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Learning and Innovating Skills in Vocational High Schools: Systematic Literature Review

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Abstract

This systematic literature review aims to describe the learning and innovation skills in Vocational High Schools. Utilizing a systematic review methodology, the findings highlight the influence of various teaching methods and strategies on the development of learning and innovation skills. These include Active Learning, Career-Based Learning Strategies, Integrated Teaching and Learning, Project-Based Learning (PjBL) focusing on 21st-century skills, PjBL in Vocational High Schools, Project-Based Efficacy, Skill-Based Learning, and Teaching Strategies. Notably, the implementation of Active Learning, such as Quiz Team and Learning Tournament methods, has proven effective in enhancing collaboration, motivation, and student academic achievements. Career-based strategies emphasize the integration of soft skills. The review underscores the central focus on developing students' character, auto-systemic thinking, complex reasoning skills, and critical reading-thinking skills. Challenges in vocational education are addressed through multiple representations. Strategic steps, including the evaluation of media and learning resources, assessing graduates' employability, curriculum adjustments, industry collaborations, and programs like teaching factories, aim to minimize competency gaps between graduates and workforce demands. By integrating learning and innovation skills into education, SMKs can offer relevant, adaptive, and holistic development for students, preparing them for success in their careers and fostering innovative contributions to society. A systematic evaluation focusing on learning objectives and student needs ensures an effective learning approach and the attainment of educational goals.

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INTRODUCTION

The Ministry of Education, Research, and Technology stated that the vision of Indonesian education in 2035 is to build the Indonesian people to become excellent

lifelong learners, continue to develop, prosper, and have noble morals by cultivating Indonesian cultural values and Pancasila. Education in Indonesia is directed to help every individual in Indonesia to continue learning and developing throughout their lives. Instilling moral and ethical values, with the aim of forming a noble character includes the cultivation of Indonesian cultural values and Pancasila, which is the basis of state ideology, in the educational process. Based on the Decree of the Education Curriculum and Assessment Standardization Board number 022 / h / kr / 2022 concerning learning outcomes in shaping competencies (hard skills), soft skills and character of students in the field of maintenance and repair of motor vehicles so that they become citizens who believe, fear God Almighty, and have noble character, global diversity, mutual cooperation, independence, critical reasoning, and creativity.

21st century learning has its own characteristics and uniqueness, where learning carried out in educational institutions must be student-centered, by designing learning that allows students to be actively involved in the learning process and teachers become examples of learners who direct and manage classes (Syaputra &; Sariyatun, 2019). According to The Partnership for 21st Century Skills (2015), three subjects that must be taught to learners include life and career skills, learning and innovation skills, as well as information, media, and technology skills, which in learning and innovation skills include critical thinking skills (critical thinking), creativity (creative), collaboration (collaboration), and communication (communication). Based on research conducted by Aliftika, Purwanto, and Utari (2019) shows that students' critical thinking, communication, and collaboration skills are close to standard, while creativity and innovation skills are below standard.

Based on research conducted by Putriani and Aini (2022), Hardianto, Mahanal, and Zubaidah (2023), Mabrurah, Qadar, and Sulaeman (2023), it was found that the critical thinking skills of vocational high school students are in the low category. These studies highlight the importance of developing and improving critical thinking skills among vocational secondary school learners in a variety of subjects. According to Bishop, Kramers, and Camiré (2023), learning in secondary school can play an important role in cultivating critical thinking skills among learners. Creativity is considered by Adeoye and Jimoh (2023), Winaryati, Munsarif, Mardiana, and Suwahono (2021), Soykurt (2021), and Puspitasari (2020) as important skills to be implemented in 21st century learning as optimization of innovation, problem solving, and student collaboration. The creativity of vocational students can be increased through creative project-based learning models (Usmeldi &; Amini, 2022), improving learning skills such as reading speed, text comprehension, and math skills, associated with creativity in secondary school students (Magenes, Cancer, Curti, Pradella, &; Antonietti, 2022), and the implementation of problem-based learning (Mulyadi, 2022). Increasing student creativity according to Prasetya and Nadiroh (2018) is very urgent because it has a significant impact on the quality of student creativity, as well as the quality of educational institutions.

Based on research conducted by Adeoye & Jimoh (2023), there is a research gap related to the development of more specific and detailed theoretical models to develop problem-solving skills. A more in-depth study in developing theoretical models that can be applied practically in an educational environment can be a valuable contribution. The relationship between problem-solving skills and academic achievement, success in the workforce, and higher levels of innovation and creativity, but the research gap may lie in the lack of quantitative impact measurement. Advanced research that focuses on measuring the direct impact of developing problem-solving skills on innovation, creativity, and learner success in a more measurable manner could be an exciting area of research. In Putriani and Aini's (2022) research, there is a research gap that can lie in the lack of research that quantitatively measures the effectiveness of learning strategies in

improving mathematical critical thinking skills in vocational high school students. Further research that focuses on measuring impact in more detail can provide a deeper understanding. Hardianto et al. (2023) concluded that the RICOSRE-FC learning model has the potential to improve the critical thinking skills of high school students in biology learning. However, a possible research gap is a lack of information about the impact of these learning models on specific aspects of critical thinking skills, such as analysis, evaluation, or proof. Bishop et al. (2023) explain about exploratory case research that explores missed opportunities for critical awareness in secondary school training.

The research gap of this article is the lack of emphasis on developing critical awareness in the context of training in secondary schools, as well as the lack of understanding of how this concept can be integrated into existing youth development frameworks. Winaryati et al. (2021) promote creativity and innovation in the teaching and learning process, as well as the importance of a supportive environment for schools to promote creativity and innovation, but no research has been conducted on how creativity and innovation are integrated with classroom learning. Puspitasari (2020) conducted research on implementing activity-based projects to develop 21 skills in teachers across generations and create a more inclusive and creative learning environment. Creative activities in foreign language classes have advantages such as supporting critical thinking, increasing students' concentration, and creating a more open learning atmosphere. Prasetya and Nadiroh (2018) highlight the importance of developing student creativity programs in education by increasing the quantity and quality of student creativity programs that can make a positive contribution to educational progress. They also highlight the need for a holistic approach in developing learners' creativity, which includes cognitive, affective, and psychomotor aspects. Further research in can provide deeper insights into how to increase the quantity and quality of learner creativity programs as well as their impact on education.

Curriculum changes are a challenge for teachers to present ideal learning in accordance with the demands of the Merdeka curriculum (Bilqisthi et al., 2023). To achieve the expected graduates, constrained by the low critical thinking skills of students as evidenced by the low learning outcomes using questions with high order tihinking skills criteria. There is no project-based learning guide available as a learning guide that is integrated with critical thinking, collaboration, communication and creativity skills.

The importance of learning and innovation skills is increasingly recognized as an essential ability that distinguishes between learners who are ready to face the complex challenges of life and work in the 21st century and those who are not (Erdoğan, 2019). Research has shown that prioritizing problem-solving skills enables learners to analyze complex problems, develop creative solutions, and implement those solutions effectively (Adeoye &; Jimoh, 2023). Learners need skills such as critical thinking, decision-making, and the ability to solve complex problems (Lu & Caballes, 2022). Teachers play an important role in integrating learning skills and innovation into the classroom, but they face challenges in choosing the right materials for learners with different abilities (Prayoga, Padmadewi, & Agustini, 2020). Integrating 21st century skills, including communication, collaboration, critical thinking, problem-solving, creativity, and innovation into the curriculum can be achieved through project-based learning, allowing learners to respond to complex questions and challenges (Kumaro &; Barliana, 2022).

Berdasarkan latar belakang masalah di atas maka tujuan penulisan penelitian kualitatif ini adalah untuk menyusun konstruksi teori baru terkait Keterampilan Belajar dan Berinovasi Peserta Didik Sekolah Menengah Kejuruan

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METHOD

Desain

The design used in writing this article is a systematic literature review. Data retrieval techniques using literature search are through the google scholar journal database with keywords used to search for journals are "Learning and innovation skills", "21st century skills", "Soft skills". From the keywords "Learning and Innovation Skills" there are 14 articles, "21st century skills" there are 27 articles, and "Soft skills" there are 24 articles. The collected articles were then screened according to relevant studies, thus obtaining as many as 12 articles used for theoretical construction on Learning and Innovating Skills of Vocational High School Students

Data Analysis Techniques

Data analysis techniques using qualitative, the sequence is to make reductions, create codes, and compile concept maps. Data reduction is the process of sorting and concentrating important information, simplifying, summarizing, and transforming data collected during research into a form that is easier to understand and analyze. Data reduction helps researchers to identify the most important and relevant information to the research objectives. Code generation by assigning labels or codes to segments of data to facilitate grouping similar ideas. These codes allow researchers to organize data and find patterns or themes. The preparation of concept maps through the process of visualizing relationships between concepts that have been identified through code (Mahmudah, 2021). Concept maps help researchers to visualize and understand complex relationships between various data elements. Data analysis techniques using the help of Atlas.ti software version 8

RESULTS AND DISCUSSION

Based on literature search that has been carried out through various journal databases, the relevant publication results for this literature review review can be seen in the table below.

Table 1. Relevant Research Findings

No.	Author	Judul	Negara
1	Tajuddien dan Faroh (2021)	*21st Century Skill Grouping in Public Vocational School Students in Indonesia*	Indonesia
2	Le, Hlaing, dan Ya (2022)	*21st-century competences and learning that technical and vocational training*	Thailand
3	Mutohhari, Sutiman, Nurtanto, Kholifah, dan Samsudin (2021)	*Difficulties in Implementing 21st Century Skills Competence in Vocational Education Learning*	Indonesia
4	Bunyamin, Samsudi, dan Rohman (2022)	*Soft Skill Improvement Strategy for Vocational High School Students Base on Career and 21st Century Learning Oriented*	Indonesia
5	Sutianah (2022)	Peningkatan Soft Skills Peserta Didik Melalui *Integrated Teaching And Learning* Berbasis	Indonesia

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		Jobskils Di Sekolah Menengah Kejuruan (Smk)	
6	Nuryanto dan Eryandi (2020)	*The 21st Century Ideal Skills for Vocational High Schools*	Indonesia
7	Hidayatulloh dan Ashoumi (2022)	*The perspective of work readiness in vocational school students with 21st century communication and collaboration skills*	Indonesia
8	Sudjimat, Nyoto, dan Romlie (2021)	*Implementation of Project-Based Learning Model and Workforce Character Development for the 21st Century in Vocational High School*	Indonesia
9	*Apriadi dan Sudjimat (2020)*	*Project-based learning to improve learning outcomes and 21st century skills of vocational high school students competency of light vehicle engineering skills*.	Indonesia
10	González-Pérez dan Ramírez-Montoya (2022)	*Components of Education 4.0 in 21st Century Skills Frameworks: Systematic Review*	Mexico
11	Soderlund (2020)	*Implementing 21st Century Learning and Innovation Skills in Classrooms*	Amerika Serikat
12	Sari dan Wardhani (2020)	*Critical thinking as learning and innovation skill in the 21st century*	Indonesia

Based on table 1, then the relevant publication results are analyzed using the help of atlas.ti software version 8. The first analysis carried out was reducing data and compiling research coding. The results of the coding can be seen in tables 2 and 3.

Tabel 2. Reduksi Data

"Most are oriented toward students, developing competencies through the dimensions of character, meta-learning, and linking active learning teaching strategies"."It concludes with a refection on creating educational models to develop complex-reasoning competencies and auto-systemic thinking to support problem- solving and address social need"s. (González-Pérez & Ramírez-Montoya, 2022)	◇ Active Learning ◇ auto-systemic thinking ◇ Complex-reasoning competen... ◇ Developing of character ◇ meta-learning ◇ Student-sentris ◇ Teaching Strategies
"There is a gap between expectations and reality between high school graduates and the needs of industry and the world of work". "There is no link and match between graduates and needs". "Hard skills and soft skills are not	● Industry-need and school-graduates gap ● Graduates-needs mismatch

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22

yet balanced". Tajuddien dan Faroh (2021)

The project-based learning model is recommended for technical and vocational education. Several research studies have shown that this model develops the skills required in the 21st century. (Le dkk., 2022)

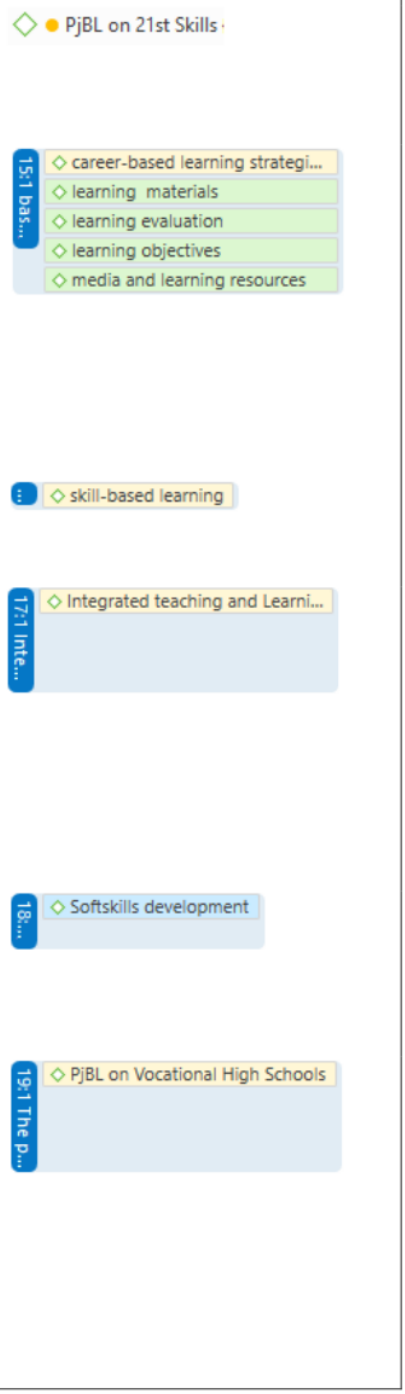
"Based on the resulting SWOT analysisthe highest score for the strength-opportunity strategy (SO: 3.53), whereimproving the soft skills of vocational students based on career-oriented learning in the 21st century, can optimize the SO strategy in all aspects, namely: 1) learning objectives; 2) basic behavior of students; 3) learning materials; 4) career-based learning strategies oriented to 21st century skills; 5) media and learning resources; and 6) learning evaluation" ,Bunyamin dkk. (2022)

"such as training and developing the competence of teachers and students in implementing 21st century skill-based learning, need to be improved", Mutohhari dkk. (2021)

Integrated Teaching and Learning berbasis Kecakapan Kerja di SMK dalam project based learning dapat mengembangkan dan meningkatkan soft skills peserta didik, yaitu *communication skills, interpersonal skills, social skills, emotional skills, humanities, collaboration skills, critical thinking*, memiliki kreatifitas, bekerja sama, berpikir kritis, peduli lingkungan, tanggung jawab, etos kerja, keterampilan beradaptasi, dan berpikir kreatif, dan *showing innovation*. Sutianah (2022)

"Seeing the various urgencies of SMKs in facing the era of the industrial revolution 4.0 which is developing at this time, it is very necessary to support the development of soft skills that need to be provided for vocational students", Nuryanto dan Eryandi (2020)

"The project planning carried out by VHS teachers in implementing the PjBL model can be described as follows: (1) planned projects have various characteristics, including (a) formulated from the simple to complex workpieces with certain functions and are worthy of sale, (b) simple projects are formulated from one or several basic competencies in one particular subject. Contrastingly, complex projects are formulated from several basic competencies in various subjects in cross-expertise competencies or



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cross- programs, (2) some of the projects were formulated by a team of vocational teachers from certain VHS and industries; and (3) most projects were formulated without involving students", Sudjimat dkk. (2021)	
"Communication and collaboration skills had both partial and simultaneous influences on student work readiness. Also, these skills were directly proportional to the level of the vocational students' work readiness", Hidayatulloh dan Ashoumi (2022).	◇ Skills Impact
"The fourth learning skill, critical thinking, is successfully implemented when teachers utilize service learning opportunities, have a welcoming classroom environment, and challenge learners to critically think at developmentally appropriate levels", Soderlund (2020)	◇ developmentally appropriate l...
"the application of project-based learning model is able to improve the 21st century skills of students with different prior knowladge and able to improve students' learning outcomes", Apriadi dan Sudjimat (2020)	◇ Project-Based Efficacy
"The results showed a positive correlation between critical reading skills with critical thinking skills", Sari dan Wardhani (2020)	◇ critical reading-thinking skills

Tabel 3. Koding Penelitian

Code	Grounded	Code	Grounded
Active Learning	1	developmentally appropriate levels	1
career-based learning strategies oriented	1	meta-learning	1
Integrated teaching and Learning	1	Skills Impact	1
PjBL on 21st Skills	1	Softskills development	1
PjBL on Vocational High Schools	1	Graduates-needs mismatch	1
Project-Based Efficacy	1	Industry-need and school-graduates gap	1
skill-based learning	1	learning materials	1
Teaching Strategies	1	learning evaluation	1
auto-systemic thinking	1	learning objectives	1
critical reading-thinking skills	1	media and learning resources	1
Developing of character	1	Student-sentris	1

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Berdasarkan koding penelitian di atas, selanjutnya disusun peta konsep penelitian sebagai *novelty*/temuan penelitian yang didapatkan.

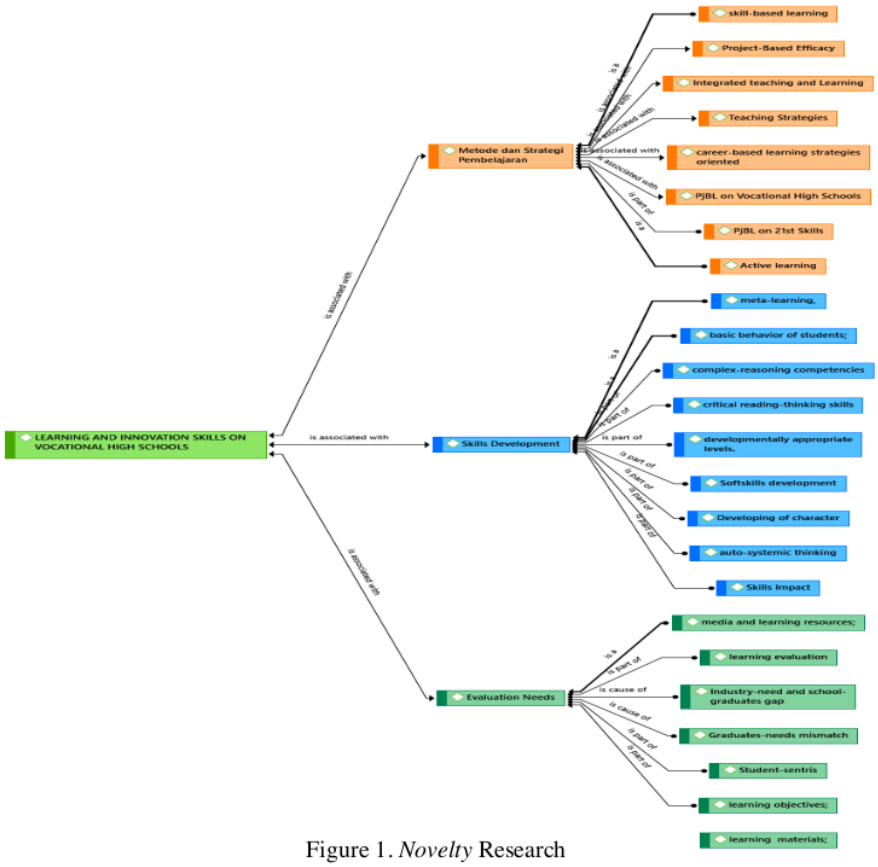

Figure 1. *Novelty* Research

Based on the above findings, it can be discussed as follows:

Learning Methods and Strategies

Learning and innovation skills in Vocational High Schools are influenced by the learning methods and strategies implemented. Based on the review conducted on related articles, indicators were obtained *Active learning, career-based learning strategies oriented, Integrated, teaching and Learning, PjBL on 21st Skills, PjBL on Vocational High Schools, Project-Based Efficacy, skill-based learning, Teaching Strategies* as indicators related to learning methods and strategies in SMK.

Active learning is a learning approach that involves direct participation of students in the learning process, keeping them away from the role of passive recipients of information, (Ren et al., 2021) (Syakdiyah et al., 2019) . In the vocational high school (SMK) environment, several effective active learning methods have been applied through the Quiz Team method (Astra, Susanti, &; Wulandari, 2021), where students work together in teams to answer quizzes, improve collaboration, and their learning outcomes. In addition, the Learning Tournament method encourages student activeness and learning

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achievement through healthy competition (Islami, Candra, Usmeldi, Sartiva, &; Imelda, 2020). The application of active learning in vocational schools aims to create a fun learning environment, increase learning motivation, and enable students to develop their skills. This is important because it can help students prepare for the world of work that requires skills to innovate and adapt to change.some of the benefits of active learning are increasing learning ability and understanding of concepts, increasing learning motivation, helping students develop skills to innovate and adapt, providing an interesting and inclusive learning environment (Maulia, Chung, &; Okon, 2023).

Career-based learning strategies in Vocational High Schools (SMK) that focus on developing learning skills and innovation involve the integration of students' soft skills into the learning process (Bunyamin et al., 2022). The main objective of this strategy is to prepare learners to be able to compete in the job market and the world of entrepreneurship by bringing together the development of hard skills and soft skills. Some of the strategies that can be implemented include improving Career-Based Soft Skills, which involves designing learning objectives, basic behaviors of learners, learning materials, career-oriented learning strategies with a focus on 21st century skills, as well as the use of media and learning resources, including learning evaluation. In addition, SWOT Analysis becomes an important tool by evaluating strengths, weaknesses, opportunities, and threats in the development of soft skills of vocational students. This approach helps formulate strategies that can optimize existing strengths and opportunities.

Character and career development is the main focus, by increasing the role of schools in shaping the character and career orientation of vocational students. This includes ensuring that learning is not only limited to improving knowledge and skills (*hard skills*), but also strengthening *soft skills*. This strategy aims to prepare students to compete in the world of work and entrepreneurship by aligning the development of hard skills and soft skills. It is hoped that through the implementation of this strategy, SMK students can develop skills that are in accordance with the demands of the world of work, enabling them to compete and adapt to the dynamics of change that occur.

Integrated *teaching and learning* is an approach that integrates various subjects or skills into a single lesson or project. This approach has been shown to have a positive impact on the development of learners' critical thinking skills and understanding of concepts. In addition, integrated learning is recognized as an effective method to facilitate the acquisition of 21st century skills and competencies in the context of learning. The applicability of integrated learning can be implemented in various educational contexts, including in vocational high schools (SMK). The main principles of integrated learning include the stages of theme extraction, implementation, evaluation, and reaction. As an important step to improve the quality of STEM-based teaching and learning, teachers are expected to have mastery of conceptual models, design, implementation, and evaluation of integrated learning (Ananda &; Salamah, 2021). Thus, this approach becomes the foundation for achieving more holistic and relevant learning in supporting the development of learners in the contemporary education era. 31

Project-Based Learning (PjBL) is a learning method that places emphasis on developing 21st-century head skills, such as critical thinking, collaboration, creativity, and communication. In PjBL, learners are given the opportunity to work on real-world problems and develop solutions through a process of research, collaboration, and reflection. PjBL has been implemented in various types of secondary schools, including vocational and non-vocational schools, with the aim of preparing learners to face challenges in the work environment. Research shows that PBL can improve learners' learning abilities, including critical thinking skills and self-efficacy. The PjBL implementation process involves several steps, ranging from formulating learning questions by students, making project plans with teachers to answer these questions, to

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developing products such as story texts or presentations to show a deep understanding of the topic being explored. Next steps include testing and evaluation of the product by teachers and verification by learners as part of a thorough learning process. Although PjBL is interesting and can produce positive learning outcomes, this approach is also faced with some challenges during its implementation. However, with the right support and careful preparation, PjBL can be an interesting and useful learning experience for the development of students' head skills in the modern education era (Yuniarti, 2021).

Educational strategies can be applied to improve learning ability and innovation in a vocational high school environment including visualization, where learners are encouraged to form mental images based on words or texts to focus attention on concepts or subject matter. In addition, shared learning becomes an approach that involves cooperation between learners in responding to challenges or creating products, creating collaborative spaces in the learning process. The personalization approach is also applied by adjusting learning methods according to the needs and cognitive, emotional, and social abilities of each learner. The integration of technology in learning, being another strategy, aims to support the learning process and improve the efficiency of information delivery. Centralist learning places learners as the main focus, allowing exploration of topics of interest and development of critical skills. Cooperative Learning encourages collaboration between multiple learners in solving problems or creating products, giving impetus to team-based learning.

The development *of Learning and Innovation* Skills in Vocational High Schools (SMK) is influenced by various learning methods and strategies, with indicators including *Active Learning, Career-Based Learning Strategies, Integrated Teaching and Learning, PjBL on 21st Skills, PjBL on Vocational High Schools, Project-Based Efficacy, Skill-Based Learning, and Teaching Strategies*. The application *of Active* Learning, such as through *the Quiz Team and Learning Tournament* methods, increases collaboration and student achievement, providing benefits in the form of increased learning ability, motivation, innovation skills, and adaptation. In addition, career-based learning strategies in SMK focus on the integration of soft skills in learning, with steps involving the improvement of Career-Based *Soft Skills*, and career-oriented strategies to formulate optimal strategies. Education in the vocational environment also emphasizes character development and career orientation of students, with the application of Integrated Teaching and Learning that integrates various subjects or skills in one lesson or project, and Project-Based Learning that emphasizes the skills of 21st century heads. Various other educational strategies, such as visualization, shared learning, personalization, technology integration, centralist learning, and *Cooperative Learning,* are applied to improve the learning ability and innovation of vocational students, creating holistic and relevant learning experiences in accordance with the demands of the modern world of work.

Skills Development

Learning and innovation skills in Vocational High Schools need to develop additional skills in addition to the four skills commonly known as 4Cs, these additional skills are *auto-systemic thinking, basic behavior of students, complex-reasoning competencies, critical reading-thinking skills, Developing of character, developmentally appropriate levels, meta-learning, Impact Skills, and Soft skills development*. Auto-systemic thinking, or systems thinking, is a holistic approach to understanding and managing complex systems. This approach can stimulate innovation by paying attention to the interrelationships and dependencies between elements in the environment and is widely applied in various disciplines such as engineering, policy making, and business, systems thinking ensuring that products and services consider the context of the systems

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in which they operate (Tooley, 2021). The DSRP (Distinctions, Systems, Relationships, Perspectives) method that appears in systems thinking presents four simple cognitive tasks or rules that produce emergent properties of sist thinking. The involvement of systems thinking is highly interdisciplinary, applicable in both academic and practical contexts, and applied in a wide range of natural and social sciences. The relevance of auto-systemic thinking in education, including in vocational schools, is very significant (Cabrera &; Cabrera, 2022). This approach can help students and educators understand and manage complexity in the learning and teaching process. In addition, systems thinking contributes to the development of skills essential for innovation and problem-solving in the world of work.

The basic behavior of learners has a major role in the development of learning skills and innovating in Vocational High Schools (SMK). Learners' emotional engagement with school becomes a key factor that reinforces their vocational identity, especially for learners who may be younger, less motivated, or less resilient (Sun, 2022). Efforts to improve soft skills for vocational students, which focus on careers and 21st century learning, emphasize the importance of a balance between hard skills development and soft skills so that graduates can compete in the world of work and entrepreneurship (Abdurrahman &; Mahmudah, 2023). Learners also benefit from the systematic and accurate application of work methods, which develop coordination, organization, management, creative thinking, and adaptability skills to new situations (Mahmudah &; Putra, 2021). Essential habits such as expressing curiosity and learning from failures in working on projects become an integral part of learners' development. Thus, learners become individuals who are able to solve problems, collaborate, and think independently, planning their future with confidence. Through approaches such as project-based learning, internships, and work-related assignments in schools, the development of these skills in SMK becomes a strong foundation to prepare students to face challenges in the world of work and to become innovators capable of bringing change in the future.

The development of learning and innovating skills in Vocational High Schools (SMK) is highly dependent on mastering complex reasoning competencies and critical-reading skills. The results show that the implementation of 21st century skills in vocational education in Indonesia faces obstacles, mainly due to the transformation of technology-based learning and complex non-cognitive skills. Vocational education teachers have difficulty in applying these skills (Mutohhari et al., 2021). Analysis of critical thinking skills in vocational learners revealed that most learners have low levels of critical thinking skills, with factors such as learner input, quality of learning, and support in learning playing a role in this. Other studies highlight that the application of multiple representation approaches in learning can improve the critical thinking skills of vocational students compared to conventional approaches.

The development of learning and innovating skills in Vocational High Schools (SMK) is strengthened by several key factors. One of the main aspects is the development of the character of learners through value and ethics education, shaping them into responsible and integrity individuals. Strong character becomes the basis for the ability of learners to make better use of learning opportunities. The importance of adapting learning programs to the level of development of students is another focus. By ensuring that teaching materials and methods are appropriate for the age and ability of students, SMK can create a learning environment that supports their growth. This involves a deep understanding of student development and the application of appropriate learning strategies. The concept of meta-learning, or meta-learning, is a key element in efforts to develop learning skills and innovate (Agarwal, Yurochkin, &; Sun, 2021). It involves learners reflecting on their own learning process, encouraging a growth mindset that

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motivates them to try harder. With better self-understanding, learners can adapt their learning approach to achieve desired goals.

The development of soft skills is a crucial aspect in perfecting education in SMK. In addition to technical skills, learners also need to be equipped with soft skills such as communication, collaboration, and critical thinking. Adjustment of assessment methods, education, training, and rewards within organizations is an important step to accommodate soft skills assessments. Creating a supportive learning environment in SMK involves the use of various learning methods, from traditional to non-traditional approaches such as peer training. This ensures that learners are not only prepared to achieve success in their careers, but also become lifelong learners who are adaptive to changes in the workplace of the future. Thus, SMK can carry out its critical role in shaping a generation that is ready to face challenges and contribute to innovation in the future.

The development of Learning and Innovation Skills in Vocational High Schools (SMK) focuses on developing additional skills, such as auto-systemic thinking, basic behavior of students, complex-reasoning competencies, critical reading-thinking skills, developing of character, developmentally appropriate levels, meta-learning, Skills Impact, and Softskills development, apart from the four general 4Cs skills. Auto-systemic thinking, especially through systems thinking approaches, is a major focus for stimulating innovation and understanding interrelationships in the environment. Basic learner behaviors, including emotional engagement and essential habits, play a key role in the development of soft skills and the balance between hard skills and soft skills. Complex reasoning competencies and critical-reading skills become important elements, but their implementation is faced with challenges in vocational education, which can be overcome with a multiple representation approach. Character development of learners, adjustment of learning programs, meta-learning concepts, and emphasis on soft skills through various learning methods are strategic steps to ensure that SMK provides relevant, adaptive, and supportive education for the development of learners. By integrating learning skills and innovation in various aspects of learning, SMK can prepare learners for success in careers and become innovative contributors in society.

Learning Evaluation

In an effort to improve learning skills and innovate in Vocational High Schools (SMK), it is necessary to evaluate media *and learning resources, learning evaluation, lindustry need and school graduates gaps, graduate needs mismatch, students centric, learnig objectives, learning materials*. Evaluation of media and learning resources involves assessing the effectiveness and relevance of the learning media applied in the teaching process. Learning media assessment is an evaluative step that involves assessing learning media based on predetermined standards or objectives. This process aims to make decisions related to the improvement and development of learning media, with the aim of improving their quality. The objectives of learning media evaluation include determining the type of learning media to be used, the availability of learning media, evaluating the use of learning media, the ability of teachers to use media, the suitability of the type of learning media to learning materials, the effectiveness of using learning media, and technically, the type of learning media used is not in a damaged state (Wahidin, Sarbini, &; Tabroni, 2022). Evaluation of learning media is very important to ensure that the learning tools and resources used are in accordance with technological developments and the needs of learners, thus creating a dynamic and interesting learning environment.

Evaluation of job absorption of vocational high school (SMK) graduates is an important step to assess the extent to which graduates meet industry needs. Various steps

have been taken to reduce the disparity between the skills possessed by Vocational High School (SMK) graduates and the needs expected by the industrial world. For example, the adjustment of the SMK curriculum to the needs of industry, collaboration between SMK and industry, as well as activity programs such as teaching factories, cooperation with industry, and counseling from stakeholders related to employment. This evaluation aims to ensure that SMK graduates have the skills and knowledge needed by the industry, as well as to minimize the gap between graduate employment absorption and employment demands. These studies used a variety of evaluation methods, such as closed and open questionnaires, as well as quantitative descriptive data analysis. The results of this evaluation can be used to develop educational programs that are more in line with the demands of the industrial world.

Curriculum evaluation in vocational education involves assessing possible mismatches between the needs of graduates and the material taught in schools. The aim is to ensure that the curriculum and teaching methods applied in schools are in accordance with the real needs of graduates. This evaluation includes aspects of compatibility between learning objectives, curriculum content, and competencies needed in the world of work. Internal relevance in curriculum development focuses on cohesion between its components, such as the objectives to be achieved and the content of the curriculum. Curriculum evaluation can also be an encouragement to improve the quality of the learning process, facilities, and overall school management. One crucial aspect of curriculum evaluation is ensuring that the assessment of learning outcomes is in accordance with the needs of students. This ensures that evaluation not only involves the quality of teaching, but also emphasizes the understanding and application of concepts by learners.

Learner-oriented evaluation includes an assessment of the extent to which the learning approach is focused on the needs of learners. Meanwhile, evaluation of learning objectives involves assessing the level of achievement of predetermined learning objectives. These two aspects are key in ensuring that the learning process is effective and learner-centered. Evaluation of the achievement of learning objectives involves assessing the extent to which learning objectives have been achieved. Criteria for achieving learning objectives are a series of criteria or indicators that can be used by educators to reflect on the learning process and analyze the level of mastery of competencies by students. Learning evaluation also has an important role in assessing how efficient and effective the learning process is. Generally, assessments aim to gather thorough information about learning outcomes and processes to monitor learning progress. Learning evaluation includes measurement and assessment activities, involving three main steps, namely planning, implementation, and analysis and reporting of results, aiming to provide comprehensive and relevant information for educators to make good decisions related to the learning process and student development (Elis Ratna Wulan &; Rusdiana, 2015).

In an effort to improve learning skills and innovate in Vocational High Schools (SMK), evaluation of media and learning resources is a crucial aspect. This evaluation includes an assessment of the effectiveness and relevance of the learning media used, with the aim of ensuring the sustainability of technological developments and the needs of students. The employment absorption of SMK graduates also needs to be evaluated to assess the extent to which graduates meet industry needs. Measures such as curriculum adjustments, collaboration with industry, and activity programs such as teaching factories are efforts to minimize the gap between graduate competencies and employment demands. Curriculum evaluation in vocational education involves assessing the suitability between learning objectives, curriculum content, and competencies needed in the world of work. Learner-oriented evaluation and learning objectives guarantee that the learning

approach focuses on the needs of the learners and that the learning objectives are achieved. Learning evaluation, through measurement and assessment activities, helps monitor student learning progress and provides information for educators in making decisions related to the learning process and student development comprehensively.

CONCLUSION

Based on the results of the systematic review, the development of Learning and Innovation Skills in Vocational High Schools (SMK) is influenced by various learning methods and strategies, such as Active Learning, Career-Based Learning Strategies, Integrated Teaching and Learning, PjBL on 21st Skills, PjBL on Vocational High Schools, Project-Based Efficacy, Skill-Based Learning, and Teaching Strategies. The application of Active Learning, including the Quiz Team and Learning Tournament methods, is proven to increase student collaboration, motivation, and achievement, while career-based strategies focus on the integration of soft skills. Learner character development, auto-systemic thinking, complex-reasoning skills, and critical-reading are the main focuses, faced with challenges in vocational education that can be overcome by multiple representations. Evaluation of media and learning resources, graduate employment, curriculum adjustments, industry collaboration, and programs such as teaching factories are strategic steps to minimize the gap between graduate competencies and employment demands. By integrating learning skills and innovation in learning, SMK can provide education that is relevant, adaptive, and supports the holistic development of learners, preparing them for success in careers and contributing innovatively to society. Systematic evaluations that focus on learning objectives and learner needs ensure effective learning approaches and learning objectives are achieved.

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