



# Integrated Metaphorming Learning Model of 21<sup>st</sup> Century Skills to Increase Student Creativity

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## ABSTRAK

Berdasarkan riset PISA pembelajaran yang dilakukan saat ini belum mampu mengembangkan kreativitas mahasiswa. Kreativitas adalah kemampuan yang mencerminkan kelancaran, keluwesan dalam berpikir serta kemampuan mengembangkan, memperkaya dan merinci suatu gagasan berkualitas agar dapat menyelesaikan permasalahan-permasalahan yang dihadapinya. Penelitian ini dilakukan dengan tujuan untuk menganalisis peningkatan kreativitas mahasiswa melalui model pembelajaran metaphorming terintegrasi keterampilan abad 21. Penelitian ini menggunakan pendekatan kuantitatif, jenis quasi eksperimen dan desain Nonequivalent Control Group Design. Metode pengumpulan data menggunakan tes. instrument pengumpulan data menggunakan soal tes. Sampelnya adalah mahasiswa unit D berjumlah 30 mahasiswa sebagai kelas kontrol dan unit E berjumlah 32 mahasiswa sebagai kelas eksperimen yang dipilih secara purposive sampling. Teknik analisis data menggunakan perhitungan indeks gain (N-Gain). Hasil penelitian yaitu model pembelajaran metaphorming terintegrasi keterampilan abad 21 mampu meningkatkan kreativitas mahasiswa, akan tetapi tidak terdapat perbedaan hasil belajar yang signifikan antara mahasiswa yang di ajarkan dengan model pembelajaran metaphorming terintegrasi abad 21 dengan tanpa integrasi keterampilan abad 21. Uji hipotesis menunjukkan bahwa kreativitas hanya mempengaruhi 25% peningkatan hasil belajar mahasiswa, sisanya dipengaruhi oleh factor-faktor yang tidak terukur dalam penelitian ini. Disimpulkan bahwa model pembelajaran metaphorming terintegrasi keterampilan abad 21 berdampak positif terhadap kreativitas mahasiswa.

## ABSTRACT

Based on PISA research, current learning has yet to be able to develop student creativity. Creativity is an ability that reflects fluency, flexibility in thinking, and the ability to develop, enrich, and detail quality ideas to solve problems. This research was conducted to analyze the increase in student creativity through an integrated Metaphorming learning model for 21<sup>st</sup> century skills. This research used a quantitative approach, a quasi-experimental type, and a Nonequivalent Control Group Design. The data collection method uses tests. The data collection instrument uses test questions. The sample was 30 students from Unit D as the control class and Unit E with 32 students as the experimental class who were selected using purposive sampling. The data analysis technique uses gain index calculations (N-Gain). The research results show that the Metaphorming learning model integrated with 21<sup>st</sup> century skills can increase student creativity. However, learning outcomes are similar between students taught with the integrated Metaphorming learning model of the 21<sup>st</sup> century and with the integration of 21<sup>st</sup>-century skills. Hypothesis testing shows that Creativity only influences a 25% increase in student learning outcomes; the rest is influenced by factors not measured in this research. It was concluded that the Metaphorming learning model integrated with 21<sup>st</sup> century skills positively impacted student creativity.

## 1. INTRODUCTION

Talking about educational issues certainly cannot be separated from skills in the learning process that can be realized with quality education. In the 21<sup>st</sup> century, competition in the field of education can be said to be very tight because quality human resources are more pervasive and will produce quality

education (Shanti et al., 2017). The 21<sup>st</sup> century skills are skills that are currently popular in the world of education, both within schools and universities (Haryani et al., 2021; Hidayatullah et al., 2021; Mubarakah et al., 2021; Suciati et al., 2022; Wang et al., 2018). These 21<sup>st</sup> century skills can be obtained based on the experiences of students and educators (Haviz et al., 2020; Teo, 2019). The pattern of 21<sup>st</sup> century skills emphasizes the ability of students to find out for themselves from various sources, formulate problems, think analytically, and collaborate in solving problems (Kumalasani & Kusumaningtyas, 2022). In addition, educators must also have innovation, creativity, critical thinking, collaboration, and communication skills so that they can create a learning process with different skills (Daryanes et al., 2023; Fitriyani & Nugroho, 2022; Y. A. Yulianti & Wulandari, 2021).

The most important component of 21<sup>st</sup> century skills is the ability to think creatively. However, in reality, based on research from the Program for International Student Assessment (PISA), it has not been able to give students the ability to think creatively. As a result, the learning process that has been carried out must be renewed so that it is able to master 21<sup>st</sup> century skills and can be carried out properly. A quality teaching and learning process is produced by qualified educators (Asrizal & Usman, 2022; Aziz et al., 2020; Liu et al., 2020). Qualified educators are educators who are able to improve their skills, broad knowledge, clear curriculum, and supportive resources (Darling-Hammond & Hyler, 2020; Turşucu et al., 2018). Furthermore, there are four skills in the 21<sup>st</sup> century (4C), namely creative, critical thinking, communication, and collaboration skills.

The reality that is happening in the field is that not all students get 21<sup>st</sup> century skills, especially the ability to think creatively. Student creativity will affect their learning outcomes. This is also in line with research states that creative thinking skills are needed because they can determine learning outcomes (Daud et al., 2012; Nurhayati & Wahyuni, 2020). Creativity is a student's ability to reflect fluency, flexibility in thinking, and the ability to develop, enrich, and detail a quality idea (Adiansha et al., 2020; Hernita & Djamas, 2019). In addition, creativity is believed to be the key to success in solving all problems. Thus, it can be said that creativity and learning outcomes are two things that cannot be separated.

Learning outcomes are one of the factors that measure success in education (Maryunani & Hasan, 2022; Yahya & Irfan, 2018). The activities cover three aspects, such as knowledge, skills, and attitudes (Chase et al., 2019). Students must obtain important learning outcomes. Educators are required to be able to make the learning process active by involving students so that they can hone or improve their creative abilities and learning outcomes. Therefore, it can be concluded that educators are required to have the ability to organize learning so that it is interesting and not monotonous (Nurhayati et al., 2022; Siregar et al., 2022). The success of learning can be obtained by using a learning model (Argarini, 2018; Rahardjo, 2019). The learning model used is one that can increase student creativity.

In order to realize creative learning, educators must be able to develop their attitudes, knowledge, and skills. To make this happen, it is required to have several stages, namely having to make observations based on a scientific approach, developing the ability to ask questions, thinking, conducting experiments, and communicating well. One of the learning models that involves and fosters the enthusiasm of educators to learn creatively is the Metaphorming model of learning. This is in accordance with research namely that the metaphorming learning model is a learning model that can be applied to increase creativity (Anwar, 2019; Suwartini et al., 2021). Metaphorming comes from the word meta which means beyond the real world and phora which means transfer. Metaphorming can be expressed as an action that refers to the activity of changing a material from one meaning to another.

The metaphorming learning model is a learning model that can lead students to think creatively. This is because the metaphorming learning model provides an opportunity for every student to have brilliant ideas (B Anwar, 2019; Suwartini et al., 2021; Zhang, 2019). This learning model has four stages: connection, discovery, creation, and application (Erdogan, 2019). Therefore, the metaphorming learning model is expected to increase student creativity. Metaphorming can be said to help students think more creatively to solve the problems they face. In addition, it can also solve problems with cooperation so as to provide good learning outcomes. This is because metaphorming is a way to develop a Creative Open system (COS), namely by applying the way of thinking of geniuses to students. This is a step that is considered more strategic. Learners are equipped with the skills to learn. Training students to think creatively is part of the metaphorical model of learning and is a foundation for innovation and creation.

The metaphorming learning model has four stages: connection, discovery, invention, and application (Nurlaela et al., 2019; Sunito et al., 2013). The metaphorming model at the connection stage is used to connect two or more things that have the goal of understanding something so that they can connect ideas, knowledge, and experience so that they can be directed to be creative. The metaphorming model at the discovery stage involves observation and experience so that it can lead to finding something. The metaphorming model at the invention stage is a form of creative thinking so that one can feel that a lesson

is useful to do. Furthermore, the metaphorming model at the application stage, which leads to the thought or results of a product, will continue to develop according to the times.

Several previous studies have shown that the research is only oriented towards 21<sup>st</sup> century skills or learning metaphoring. Previous research findings stated that the results of the analysis of the need for developing TPACK-oriented digital teaching materials and 21<sup>st</sup> century skills (Irwanto et al., 2022; Purwanto & Risdianto, 2022; Setyo et al., 2023; Yunansah et al., 2022). Other research results reveal that 21<sup>st</sup> century skills need to be developed in the field of education because they can affect the ability to produce students who are ready to face various challenges and problems (Suwartini et al., 2021; Wasqita et al., 2022; Yulianti et al., 2022). In addition, other research develops 21<sup>st</sup> century skills in learning chemistry, educators can choose learning models with a scientific approach in order to develop 21<sup>st</sup> century skills in students (Redhana, 2019).

Furthermore, research on metaphorming learning has been carried out by the metaphorming teaching approach is ideal for teachers to improve students' writing skills and develop cognitive competence in the writing process (Ramli et al., 2019). Other research, conducting research by combining metaphorming learning models with mind-mapping media (Sari & Widodo, 2019). The purpose of this study was to determine the effectiveness of the Mind Mapping-Assisted Metaphorming Model on mathematical critical thinking skills on the subject of relational angle trigonometry. Furthermore, the metaphorming approach is a creative and new way for students to develop new ideas and perspectives and can help students explore many ideas, knowledge, and creative solutions (Zhang, 2019). Then, other research using the metaphorming model to increase students' thinking creativity so that they can generate new ideas and develop them optimally (Septasari et al., 2021).

Based on some of the results of these studies, it can be seen that learning 21<sup>st</sup> century skills or learning metaphoring has a positive influence on the learning process. It's just that in previous studies, there have been no studies that specifically discuss integrating metaphorical learning with 21<sup>st</sup> century skills to increase student creativity. As a result, this study focused on finding out whether the metaphorming learning model integrated with 21<sup>st</sup> century skills can increase student creativity. This research was conducted with the aim of analyzing the increase in student creativity through an integrated metaphorming learning model of 21<sup>st</sup> century skills.

## 2. METHOD

The research approach used in this study was a quantitative approach, with a quasi-experimental type of research and a Nonequivalent Control Group Design (Sugiyono, 2018). This design was chosen to obtain data on student creativity where the nonequivalent control group design consisted of two classes were compared the measurement results between one class with treatment and another class without treatment. The sample was selected using a purposive sampling technique. Based on consideration, the students have about the same academic abilities and the samples used in this study were the second semester students of unit D with 30 students as the control class and 32 students in unit E as the experimental class.

The instrument used in this study was a test called creativity test totaling 10 questions in the essay forms where the questions can be used if those have fulfilled the validity, reliability, level of difficulty and discriminating power tests. The questions are made based on indicators of creativity. Indicators of creativity in this study are fluent thinking (Fluency), flexible thinking (Flexibility), detailed-oriented thinking (Elaboration) and original thinking (Originality) (Agustiana et al., 2020) The questions and assessment guidelines used are presented in Table 1.

**Table 1.** Questions and Guidelines For Assessing Creativity

Question Indicator	Question Number		Score	Characteristics
	Pre-test	Post-test		
(1)	(2)	(3)	(4)	(5)
Fluency	1, 2	4, 8	3	<ul style="list-style-type: none"> <li>- Answers are delivered in two different ways with given explanations and pictures</li> <li>- Answers based on existing discourse and theory</li> <li>- Formulated in a coherent discussion with good and correct language.</li> </ul>
			2	<ul style="list-style-type: none"> <li>- Answers are delivered in one way with explanations and pictures</li> <li>- Answers based on existing discourse and theory</li> </ul>

Question Indicator	Question Number		Score	Characteristics
	Pre-test	Post-test		
(1)	(2)	(3)	(4)	(5)
Flexibility	3, 4, 5,	6, 7, 10	1	<ul style="list-style-type: none"> <li>- Formulated in a coherent discussion with good and correct language.</li> <li>- Answers are delivered in one way without explanations and pictures</li> <li>- Formulated in a less coherent discussion with poor language.</li> </ul>
			0	No answer/wrong answer
			3	<ul style="list-style-type: none"> <li>- Answers are delivered in two variations with given explanations</li> <li>- Answers based on existing discourse and theory</li> <li>- Formulated in a coherent discussion with good and correct language.</li> </ul>
			2	<ul style="list-style-type: none"> <li>- Answers are delivered in two different ways without given explanations</li> <li>- Answers based on existing discourse and theory</li> <li>- Formulated in a coherent discussion with good and correct language.</li> </ul>
			1	<ul style="list-style-type: none"> <li>- Answers are delivered in one way with explanations</li> <li>- Formulated in a less coherent discussion with poor language.</li> </ul>
Elaboration	6, 7	1, 3	0	No answer/wrong answer
			3	<ul style="list-style-type: none"> <li>- Answers delivered are detailed with logical explanations</li> <li>- Answers based on existing discourse and theory</li> <li>- Formulated in a coherent discussion with good and correct language.</li> </ul>
			2	<ul style="list-style-type: none"> <li>- Answers delivered are not detailed but with explanations</li> <li>- Answers based on existing discourse and theory</li> <li>- Formulated in a coherent discussion with good and correct language.</li> </ul>
			1	<ul style="list-style-type: none"> <li>- Answers delivered are not detailed and without explanations</li> <li>- Formulated in a less coherent discussion with poor language.</li> </ul>
			0	No answer/wrong answer
Originality	8, 9, 10	2, 5, 9	3	<ul style="list-style-type: none"> <li>- Answers delivered are original with given explanations and pictures</li> <li>- Answers based on existing discourse and theory</li> <li>- Formulated in a coherent discussion with good and correct language.</li> </ul>
			2	<ul style="list-style-type: none"> <li>- Answers delivered are original without given explanations and pictures</li> <li>- Answers based on existing discourse and theory</li> <li>- Formulated in a coherent discussion with good and correct language.</li> </ul>
			1	<ul style="list-style-type: none"> <li>- Answers delivered are not original and in line with the existing theory</li> <li>- Formulated in a less coherent discussion with poor language.</li> </ul>
			0	No answer/wrong answer

(Adapted from Agustiana et al., 2020)

Before the research was conducted, the researcher gave a pretest to students from both the experimental and the control classes and the both classes were given different treatments. After learning process was completed, each class was given a post-test to see the differences in student creativity between

the control class and the experimental class. The research data were analyzed using analysis with normality test, homogeneity test and two-average similarity test. Descriptive statistical analysis was used to describe the data on student creativity. The results of the normality test and homogeneity test were taken into consideration to test the hypothesis.

Hypothesis testing was carried out to determine the relationship between creativity and learning outcomes using correlation analysis and linear regression testing with the SPSS 23 program. To obtain data on student learning outcomes, the researcher gave learning outcomes questions in each class.

### 3. RESULT AND DISCUSSION

#### Result

This research was conducted on the subject of basic science concepts in SD II on material of Force. This study used the integrated metaphorming learning model of 21<sup>st</sup> century skills in the experimental class and a metaphorming learning model in the control class. Before giving treatment through the application of a metaforming learning model integrated with 21<sup>st</sup> century skills in the experimental class, the researcher gave a pretest to see the students' initial abilities before the action was given. Furthermore, the treatment was given for 2x meetings in each class. Finally, to see an increase in student creativity, the researchers gave a posttest for student creativity questions. To see the relationship between creativity and student learning outcomes researchers provide learning outcomes questions in each class.

The metaphorming learning model has four stages, namely connection, discovery, invention and application. At the connection stage, the researcher tries to connect the knowledge that students already have with style material by providing problems. Through this problem it is hoped that students will try to connect the material with real experiences that have been experienced by students. The discovery stage, namely the researcher tries to direct students to the material to be studied by involving experiences that have been experienced by students so that students find their own knowledge. In the invention stage, the researcher gives problems and then provokes students' creativity to solve these problems with the intellect of each student. Furthermore, the application stage is directing students to the right solution of the problems that have been given.

The assessment of student creativity in the control and experimental classes was carried out in different ways. The metaphorming learning model applied in the control class while the integrated metaphorming learning model of 21<sup>st</sup> century skills applied in the experimental class. The same questions were given to the control and experimental classes. In this study, the increase in student creativity could be seen in the pretest and posttest scores that have been given. Based on data analysis showed that there is an increase in student creativity through the application of the integrated metaphorming learning model of 21<sup>st</sup> century skills in the material of Force. This can be seen from the high score of the final test in the experimental class which was 74.75 compared to the control class which was only 60.33 with an N-Gain of 0.56 which meant it was still in medium criteria. Increasing student creativity on the subject of style through the application of the integrated metaphorming learning model of 21<sup>st</sup> century skills can be seen in [Table 2](#).

**Table 2.** Increasing Student Creativity in Each Indicator

No.	Creativity Indicator	Experiment Class		Control Class	
		N-Gain	Criteria	N-Gain	Criteria
1	Fluency	0.69	Medium	0.07	Low
2	Flexibility	0.53	Medium	0.29	Low
3	Elaboration	0.25	Low	0.01	Low
4	Originality	0.40	Medium	0.13	Low
	<b>Average</b>	<b>0.47</b>	<b>Medium</b>	<b>0.13</b>	<b>Low</b>

The [Table 2](#) shows that the creativity of students in the experimental class is higher than the control class, especially on the fluency indicator. Assessment of student learning outcomes in the control and experimental classes was carried out by using a test instrument. The questions given to the control and experimental classes were the same questions. The increase result in student learning outcomes can be seen in [Table 3](#).

**Table 3.** Improving Student Learning Outcomes through Integrated Metaphorming Learning Model of 21<sup>st</sup> Century Skills

No.	Grade	Class	
		Experiment	Control
1	Average	70.62	67.78
2	Variance	104.20	162.71
3	N-Gain	0.48	0.45

The Table 3 shows that there is no significant difference in learning outcomes between the control class and the experimental class. The average values of the experimental class was 70.62 while in the control class was 67.78 with an N-Gain that was almost close to 0.48 for the experimental class and 0.45 for the control class and both are in the improvement category of medium. This is due to both classes applied the metaphorming learning model, but the experimental class was integrated with 21<sup>st</sup> century skills. This meant that both classes went through the stages of connection, discovery, creation, application in the metaphorming learning model. The application of the metaphorming learning model emphasizes the importance of students constructing their knowledge through active involvement in learning activities.

The relationship between creativity and student learning outcomes was analyzed by calculating the correlation coefficient and the significance test then proceeded to determine the regression equation, the calculation of this study using SPSS 20 was to determine the relationship and effect between creative thinking ability on student learning outcomes can be seen in Table 4.

**Table 4.** Relationship Between Creativity and Student Learning Outcomes

		Creativity	Learning Outcome
Creativity	Pearson Correlation	1	0.224
	Sig. (2-tailed)		0.217
	N	32	32
Learning outcome	Pearson Correlation	0.224	1
	Sig. (2-tailed)	0.217	
	N	32	32

From the data obtained  $\alpha = 0.217$ , it meant that  $\alpha > 0.05$  so there was no significant relationship between creativity and student learning outcomes. Further tests were conducted to determine how much creativity had an effect on student learning outcomes. The test results showed a coefficient of determination of 0.250, which meant that student creativity affects learning outcome was 25%, so there were other factors that affect student learning outcomes.

**Discussion**

The results of the data analysis showed that there was an increase in student creativity through the application of Integrated Metaphorming Learning Model of 21<sup>st</sup> century skills in subject matter of Force, especially on the fluency indicator (fluent thinking). This is due to the integrated learning model of 21<sup>st</sup> century skills in the experimental class. One of the skills in the 21<sup>st</sup> century skills is creative thinking which is integrated into the metaphorming learning model to develop student creativity. This learning model has 4 learning stages namely connection, discovery, creation and application (Bakri Anwar, 2019; Luthfiyah Nurlaela, Ismayati, et al., 2019). The creative process will only occur if it is built through problems (Hadi et al., 2022; Mamahit et al., 2020; Septikasari & Frasandy, 2018). In the integrated metaphorming learning model of 21<sup>st</sup> century skills, lecturers present various problems to stir students’ connections to discover their knowledge. This connected thinking will make students creative in finding solutions to a problem.

The problems presented are able to generate/stir student creativity, especially on fluency indicators. Fluency (thinking fluently) is the ability to generate many ideas (Chávez-Eakle et al., 2012; Arie Wahyuni & Kurniawan, 2018). These ideas can emerge through the connection phase when the lecturer presents problems to connect the knowledge that students already have with the knowledge that students will acquire. Learning metaphors allows students to connect old knowledge with new ones for better problem solving (Yati Suwartini et al., 2021). The creativity is the ability to generate a new idea or new creation/combination with existing things so that there is an update that is relatively different from what has existed before (Septiana et al., 2018). The creativity is a mental ability or unique human skill that can create the different, unique, new, original and effective expressions (Nita, 2019).

The metaphorming learning model has four stages: connection, discovery, invention, and application. The metaphorming model at the connection stage is used to connect two or more things that have the goal of understanding something so that they can connect ideas, knowledge, and experience so that they can be directed to be creative (Azizah et al., 2020; Sunito et al., 2013). The metaphorming model at the discovery stage involves observation and experience so that it can lead to finding something. The metaphorming model at the invention stage is a form of creative thinking so that one can feel that a lesson is useful to do. Furthermore, the metaphorming model at the application stage, which leads to the thought or results of a product, will continue to develop according to the times (Luthfiyah, et al., 2019; Indra Sunito et al., 2013).

Data analysis which was carried out to see the relationship between creativity and student learning outcomes showed that there was no significant relationship between creativity and student learning outcomes. Creativity only affects learning outcomes by 25%, meaning that there are other factors that influence student learning outcomes. The results of this study state that student learning outcomes are not influenced by creative thinking abilities (Wahyuni & Kurniawan, 2018). In line with this, the research state that creativity has no influence on learning outcomes (Sihombing et al., 2021). There is a significant relationship between creativity and learning outcomes (Nita, 2019). Other research states that there is a positive and significant relationship between creativity and learning outcomes (Septiana et al., 2018). Thus it can be said that student learning outcomes are not only influenced by creativity, but there are still other factors that influence student learning outcomes that are measureless in this study.

The metaphorming learning model is a learning model that can lead students to think creatively. This is because the metaphorming learning model provides an opportunity for every student to have brilliant ideas (Zhang, 2019). Therefore, the metaphorming learning model is expected to increase student creativity. Metaphorming can be said to help students think more creatively to solve the problems they face. In addition, it can also solve problems with cooperation so as to provide good learning outcomes. This is because metaphorming is a way to develop a Creative Open system (COS), namely by applying the way of thinking of geniuses to students. This is a step that is considered more strategic. Learners are equipped with the skills to learn. Training students to think creatively is part of the metaphorical model of learning and is a foundation for innovation and creation.

In learning process, the students must be triggered to think outside the existing habits by involving students in the process of conveying new ideas and solutions, asking unusual questions, and trying to propose alleged answers. 21<sup>st</sup> century skills are able to grow and increase cooperation within a group to solve certain problems, increase tolerance for differences of opinion, to think critically and creatively to solve a problem (Septikasari & Frasandy, 2018). The application of the metaphorming learning model should be given more emphasis on the importance of students constructing their knowledge through active involvement in learning activities. The metaphorming learning model in learning process can creates a fun and creative atmosphere for students (Wulandari & Megawati, 2017). In learning activities, it is not just transferring knowledge, but must involve students directly so that learning is carried out more meaningful. Students must relearn the knowledge they have acquired so that students are fluent in providing answers and ideas with sentences or with the student's own language that is unique or new. To support the improvement of student learning outcomes, it is necessary to conduct further research to find out other factors that influence student learning outcomes apart from creativity.

#### 4. CONCLUSION

Based on the results of the research and data analysis that has been done, it can be concluded that the integrated metaphorming learning model of 21<sup>st</sup> century skills is able to increase student creativity, but there is no significant difference in learning outcomes between students who are taught with and without the integrated metaphorming learning model of 21<sup>st</sup> century skills. In general it can be said that creativity has little influence on student learning outcomes, the rest is influenced by factors that are not measurable in this study. It is hoped that there will be further research that can measure the factors that influence student learning outcomes apart from creativity.

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