challenges in Implementation

Teachers face several key challenges, particularly related to the limited availability of technological devices and unstable internet connections in school laboratories. This often hinders the implementation of digital projects, resulting in rescheduling or simplification of projects. Additionally, the low level of digital literacy

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among students, especially at the beginning of the school year, necessitates allocating extra time for introducing devices and software before proceeding to the core material. Limited technical training for teachers also has an impact on the suboptimal development of interactive and engaging digital teaching materials.

Table 2. Challenges in Implementation

No	Types of Challenges	Impact on Learning
1	Device and network limitations	Digital learning disrupted, projects postponed
2	Low digital literacy among students	The process of getting to know the application or program takes longer
3	Limited teacher training	Suboptimal development of teaching modules

Source: Teacher reflection documentation, 2025

These findings align with studies that emphasize the importance of teachers' ability to initiate independent solutions. Teachers develop alternative strategies, such as using manual simulations (unplugged), group discussions, and rotating the use of devices so that all students have equal learning opportunities (Husna & Yanni, 2022).

Adaptive Solutions and Practices Implemented

Teachers implement various creative and adaptive solutions in facing the challenges of Informatics learning. One of the strategies employed is the development of hybrid modules, which combine print and digital versions. This strategy has proven effective in bridging the technology access gap, allowing students with limited devices to participate in learning optimally. The use of hybrid modules in the context of blended learning not only increases student participation in the learning process but also contributes to improved learning outcomes, particularly when content is presented visually and in a contextual manner.

In addition, teachers integrate Informatics learning with other subjects, such as Indonesian Language, through assignments to create narrative-based digital presentations. This cross-subject integration encourages students to think creatively and hone their digital skills in a broader and more meaningful context. School-based community projects, such as cleanliness and digital literacy campaigns, are also used to foster social awareness, teamwork, and digital responsibility.

From an evaluation perspective, teachers implement project-based formative assessments supplemented with assessment rubrics and written reflections from students. This evaluation not only assesses the final results but also emphasizes the learning process, including students' ability to plan, revise, and reflect on their work steps. This approach is effective in providing constructive feedback and encouraging students to develop metacognitive awareness of their own learning process.

These findings align with research results indicating that project-based assessment can enhance students' reflective and critical thinking skills (Simanjuntak et al., 2024). However, the effectiveness of assessment is highly dependent on the readiness of teachers in developing authentic, relevant, and comprehensive assessment instruments. Thus, the success of Informatics learning in the Kurikulum Merdeka is not only determined by the availability of technology, but also by pedagogical innovation and the professional competence of teachers in designing adaptive learning.

Implications and Impact of the Study

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This study shows that infrastructure limitations are not always an absolute barrier to meaningful computer science learning. Using a project-based approach and hybrid strategy, teachers at SMPN 12 successfully created creative and adaptive learning.

In practical terms, these findings can serve as a model for other schools with similar conditions to develop flexible and effective learning strategies. This study also highlights the importance of strengthening teacher capacity through training, providing supportive teaching media, and policy support from the school.

Theoretically, this study enriches the discourse on the implementation of the Kurikulum Merdeka at the secondary education level, particularly in the subject of Informatics. The emphasis on flexibility of strategy, continuity of assessment, and cross-subject integration is key to designing learning that is relevant to the needs of the 21st century.

Discussion

The results of this study indicate that the implementation of Informatics teaching in the Kurikulum Merdeka at SMP Negeri 12 Bandung was carried out adaptively, despite facing several challenges. The success of the implementation was significantly influenced by the active role of teachers as learning designers, the readiness of the school infrastructure, and the suitability of the teaching modules to the students' characteristics and needs. One of the main findings is the effectiveness of the Project-Based Learning (PBL) strategy in teaching Informatics. PjBL encourages active student engagement and the development of 21st-century skills, such as collaboration, problem solving, and creativity (Sholeh et al., 2024; Widiawati et al., 2024). PjBL places students at the center, encourages cooperation in solving real problems through organized research, and develops 21st-century skills by producing appropriate products (Ishartono et al., 2023; Yulianti et al., 2023). PjBL has been proven to increase students' interest in learning, especially when projects are related to local issues and technologies that are familiar to them. This demonstrates that PjBL can bridge Informatics concepts with students' real-life experiences, thereby increasing the relevance of learning materials.

Teachers' adjustments to teaching modules in response to limited school conditions demonstrate that the flexibility of the Kurikulum Merdeka is crucial in creating relevant learning. In the Kurikulum Merdeka, the learning process will be more enjoyable because students can engage in more discussions with teachers, rather than just listening to explanations (Sulistyosari et al., 2022). This learning is more directed at shaping the character of students to be brave, independent, socially intelligent, civilized, polite, competent, and not solely dependent on the ranking system (Hartono, 2024).

SMP Negeri 12 has not fully utilized advanced technologies, such as Augmented Reality (AR), in the implementation of its teaching modules. However, the principles of differentiation and material adaptation have been applied well. Teachers utilize visual media and group-based activities as alternatives to bring the material closer to the students. Visual learning enables the creation of a fun learning environment, enhances interaction and cooperation among students both within their groups and with teachers, and fosters a conducive atmosphere for teaching and learning. By structuring learning around the syntax of visual media, the learning process becomes more engaging and enjoyable for students (Rosidah, 2023). These findings support research results indicating that interactive technology-based e-modules can increase student participation, even though the implementation of advanced technologies, such as AR, is still limited.

This study also highlights the main challenges in implementing Informatics learning, namely, limited devices and internet connectivity. Although these challenges are not new, the findings reemphasize the importance of equal access to technology in all schools in Indonesia. Electronic modules can be an alternative solution to overcome these limitations. At SMP Negeri 12, teachers overcome this problem by

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creating blended learning and unplugged activities that enable students to understand basic Informatics concepts without relying entirely on digital devices. This approach illustrates the creativity and initiative of teachers in adapting to existing limitations.

From an evaluation perspective, teachers at SMP Negeri 12 have utilized project-based formative assessments, which provide students with continuous feedback. The implementation of formative assessments has successfully encouraged student engagement in the learning process and helped them improve their understanding over time (Indah, 2024). This assessment supports findings that authentic assessments, such as project presentations or student reflections, can improve students' conceptual understanding and numeracy skills. The uniqueness of this study lies in the use of student reflections as a basis for improving learning strategies, which strengthens an adaptive and sustainable learning culture. Thus, evaluation not only measures the final results but also the learning process of students.

The uniqueness of this study lies in its local context and exploratory approach, which highlight concrete practices in the field. Unlike studies that are generally descriptive in nature, this research provides deeper insights into how teachers navigate curriculum changes and innovate in the face of limitations. These findings contribute to the development of a framework of best practices in contextual and school-based computer science teaching.

Theoretically, the results of this study support the constructivist approach in Informatics learning, which places students as active subjects in the learning process. These findings also reinforce the argument that teacher competence, especially in terms of digital literacy and differentiated pedagogy, is crucial in the implementation of the Kurikulum Merdeka. These findings can be used as a basis for policy considerations for the Education Office in designing field-based teacher training and providing minimal infrastructure support for the implementation of Informatics subjects.

In addition, the results of this study indicate the importance of collaboration between teachers, principals, and external stakeholders in supporting the sustainability of informatics learning programs. Support from schools in the form of time allocation, additional facilities, and recognition of teacher innovation can be driving factors in maintaining enthusiasm and consistency in curriculum implementation.

From the students' perspective, active involvement in real-life projects helps increase their sense of responsibility, self-confidence, and ability to work in teams. This reinforces the view that computer science education is not solely technical in nature, but also has social values that shape students' character.

This study underscores the importance of developing more adaptive policies informed by local data in the creation of curricula and teacher training programs. Each educational unit has a unique context and set of challenges, so empowering teachers to make pedagogical decisions is crucial in achieving the overall objectives of the Kurikulum Merdeka.

CONCLUSION

This study concludes that the teaching of Informatics in the Merdeka Curriculum at SMP Negeri 12 Bandung is carried out dynamically and adaptively. The use of a project-based approach, contextual teaching modules, and continuous formative assessment has been proven to increase student engagement and the achievement of basic digital competencies. This strategy aligns with the principles of the Kurikulum Merdeka, which emphasizes students as active participants in their learning. Teachers play an important role in the success of this implementation. They not only deliver material, but also design learning experiences that are relevant to real-world conditions. Despite facing infrastructure limitations, teachers can develop creative and effective learning solutions according to the needs of students.

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Based on these findings, it is recommended that teachers' professional competencies continue to be developed through ongoing training programs, particularly in the areas of digital pedagogy and curriculum development tailored to student needs. These training programs are crucial for strengthening teachers' technological competencies, enabling them to effectively utilize learning devices and applications in alignment with the Kurikulum Merdeka. On the other hand, infrastructure support from schools and the government needs to be strengthened, especially in providing adequate equipment and improving internet access in schools, so that the implementation of Informatics learning can run optimally. In addition, collaboration between schools and education stakeholders is highly recommended to encourage the exchange of good practices, the development of shared learning resources, and collective improvement in teaching quality. For example, resource-sharing programs and joint seminars between schools can be held to enable the dissemination of information and more effective teaching methods.

Further research involving the direct participation of students is also recommended to provide a broader picture of the effectiveness of the teaching strategies applied, as well as to identify more appropriate learning innovations in the context of the Kurikulum Merdeka. By involving students in the research, we can gain deeper insights into how they respond to these teaching strategies and identify ways to enhance their engagement further.

AUTHOR'S NOTE

This article is guaranteed to be free from conflicts of interest that could influence its publication process. The author affirms that all data and content in this article are original works compiled based on the principles of academic integrity and have undergone an ethical and responsible research process. All information presented in this article is sourced from valid interviews and documentation and has been approved by the relevant informants. The author would like to express their most profound appreciation to the management and teaching staff at SMP Negeri 12 Bandung for their full support during the data collection process and for their willingness to share their experiences and learning practices in teaching Informatics. Thanks are also extended to colleagues and academic institutions who have provided valuable input in refining this article.

We hope this article can make a positive contribution to the development of adaptive and contextual Informatics learning practices in the era of the Kurikulum Merdeka, serving as a reference for teachers and policymakers in improving the quality of digital education at the junior high school level.

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