Journal of English Language and Education
ISSN 2597- 6850 (Online), 2502-4132 (Print)
Journal Homepage: https://jele.or.id/index.php/jele/index

OPEN ACCESS Article

The Effectiveness of the Cybernetic Approach in Learning Management on Student Creativity and Learning Responsibility at SMKN 1 Sawoo

https://doi.org/10.31004/jele.v11i1.1856

*Yanna Sofa, Rina Widiayanti, Vika Shelayanti, Samiro Manan, Muhammad Nasrullah, Arief Rahman Yusuf[abcdef]

[123456]Universitas Muhammadiyah Ponorogo, Indonesia
Corresponding Author: vikashela91@gmail.com

A B S T R A C T

This study aims to analyze the effectiveness of implementing a cybernetic approach in learning management in developing students' creativity and responsibility for learning at SMKN 1 Sawoo. Using a qualitative phenomenological approach, the study explores the experiences and meanings constructed by teachers, students, and school administrators regarding the application of the cybernetic approach in the learning process. Data were collected through in-depth interviews, participant observation, and documentation, with participants selected purposively. The data were analyzed cyclically using an interactive analysis model. The findings show that the implementation of a cybernetic approach in learning management contributes to a more planned, controlled, and sustainable learning process, accompanied by more intensive teacher–student interaction. This approach positively influences students' creativity, as reflected in their ability to generate ideas, think innovatively, and produce varied learning outcomes. In addition, students' responsibility for learning improves, as indicated by increased discipline, independence, and commitment to completing learning tasks. These results suggest that the cybernetic approach has the potential to support more adaptive and meaningful learning management in vocational education contexts.

Keywords: *Entrepreneurship Management, Entrepreneurship Education, School Cafe*

Article History:
Received 16th December 2025
Accepted 14th January 2026
Published 16th January 2026

INTRODUCTION

Education in the modern era is faced with increasingly complex challenges along with technological developments, changes in student characteristics, and the demands of the dynamic world of work. Educational institutions are no longer only required to produce graduates who master technical knowledge and skills, but also have the ability to think creatively, responsibly, and are able to manage their learning process independently. This challenge is increasingly felt in vocational education, especially vocational high schools (SMK), which are directly oriented towards the readiness of graduates to enter the world of work and industry (Afif, 2024; Husni et al., 2024; Latifah et al., 2024).

In this context, learning management plays a strategic role as a systematic effort to regulate, control, and evaluate the learning process so that educational goals can be achieved optimally (Fadli & Isa, 2021; Zhanty, 2019). Effective learning management emphasizes not only the achievement of the end result, but also on the management of the learning process that encourages active student engagement, creativity development, and the formation of learning responsibilities. However, learning practices in vocational schools are still often oriented towards delivering material and achieving technical competencies alone, so they do not fully provide space for students to think creatively, take initiative, and manage their learning process independently (Anggraeni & Susanti, 2024; Cahyati & Amir, 2025).

Low creativity and student learning responsibility are problems that are often found in vocational learning. Students tend to wait for the teacher's instructions, lack the courage to express ideas, and are not able to reflect and evaluate their own learning process (Anggraheni, 2025). This condition shows that learning has not been managed as a system that allows for continuous feedback and the development of students' self-control skills. Therefore, a learning approach is needed that not only focuses on content, but also on the systematic management of student learning processes, interactions, and regulations.

One relevant approach to answer these challenges is the cybernetic approach. The cybernetic approach views learning as a system consisting of input, process, and output components that interact with each other through feedback and control mechanisms (Kalifah et al., 2022; Kholis et al., 2023; Priyadharma, 2019). In this perspective, learning does not take place in a linear manner, but is adaptive and reflective, where teachers play the role of managers of the learning system and students as active subjects involved in controlling and regulating the learning process (Nura, 2022; Nurmala et al., 2025) (Saabighoot et al., 2024). The application of system principles, feedback, and self-control in learning is believed to be able to create a more meaningful learning experience and encourage the development of students' creativity and learning responsibility (Telaumbanua et al., 2022; Wahyuna & Usmaidar, 2023).

SMKN 1 Sawoo is one of the vocational schools that has implemented learning management by emphasizing interaction, continuous evaluation, and active involvement of students in the learning process. This condition makes SMKN 1 Sawoo a relevant context to examine the application of cybernetic approaches in learning management and its effectiveness in developing students' creativity and learning responsibility. However, research on cybernetic approaches in the field of education is still dominated by studies that focus on cognitive aspects and the achievement of learning outcomes.

Previous studies have generally examined cybernetic approaches as a learning strategy or method, focusing on the effectiveness of instructional systems and improving academic achievement. Studies that specifically position the cybernetic approach as a planned, controlled, and sustainable learning management framework are still relatively limited, especially in the context of vocational education in vocational schools. In addition, aspects of student creativity and learning responsibility as an output of cybernet-based learning management have not been studied in depth, as well as the exploration of the direct experience of teachers and students in implementing this approach as an adaptive and reflective learning managerial practice.

Based on these gaps, the novelty of this research lies in the meaning of the cybernetic approach as a learning management framework, not just as a teaching strategy. This research integrates the principles of systems, feedback, and learning control with the development of students' creativity and learning responsibility in the context of vocational education. In addition, this research provides an empirical understanding of how cybernetic approaches are implemented and lived by teachers and students in daily learning practices.

This research has a strong relevance to the needs of vocational education that demands graduates to be not only technically competent, but also creative, independent, and responsible in learning. The significance of this research lies in its contribution in providing an empirical basis for more systematic and adaptive learning management through cybernetic approaches. Theoretically, this research is expected to enrich the study of learning based on cybernetic theory in the context of vocational education. Practically, the results of this study are expected to be a reference for teachers, schools, and policy makers in designing and implementing innovative learning that is oriented towards developing students' creativity and learning responsibility. Thus, this study aims to analyze the effectiveness of the application of cybernetic approaches in learning management to the development of students' creativity and learning responsibility at SMKN 1 Sawoo.

METHOD

This research uses a qualitative approach with the type of phenomenological research. The phenomenological approach was chosen to deeply understand the experiences, meanings, and perceptions of the research subjects related to the application of cybernetic approaches in learning management and their impact on students' creativity and learning responsibilities. The focus of the research is directed at how learning phenomena are experienced, understood, and interpreted by teachers, students, and the school in a natural context without manipulating variables. Through this approach, the researcher seeks to uncover the essence of the learning experience that takes place, especially related to interaction patterns, learning management, and changes in students' learning attitudes and behaviors as a result of the application of the cybernetic approach.

Research Context

This research was carried out at SMKN 1 Sawoo. This school was chosen purposively because it has implemented learning management that emphasizes active interaction, control of the learning process, and continuous evaluation. The learning environment at SMKN 1 Sawoo is considered relevant to examine the application of cybernetic approaches in learning management, especially in the context of vocational education which requires integration between the learning process, creativity development, and the formation of student learning responsibilities.

Participants

The research subjects include school principals, vice principals for curriculum, teachers of productive subjects, and students who are directly involved in the learning process. The selection of participants was carried out purposively by considering their involvement, experience, and understanding of the application of cybernetic approaches in learning. Participants are selected to gain a comprehensive perspective on the planning, implementation, and evaluation of learning and its impact on students' creativity and learning responsibility.

Data Collection Techniques

Data collection was carried out through in-depth interviews, participatory observations, and documentation studies. The in-depth interview aims to explore participants' experiences, perceptions, and meanings towards the application of cybernetic approaches in learning management. Participatory observation is carried out to directly observe the learning process, interaction patterns between teachers and students, and student learning behavior related to creativity and learning responsibility. Documentation studies are used to complement and strengthen data through the analysis of learning documents, such as learning tools, evaluation notes, teacher journals, and student outputs.

Data Analysis Procedure

The data analysis in this study refers to the Miles and Huberman interactive model which is enriched with the coding stages according to Saldaña. The analysis process is carried out on a cyclical and continuous basis from data collection to conclusion drawn. The first stage is data reduction, which is selecting, focusing, and simplifying raw data from interviews, observations, and documentation. At this stage, the researcher conducts initial coding, such as *descriptive coding* and *in vivo coding*, to identify initial themes relevant to the phenomenon of cybernetic learning, creativity, and learning responsibility.

The second stage is data presentation, which is organizing data that has been reduced in the form of descriptive narratives, matrices, and thematic categories. At this stage, advanced coding (second cycle coding), such as *pattern coding*, is carried out to find patterns, relationships between categories, and deeper meanings of the participants' experiences. The third stage is drawing conclusions and verification, which is formulating research findings based on emerging patterns and themes and re-checking the data to ensure consistency and accuracy of interpretation. The resulting conclusions are a synthesis of participants' experiences that represent the essence of the phenomenon of applying cybernetic approaches in learning management.

Ethical Considerations

This study pays attention to the ethical principles of qualitative research. All participants were given an explanation of the objectives and procedures of the research and expressed their consent to participate voluntarily. The identity of the participants is kept confidential by using codes or initials to protect privacy. The researcher ensures that the entire process of data collection and analysis is carried out objectively, transparently, and responsibly. The validity of the data is maintained through source triangulation, technique triangulation, and time triangulation, as well as through *member checks* and *trail audits* to increase the credibility, dependability, and confirmability of research results.

FINDINGS AND DISCUSSION

Findings

Based on the results of in-depth interviews conducted with the principal, vice principal for curriculum, productive teachers, and several students of SMKN 1 Sawoo, a comprehensive picture was obtained of the application of the cybernetic approach in learning management and its impact on students' creativity and learning responsibility. The principal explained that the implementation of the cybernetic approach in learning management is carried out in stages through strengthening the system of planning, implementation, and evaluation of learning based on feedback. According to him, this approach emphasizes the importance of a two-way flow of information between teachers and students, so that learning is not only one-way, but forms a dynamic interaction system. The principal also emphasized that the cybernetic approach helps schools in managing learning more adaptively to the needs and characteristics of vocational students.

The vice principal for curriculum revealed that cybernetics-based learning management is realized through flexible learning planning, the use of learning technology, and continuous evaluation. Teachers are encouraged to not only deliver material, but also monitor student responses, evaluate the learning process, and adjust learning strategies based on the results of these evaluations. According to him, this system makes learning more controlled but still gives room for students' creativity.

Productive subject teachers said that the application of cybernetic approaches has made significant changes to students' learning behavior. Teachers are more active in providing direct feedback, both verbally and in writing, to the results of students' work. In addition, teachers also involve students in the process of learning reflection, such as discussion of assignment results and project evaluation. Teachers consider that this approach encourages students to think creatively in completing assignments and increases their awareness of learning responsibilities. Meanwhile, students stated that learning with a cybernetic approach felt more interesting and challenging. They feel empowered to develop their own ideas, especially in project-based learning. Students also revealed that the existence of continuous evaluation and feedback from teachers makes them more responsible for assignments and learning outcomes. Some students mentioned that they became more disciplined in managing time and completing work because every learning process was always monitored and evaluated.

The results of observations carried out during the learning process show that the application of cybernetic approaches in learning management runs systematically and in a structured manner. The teacher starts the learning by conveying clear learning objectives and success criteria, so that students understand the direction and targets that must be achieved. During the learning process, there was an intense two-way interaction between teachers and students. Teachers not only deliver material, but also actively monitor student responses, ask triggering questions, and provide direct feedback on student learning activities. Students appear to be actively discussing, expressing opinions, and working together in groups to complete a given assignment or project.

In project-based learning activities, students show a high level of creativity, as seen from their ability to develop ideas, modify concepts, and produce various products or solutions. Teachers act as facilitators who direct and control the course of learning through periodic evaluation and reflection mechanisms. Observations also show an increase in student learning responsibility. Students appear to be more disciplined in doing assignments, bringing study materials, and completing work according to the specified time. In addition, students also show a responsible attitude in group work, such as dividing tasks, helping each other, and accounting for the results of work in front of teachers and friends.

The results of the documentation obtained from SMKN 1 Sawoo support the findings of interviews and observations. Learning planning documents, such as the syllabus and the Learning Implementation Plan (RPP), show that teachers have integrated the principles of a cybernetic approach, especially in the aspects of goal-based planning, learning process management, and continuous evaluation.

Documentation of student work in the form of project reports, practical products, and learning portfolios shows an increase in student creativity. The results of students' work look more varied, innovative, and reflect critical thinking and problem-solving skills. In addition, assessment records and learning reflections show that students consistently follow the process of evaluation and improvement of learning outcomes. Student attendance documents, teacher learning journals, and evaluation records show an increase in student discipline and learning responsibility. Students were recorded to be more consistent in attending learning, completing assignments on time, and actively participating in learning activities both in the classroom and in the practical workshop.

Based on the results of interviews, observations, and documentation, it can be concluded that the cybernetic approach in learning management at SMKN 1 Sawoo is effective in increasing students' creativity and learning responsibility. This approach makes for an adaptive, interactive, and feedback-oriented learning system, so that students are not only learning objects, but also active subjects and responsible for their learning process.

Discussion

Cybernetic Learning Theory, which is rooted in the thought of Norbert Wiener (1948), views learning as an open system whose success is determined by the effectiveness of communication, control mechanisms, and the continuity of feedback loops. In the context of education, learning is not understood as a linear process of delivering material, but as a dynamic system that always adjusts based on feedback from the ongoing learning process (Wiener, 1948, 2019). The field findings at SMKN 1 Sawoo show a strong match with Norbert Wiener's frame of mind. This learning management practice implemented in schools emphasizes the importance of a two-way flow of information between teachers and students. The results of interviews with the principal and vice principal for the curriculum revealed that learning is managed through interconnected and feedback-based stages of planning, implementation, and evaluation. Teachers actively monitor student responses, evaluate the ongoing learning process, and adjust learning strategies based on the results of the evaluation. This shows that learning at SMKN 1 Sawoo has functioned as an adaptive cybernetic system, as theorized by Wiener.

The results of learning observations further strengthen this suitability. Teachers seem to play the role of controlling the learning system by ensuring that every input in the form of objectives, materials, and assignments is processed optimally through structured learning activities, resulting in outputs in the form of increased creativity and student learning responsibility. The existence of direct feedback and periodic reflection shows that learning does not stop at the achievement of results, but continues to undergo continuous improvement. Thus, the principles of system, control, and feedback loop put forward by Norbert Wiener are implemented in real life in learning practice at SMKN 1 Sawoo.

Furthermore, Landa's (1976) thought that emphasized the concept of *instructional regulation and control* provides an important foundation in understanding the role of teachers in cybernetic learning systems. According to Landa, effective learning requires planned

instructional regulations, where teachers play the role of regulators of the learning process through the management of input-process-output flows and the provision of systematic feedback (Landa, 1976). Field data shows that productive teachers at SMKN 1 Sawoo have carried out the function of learning regulation as stated by Landa. Teachers not only play the role of delivering material, but also as facilitators and controllers of the learning process. Feedback is provided orally and in writing, student reflection is facilitated through discussion of assignments and projects, and evaluations are carried out on an ongoing basis. This practice shows that teachers act as *instructional controller* which keeps the learning process on the path of the goal that has been set.

Conformity with Landa's theory is also reflected in the lesson planning document. The Learning Implementation Plan (RPP) and syllabus used show the existence of goal-based planning, clear success indicators, and an integrated evaluation mechanism. Thus, the instructional regulation and control that are at the core of Landa's theory are concretely realized in learning management at SMKN 1 Sawoo.

In addition, the view of Pask and Scott (1972) that emphasizes learning as a process of systemic interaction based on dialogue, reflection, and the development of individual competencies also finds relevance in field data. According to Pask and Scott, learning will be effective if students are actively involved in the communication process, able to reflect on their learning experiences, and develop understanding independently (Scott, 2004). The results of interviews and observations showed that students at SMKN 1 Sawoo were not only recipients of information, but also actively involved in discussions, group work, and project-based learning. In this activity, students are given space to express their opinions, develop ideas, and reflect on their work based on feedback from teachers. Student statements that say that learning feels more challenging and gives confidence to develop ideas independently shows that the learning process has encouraged the formation of individual competencies, both in terms of creativity and learning responsibility. This is in line with Pask and Scott's theory which places interaction and reflection at the core of cybernetic learning.

In the perspective of cybernetic theory, creativity is understood as the result of a reflective and continuous process of information processing. Field findings show that students' creativity at SMKN 1 Sawoo develops through project-based learning that provides freedom in developing ideas, modifying concepts, and producing varied and innovative products. This condition is in line with the views of Thariqa et al. (2025) and Fauziah and Nugraha (2023) who state that creativity grows through mechanisms *feedback loop* which makes students make continuous improvements and innovations. Thus, student creativity can be understood as the output of an effectively managed cybernetic learning system (Hasan et al., 2025; Siti & Mulyawan, 2023).

In addition to creativity, the field findings also show that cybernetic approaches contribute to the formation of student learning responsibilities. Mayer (2021) asserts that learning responsibility grows through a learning system that provides autonomy, self-evaluation, and continuous feedback (Ardiansyah, 2025). This principle is in line with documentation data that shows increased student discipline, consistency of attendance, punctuality in completing assignments, and students' ability to account for their work. This confirms that the cybernetic approach not only has an impact on the cognitive and creativity aspects, but also on the affective dimension in the form of learning responsibility, which has been relatively underpaid in cybernetic research.

Based on the overall analysis, it can be concluded that the field data at SMKN 1 Sawoo has a high level of compatibility with the theory and main figures of Cybernetic Learning Theory, namely Norbert Wiener (1948), Landa (1976), and Pask and Scott (1972). The application of cybernetic approaches in learning management has proven to be in line with the principles of systems, regulations, control, interaction, and feedback put forward by these figures. Furthermore, the findings of this study expand the application of cybernetic theory by including the dimensions of creativity and learning responsibility in the context of vocational education. This provides a strong conceptual foundation for the development of the

Cybernetic Creative–Responsible Learning Model (CCRLM) as a theoretical and practical contribution to this research.

The results of the study show that the application of the cybernetic approach in learning management at SMKN 1 Sawoo runs systematically and sustainably. This approach is applied through planned learning management, controlled implementation, and continuous evaluation. The learning process does not only focus on delivering material, but also on managing student interaction and response during learning activities.

In learning practice, teachers start the activity by conveying clear goals and success criteria, so that students understand the direction and targets of learning that must be achieved. During the learning process, there is an intense two-way interaction between teachers and students. Teachers actively monitor students' learning progress, provide direction, and adjust learning strategies based on student responses and needs. This condition creates a more dynamic and participatory learning atmosphere. The application of cybernetic approaches also has an impact on increasing student creativity. This can be seen from the ability of students to develop ideas, modify concepts, and produce diverse works or solutions, especially in project-based and practice-based learning activities. Students show courage in coming up with ideas, trying new approaches, and completing tasks in a more innovative way. Students' creativity develops along with opportunities to explore and make improvements based on the feedback received.

In addition to creativity, the results of the study show an increase in students' learning responsibility. Students become more disciplined in participating in learning, managing time, and completing assignments according to the stipulations that have been set. This responsibility is also seen in group work, where students are able to divide tasks, work together effectively, and account for the results of their work. This attitude shows that there is an awareness of students of their roles and obligations in the learning process. The learning evaluation process is carried out on an ongoing basis and is not only oriented towards the final result. Teachers and students are involved in reflection activities to assess the learning process and outcomes that have been carried out. Through this reflection, students get the opportunity to correct mistakes, improve the quality of their work, and develop a more independent and responsible learning attitude. This ongoing evaluation encourages students to not only pursue grades, but also understand the learning process as an important part of the achievement of competencies.

The results of this study provide important implications for learning practices, education management, and policy development in the Vocational High School environment. The application of cybernetic approaches in learning management has been proven to be able to create a more directed, adaptive, and participatory learning process. Therefore, this approach can be used as an alternative learning strategy that is relevant to the characteristics of vocational education that emphasizes the balance between technical competence and the formation of student learning character. The implications for teachers show that the role of educators is no longer limited to delivering material, but rather develops into active managers of the learning process. Teachers are required to be able to systematically manage the learning flow, monitor student responses, and provide feedback on an ongoing basis. This practice encourages teachers to be more reflective in managing learning and adjust teaching strategies based on students' needs and development. Thus, learning becomes more contextual and meaningful for students.

For students, the results of this research have implications for the formation of a more independent, creative, and responsible learning attitude. A learning process that provides room for reflection and continuous improvement encourages students to not only focus on the end result, but also understand the importance of the learning process. Students learn to manage time, complete tasks earnestly, and account for their work individually and in groups. This implication is important for the formation of students' work character and professionalism as prospective vocational graduates. The implications for schools show that integrated, feedback-based learning management can improve the overall quality of learning.

Schools need to support the implementation of this approach through the provision of adequate learning facilities, strengthening the culture of reflection, and continuing professional development of teachers. In addition, schools can make cybernetic approaches part of their strategies to strengthen character and improve the quality of practice- and project-based learning.

At the curriculum level, the results of this study imply that learning needs to be designed flexibly and adaptively to the needs of students. Vocational curricula should provide a wider space for project-based learning, self-reflection, and continuous evaluation. Thus, the curriculum is not only oriented towards the achievement of technical competence, but also on the development of creativity and learning responsibility as part of 21st century competence. The implications of this research also include aspects of learning model development. The findings of the study show that the cybernetic approach can be operationalized practically in vocational learning, so that it has the potential to be developed into a more systematic and applicable learning model. This model can be a reference for teachers and schools in designing learning that balances learning control and giving autonomy to students.

CONCLUSION

This study confirms that the cybernetic approach in learning management not only functions as a technical tool for managing the learning process, but also as a framework of thinking that shapes the way teachers and students interpret learning as an interconnected, adaptive, and reflective system. Through learning management that emphasizes continuous feedback and control of the learning process, students are positioned as active subjects who have a role in directing, evaluating, and accounting for their own learning process. This shows that the effectiveness of the cybernetic approach lies in its ability to build a learning culture that is process-conscious, rather than solely results-oriented. Conceptually, the findings of this study broaden the understanding of cybernetic approaches by placing them as a learning management framework oriented towards the development of learning characters, particularly students' creativity and learning responsibility. This approach allows for the transformation of the role of the teacher from a material presenter to a manager of the learning system, while encouraging students to develop self-regulation, the courage to explore, and awareness of the consequences of each learning process undertaken. Thus, cybernetic approaches have strong relevance for vocational education that demands a balance between technical competence and work attitude readiness. The practical implications of this study suggest that the application of cybernetic approaches requires consistency in the planning, implementation, and evaluation of learning, as well as adequate institutional support. Schools need to strengthen learning management based on systems and feedback, while teachers need to be equipped with pedagogical competencies that enable them to design interactive, reflective and contextual learning. Without managerial support and a conducive school culture, cybernetic approaches have the potential to be partially implemented and lose their systemic meaning. This study has limitations in the scope of location which is limited to one school and the relatively short duration of implementation, so the findings obtained cannot be generalized widely. Therefore, further research is recommended to involve more diverse school contexts, different areas of expertise, and longer implementation periods to examine the sustainability and variation of the application of cybernetic approaches in learning management. Advanced research can also integrate this approach with quantitative studies or mixed methods to strengthen empirical evidence and expand scientific contributions.

REFERENCE

Afif, Z. N. (2024). Manajemen kurikulum program pembelajaran kewirausahaan di Sekolah Menengah Kejuruan. *At Tadbir: Islamic Education Management Journal*, 2(1), 66–77.

Anggraeni, M., & Susanti, A. D. (2024). Eksplorasi kultur sekolah dalam membangun kemandirian belajar siswa akuntansi pada salah satu SMK di Karanganyar. *Jurnal Akuntansi, Manajemen, Dan Perencanaan Kebijakan*, *2*(1), 17.

Anggraheni, V. (2025). Strategi Guru dalam Menghadapi Tantangan Pembelajaran Anak pada Autisme di SMK Regular. *JIMU: Jurnal Ilmiah Multidisipliner*, *3*(03), 779–784.

Ardiansyah, M. D. (2025). Pengaruh Media Interaktif Berbasis Educaplay Pada Mata Pelajaran IPS kelas VIII Terhadap Motivasi Siswa dan Hasil Belajar di SMP Sepuluh Nopember Sidoarjo. *Jurnal Dialektika Pendidikan IPS*, *5*(4), 88–98.

Cahyati, Y., & Amir, A. (2025). Peran Perpustakaan Dalam Mendorong Pembelajaran Mandiri di SMK Negeri 3 Pontianak. *CODEX: Jurnal Ilmu Perpustakaan Dan Informasi*, *1*(1), 31–37.

Fadli, A., & Isa, A. (2021). Kontribusi Implementasi Pendidikan Karakter dan Lingkungan Sekolah terhadap Berpikir Kreatif serta Dampaknya pada Kompetensi Kejuruan. *Jurnal Keislaman*, *4*(1), 85–100.

Hasan, A. N. A., Thariqa, N. A., & Saad, E. H. (2025). *Efektivitas Teori Belajar Sibernetik dalam Mengembangkan Kemandirian dan Kreativitas Siswa*.

Husni, I. N., Giatman, M., & Ernawati, E. (2024). Analisis manajemen berbasis sekolah pada sekolah menengah kejuruan: Studi literatur. *Journal of Education Research*, *5*(3), 3170–3180.

Kalifah, D. R. N., Hidayah, N., & Yanti, Y. (2022). Implikasi Teori Belajar Sibernetik Terhadap Pembelajaran Daring Dengan Menggunakan Google Classroom. *ELSE (Elementary School Education Journal): Jurnal Pendidikan Dan Pembelajaran Sekolah Dasar*, *6*(2), 500–512.

Kholis, M. N., Jayanti, R., Wardani, D. K., Khanif, M., & Mayangsari, S. D. (2023). Implementasi Teori Sibernetik pada Materi Teks Prosedur di Kelas XI SMAS Karya. *Pena: Jurnal Pendidikan Bahasa Dan Sastra*, *13*(2), 57–66.

Landa, L. N. (1976). *Instructional regulation and control: Cybernetics, algorithmization, and heuristics in education*. Educational Technology.

Latifah, U., Maksum, H., & Purwanto, W. (2024). Penerapan manajemen kepemimpinan yang efektif untuk meningkatkan kualitas pendidikan teknologi kejuruan di sekolah menengah kejuruan. *Al Qalam: Jurnal Ilmiah Keagamaan Dan Kemasyarakatan*, *18*(4), 2774–2790.

Nurâ, E. O. (2022). Implementasi Teori Sibernetik pada Pembelajaran Jarak Jauh Masa Pandemi COVID-19. *Jurnal Syntax Imperatif: Jurnal Ilmu Sosial Dan Pendidikan*, *3*(1), 36–46.

Nurmala, N., Diansah, E. A. A., Ibrahim, M. S. S., Aisyah, S., & Prasongko, W. A. (2025). Optimalisasi Kemampuan Kognitif Santri Prespektif Teori Sibernetik: Studi pada Pesantren Al Ibrohimy Bangkalan. *Al Qalam: Jurnal Ilmiah Keagamaan Dan Kemasyarakatan*, *19*(2), 768–778.

Priyadharma, S. (2019). Model pemrosesan informasi Gregory Bateson dalam pendekatan sibernetis. *Jurnal Manajemen Komunikasi*.

Saabighoot, Y. A., Supriatna, E., Naufal, R., & Rusdiani, I. (2024). Implementasi Kurikulum Merdeka berbasis Sibernetik pada Lembaga Pendidikan Anak Usia Dini di Provinsi Banten. *Aulad: Journal on Early Childhood*, *7*(3), 894–900.

Scott, B. (2004). Second-order cybernetics: an historical introduction. *Kybernetes*, *33*(9/10), 1365–1378.

Siti, U. F., & Mulyawan, S. N. (2023). Penerapan Teori Belajar Sibernetik dalam Upaya Meningkatkan Kreativitas Siswa di SD IT Assajidin Kab. Sukabumi. *Jurnal Arjuna: Publikasi Ilmu Pendidikan, Bahasa Dan Matematika Умедиеи: Asosiasi Riset Ilmu Manajemen Dan Bisnis Indonesia*, *1*(4), 143–165.

Telaumbanua, A., Gulo, D., Lahagu, L. A., Gulo, C. K., & Gulo, E. K. K. (2022). Pengaruh Penerapan Teori Belajar Sibernetik Terhadap Kemampuan Mahasiswa Mengelola Pembelajaran Berbasis Digital. *Jurnal Teologi Dan Pendidikan Kristen*, *1*(2), 58–67.

Wahyuna, R., & Usmaidar, R. F. (2023). Analisis Teori Sibernetik Pada Era Pembelajaran 5.0 Dalam Perkembangan Hasil Belajar Siswa Di Kelas VII MTsN 1 Langkat. *Ability: Journal of Education and Social Analysis*, 34–40.

Wiener, N. (1948). Cybernetics. *Scientific American*, *179*(5), 14–19.

Wiener, N. (2019). *Cybernetics or Control and Communication in the Animal and the Machine*. MIT press.

Zhanty, R. (2019). Disposisi Matematik terhadap Kemampuan Berpikir Kreatif Matematik Siswa SMK. *Journal on Education*, *1*(3), 113–118.