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JURNAL MANAJEMEN PENDIDIKAN ISLAM

DEVELOPING CREATIVITY IN VOCATIONAL HIGH SCHOOL (SMK) CULINARY ARTS STUDENTS TO ENHANCE PRODUCT INNOVATION: A SCOPING REVIEW

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Abstract

Technological developments and shifts in learning paradigms demand that vocational education, particularly in the culinary field, continuously innovate to foster student creativity. This article is a literature review aimed at analyzing various studies regarding learning strategies that can develop creativity and culinary product innovation in Vocational High Schools (SMK). The approach was conducted through a systematic review of eight scientific articles covering Project-Based Learning (PjBL) models, the use of Virtual Reality (VR) and gamification, and contextual approaches based on local culture.

The results of the study indicate that: (1) The implementation of PjBL is able to increase student creativity and collaboration in generating new products. (2) The application of VR and gamification encourages motivation, engagement, and reflection on the learning process. (3) The integration of local culture strengthens the relevance and social value of product innovation.

Together, these three elements contribute to increasing the effectiveness of culinary learning through authentic and technology-based experiences. The practical implication for SMK teachers is the need to design learning environments that combine projects, digital simulations, and game elements as a creative learning ecosystem in the Industry 4.0 era

Keywords: creativity, product innovation, culinary vocational school, Project-Based Learning, Virtual Reality, gamification..

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INTRODUCTION

The changing dynamics of the creative industry demand that vocational education institutions, specifically Vocational High Schools (SMK) in the culinary field, prepare graduates who are not only technically competent but also adaptive and innovative. In this context, creativity is no longer viewed as an additional skill but rather as the core of culinary expertise. A creative student possesses the capacity to discover new solutions, modify food

ingredients, and create culinary product innovations that hold both cultural and economic value.

Amabile (1996) defines creativity as the ability to produce novel works that are valuable, both aesthetically and functionally. In the culinary world, creativity serves as the foundation for the food innovation process, where new ideas, modern cooking techniques, and local values blend to produce unique and competitive products. Furthermore, Csikszentmihalyi (1996) adds that creativity emerges when individuals are in a state of *flow*—a condition where skills and challenges meet in balance within a meaningful learning experience.

Digitalization and the integration of learning technology have become the primary drivers of innovation in vocational education. Research by Bouck et al. (2025) demonstrates that non-immersive Virtual Reality (VR) can assist students with special needs in mastering life skills such as cooking. Furthermore, research by Filothei Manalu (2025) confirms the effectiveness of the Project-Based Learning (PjBL) model in improving learning outcomes and creativity among culinary students at SMKN 6 Surabaya, while Winanti et al. (2024) found that VR-based gamification enhances motivation and innovation in culinary learning.

The synergy between PjBL, VR, and gamification illustrates a new direction for vocational education, oriented toward forming a creative mindset, adaptive abilities, and the courage to experiment. This approach aligns with the spirit of *Merdeka Belajar* (Emancipated Learning), which emphasizes students' freedom to explore and create. Therefore, this literature review aims to systematically examine learning strategies and empirical results that contribute to the development of creativity and culinary product innovation in Vocational High Schools.

RESEARCH METHOD

This study employs a Systematic Literature Review (SLR) approach to examine research findings focusing on the development of creativity among culinary Vocational High School (SMK) students. This method was selected for its ability to provide a comprehensive understanding of the concepts, strategies, and pedagogical practices implemented across various vocational education contexts. The review was conducted by tracing scientific articles published between 2021–2025 relevant to the themes of creativity, product innovation, and culinary education.

The analysis process was carried out through three systematic stages:

1. Identification: Selecting articles with a primary focus on creativity, innovation, and vocational culinary education.
2. Data Extraction: Collecting key information such as research objectives, methods, participants, primary findings, and implications for student creativity.
3. Thematic Synthesis: Categorizing findings into major themes, such as learning models, the role of technology, and contextual factors influencing product innovation.

This systematic research approach was further expanded by referencing diverse research designs from three additional sources used in this study:

1. Filothei Manalu (2025) utilized a quasi-experimental design with a non-equivalent control group to assess the impact of implementing the Project-Based Learning (PjBL) model on the learning outcomes and creativity of culinary students at SMKN 6 Surabaya.
2. Bouck et al. (2025) applied a single-case study design to explore the effectiveness of non-immersive virtual reality (VR) in teaching cooking skills and generalization abilities to students with intellectual disabilities.
3. Winanti et al. (2024) developed a conceptual literature study and gamification-based simulation to create a culinary learning model using a virtual reality approach that is both motivating and interactive.

The integration of these three studies enriches the analysis process as each represents a different dimension of creative learning: PjBL emphasizes real-world projects and collaboration, non-immersive VR focuses on practical simulation and reflection, while gamification strengthens the motivational aspects of learning. By combining these various designs, this literature review not only identifies empirical results but also builds a conceptual understanding of how culinary creativity can be developed through a multidimensional approach.

All obtained data were analyzed qualitatively using a narrative synthesis approach. The analysis was performed by identifying similarities and differences in findings and then interpreting their implications for vocational learning in SMK. Through these steps, the study aims to achieve a holistic understanding of effective patterns in fostering creativity and culinary product innovation in the digital era.

RESEARCH RESULTS AND ANALYSIS

Results

Summary of Previous Research Studies

The review of the eight articles reveals a thematic consistency regarding the role of creativity as the core of the vocational learning process in the culinary field. Five primary studies highlight the pedagogical aspects and cultural contexts that support the formation of creativity, while three additional studies expand the scope to include digital technology approaches and interactive learning.

Previous research, such as that conducted by Febriani et al. (2021) and Sutianah (2021), demonstrates that culinary creativity plays a vital role in increasing student engagement within the Teaching Factory framework and fostering entrepreneurial skills. Sukerti and Marsiti (2024) further add that the integration of local culture through Project-Based Learning (PjBL) can foster a sense of identity pride as well as divergent thinking abilities.

The research by Bouck et al. (2025) enriches these findings by showing how non-immersive Virtual Reality (VR) is capable of enhancing students' life skills within a cooking context, particularly for students with special needs. These findings prove that digital simulation-based learning can improve work accuracy and the ability to generalize skills to the real world.

Meanwhile, Filothei Manalu (2025) found that the application of PjBL at SMKN 6 Surabaya significantly increased technical skills, creativity, and innovation in culinary product processing. This model is proven to foster a spirit of collaboration and responsibility toward work outcomes. Winanti et al. (2024) added a motivational dimension by developing gamification-VR based culinary learning, which successfully increased

student interest, participation, and awareness of the importance of technology in the modern world of gastronomy.

Table 1. Summary of Previous Research Studies

Researcher & Year	Design & Subjects	Research Focus	Key Findings	Implications
Febriani et al., 2021	Quantitative Experimental	Culinary student creativity through Teaching Factory	Improvement in entrepreneurial skills and creativity	Authentic practice models support product innovation
Sutianah, 2021	Qualitative	Industry-based learning in SMK	Industry collaboration enriches culinary ideas	School-industry relationships are vital for creativity
Sukerti & Marsiti, 2024	Descriptive Qualitative	Local culture-based PjBL	Increased creativity based on local wisdom	Contextual learning fosters originality
Bouck et al., 2025	Single-case study	Use of non-immersive VR	Improved cooking skills & generalization	VR technology is effective for practical learning
Filothei Manalu, 2025	Quasi-experimental	Implementation of PjBL	PjBL enhances creativity & learning outcomes	PjBL is highly relevant for culinary students
Winanti et al., 2024	Conceptual study	Gamification & VR in culinary arts	Increased student motivation & participation	Gamification fosters technopreneurship

Source: *Synthesized literature results (2021–2025).*

Analysis

The six studies demonstrate an interconnectedness between active learning, the use of technology, and the strengthening of creativity. The studies by Bouck et al. (2025) and Winanti et al. (2024) expand the traditional focus by incorporating VR technology, while Filothei (2025) reinforces the relevance of PjBL as a primary pedagogical approach.

Definition and Measurement of Creativity

Generally, creativity within the context of culinary education is defined as the ability for divergent thinking that produces new, original, and applicable ideas. The measurement of creativity does not rely solely on psychometric scales but is also based on the observation of processes and the culinary products generated by students. Febriani et al. (2021) utilized a Likert scale with indicators of fluency, flexibility, originality, and elaboration. Sukerti & Marsiti (2024) utilized student responses to PjBL worksheets. Bouck et al. (2025) and Winanti et al. (2024) emphasized practical skill performance and active participation in digital simulations.

These findings indicate a paradigm shift from merely "measuring creative ideas" toward "observing the creative process." Creativity in culinary education is performative—it is evidenced by how students explore local ingredients, modify recipes, and present products that hold both aesthetic and economic value.

Table 2. Definition and Measurement of Creativity in Culinary Learning

Researcher	Definition of Creativity	Instrument/Measurement	Dominant Indicators
Amabile (1996)	Ability to produce valuable ideas	Product-based assessment	Originality, aesthetic value
Csikszentmihalyi (1996)	Individual–environment interaction	Observation of <i>flow</i> state	Full engagement, balanced challenge
Febriani et al. (2021)	Student divergent ability	4-aspect Likert scale	Fluency, flexibility, elaboration
Filothai Manalu (2025)	Creativity through projects	Product assessment rubric	Recipe innovation, collaboration
Bouck et al. (2025)	Digital adaptive skills	VR performance observation	Accuracy, reflection on action
Winanti et al. (2024)	Game-based motivation	Activity observation	Enthusiasm, healthy competition

Source: *Compiled and adapted from literature (2021–2025).*

Analysis:

The measurement of creativity now emphasizes **performative processes** rather than just abstract ideas. The use of VR and gamification allows for the direct observation of creative learning dynamics.

Synthesis of Findings and Thematic Analysis

The integrated results from the eight studies reveal four primary themes:

- Innovative Learning Models as Catalysts for Creativity**
PjBL, Teaching Factory, and gamification-based learning are proven to foster curiosity, collaboration, and responsibility. Project-based approaches encourage students to learn from real-world experience and develop ownership over their work (Filothai, 2025; Sukerti & Marsiti, 2024).
- Digital Technology as a Facilitator of Creative Learning**
The use of virtual reality—both immersive and non-immersive (Bouck et al., 2025; Winanti et al., 2024)—expands the students' space for exploration, providing simulations that are safe, engaging, and contextualized to modern industry needs. This technology facilitates learning by doing within a digital space without losing practical aspects.
- Integration of Soft, Hard, and Entrepreneurial Skills**
Culinary creativity develops optimally when students master not only technical skills (hard skills) but also critical thinking, communication, and innovation (soft and entrepreneurial skills), as shown by Sutianah (2021) and Febriani et al. (2021). This aligns with the demands of the culinary industry, which prioritizes product uniqueness alongside market sensitivity.
- Contextualization of Culture and Local Industry**
Studies by Sukerti & Marsiti (2024) and Filothai Manalu (2025) demonstrate that learning which incorporates local culture—such as the Megibung tradition or regional specialty foods—increases the relevance and meaning of learning. In this sense, creativity becomes not only personal but also social and cultural.

Table 3. Synthesis of Key Findings and Their Implications

Key Theme	Synthesis of Findings	Implications for Culinary SMK
Innovative Learning Models	PjBL, Teaching Factory, and gamification effectively foster collaboration and responsibility.	Teachers need to develop authentic team-based projects.
Digital Technology	VR enhances exploration and reflection in learning.	Technology integration must be accompanied by teacher guidance.
Soft–Hard Skills Integration	Creativity grows from the synergy of technical and social skills.	The curriculum must balance practice and reflection.
Local Cultural Context	Culture-based learning enriches meaning and identity.	Innovative culinary products can preserve local wisdom.

Source: *Author's synthesis based on 8 articles (2021–2025).*

General Synthesis

The integration of findings from various studies indicates that developing creativity and culinary product innovation in SMK students requires a multidimensional approach. The PjBL model fosters collaboration and critical thinking; VR expands explorative and reflective capabilities; while gamification strengthens learning motivation and persistence.

These three approaches complement one another: PjBL provides a real-world context, VR offers safe and engaging simulative experiences, and gamification provides the psychological drive to continue learning and innovating. These results support the conclusion that culinary students' creativity cannot be developed linearly, but rather through learning experiences that integrate cognition, affect, and action within both real-world and digital contexts.

Conceptual Diagram



The diagram above illustrates the synergistic relationship between PjBL, VR, and gamification as the driving factors of creativity, leading to improved product innovation and learning effectiveness.

Discussion

Overview of Findings

The findings confirm that creativity development is not the result of a single intervention, but a product of simultaneous interaction between instructional design (e.g., PjBL and Teaching Factory), educational technology (e.g., VR and gamification), and cultural/local industry contexts. This is consistent with literature highlighting the multidimensional nature of creativity (Amabile, 1996; Csikszentmihalyi, 1996).

Theoretical and Empirical Integration

The findings align with Amabile's (1996) components of creativity: expertise, creative processes, and motivation. PjBL supports the "expertise" and collaboration aspects, while VR and gamification reinforce the motivational components, creating conditions conducive to the "flow" state described by Csikszentmihalyi (1996). Furthermore, the results resonate with the Investment Theory (Sternberg & Lubart, 1999),

where students "invest" in novel ideas despite initial unpopularity—evidenced by their courage to experiment with new recipes.

The Role of PjBL, VR, and Gamification

PjBL: Provides an authentic framework for problem-solving and fosters "ownership" of the work.

VR (Non-immersive): Serves as a safe medium for repetitive psychomotor practice (e.g., cooking techniques) without real-world risks, supporting the generalization of skills.

Gamification: Increases persistence through level structures, instant feedback, and healthy competition.

Soft Skills, Entrepreneurship, and Local Culture

Culinary creativity is deeply tied to soft skills (communication and project management) which are crucial for commercializing ideas (Febriani et al., 2021). Additionally, incorporating local wisdom (e.g., regional culinary traditions) adds a layer of cultural authenticity and market appeal to the innovative products created by students.

Pedagogical Implications and Challenges

For SMK teachers, this necessitates a paradigm shift from procedural teaching to project-and-technology-based learning. However, implementation faces real obstacles: infrastructure limitations, teacher technological capacity, and development costs. Since many studies are case-based or quasi-experimental (Bouck et al., 2025; Filothei Manalu, 2025), generalizations should be made with caution.

Literature Gaps and Future Research Directions

This review identifies several research gaps: 1) the need for longitudinal studies to assess the sustainability of innovation; 2) large-scale quantitative research comparing the combined effects of PjBL–VR–Gamification; 3) cost-benefit analyses for rural schools; and 4) the development of standardized yet contextual creativity assessment methods for vocational education.

Final Reflection

Overall, the literature demonstrates the strong potential of combining project-based pedagogy and digital technology to foster creativity in culinary SMK. However, practical success requires a systemic approach: teacher training, infrastructure support, industry collaboration, and assessments that balance both process and product. By addressing these factors, SMK can become incubators for culinary innovation that are both economically and culturally relevant.

Conclusion and Recommendations

This study concludes that the development of creativity in culinary Vocational High School (SMK) students is highly effective when supported by a combination of Project-Based Learning (PjBL), Virtual Reality (VR), and Gamification. These three elements are mutually reinforcing: (1) PjBL builds authentic and collaborative experiences. (2) VR expands the scope for practical exploration and (3) Gamification increases motivation and learning persistence. The integrated implementation of this model contributes to an increase in culinary product innovation, learning effectiveness, and the students' *technopreneurship* spirit.

Recommendations:

1. SMK Teachers are encouraged to integrate local culture-based projects with simple VR media.
2. Educational Institutions need to provide technology training for vocational teachers.

Future Research should empirically assess the effectiveness of the PjBL–VR–Gamification combination within a classroom setting

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