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Interaction Between Station Rotation Model and Cognitive Style on Student's Collaborative Skills

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Abstract

This research aims to investigate the interaction between the station rotation model and students' cognitive styles on the development of collaborative skills. This research uses a quasi-experiment which is described in a factorial design and used to examine the effect of the station rotation model and cognitive style on collaborative skills in junior high school students. The data collection uses test and field observation then the data analysis used the SPSS software. The research findings revealed students with a field-independent cognitive style showed higher achievement when using SRM 2, a score reaching 38.35, while when applying SRM 1, the score was slightly lower, namely 36.241. In contrast, students with a field-dependent cognitive style achieved higher scores through the application of SRM 1, a score reaching 37.057. The results of the Tests of Between-Subjects Effects analysis show by a p-value of 0.000, which is lower than the significance threshold of 0.050.

Keywords: *station rotation model, cognitive styles, collaborative skills, junior high school.*

Introduction

Industry 4.0 has changed the industrial paradigm globally, with the Industrial Revolution 4.0 arriving in 2011 in Germany (Suwardana, 2018). This revolution is known as the Digital Revolution, which aims to change the manufacturing industry process from manual to digital (Rojko, 2017). Industrial Revolution 4.0 is an effort to transform towards improvement by integrating the online world and production lines in industry, where all production processes run with the internet as the main support. In, Industry 4.0, industrial players let computers connect and communicate with each other to ultimately make decisions without human involvement. The combination of cyber-physical systems, the Internet of Things (IoT), and the Internet of Systems makes Industry 4.0 possible and makes smart factories a reality (Kominfo, 2023). This initiative introduces digitalization and the use of new technology as a strategic effort to optimize industrial potential. This new technology, which is the result of the Industrial Revolution 4.0, marks a significant transition in the form of digitalization.

Along with the development of Industrial Revolution 4.0, the education sector also needs to adapt to these changes. The importance of mastering 21st-century skills is because in Industry 4.0 students are required to be able to develop life skills and soft skills, which include the ability to think critically and solve problems, creativity, communication, and collaborative abilities (Nabilah & Nana, 2020). Increasing collaborative capabilities is a

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necessity in line with the demands of the Industrial Revolution 4.0, where learning models play a central role in this transformation process (Eggen & Kauchak, 2010). In this context, the Station Rotation Model (SRM) is the focus of research, as a learning model designed to improve students' collaborative skills.

The Station Rotation Model (SRM) is integrated into online and blended classroom learning environments, creating a platform that enables effective collaboration and social interaction (Mamman et al., 2022). However, to maximize the potential of the station rotation model, it is necessary to understand how this model interacts with students' cognitive styles. Cognitive style plays a crucial role in how students process information and understand concepts (Darmono, 2012). Therefore, this research directs attention to the influence of cognitive style on station rotation model interactions and the development of students' collaborative skills.

In the context of blended learning, Grasiella (2019) emphasized that the station rotation model has proven to be effective in increasing collaborative experiences and student activity. The form of blended learning with SRM includes variations between online and offline classes, both individual and with teachers, as well as collaborative activities. Students can use technology to deepen their overall understanding. The advantage of the station rotation model lies in monitoring student performance in groups or individually, enabling effective evaluation. The application of technology in SRM also encourages the development of communication skills, the effectiveness of reading compression, and content delivery (Ogude & Chukweggu, 2019).

This research aims to investigate the interaction between the station rotation model and students' cognitive styles in developing students' collaborative skills. By understanding the dynamics of this interaction, it is hoped that this research can provide a valuable contribution to the development of more adaptive and effective learning strategies in the era of the Industrial Revolution 4.0.

Literature Review

Station Rotation Model

The station rotation model is a blended learning model in which students rotate through various stations in the classroom with at least one technology-based station (Horn & Staker, 2015). In this model, teachers set up various stations in their classrooms for students to rotate around. At the time determined by the teacher, students take turns to the next station and start working on the tasks specified at that station (Walne, 2012). This model can be customized to meet individual classroom needs. Classrooms can be broken down into two, three, or even four different stations based on student and teacher needs or based on access to technology devices.

Similar to the old classroom station model that occurred in traditional classrooms in the past which was used to differentiate instruction for groups of students. The biggest difference is that now at least one of the stations is computer-based. One way a three-station rotation could be organized is to have one station directed by the teacher, a second station to incorporate online instruction, and a third station to provide collaborative learning opportunities with a small group of peers (Staker & Horn, 2012).

The station rotation teaching model, a type of blended learning, involves the utilization or use of internet-connected information and communication technology with classroom settings in learning activities (Akinoso et al., 2020). Rotational model as one type of blended learning, where students rotate between working online and other classroom-based modalities in the learning process (Bryan, et al., 2016). The station rotation model was chosen because the percentage of direct face-to-face learning is still greater than online learning given the learning system in schools. This model implements direct

learning by teachers, cooperative learning between students and online learning using technology. In the station rotation learning model, online learning takes place after classroom learning ends. Online learning in the station rotation model is applied to strengthen students' understanding of the teaching materials that have been given during in-class learning (Nida et al., 2020).

In this research, the station rotation model is implemented using Google software applications. The station rotation model will consist of several activities which are modified into two patterns, namely: Station Rotation Model 1 (SRM 1) with the following details (1) Giving assignments to students via Google Classroom media or Personalized, Online Instruction. (2) Assign students to discuss in groups looking for answers to assignments given through Google Workspace or Independent & Collaborative Practice media. (3) Providing explanations to students using the lecture method using Google Meet or Teacher-Led (Group) Instruction. Station Rotation Model 2 (SRM 2): (1) Provide explanations to students using the lecture method using Google Meet or Teacher-Led (Group) Instruction. (2) Give assignments to students via Google Classroom or Personalized, Online Instruction. (3) Assign students to discuss in groups looking for answers to assignments given through Google Workspace or Independent & Collaborative Practice media.

Cognitive Styles

Cognitive style is understood as a consistent model of self-function that an individual has demonstrated through his perceptual and intellectual activities (Rostampour & Niroomand, 2014). The term "cognitive style" refers to a person's preferred method of processing thoughts, organizing, sorting and representing information in the mind (Alalouch, 2021). Cognitive style refers to a terminology used to visualize an individual's unique way of receiving and processing information received (Sianturi et al., 2022). Cognitive style is considered as a determining element of the uniqueness that students have in understanding and managing information from the environment (Singer et al., 2017).

Based on the four cognitive style points of view previously explained, it can be concluded that cognitive style is a characteristic of students in terms of understanding, remembering, organizing, and processing information in the way they think and in solving problems.

There are positive and negative tendencies at each pole and cognitive styles fall between these two poles. Woolfolk (2009) differentiates cognitive styles into two dimensions, namely: (1) differences in students psychologically or which reflect the way a person analyzes in interacting with the environment, including field-dependent and field-independent cognitive styles; (2) conceptually cognitive styles are differentiated by speed of thinking and time, including reflective and impulsive cognitive styles. Among the cognitive styles that have been identified so far, the field-dependent/field-independent style has been studied the most, and both are stated as dimensions of cognitive style that have a range of applications that intersect with many educational issues (Sahin & Sasmaz Oren, 2022).

Two characteristics of cognitive styles classified as FI are: 1) process information in a patterned and analytical manner and have a tendency to self-determine goals; 2) feel challenged to learn and understand information and social content and, therefore, require specialized assistance; 3) develop inductive reasoning to interpret their own structure input in unstructured situations, and feel efficient working alone; 4) are not affected by criticism and are more introverted; 5) tackle problems without explicit guidance and instruction. And FD classifications are: 1) process information with intact patterns and clear structures and have a tendency to require reinforcement; 2) show greater interest in social content and, therefore, memorize social information well; 3) develop deductive reasoning to interpret inputs, have difficulty with structured learning materials and enjoy working in teams, are affected by criticism, and are more extroverted; 4) require clear

instruction metaphors to solve problems (Witkin et al., 1977).For more details, field-independent and field-dependent cognitive styles will be explained as follows:

a. Field Independent (FI)

The characteristic of the field-independent cognitive style has distinctive characteristics including: 1) the formulation of learning objectives is carried out independently; 2) strengthening learning motivation is carried out intrinsically; 3) understanding the material using intermediaries.

A learning style that prioritizes freedom for students is a characteristic of the field-independent cognitive style, so the material in a lesson will not be accepted absolutely but will be analyzed first and then redesigned using the students' language so that students can easily understand the material well (Candiasa, 2002). This field-independent cognitive style has interaction activities with the teacher or environment as necessary and appropriate and formulates its own learning goals which are stated internally. The learning process that takes place in parallel is more beneficial for the field-independent cognitive style.

Based on the theories above, it can be concluded that individuals with a field-independent cognitive style are students who tend to see objects as part of a separate environment, can analyze to separate stimuli from their context, can restructure, are impersonally oriented, tend to formulate their own goals and work with intrinsic motivation and reinforcement. In the learning process, individuals with a field-independent cognitive style tend to learn by formulating their own learning goals with more emphasis on intrinsic motivation and reinforcement and can adjust the organization of learning materials. Students who have a field independent cognitive style are more effective in learning step by step or sequentially, starting with analyzing facts and processing to get results (Darmono, 2012).

b. Field Dependent (FD)

Students with this style have an interest in seeing learning patterns as a whole (Desmita, 2015). Students have difficulty with sorting learning programs into different parts, so the character of students with the FD cognitive style tends to be global and accept available charts or structures, very high social orientation, very high social skills in students with this style, and compliance with existing regulations (Candiasa, 2002). Another characteristic of the FD cognitive style is that it is kind friendly, and wise so that it can interact with other people and is easily accepted by the surrounding community, but the weakness of students with this style is that they have difficulty expressing opinions with their thoughts. students whose cognitive style is field dependent depend on the structure of their environment, the learning process depends on experience, have short attention spans that change easily, like to study the environment, choose learning situations according to feelings and experiences, are socially oriented and less achievement-oriented, and are less competitive (Darmono, 2012).

Collaborative Skills

The 21st century requires collaborative skills, because this century requires someone to be able to foster an attitude of cooperation with other people. Collaboration skills according to Wolkowicz (2023) are skills that students use when working with other people to produce or create something or achieve a common goal. The intended goal is educational goals, where these goals consist of four pillars, namely the first pillar is learning to know, and mastery of learning tools which will later be used to develop concentration, memory skills, and thinking abilities. The second pillar is learning to do, namely skills in work, and how education can equip students to be able to use many of the skills expected in work in the future. The third pillar is learning to be, education contributes to the optimal development of students' personalities according to their respective conditions and the fourth pillar is learning to live together, building socialization and communication through the learning process in the classroom. One way

that can be used to achieve a learning goal is by increasing collaborative skills. According to Child & Shaw (2016), collaborative skills are an important educational output, not just used as a medium for developing or assessing knowledge learned through involvement and practice. The collaboration between learners is seen as essential in learning where learners interact with each other and exchange ideas and share information with each other (Khalil & Ebner, 2017).

So collaborative skills will be able to contribute to the learning process, where Greenstein states that to be able to measure collaborative skills several indicators must be understood, namely that students are asked to be active, productive, show flexibility and compromise, be responsible, and be respectful (Greenstein, 2012). Collaborative skills can create effective communication skills by placing them in the interpersonal part of students. Collaborative skills are very essential, as they can accelerate and improve performance in group work. groups are made up of students with diverse backgrounds and different skills who work together to achieve one big goal by doing what they want to achieve (Naila, 2020). Collaboration occurs when two or more people work together at school to achieve a common goal. Therefore, collaboration skills encompass everything necessary to work effectively with classmates and produce results as a team. A student who is skilled at collaborating in the school environment is a good team member, able to communicate well, can make decisions together, and has a positive influence as a leader (Kaplan, 2023).

Collaborative skills have several indicators that will be used to measure the level of effectiveness of collaborative skills in students. Indicators for collaborative skills are outlined in Table 1, following the criteria set by Mustaji (2017).

Table 1. Indicators for collaborative skills

No	Domain	Observed aspects
1	Contribution	a. Take an active role in discussions in groups. b. Contribute to providing ideas according to the topic during discussions.
2	Time Management	a. Complete tasks on time. b. Collect assignments on time.
3	Problem-solving	a. Trying to find ideas for answers to problems. b. Provide solutions from his ideas to solve problems.
4	Collaborate with Others	a. Listen and respect other people's opinions. b. Helping others to make working in the group easier.
5	Investigation Technique	a. Search for various sources of information for problem-solving. b. Uses various sources of information for problem-solving.

Research Design

This research uses a quasi-experiment which is described in a factorial design with a 2x3 factorial design. A 2x3 factorial design was used to examine the effect of the station rotation model and cognitive style on collaborative skills in junior high school students in the city of Bojonegoro, Indonesia, especially in Natural Sciences subjects. The 2x3 factorial design was chosen and applied to students to see whether or not the station rotation model with cognitive style affected the students' collaborative skills. This research is divided into three implementation stages, namely the pre-research stage, research implementation stage, and post-research stage. In the pre-research stage,

researchers will collect data in the form of information and facts in the field. At the pre-research stage, instruments were prepared that would be used to collect data and learning tools for implementing learning in experimental and control classes. The research stage was carried out by collecting all the required data. The first step in collecting student data is to give a pretest to the students, the aim is to find out the extent of the collaborative skills that the students have and the extent to which the students' cognitive styles have been used. After all the initial steps have been carried out, continue with the core steps by implementing the learning design that has been developed according to the station rotation model into classes which are divided into two, namely the control class and the experimental class. The control class used a learning design with station rotation model 2 (SRM 2) with a field-dependent (FD) and field-independent (FI) cognitive style, while the experimental class used a learning design with station rotation model 1 (SRM 1) with a field dependent cognitive style (FD) and field independent (FI) as well. The post-research stage is to give a posttest to students to find out the level of skills and abilities possessed by students so that the station rotation model and cognitive style can have a good influence on the learning process. Data from the implementation of the posttest and field observations will be entered into a table for analysis and the results will be interpreted using the SPSS version 24 program.

Results

After all, data meets the requirements for normal and homogeneous distribution. Next, data analysis was carried out using Multivariate analysis of variance (MANOVA) to determine the influence between variables. The results of the data analysis are presented in Table 2.

Table 2. Output Test of Between Subjects Effects

Tests of Between-Subjects Effects						
Source	Dependent Variable	Type I Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Collaborative_Skills	1140.306[a]	3	380.102	33.589	.000
	Crtical_thinking	1070.624[b]	3	356.875	29.249	.000
	SRL	1734.324[c]	3	578.108	49.730	.000
Intercept	Collaborative_Skills	154038.811	1	154038.811	13612.335	.000
	Crtical_thinking	84041.646	1	84041.646	6888.060	.000
	SRL	1141998.811	1	1141998.811	98237.142	.000
StaRotModel	Collaborative_Skills	446.693	1	446.693	39.474	.000
	Crtical_thinking	497.192	1	497.192	40.750	.000
	SRL	1044.334	1	1044.334	89.836	.000
Cognitio_Style	Collaborative_Skills	221.541	1	221.541	19.578	.000
	Crtical_thinking	176.549	1	176.549	14.470	.000

	SRL	235.488	1	235.488	20.257	.000
StaRotModel * Cognitio_Style	Collaborative_Skills	472.072	1	472.072	41.717	.000
	Crtical_thinking	396.884	1	396.884	32.529	.000
	SRL	454.502	1	454.502	39.097	.000
Error	Collaborative_Skills	1391.883	123	11.316		
	Crtical_thinking	1500.731	123	12.201		
	SRL	1429.865	123	11.625		
Total	Collaborative_Skills	156571.000	127			
	Crtical_thinking	86613.000	127			
	SRL	1145163.000	127			
Corrected Total	Collaborative_Skills	2532.189	126			
	Crtical_thinking	2571.354	126			
	SRL	3164.189	126			
a. R Squared = ,450 (Adjusted R Squared = ,437)						
b. R Squared = ,416 (Adjusted R Squared = ,402)						
c. R Squared = ,548 (Adjusted R Squared = ,537)						

Interaction between Station Rotation Model and Cognitive Style on Collaborative Skills

Based on the calculation results documented in detail in Table 3, we can gain a deeper understanding of the comparison of the average scores of collaborative skills of students with certain cognitive styles who were taught with two different station rotation models. For students with field independent (FI) cognitive style, the average value of collaborative skills achieved through the station 1 rotation model was 36.241, while for the station 2 rotation model, this value increased to 38.353. In contrast, for students with a field-dependent (FD) cognitive style, the average value of collaborative skills achieved through the station 1 rotation model was 37.057, while for the station 2 rotation model, this value decreased to 30.935.

Analysis of these differences provides interesting insights, especially when we consider the different outcomes between students with FI and FD cognitive styles. Students with a field-independent (FI) cognitive style showed higher achievement of collaborative skills with the application of the 2-station rotation model, while students with a field-dependent (FD) cognitive style achieved better results with the 1-station rotation model. This phenomenon highlights the importance of considering differences in students' cognitive characteristics in designing learning approaches.

It is important to note that this tendency may be related to the analytical and independent nature generally possessed by students with the FI cognitive style, which is more in line with the structure of SRM 2. On the other hand, students with the FD cognitive style, who tend to be more dependent on the context and external information, may respond better to an SRM 1 approach that emphasizes understanding of context.

In this context, these findings provide a strong indication that the successful implementation of the station rotation model can be greatly influenced by the suitability

of the model to students' cognitive characteristics. This emphasizes the importance of adapting and differentiating learning approaches to maximize the potential of students with different cognitive styles. The practical implication of these findings is that educators and teachers need to pay attention to the diversity of students' cognitive styles when designing and implementing certain learning models.

Table 3. Average Value of Station Rotation Model and Cognitive Style on Collaborative Skills

Dependent Variable	Cognitive Style	Sta_Rot_Model	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
Collaborative_Skills	FI	Station Rotation Model 1	36.241	.625	35.005	37.478
		Station Rotation Model 2	38.353	.816	36.738	39.968
	FD	Station Rotation Model 1	37.057	.569	35.932	38.183
		Station Rotation Model 2	30.935	.496	29.953	31.917

The output of the Tests of Between-Subjects Effects analysis in Table 2 provides an in-depth picture of the influence of the station rotation model and cognitive style on students' collaborative skills. In these results, it is seen that the p-value recorded is 0.000, which is lower than the significance threshold of 0.050. This shows that the observed results or differences observed in the influence of the station rotation model and cognitive style on students' collaborative skills did not occur by chance. Rather, the results can be considered as statistically significant results.

In this context, the low statistical significance of the p-value indicates that there is a real and non-random influence between the station rotation model and cognitive style on students' collaborative skills. Therefore, the conclusion that can be drawn is that the learning model variables with the station rotation model and students' cognitive styles interact significantly and have a meaningful impact on the development of students' collaborative skills.

It is important to emphasize that the existence of this significant influence can have profound implications in the context of learning design. Teachers and educational practitioners can utilize these findings to design more targeted and adaptive learning strategies. For example, they can customize learning approaches based on each student's cognitive style to maximize collaborative skills. The results of this analysis not only imply that the station rotation model and cognitive style together exert a significant influence on students' collaborative skills, but also provide a strong basis for policymakers and educators to implement more differentiated and effective learning strategies. Therefore, these findings can provide a strong basis for improving the quality of learning and achieving more holistic and adaptive educational goals.

Discussion

This research provides a significant contribution in the context of developing students' collaborative skills through the application of the Station Rotation Model (SRM) by considering the role of individual cognitive style. These findings are consistent with previous research highlighting the relevance of SRM in creating collaborative and social learning environments (Mamman et al., 2022). SRM is not only relevant in online learning and blended classes but also to be an effective tool for improving students' collaborative skills (Rocca et al., 2014).

This study illustrates differences in the effects of SRM depending on students' cognitive style, where students with a field-independent (FI) cognitive style outperform SRM 2, while students with a field-dependent (FD) style perform better with SRM 1. SRM 1 (36.241), SRM 2 (38.353). Field-dependent (FD) cognitive style students' scores: SRM 1 (37.057), SRM 2 (30.935). Notably, FI students excel with SRM 2, while FD students perform better with SRM 1. These findings emphasize the importance of understanding and considering variations in students' cognitive styles in designing learning strategies. In this context, Darmono (2012)underlines that teachers must be able to recognize and understand students' characteristics, including their cognitive styles, to ensure successful learning.

In line with the emphasis on adapting learning strategies, these findings highlight that SRM 1 is more effective for students with an FD cognitive style, while SRM 2 is more effective for students with an FI cognitive style. This illustrates the importance of flexibility in learning approaches to accommodate individual student differences. This finding is in line with the thoughts of Conti (2019) who emphasizes the importance of combining learning variables with students' cognitive characteristics to obtain optimal results.

In terms of methodology, the success of this research can be seen from the statistically significant results with a p-value of 0.000 < 0.050 on the interaction effect of the station rotation model and cognitive style on students' collaborative skills. These results support previous research findings and contribute to the understanding of the importance of combining learning variables with students' cognitive characteristics.

The importance of designing a learning approach that combines learning variables with students' cognitive characteristics can make a significant contribution to improving the quality of education. Through a deeper understanding of the interactions between SRM, students' cognitive styles, and the development of collaborative skills, educators can more effectively adapt learning strategies to meet the demands of the Industry 4.0 era and prepare students for future challenges.

Conclusion

The research results show that there are significant differences in the development of students' collaborative skills between SRM 1 and SRM 2. Students with a field-independent (FI) cognitive style tend to get higher grades when taught with SRM 2, while students with a field-dependent (FD) cognitive style) are superior to SRM 1. Students' cognitive styles play a crucial role in the effectiveness of the Station Rotation Model. Students with field-independent (FI) preferences are more helped by SRM 2, while students with field-dependent (FD) preferences are more benefited by SRM 1.

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References

Akinoso, S. O., Agoro, A. A., & Alabi, O. M. (2020). Effect of Station Rotation Mode of Instructional Delivery for Mathematics in the Era of Advancing Technology. Journal of the International Society for Teacher Education, 24(2), 60–72. http://mylibrary.wilmu.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=eue&AN=148741700&site=ehost-live

Alalouch, C. (2021). Cognitive styles, gender, and student academic performance in engineering education. Education Sciences, 11(9). https://doi.org/10.3390/educsci11090502

Bryan, A., & Volchenkova, K. N. (2016). Blended Learning: Definition, Models, Implications for Higher Education. Bulletin of the South Ural State University Series "Education. Education Sciences," 8(2), 24–30. https://doi.org/10.14529/ped160204

Candiasa, I. M. (2002). Pengaruh Strategi Pembelajaran Dan Gaya Kognitif Terhadap Kemampuan Memprogram Komputer Eksperimen Pada Mahasiswa Ikip Negeri Singaraja. Jurnal Teknologi Pendidikan Universitas Negeri Jakarta, 4(3), 1–36.

Child, S., & Shaw, S. (2016). Collaboration in the 21st century: Implications for assessment. A Cambridge Assessment Publication, 22, 17–22.

Darmono, A. (2012). Identifikasi Gaya Kognitif (Cognitive Style) Peserta Didik dalam Belajar. Al-Mabsut, 3(1), 63–69. www.ifets.into/journals/91/23.pdf

Desmita. (2015). Psikologi Perkembangan. PT Remaja Rosdakarya.

Eggen, P., & Kauchak, D. (2010). Educational psychology: Windows on classrooms (C. Robb, L. Reinkober, P. D. Bennett, & S. G. Langner (eds.); Eighth edi). Pearson.

Grasiella. (2019). Reshaping Undergraduates Research Experience With Station Rotation Learning Model. International Journal of Advanced Research, 7(11), 702–710. https://doi.org/10.21474/ijar01/10061

Greenstein, L. (2012). Assessing 21st Century Skills: A Guide to Evaluating Mastery and Authentic Learning. SAGE Company.

Horn, M. B., & Staker, H. (2015). Blended Learning: Promoting Educational Revolution with Subversive Innovation. Machinery Industry Press.

Kaplan, Z. (2023). What Are Collaboration Skills? Definition and Examples. The Forage. https://www.theforage.com/blog/skills/collaboration-skills

Khalil, H., & Ebner, M. (2017). Using Electronic Communication Tools in Online Group Activities to Develop Collaborative Learning Skills. Universal Journal of Educational Research, 5(4), 529–536. https://doi.org/10.13189/ujer.2017.050401

Kominfo. (2023). Apa itu Industri 4.0 dan bagaimana Indonesia menyongsongnya. Kementerian Komunikasi Dan Informatika RI. https://www.kominfo.go.id/content/detail/16505/apa-itu-industri-40-dan-bagaimana-indonesia-menyongsongnya/0/sorotan_media

Mamman, B., Abuhassna, H., Umara, K., Mustapha, A. M., Awae, F., Ali, A. S., Radzi, M. B. P., Alshehhi, A. M. A. A., & Almheiri, A. S. B. H. (2022). Pre-Service Teachers' Views on How the Station Rotation Model with a Blended Social Learning Environment (SRM-BSCLE) Enhances their Critical Thinking Skills. International Journal of Academic Research in Progressive Education and Development, 11(2). https://doi.org/10.6007/ijarped/v11-i2/14134

Mustaji. (2017). Model dan Desain Pembelajaran: Teori dan implementasi problem-based learning dan collaborative learning. Unesa University Press.

Nabilah, L. N., & Nana. (2020). Pengembangan Keterampilan Abad 21 dalam Pembelajaran Fisika di Sekolah Menengah Atas Menggunakan Model Creative Problem Solving. Science Gate, 1–10. https://osf.io/6vwhd/

Naila, I. (2020). The Effectiveness of Science Project Learning based on Entrepreneurship Model to Improve Elementary Students' Collaborative Skills. Mimbar Sekolah Dasar, 7(3), 348–361. https://doi.org/10.17509/mimbar-sd.v7i3.28676

Nida, N. K., Usodo, B., & Sari Saputro, D. R. (2020). The blended learning with Whatsapp media on Mathematics creative thinking skills and math anxiety. Journal of Education and Learning (EduLearn), 14(2), 307–314. https://doi.org/10.11591/edulearn.v14i2.16233

Ogude, B. A., & Chukweggu, C. O. (2019). The Effects of Station Rotation Model (SRM) and Lecture Method on Blended learning on Secondary School Students' Performance on Reading Comprehension. Journal of Advances in Education and Philosophy, 03(10), 376–383. https://doi.org/10.36348/jaep.2019.v03i10.006

Rocca, L. C., Margottini, M., & Capobianco, R. (2014). Computer-supported collaborative learning in higher education. Open Journal of Social Sciences, 2, 61–66. https://doi.org/10.4018/978-1-59140-408-8.ch001

Rojko, A. (2017). Industry 4.0 concept: Background and overview. International Journal of Interactive Mobile Technologies, 11(5), 77–90. https://doi.org/10.3991/ijim.v11i5.7072

Rostampour, M., & Niroomand, S. M. (2014). Field Dependence/Independence Cognitive Styles: Are They Significant At Different Levels Of Vocabulary Knowledge? International Journal of Education and Literacy Studies, 2(1), 52–57. https://doi.org/10.7575/aiac.ijels.v.2n.1p.52

Sahin, F., & Sasmaz Oren, F. (2022). Laboratory as an Instrument in Improving the Scientific Reasoning Skills of Pre-Service Science Teachers with Different Cognitive Styles. Science Insights Education Frontiers, 13(2), 1875–1897. https://doi.org/10.15354/sief.22.or072

Sianturi, M., Suliantin, R., & Fitrianti, H. (2022). Relationships Between Cognitive Styles and Indigenous Students' Mathematics Academic Outcomes. Journal of Learning for Development, 9(3), 528–544. https://doi.org/10.56059/jl4d.v9i3.684

Singer, F. M., Voica, C., & Pelczer, I. (2017). Cognitive styles in posing geometry problems: implications for assessment of mathematical creativity. ZDM - Mathematics Education, 49(1), 37–52. https://doi.org/10.1007/s11858-016-0820-x

Staker, H., & Horn, M. B. (2012). Classifying K-12 Blended Learning. Innosight Institute, May, 22. http://eric.ed.gov/?id=ED535180%5Cnhttp://files.eric.ed.gov/fulltext/ED535180.pdf

Suwardana, H. (2018). Revolusi Industri 4. 0 Berbasis Revolusi Mental. JATI UNIK : Jurnal Ilmiah Teknik Dan Manajemen Industri, 1(2), 109–118. https://doi.org/10.30737/jatiunik.v1i2.117

Witkin, H. A., Moore, C. A., Goodenough, D., & Cox, P. W. (1977). Field-Dependent and Field-Independent Cognitive Styles and Their Educational Implications. Review of Educational Research, 47(1), 1–64. https://doi.org/10.3102/00346543047001001

Wolkowicz, O. (2023). Collaboration Skills: Definition, Examples & How to Improve.

Woolfolk, A. (2009). Educational Psychology, Active Learning Edition. Allyn and Bacon.