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Adaptive strategies employed by informatics teachers at SMAN 1 Parongpong within the context of Kurikulum Merdeka

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ABSTRACT

In the ever-evolving digital era, Informatics has become crucial for equipping students with 21st-century skills, including computational thinking, problem-solving, collaboration, and digital literacy. This subject not only serves as an introduction to technology but also as a foundation for developing students' logical and innovative thinking. This study aims to identify and analyze adaptive strategies implemented by teachers in the Informatics learning process, adapted to the characteristics of the Kurikulum Merdeka. The need for adaptive strategies arises from various challenges still encountered in the field, such as the high complexity of teaching materials, limited technological facilities and infrastructure in schools, and the low readiness of teachers and students to adapt to curriculum changes. This study employed a descriptive qualitative approach, collecting data through semi-structured interviews and documentation of teaching materials. The results show that teachers at SMAN 1 Parongpong apply Problem-Based Learning and Project-Based Learning models, optimize the use of digital media such as learning videos and online applications, and develop flexible lesson plans and project-based assessments. These strategies not only increase student engagement and motivation to learn but also effectively and contextually support the achievement of the Kurikulum Merdeka objectives in Informatics subjects.

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ABSTRAK

Di era digital yang terus berkembang, Informatika menjadi aspek penting dalam membekali murid dengan keterampilan abad ke-21, seperti berpikir komputasional, pemecahan masalah, kolaborasi, dan literasi digital. Mata pelajaran ini tidak hanya berfungsi sebagai sarana pengenalan teknologi, tetapi juga sebagai landasan dalam membentuk pola pikir logis dan inovatif pada murid. Penelitian ini bertujuan untuk mengidentifikasi dan menganalisis strategi adaptif yang diterapkan oleh guru dalam proses pembelajaran Informatika yang disesuaikan dengan karakteristik Kurikulum Merdeka. Kebutuhan akan strategi adaptif muncul karena masih ditemukannya berbagai tantangan di lapangan, seperti kompleksitas materi ajar yang tinggi, keterbatasan fasilitas dan infrastruktur teknologi di sekolah, serta rendahnya kesiapan guru dan murid dalam menghadapi perubahan kurikulum. Penelitian ini menggunakan pendekatan kualitatif deskriptif dengan metode pengumpulan data melalui wawancara semi-terstruktur dan studi dokumentasi perangkat ajar. Hasil penelitian menunjukkan bahwa guru di SMAN 1 Parongpong menerapkan model pembelajaran Problem-Based Learning dan Project-Based Learning, mengoptimalkan penggunaan media digital seperti video pembelajaran dan aplikasi daring, serta menyusun rencana pembelajaran fleksibel dan asesmen berbasis proyek. Strategi-strategi ini tidak hanya meningkatkan keterlibatan dan motivasi belajar murid, tetapi juga mendukung pencapaian tujuan Kurikulum Merdeka secara efektif dan kontekstual dalam mata pelajaran Informatika.

Kata Kunci: *Informatika; Kurikulum Merdeka; model pembelajaran; strategi pembelajaran*

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INTRODUCTION

The curriculum is an essential part of the educational process. With the curriculum, the teaching and learning process at school can run well and regularly as it should. The curriculum is developed to adapt to environmental circumstances and needs, as they are interrelated, and serves as a reference for all parties in carrying out education (Lestari *et al*., 2023). In developing a good curriculum, deep study and reflection are needed. In its development, the curriculum in Indonesia has undergone eleven changes, starting from the 1947 Curriculum (post-independence national character education), the 1952 Curriculum (emphasis on integrated teaching), the 1964 Curriculum (Pancawardhana education), the 1968 Curriculum (academic and moral education), the 1975 Curriculum (goal-based curriculum), the 1984 Curriculum (CBSA approach), the 1994 Curriculum (quality and efficiency improvement), the 2004 Curriculum (KBK), the 2006 Curriculum (KTSP), the 2013 Curriculum (K-13), and finally the Kurikulum Merdeka which began to be implemented gradually since 2018. This change in the educational curriculum is influenced by three main factors, namely universities, society, and the value system. The community demands a curriculum that is relevant to social needs, while the diverse value system also shapes its content. One of the main characteristics of the Kurikulum Merdeka is that it encourages more interactive, collaborative, and flexible learning methods. Teaching staff, students, and schools are given greater freedom to implement learning in line with their respective characteristics. This curriculum aims to foster holistic student development so that students become Pancasila students ready to face the future (Septiani *et al*., 2024).

In the context of the Kurikulum Merdeka, the subject of Informatics is among the fields most significantly affected. In today's digital era, skills in informatics and technology are becoming increasingly important. In line with the Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 16 of 2022 concerning Standards for the Process of Primary and Secondary Education, Informatics learning must develop students' abilities in computerization, programming, and digital literacy. Therefore, the existence of Informatics teachers plays a key role in the successful implementation of Informatics learning in schools (Wahdini *et al*., 2024). However, in practice, implementing Informatics learning within the Kurikulum Merdeka is inseparable from various challenges in the field. A study at Al-Manshuriyah Junior High School, Pemalang, noted that in the 2022-2023 school year, the provision of Informatics/ICT subjects in grade 7 is the first implementation in the Kurikulum Merdeka, and teachers must adjust learning methods according to the conditions of available facilities and infrastructure (Farhan *et al*., 2023).

One of the main challenges is the limited availability of learning support facilities, such as computers, internet access, and adequate technology-based learning materials. This limitation affects learning effectiveness, as Informatics is highly dependent on direct practice and the use of technological devices. In addition, students' readiness to engage with relatively complex Informatics materials is an obstacle in itself. Not all students have a background or initial experience in information technology, so a student-centered approach is needed. On the other hand, managing learning time is an additional challenge, mainly because the scope of Informatics material in the Kurikulum Merdeka is quite broad, while face-to-face time is limited. Given the complexity of these challenges, teachers need specialized strategies to adapt learning methods and approaches so that curriculum goals are still achieved.

In contrast to previous studies that were more general in scope, this study examines explicitly the adaptive strategies used by Informatics teachers at SMAN 1 Parongpong to address challenges in the field. The novelty of this research lies in its focus on the practice of adapting learning methods and approaches applied by teachers in real life in the context of the Kurikulum Merdeka while providing an in-depth picture of how teachers optimize Informatics learning despite limited resources and time. Based on this background, this study aims to examine in depth how the implementation of the Kurikulum Merdeka in Informatics learning at SMAN 1 Parongpong, the challenges teachers face in implementing Informatics learning, and the adaptive and effective strategies they apply to overcome these challenges. These three

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aspects are expected to provide a systematic and comprehensive picture of teachers' efforts to optimize Informatics learning amid limited resources, time, and material complexity.

LITERATURE REVIEW

Kurikulum Merdeka

The Kurikulum Merdeka is the latest policy launched in 2022 in response to educational challenges in the post-pandemic era and to improve the quality of national learning as part of the recovery from the learning crisis (Nugraha, 2022). This curriculum emphasizes flexibility, differentiation of learning, and the cultivation of character values through the Pancasila Student Profile. The Merdeka Curriculum divides grades 1 to 12 into six phases, namely Phase A to Phase F. This division aims to adapt learning to students' developmental stages. The following is the division of each phase in the Kurikulum Merdeka (Pratiwi, 2022):

1. Phase A includes grades 1 and 2 of SD/MI, focusing on strengthening the basics of literacy, numeracy, and character through a simple thematic approach.
2. Phase B includes grades 3 and 4 of SD/MI, with an emphasis on improving logical thinking skills, text emphasis, and understanding of basic mathematical concepts.
3. Phase C is intended for grades 5 and 6 of SD/MI, where students begin to develop critical thinking skills, solve problems, and explore information from various sources.
4. Phase D includes Grades 7 to 9 of Junior High School/MTs, focusing on strengthening academic abilities and character, as well as mastering competencies across subjects.
5. Phase E includes grade 10 of SMA/MA or SMK/MAK, which encourages students to explore their interests and talents through a more flexible selection of subjects.
6. Phase F is intended for grades 11 and 12 of SMA/MA or SMK/MAK, with a focus on the experience of selected materials and preparation of students for higher education or the world of work.

There are several changes in the curriculum from the 2013 Curriculum to the Kurikulum Merdeka, including making computer science a compulsory subject in high school. The Kurikulum Merdeka was then launched by the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) to improve the quality of national education. This curriculum implements a diverse intracurricular learning system, where educators are given the flexibility to choose teaching tools that align with the material and the needs and interests of students. This flexible learning model provides students with space to explore concepts more comprehensively and strengthen their skills (Paramita *et al*., 2025).

In addition, the Kurikulum Merdeka also includes affirmative policies that support the equitable distribution of education, especially in disadvantaged, frontier, and outermost (3T) regions. The formation of students' character is not only carried out through classroom learning but also through experiences outside the classroom, such as the ability to participate in discussions, social skills, and the courage to express opinions. This also encourages students' creativity under teachers' guidance. Therefore, teachers are required to develop innovative learning concepts to foster students' independent thinking. The curriculum is designed as part of a national learning recovery strategy that will be implemented through the 2024/2025 school year and further evaluated in 2024. One of the main characteristics of the Kurikulum Merdeka is the implementation *of Project-Based Learning,* designed to address post-pandemic educational challenges (Jannah *et al*., 2021). This strategy not only aims to develop students' *soft skills*, such as the ability to work together, communicate, and manage time, but also to form strong character, including faith values, cooperation, cultural diversity, independence, creativity, and critical thinking skills (Rohim & Nugraha, 2023). Through contextual and practical learning, students are expected to internalize these values while improving their overall academic competence. In addition, this curriculum emphasizes

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essential materials so that students have sufficient time to develop a solid foundation in literacy and numeracy as basic competencies (Nasution *et al*., 2023).

To support successful implementation, the Kurikulum Merdeka provides teachers with flexibility to adapt the learning process to students' abilities, needs, and local contexts. This "*teaching at the right level*" approach allows teachers to address the ability gap in a classroom and provide a more personalized learning experience. In addition, integrating local wisdom into learning is a priority so that the learning process is not only academically relevant but also meaningful for students. Thus, the Kurikulum Merdeka seeks to realize inclusive, adaptive, and holistic education in order to improve the quality of national education. The Kurikulum Merdeka also places the Pancasila Student Profile (PPP) as the foundation in the preparation of educational content standards, processes, and assessments (Putri *et al*., 2024). These standards serve as a reference for determining the curriculum structure, learning outcomes, learning principles, and assessments. Its implementation consists of two main components: intracurricular activities in the form of face-to-face classroom learning and project activities designed to develop PPP values. Approximately 25% of the total lesson hours are allocated to the project's activities. This curriculum change is intended mainly for educational units that already have resources and supporting facilities (Ocy *et al*., 2023).

Kurikulum Merdeka Toolkit

To support the implementation of the Kurikulum Merdeka, the government provides several core tools that serve as the primary references for planning and implementing learning. These devices include (Putri *et al*., 2024; Rahayu *et al*., 2024; Sari *et al*., 2023):

1. Learning Outcomes (CP) is a document that replaces Core Competencies and Basic Competencies in the previous curriculum. CP contains a set of competencies and the scope of material that students must achieve during the learning phase. This document is prepared based on the phases of student development (A to F), not on class levels per school year, providing flexibility for educational units to adjust the pace of student learning.
2. The Learning Objectives Flow (ATP) is an operational elaboration of the CP that is compiled systematically and chronologically. ATP serves as a guide for teachers in designing a logical and gradual learning sequence so that students can achieve CP optimally. This document can be prepared individually by teachers or by teacher working groups and adjusted to the context of each educational unit.
3. The Teaching Module is a learning tool developed based on ATP and used as a guideline in the teaching and learning process. This module contains learning objectives, activity steps, assessments, and the learning media and resources used. The Teaching Module is flexible and can be adapted to students' characteristics, including differentiation based on ability, learning style, or special needs. Compared with the Learning Implementation Plan (RPP) in the previous curriculum, the Teaching Module is arranged in a more detailed, contextual manner, thereby encouraging teachers to become active and reflective facilitators in the learning process.
4. The Pancasila Student Profile Strengthening Project (P5) is an integral part of the Kurikulum Merdeka, which aims to shape the character of students in accordance with Pancasila values. The P5 activity is designed as a contextual, collaborative, cross-disciplinary learning experience with a primary focus on the development of national values, such as cooperation, independence, creativity, and diversity. Teachers play an important role as facilitators in designing and guiding the implementation of these projects to fit the local context and students' needs.

With these tools, the Kurikulum Merdeka provides ample space for teachers to design learning that is innovative, adaptive, and aligned with students' needs. However, the effectiveness of curriculum

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implementation is highly dependent on teachers' understanding and readiness to compile and use the device optimally (Kusumadewi *et al*., 2023).

Informatics Learning

Informatics subjects are the primary medium for developing a logical, systematic, and creative mindset by introducing computational principles such as algorithms, programming, computer systems, and networks (Nabilah *et al*., 2023). *Computational thinking* is a method of solving problems by breaking complex problems into small parts, recognizing patterns, making abstractions, and designing algorithms. It is the primary focus in the context of secondary education, so that students are able to think critically and efficiently (Marethi *et al.*, 2024). Learning in informatics also prioritizes *computational thinking* as a systematic approach to solving various problems, including complex ones. When applied contextually and appropriately, this approach not only prepares students to face the challenges of the digital era but also develops creative, logical, and rational thinking skills in overcoming real problems. Thus, Informatics not only teaches the use of technology but also trains students in systematic and structured thinking. The urgency of informatics learning is getting stronger in the digital era. Students are required not only to be users but also to be creators of innovative digital solutions. Therefore, Informatics subjects play a strategic role in equipping the younger generation with 21st-century competencies, including digital literacy, computational thinking, and collaboration and communication skills. In addition, Informatics provides a strong foundation for problem-solving skills, which are very important amid the rapid development of digital technology. Students are also trained in logic, data analysis, and information interpretation skills needed in literacy, numeracy, and other basic sciences (Said *et al*., 2024).

The importance of Informatics education is officially recognized by the government, especially stated in the Regulation of the Minister of Education and Culture Number 36 of 2018 concerning Amendments to the Regulation of the Minister of Education and Culture Number 59 of 2014 concerning the 2013 Curriculum of Senior High Schools/Madrasah Aliyah (SMA/MA), which stipulates that the implementation of Informatics subjects as an elective subject begins from the 2019/2020 school year, depending on the readiness of the school. This policy aligns with the government's efforts to address the challenges of the Industrial Revolution 4.0. The government considers that Informatics is not only an additional subject but also a science that students must master at the primary and secondary education levels. The Merdeka Curriculum is one of the government's concrete steps to update Indonesia's education system (Hidayat *et al.,* 2025).

The importance of Informatics learning in shaping students into technology producers is that it equips them with skills such as critical thinking, creativity, collaboration, and communication, which are urgently needed in the digital era (Putranto, 2024). By creating, students are trained to think *out of the box* and come up with new ideas. The positive impact of success in creating something will increase students' confidence, which is very much in line with today's world of work, which demands individuals who can not only use technology but also develop it. Informatics learning plays a crucial role in fostering students' understanding of digitalization, as in this digital era the ability to understand and utilize digital technology is essential. In Informatics learning, one of the recommended learning models is *Problem-Based Learning* (PBL) to challenge students to ask problems and also solve problems that are more complicated than before, can increase students' activeness in expressing their opinions, rally cooperation and cohesiveness of students in groups, develop student leadership and develop analytical pattern skills and can help develop processes (Satria *et al*., 2025).

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Teachers' Adaptive Strategies

Teacher adaptive strategies refer to educators' ability to adapt approaches, methods, and the use of learning media flexibly and responsively to students' various situations and needs. This adaptation is not limited to technical changes in teaching but also encompasses emotional, social, and professional aspects in responding to curriculum dynamics, technological development, and challenges in the school environment (Widiansyah *et al*., 2024).

Curriculum and learning are two elements that cannot be separated in the world of education. The curriculum will not be optimally implemented without the role of teachers. At the same time, teachers will also not be able to carry out the learning process properly without the guidance and framework of the curriculum. In the context of the Kurikulum Merdeka, the relationship between the two is getting closer and more dynamic. Teachers are required not only to be implementers of learning but also facilitators, planners, and drivers of change in the classroom (Yestiani & Zahwa, 2020). Teachers are educators who act as role models and figures with a strong influence on students' development and their environment. In the Kurikulum Merdeka, this role is increasingly complex. Teachers must be able to build positive relationships with students, manage classes effectively, and design meaningful, appropriate learning experiences tailored to each student's needs. Learning is no longer one-way, but collaborative, interactive, and adapts to the social, cultural, and student contexts.

Many teachers still have difficulty understanding and developing teaching tools that align with the principles of the Kurikulum Merdeka. Some teachers experience delays in understanding the material because they need to adjust to students' abilities, while others are overwhelmed by the rapid pace of technological development. These challenges show that adaptive strategies are not only about changing teaching methods but also about how teachers build mental toughness, reflective skills, and readiness to continue developing alongside curriculum dynamics (Karlina *et al*., 2024). Despite facing various obstacles, many teachers have taken the initiative to find solutions by joining learning communities, accessing online training, and developing independent teaching modules according to the characteristics of students in their area. These strategies show that teacher adaptation in the Kurikulum Merdeka is not instantaneous but a process that continues to develop and requires collaboration among various parties. With the right strategy, teachers can be the primary key in realizing an independent, inclusive, and practical education.

METHODS

This study uses a descriptive qualitative approach to describe the adaptive strategies of Informatics teachers in implementing the Kurikulum Merdeka at SMAN 1 Parongpong. This approach was chosen because it allows researchers to understand and describe in depth the adaptive strategies applied by Informatics teachers in the context of the Kurikulum Merdeka. Through this approach, researchers can collect data in the form of words, narratives, and documents that reflect the teacher's real experience in designing and implementing learning, without aiming to generalize the research results.

Data were collected through semi-structured, direct interviews with Informatics teachers, the main informants, to obtain in-depth information about their experiences and strategies. In addition, documentation of study methods is used for teaching tools, including Learning Outcomes (CP) Phase F, Teaching Modules Chapters 1–5, Semester Programs (Promes), and Learning Goal Achievement Criteria (KKTP). This documentation study aims to obtain accurate data on teachers' adaptive strategies in designing and implementing learning. To strengthen the validity of the data, this study applied a triangulation method by combining data from interviews and documentation. The observation method is not carried out directly because the primary focus is to delve into the teacher's experiences, views, and

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adaptive strategies obtained through in-depth interviews. Through these approaches and procedures, this study is expected to provide a comprehensive overview of the adaptive strategies of Informatics teachers in facing the challenges of implementing the Kurikulum Merdeka.

RESULTS AND DISCUSSION

The Implementation of the Kurikulum Merdeka in Informatics Learning at SMAN 1 Parongpong

Informatics teachers at SMAN 1 Parongpong use two main learning models: Problem-Based Learning (PBL) and Project-Based *Learning* (PjBL). In PBL, teachers raise real problems students face daily and connect them to ICT materials. This strategy allows students to learn in context, so the material presented feels more relevant and applicable (Nazar *et al*., 2024; Saragih & Marpaung, 2023). Based on the results of the interviews, teachers applied *the Project-Based Learning* (PjBL) model by giving group project assignments that were completed within a specific period of time, even up to one week until the project was completed. This project is designed to produce real work that is relevant to the Informatics material taught. This strategy not only encourages collaboration among students but also trains critical thinking and problem-solving skills. PjBL is efficacious in improving teamwork and problem-solving skills through hands-on experiential learning (Fatimatuzzahrah *et al*., 2023; Sucipto *et al*., 2023).

Teachers also try to make learning more engaging by connecting the material to students' daily lives. Although *the ice breaking* method is not used explicitly, teachers still show the connection between the technology learned. Its use in the classroom, which reflects the principle of *student-centered learning,* which is a learning model that focuses on active student involvement, provides freedom in exploring knowledge, and adapts teaching strategies to the individual needs, interests, and potentials of students (Sucipto *et al*., 2023). In this context, teachers are no longer the only source of information, but rather facilitators who encourage students to think critically and independently in the learning process.

In practice, the limited learning time that only lasts two hours of lessons per week is a significant challenge, especially in the application of the PBL model, which requires a longer duration for the planning, implementation, and evaluation process. In addition, limited computer laboratory facilities hinder the smooth implementation of direct practice in schools. To overcome these obstacles, teachers employ adaptive strategies by encouraging students to use personal devices, such as their own mobile phones and laptops, as a medium for practice (Widiansyah *et al*., 2024). Through this approach, teachers use network simulation applications available on the Play Store and web-based websites to teach computer programming and networking concepts. That way, students can still access practicum materials without relying on limited school facilities. This strategy reflects the form of innovation and flexibility in Informatics learning, which is very important in the implementation of the Kurikulum Merdeka (Fatimatuzzahrah *et al*., 2023).

In addition to the challenges of time and facilities, teachers also face difficulties in mastering material that is considered quite complex. Based on the interview results, the Informatics material in the Kurikulum Merdeka is considered equivalent to university-level material, including algorithms, programming, and computer networks. The teacher stated that some of the material was not covered during the lecture period, so it required independent study to deliver it optimally in class. This shows the importance of strengthening teachers' competence through continuous, context-based training (Widiansyah *et al*., 2024). The complexity of this material also has implications for the gap between the competencies expected by the curriculum and the availability of school facilities, which ultimately requires teachers to be more creative in adapting learning strategies to remain relevant and applicable. The teacher also said that students' interest and active participation increased when this learning model was applied. Students are more enthusiastic about discussing, asking questions, and completing assignments, both individually and in

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groups. However, the variation in student readiness, especially in mastering technology, remains a challenge that requires anticipatory remedial materials and exceptional assistance.

In addition to the strategy for implementing learning in the classroom, the form of teacher adaptation in implementing the Kurikulum Merdeka is also reflected in the process of preparing teaching tools. Informatics teachers independently prepare learning documents, such as Learning Outcomes (CP), Learning Goal Achievement Criteria (KKTP), Teaching Modules, and Semester Programs (Promes), by tailoring them to student characteristics and school conditions. This practice reflects the level of flexibility and professionalism of teachers in responding to the dynamics of the transition from the 2013 Curriculum to the Kurikulum Merdeka, especially in aligning basic competencies with real needs in the field (Nazar *et al*., 2024).

Learning Outcomes (CP)

Fase E Berdasarkan Elemen

Elemen	Capaian Pembelajaran
Berpikir komputasional (BK)	Pada akhir fase F, peserta didik mampu menganalisis beberapa strategi algoritmik secara kritis untuk menghasilkan banyak alternatif solusi dari satu persoalan dengan memberikan justifikasi efisiensi, kelebihan, dan keterbatasan dari setiap alternatif solusi, kemudian memilih dan menerapkan solusi terbaik, paling efisien, dan optimal dengan merancang struktur data yang lebih kompleks dan abstrak.
Teknologi Informasi dan Komunikasi (TIK)	-
Sistem komputer (SK)	Menghasilkan prototipe perangkat lunak yang berinteraksi dengan *single board computer/controller* atau kit elektronika untuk edukasi yang bisa diprogram, serta mampu mengomunikasikan produk dan proses pengembangan perangkat lunak yang dilakukan dengan menggunakan perangkat lunak aplikasi.
Jaringan Komputer dan Internet (JKI)	Pada akhir fase F, peserta didik memahami konsep lanjutan jaringan komputer dan internet meliputi topologi jaringan yang menghubungkan beberapa komputer, aspek teknis berbagai jaringan komputer, lapisan informasi dalam suatu sistem jaringan komputer (OSI Layer), komponen jaringan komputer, dan mekanisme pertukaran data, konsep *cyber security*, tata kelola kontrol akses data, serta faktor-faktor dan konfigurasi keamanan jaringan.
Analisis data (AD)	-
Algoritma dan Pemrograman (AP)	Pada akhir fase F, peserta didik mampu mengembangkan program modular yang berukuran besar menggunakan bahasa pemrograman yang ditentukan, mampu memahami, memelihara, dan menyempurnakan struktur program (aspek statik) dan eksekusi (aspek dinamik) suatu *source code*, memahami algoritma standar dan strategi efisiensinya, merancang dan mengimplementasikan struktur data abstrak yang kompleks seperti beberapa *library* standar termasuk *library* untuk *Artificial Intelligence* dan *library* untuk pengolahan data bervolume besar, serta menerjemahkan sebuah

Figure 1. Summary of Learning Outcomes: Phase F of Informatics
Source: SMAN 1 Parongpong

Figure 1 shows the competencies students must achieve at the end of the learning phase. In phase F (Class XI), achievements include an understanding of algorithms, computer networks, and project-based programming skills. Teachers use this document as the primary reference for designing learning that emphasizes high-level thinking skills and digital literacy.

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Learning Objectives Achievement Criteria (KKTP)

No ATP	Alur Tujuan Pembelajaran	Skala atau Interval Nilai			
		0 – 40%	41 – 65%	66 – 85%	86 – 100%
		Belum mencapai, remedial di seluruh bagian	Belum mencapai ketuntasan, remedial di bagian yang diperlukan	Sudah mencapai ketuntasan, tidak perlu remedial	Sudah mencapai ketuntasan, perlu pengayaan
	mengembangkan dan menguji program untuk menyelesaikan *problem*.				
Bab 3 : Berpikir Kritis dan Dampak Sosial Informatika					
3.1	1. Peserta didik mampu menjelaskan arti berpikir kritis. 2. Peserta didik mampu menjelaskan pentingnya berpikir kritis serta memahami bahwa berpikir kritis harus jelas konteksnya. 3. Peserta didik mampu menjelaskan prinsip dasar berpikir kritis yang mencakup elemen berpikir, standar intelektual, dan keutamaan intelektual, dengan mengacu ke salah satu referensi yang diberikan. 4. Peserta didik mampu menerapkan berpikir kritis dalam				

Figure 2. Snippet of Learning Goal Achievement Criteria (KKTP)
Source: SMAN 1 Parongpong

Figure 2 shows how KKTP is a measuring tool used to assess students' mastery of learning objectives. The KKTP table shows the achievement indicators described at various levels (0-40%, 41-65%, etc.). With the existence of KKTP, teachers can appropriately identify students who need additional guidance, which is a form of evaluative adaptation responsive to students' diverse abilities.

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Teaching Module/RPP

LAMPIRAN

A. LEMBAR KERJA PESERTA DIDIK

Ayo Berdiskusi!

Aktivitas Berkelompok

Aktivitas BKDSI-K11-01-U: Dunia Sekitarku

Setelah menyimak beberapa peristiwa dalam pengantar materi di atas, selanjutnya diskusikan beberapa pertanyaan berikut dalam kelompok.

Ayo Membaca!

Aktivitas Individu

Aktivitas BKDSI-K11-02-U: Arti Berpikir Kritis

Di bagian ini, kalian akan belajar membaca secara kritis.

Ayo Berdiskusi!

Aktivitas Berkelompok

Aktivitas BKDSI-K11-03-U: Mengambil Keputusan Secara Kritis

Pada bagian ini kalian akan berdiskusi di dalam kelompok untuk berlatih mengambil keputusan dengan menimbang secara kritis faktor-faktor yang mempengaruhi pengambilan keputusan. Dalam kelompok, temukan sebuah kasus nyata pengambilan keputusan yang pernah atau mungkin akan kalian alami suatu saat nanti. Kalian juga bisa mengingat pengalaman saat mengerjakan tugas kelompok dalam mata pelajaran lain. Mungkin saat itu kalian harus memutuskan sesuatu terkait tugas tersebut.

Untuk kasus tersebut, temukan:

- tujuan pengambilan keputusan
- kriteria maupun sub kriteria yang akan dipakai untuk mengambil keputusan
- alasan penetapan kriteria dan sub kriteria

Gambarkan dalam bentuk bagan seperti pada contoh Gambar 3.6 Guru akan memberi kesempatan setiap kelompok untuk mempresentasikan hasil diskusi kalian.

Ayo Membaca!

Aktivitas Individu

Aktivitas BKDSI-K11-04-U: Apa itu Elemen Berpikir, Standar Intelektual, dan Karakter Intelektual

Figure 3. Teaching Module Snippets
Source: SMAN 1 Parongpong

Teaching modules are prepared independently by teachers based on CP and KKTP, which are adjusted to the context and needs of students. This module features activity-based learning approaches, including group discussions, critical reading, and decision-making. The material provided not only teaches technical concepts but also hones students' critical thinking skills through real-world scenarios. This supports the practice *of student-centered learning* when students are actively involved in the construction of knowledge.

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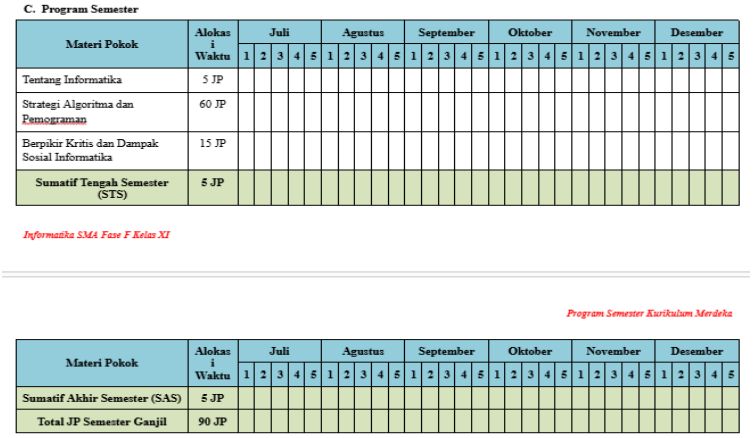
Semester Program (Promes)



C. Program Semester

Materi Pokok	Alokasi Waktu	Juli					Agustus					September					Oktober					November					Desember				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Tentang Informatika	5 JP																														
Strategi Algoritma dan Pemograman	60 JP																														
Berpikir Kritis dan Dampak Sosial Informatika	15 JP																														
Sumatif Tengah Semester (STS)	**5 JP**																														

Informatika SMA Fase F Kelas XI

Program Semester Kurikulum Merdeka

Materi Pokok	Alokasi Waktu	Juli					Agustus					September					Oktober					November					Desember				
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Sumatif Akhir Semester (SAS)	**5 JP**																														
Total JP Semester Ganjil	**90 JP**																														

Figure 4. Semester Program Snippets
Source: SMAN 1 Parongpong

Promes compiles the distribution of time and allocation of lesson hours based on the subject matter in one semester. From **Figure 4**, it can be seen that most of the allocation is to algorithmic and programming strategies (60 JP), indicating that the technical aspect is the primary focus. However, time is also allocated to social aspects and critical thinking, indicating a balance between cognitive and effective learning.

Discussion

The findings of this study indicate that Informatics teachers at SMAN 1 Parongpong employ a distinctive adaptive strategy to address the challenges of implementing the Kurikulum Merdeka. The application of the PBL and PjBL models is not solely a methodological choice, but a response to the need to instill critical and collaborative thinking skills that are part of the Pancasila Student Profile. This aligns with findings that PjBL is effective in building 21st-century skills, especially in the context of technology project-based learning (Afni, 2020; Undari *et al*., 2023). However, the Informatics material in Phase F is fairly difficult, so teachers need to continue improving their competence. In addition, it takes a high interest in learning from students and *a mindset* that problems can be solved to make this project-based learning a success. To overcome the limitations of facilities such as computer labs, teachers utilize personal devices and web-based applications as alternatives. Based on the teaching modules that have been made independently by the teacher, it is also seen that the teacher tries to create a space for students to be actively involved in the class. The rest is how the teacher can make the classroom atmosphere fun to follow, so that the interest in learning can grow further among the students. This shows creativity in facing limitations. When compared with previous findings showing that ICT teachers in the 2013 Curriculum were still predominantly using the lecture method, the Kurikulum Merdeka saw a shift towards more active and participatory learning (Sucipto *et al*., 2023). Teachers are no longer the only source of information; they now act as facilitators who support students in the learning process.

Supporting documents such as Learning Outcomes (CP), KKTP, Teaching Modules, and Semester Programs (Promes) are also still used in the Kurikulum Merdeka. However, interestingly, teachers do not only follow these documents administratively, but also adjust them to the needs and conditions of the classroom (Nazar *et al*., 2024). This reinforces the view that the Kurikulum Merdeka provides teachers with space to design relevant and contextualized learning. In the end, teachers remain the main spearhead

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who need to prepare themselves in terms of teaching readiness and creativity to create a flexible and fun learning environment for students (Hardiyanti & Sastrawati, 2025).

Overall, the findings of this study show that teachers' adaptive strategies emerged not only because of technical limitations but also because of a desire to ensure that learning remains meaningful and aligned with students' needs. Compared with previous research, it is clear that implementing the Kurikulum Merdeka, especially in the subject of Informatics, requires a combination of subject-matter understanding, innovative teaching, and the ability to adapt to school conditions. This is the core of teachers' adaptive strategies in a time of transformative curriculum change.

CONCLUSION

This research reveals that Informatics teachers at SMAN 1 Parongpong have developed various adaptive strategies to address the challenges of implementing the Kurikulum Merdeka, including limited facilities, students' limited digital skills, and the complexity of relatively new materials. These strategies include implementing problem- and project-based learning models, using students' personal devices in digital practice, preparing contextual materials, and strengthening teachers' competencies through independent learning. The Kurikulum Merdeka, which provides flexibility, has opened up space for teachers to innovate, adapt learning methods to students' characteristics and interests, and overcome obstacles in a creative and solution-oriented way. Therefore, the implementation of the Kurikulum Merdeka in Informatics learning is highly dependent on teachers' ability to adapt actively and reflectively. To support the sustainability of this strategy, systematic support is needed in the form of relevant training, the provision of adequate facilities, and education policies that support the equitable implementation of Informatics subjects in all schools. Thus, this study succeeded in describing the adaptive strategies applied by Informatics teachers in implementing the Kurikulum Merdeka, including the challenges and solutions they found in classroom learning practices.

As a suggestion, further research can explore the specific effectiveness of each adaptive strategy used by teachers, such as project-based learning, collaborative approaches, or technology integration in informatics learning. Additionally, it is important to explore the impact of these strategies on student motivation and learning outcomes. In-depth study of the process of reflection and evaluation of strategies by teachers can also enrich understanding of how the strategy is tailored to the needs and characteristics of students.

AUTHOR'S NOTE

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REFERENCES

Afni, N. (2020). Penerapan model Problem Based Learning (PBL) di sekolah dasar. *Social, Humanities, and Educational Studies (SHES): Conference Series, 3*(4), 1000-1004.

https://doi.org/10.64014/hipkin-jer.v2i3.230

Farhan, A., Furqon, A., Alfiah, N., & Noor, A. M. (2023). Implementasi kurikulum merdeka belajar pada mata pelajaran informatika/TIK di SMP Al Manshuriyah Pemalang. *Madaniyah*, *13*(1), 19-28.

Fatimatuzzahrah, F., Sakinah, L., & Alyasari, S. A. (2023). Problematika implementasi kurikulum merdeka di sekolah: Tantangan membangun kualitas pendidikan. *Jurnal Bintang Pendidikan Indonesia*, *2*(1), 43-53.

Hardiyanti, N., & Sastrawati, E. (2025). Analisis konseptual perencanaan kurikulum pendidikan dasar dalam perspektif kurikulum merdeka. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, *10*(4), 300-310.

Hidayat, R., Sukiman, S., Suyatno, S., & Samaalee, A. (2025). Implementasi Platform Merdeka Mengajar dalam pengembangan kompetensi guru: Systematic literature review. *Journal of Education Research*, *6*(4), 791-804.

Jannah, R. R., Waluya, St. B., Asikin, M., & Zaenuri, Z. (2021). Systematic literature review: Pembelajaran Project Based Learning (PjBL) terhadap kemampuan literasi Matematika siswa. *IJoIS: Indonesian Journal of Islamic Studies*, *2*(2), 227-234.

Karlina, S., Khoirany, N. S., Nurantika, R., Rahmani, S. N., Nurjamilah, S., & Rahman, A. S. (2024). Tantangan guru dan siswa dalam penerapan Kurikulum Merdeka belajar di sekolah. *Sanskara Pendidikan dan Pengajaran*, *2*(03), 172-179.

Kusumadewi, R., Susilowati, N., Hariyani, L., & Nita, A. F. (2023). Peranan guru penggerak dalam kurikulum merdeka era merdeka belajar. *Jurnal Impresi Indonesia*, *2*(8), 821-827.

Lestari, D., Asbari, M., & Yani, E. E. (2023). Kurikulum merdeka: Hakikat kurikulum dalam pendidikan. *Journal of Information Systems and Management (JISMA)*, *2*(6), 85-88.

Marethi, I., Rafianti, I., & Setiani, Y. (2024). Tinjauan literatur sistematis tentang berpikir komputasional dalam pendidikan matematika: Implikasi dan tantangan. *Wilangan: Jurnal Inovasi dan Riset Pendidikan Matematika, 5*(4), 351-368.

Nabilah, B., Zakir, S., Murtiyastuti, E., & Mubaraq, R. I. (2023). Analisis penerapan mata pelajaran Informatika dalam implementasi kurikulum merdeka tingkat SMP. *Pijar: Jurnal Pendidikan dan Pengajaran*, *1*(1), 110-119.

Nasution, A. F., Ningsih, S., Silva, M. F., Suharti, L., & Harahap, J. P. (2023). Konsep dan implementasi kurikulum merdeka. *Competitive: Journal of Education*, *2*(3), 201-211.

Nazar, E. R., Nasir, N., Bagea, I., & Abubakar. (2024). Peluang dan tantangan implementasi kurikulum merdeka belajar: Sebuah studi interview di sekolah penggerak dan mandiri berubah. *Kelola: Jurnal Manajemen Pendidikan*, *11*(1), 18-31.

Nugraha, T. S. (2022). Kurikulum merdeka untuk pemulihan krisis pembelajaran*. Inovasi Kurikulum, 19*(2), 251-262.

Ocy, D. R., Rahayu, W., & Arthur, R. (2024). Rasch model analysis: Evaluating students' spatial thinking ability in Higher-Order Thinking Skills Trigonometric Comparison Assessment (HOTS-TCA). *Jurnal Gantang*, *9*(2), 191-204.

Paramita, E., Aminullah, A., Ratnasari, D., & Husna, A. (2025). Transformasi perkembangan kurikulum di Indonesia. *Jurnal Pendidikan dan Pembelajaran Indonesia (JPPI)*, *5*(1), 169-184.

Pratiwi, N., Ahman, E., & Disman. (2023). Efektivitas model Project Based Learning (PjBL) dalam pembelajaran ekonomi SMA pada kurikulum merdeka. *Jurnal Neraca: Jurnal Pendidikan dan Ilmu*

https://doi.org/10.64014/hipkin-jer.v2i3.230

Ekonomi Akuntansi, *7*(2), 143-154.

Putranto, F. K. H. (2024). Peran pembelajaran informatika dalam menumbuhkan pemahaman literasi digital pada siswa. *Jurnal Tahsinia, 5*(8), 1131-1142.

Putri, R. T. U., Kristanto, A., Karwanto, K., Roesminingsih, E., & Hariyati, N. (2024). Proyek penguatan profil pelajar Pancasila pada kurikulum merdeka dalam mewujudkan pendidikan karakter. *Journal of Education Research*, *5*(3), 2523-2529.

Rahayu, L., Junita, A., Fiani, F. R., Putra, M. J. A., & Sari, M. Y. (2024). Kesiapan guru dalam mengimplentasikan Projek Penguatan Profil Pelajar Pancasila (P5) pada kurikulum merdeka di sekolah dasar. *Jurnal Ilmu Pendidikan dan Kearifan Lokal, 4*(5), 475-485.

Rohim, D. C., & Nugraha, Y. A. (2023). Pengaruh model project based learning terhadap kemampuan numerasi siswa di SD Jatiroto 01. *Jurnal Review Pendidikan Dasar: Jurnal Kajian Pendidikan dan Hasil Penelitian*, *9*(3), 183-189.

Said, N. N. A., Hanafi, H. F., Naning, F. H., Mat Alim, M., & Dewi, I. P. (2024). A review of barriers and benefits for implementing computational thinking initiatives in secondary schools. *Journal of ICT in Education*, *11*(1), 127-140.

Saragih, O., & Marpaung, R. (2024). Tantangan dan peluang: Studi kasus penerapan kurikulum merdeka di sekolah mandiri berubah Kabupaten Tapanuli Utara. *Jurnal Pendidikan dan Pembelajaran Indonesia (JPPI)*, *4*(3), 888-903.

Sari, A. P., Zumrotun, E., & Sofiana, N. (2023). Implementasi Projek Penguatan Profil Pelajar Pancasila (P5) di sekolah dasar. *Qalam: Jurnal Ilmu Kependidikan*, *12*(2), 65-75.

Satria, M. T. N., Kholis, N., Khonsa, N. H., Muslichah, N. W., Nurahmad, N., Susanto, O. W. N., Rijanto, T., & Chusaini, M. (2025). Penerapan model pembelajaran Problem Base Learning (PBL) terhadap penguatan keterampilan literasi digital dan berpikir komputasional pada mata pelajaran Informatika. *Jurnal Ilmiah Edutic: Pendidikan dan Informatika*, *12*(1), 29-39.

Septiani, D., Fatihah, L. A., Abellia, M., Adzim, Q. F. K. E., Candrapadmi, S., & Setiadi, W. A. (2024). Kurikulum merdeka: Readiness in facing curriculum changes at SMAN 1 Lembang. *Hipkin Journal of Educational Research*, *1*(2), 189-202.

Sucipto, S., Sukri, M., Patras, Y. E., & Novita, L. (2024). Tantangan implementasi kurikulum merdeka di sekolah dasar: Systematic literature review. *Kalam Cendekia: Jurnal Ilmiah Kependidikan*, *12*(1), 277-287.

Undari, M., Darmansyah, D., & Desyandri, D. (2023). Pengaruh penerapan model PjBL (Project-Based Learning) terhadap keterampilan abad 21. *Jurnal Tunas Bangsa*, *10*(1), 25-33.

Wahdini, F., Mansur, H., & Qomario, Q. (2024). Evaluasi kinerja guru informatika dalam pelaksanaan Kurikulum merdeka untuk meningkatkan mutu pendidikan. *JIIP-Jurnal Ilmiah Ilmu Pendidikan*, *7*(6), 5779-5788.

Widiansyah, S., Hidayat, S. P., Kamil, S. I., Purba, I. D. L. B., Rahmawati, U., & Khairo, F. M. A. (2024). Kesiapan guru dalam menghadapi tantangan implementasi kurikulum merdeka. *Harmoni Pendidikan : Jurnal Ilmu Pendidikan*, *2*(1), 344-362.

Yestiani, D. K., & Zahwa, N. (2020). Peran guru dalam pembelajaran pada siswa sekolah dasar. *Fondatia, 4*(1), 41-47.

https://doi.org/10.64014/hipkin-jer.v2i3.230