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Research Article

Elevating Argumentation Skills Through Discovery Learning

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ABSTRACT

The 2013 curriculum is oriented toward 21st-century competencies by deploying technology in learning. 21st Century skills hold predominant roles in education. Cognitive skills, critical thinking, creative thinking, metacognitive, perseverance, confidence, solving problem skills, social skills, collaboration, and communication fall under the 21st Century skills. Argumentation skills are important to educators, especially in critical thinking and being able to express opinions or arguments based on data and facts. Learners are required to make decisions on the basis of logical and reasonable information. In improving argumentation skills, a suitable learning model is required, namely Discovery Learning. Discovery learning occurs in problem-solving situations in which learners engage their existing experience and knowledge to discover meaningful new facts, relationships, and truths. As such, Discovery Learning can help learners to improve argumentation skills based on data and facts.

Keywords*: Argumentation Skill, Discovery Learning, Historical Learning*

Introduction

The 2013 curriculum brings forward a new learning paradigm that encompasses several changes, namely (1) graduate competence; (2) subject position; (3) approach; (4) curriculum structure; (5) learning process; (6) assessment of learning outcomes, and (7) extracurricular activities (Kemendikbud, 2013:73). In general, the improvement of the 2013 curriculum taps upon the ideas, designs, documents, and implementation of instructional praxis. In particular, the curriculum improvement aims to harmonize the core competencies (known as KI), basic competencies (known as KD), syllabus, subject guidelines, learning, assessment, and textbooks. These improvements are carried out based on the principles of curriculum improvement as follows. First, there needs to be fundamental alignment among core competencies, basic competencies, documents, syllabus, subject guidelines, textbooks, learning, and assessment of learning outcomes must be aligned from the aspect of competence. Second, the improvement needs to be made easy to learn, namely by formulating the scope of competencies and materials stipulated in basic

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competencies. This allows students to adapt to the targeted psychological development and pedagogical aspects. In addition, teaching needs to be seamless, as indicated by the scope of competencies and materials formulated in basic competencies. Fourth, learning needs to be measurable, which can be made operative by developing teaching competencies and materials with specified indicators that are easy to formulate and practical. Lastly, learning has to be meaningful, in that teaching competencies should have meaning for students and benefit them in real life.

Skills are key in education. Cognitive skills, problem-solving, critical thinking, creative thinking, metacognition, persistence, self-confidence, problem-solving skills, social skills, collaboration, and communication are all fundamental key skills. Everything related to cognitive skills is based on students' knowledge and experience, which is underway with resultant significant improvement in this century. Changes and various problems that often occur in the surrounding community and the environment can be the medium to increase this competency. Education in the 21st century requires students to utilize independent learning in solving real-life problems (Pellegrino, 1999; Greiff & Kyllonen, 2016; in Kutlu & Kartal, 2018:71). Students are required to learn independently to solve problems using ever-evolving information technology.

Learning in the 21st century prepares educators to face challenges where humans and technology are inherently intertwined if we are to acquire discoveries. Fisk (2017) (in Hussin, 2018: 93) states that the new vision of learning is to support students to elevate their cognition and psychomotor knowledge as well as the ability to identify the values of learned knowledge and skills. Learning that is built in the student's environment teaches them how to learn and evaluate the performance based on the actual performance. In this learning, peers play an important role because they learn together and provide information to each other. In addition, educators also act as facilitators in learning. Fisk (2017) (in Hussin, 2018: 93) also suggests that there are nine characteristics related to Education 4.0, namely (1) learning can be carried out without the limitations of space and time; (2) learning aims to prepare students to learn independently; (3) students can determine their way to learn; (4) students will engage in diverse project-based learnings; (5) students will be directed to do experiential learning, such as mentoring and collaboration projects; (6) students are required to apply theoretical knowledge and use data-based reasoning skills; (7) students will be assessed concerning their unique abilities; (8) students' opinions hold vital roles in designing and updating the curriculum to be adapted to the student's progress and the existing circumstances; (9) students will be more independent so that educators act as facilitators in learning.

Teaching materials and learning media need to be developed properly and integrated so that both can be used seamlessly in the teaching and learning process. Good History learning is developed with creativity at its crux, aiming at encouraging students' autonomy. These properties need to be at play to attract students' interest in learning and support their learning optimally.

Local history involves studying an area in a short period by the use of learning materials that can be accessed by students. However, local learning materials are not always readily available in every school because History learning only introduces and studies historical events in national and international scope. This makes local history receive only peripheral emphasis, making it hardly accessible to students. Therefore, it is important to develop learning materials that contain local history. The materials of local historical events are important to aid students in increasing their knowledge and awareness of historical events. By extension, these materials encourage students to retell historical events in their surrounding environment. about the learning of local historical events is expected to increase students' curiosity so that they are not only aware of local historical events but also proficient in retelling these historical events.

The learning materials need to be developed based on the integration of basic competencies into relevant learning content (Permendikbud, 2014: 3 in Azizha, 2019: 2). Basic Competence in the cognitive domain of Indonesian History subjects is mandatory for

the third grade in junior high school, particularly given that Bloom's taxonomy at analyzing category (C4) is deemed fundamental at this level (Anderson, 2010 in Azizha, 2019: 2). The cognitive processes at this level are included in the learning objectives devoted to this grade. One of the basic competencies intertwined with analytical skills within Basic Competency 3.10 is the ability to "analyze the strategies and manifestations of the struggles of Indonesians to defend national independence from the allies and Netherlands". The material is a form of the struggle of the Indonesian people in defending the national independence: Palagan Jomerto. The learning model needs to help students be active in identifying meaningful events. Moreover, the emerging educational paradigm requires quality human resources with various skills, one of which is argumentation skills.

In this scenario, a series of performance analyses have been conducted on the teachers at Public Senior High School 5 of Jember, Public Senior High School of Arjasa, and Public Senior High School 2 of Tanggul. The analysis documented the following findings: (1) 100% of educators always adhere to learning objectives; (2) 65% of students find it easy to understand History learning; (3) 44% of students are skilled in making reports on historical stories; (4) 64% of students understood all existing local history materials; (5) 66.22% of learning resources regarding local history in Jember are lacking because learning only relies on student worksheet and textbooks.

Multiple initiatives to improve students' argumentation skills can be introduced to History learning. Teachers have an important role in creating an effective learning process, but students have a wide range of abilities. This diversity implies the need to stimulate relevant scaffoldings to enable students actively partake in the learning process.

Argumentation skills are the ability to construct data and information prior to generating robust and appropriate ideas (Purwati, et al., 2019). Argumentation skills play an important role in increasing deeper conceptual understanding and enabling students to be active in learning activities. This circumstance requires ample opportunities to express ideas through discussion and determine final results with peers. Practicing argumentation skills can also enable students to develop their communication skills. Notwithstanding, argumentation skills are not inherent skills that are already possessed by students.

One learning model that can be used to develop argumentation skills is the Discovery Learning model, which integrates problem-solving situations, in which students learn from their prior experience and knowledge to locate meaningful new facts, their relationships, and the truths behind these connections (Bruner, 1961). Discovery learning helps students to build their knowledge based on principles and experiment results. The application of Discovery Learning has been acknowledged to improve students' argumentation skills in History learning. Attending to this line of inquiry, this study aimed to determine the effectiveness of Discovery Learning in improving students' argumentation skills in History subject in the third grade of the Social science program at Public Senior High School of Arjasa.

Methods

This quantitative research applied an experimental design. The research sample in this study was 23 second-grade students at Public Senior High School of Arjasa. The data on argumentation skills were garnered using a questionnaire. The data were analyzed by paired sample t-test with the aid of SPSS. The analysis was carried out to calculate the increase in argumentation skills before and after the engagement in Discovery Learning model. The research instrument for the variable argumentation skills was adapted from Suephattima & Faikhamta which included 3 aspects: (1) a claim, a statement submitted to other people to be accepted; (2) warrants, reasons that relate facts to statements; and (3) backing, support for an argument to provide additional support for warrants. Originating from Toulmin, the following set of questionnaire items measuring argumentation skills was adapted by Suephattima & Faikhamta.

Table 1. The Category of Students' Argumentation Skills

No.	Question	Group	Rubric Score
1.	*Claim* debatable statements	A= being able to make decision	1
		B= being unable to make decision	0
2.	*Warrants* General statements may involve hypothesis and/or logical statement between data and opinion	A+++= mentioning 4 reasons supported with evidence	12
		A++= mentioning 3 reasons supported with evidence	9
		A+= mentioning 2 reasons supported with evidence	6
		A= mentioning 1 reason supported with evidence	3
		B= mentioning 1 reason without evidence	2
		C= mentioning irrelevant reasons	1
		D= mentioning no reasons	0
3.	*Backing* Supporting statements coupled with data and facts	A+= mentioning 2 evidences	8
		A= mentioning 1 evidence	4
		B= mentioning irrelevant evidences	2
		C= proposing nothing	0

Questionnaires were given before and after learning activities, referring to pre-questionnaire and post-questionnaire with the same number of questions and scoring mechanism. The development of argumentation skills was demonstrated by the scores in ASQ (Argumentation Skill Questionnaire) as follows:

Table 2. The Grading Criteria

Mean Score (%)	Grade
80.00-100.00	*Excellent*
60.00-79.99	*Good*
40.00-59.00	*Moderate*
20.00-39.00	*Weak*
00.00-19.99	*Very Weak*

Parlan, et al; 2020:184

Data analysis in this study used a Paired Sample t-test aided by SPSS, with data normality being compulsory prior to analysis. This test was used to compare the average differences between the pre-questionnaire scores and post-questionnaire scores concerning students' argumentation skills. A normality test was performed using Shapiro-Wilk with the help of SPSS. The conclusion based on analysis results was drawn with a significance level of 5%.

Results and Discussion

Prior to Paired Sample T-test, the data were tested for normality first by administering the Shapiro-Wilk test. The results of the normality test can be seen in the table below.

Table 3. Data Normality based on Pre-test and Post-test

Tests	Shapiro-Wilk		
	Statistics	Df	Sig.
Pre-test	,957	23	,397
Post-test	,937	23	,157

Based on the results of the normality test, the pre-test data yielded *p of* 0.397, which is greater than 0.05, so the data is normal. The post-test data produces *p* 0.157, which is also over 0.05, therefore indicating data normality. Both results have implied that the data are normally distributed. The following is a presentation of the pre-questionnaire and post-questionnaire data for students' argumentation skills.

Table 4. The Students' Argumentation Skills based on Large-scale Tryout

No.	Indicators	Pre-test		Post-test		Gain
		Score	Percentage	Score	Percentage	
1.	Claim	27	100%	27	100%	0%
2.	Warrants	135	41%	234	72%	31%
3.	Backing	126	52%	198	91%	39%
	Total	288	59%	459	95%	36%

Based on the table above, the results point to the increase in the argumentation skills, as manifested in the gains across 3 indicators. In Indicator 1, the ability to raise a claim before learning using e-modules is 100% and after learning using Discovery Learning is 100%, indicating that there is no increase or decrease because participants have been proficient to propose a claim. In the area of warrants, students reach 41% before using Discovery Learning, while an increase at 72% is identified after using Discovery Learning. This marks an increase of 31%. The last one is backings, in which students attain 52% before learning using Discovery Learning. After using e-modules, they reach 91%, indicating an increase of 39%.

Table 5. Paired Samples Statistics

		Pre Test	Mastery Level	Post Test	Mastery Level
Pair 1	Mean Claim	1.0000[a]		1.0000[a]	
	Mean Warrants	5.0000	Moderate	8.6667	Excellent
	Mean Backings	4.6000	Moderate	7.3000	Good
Total		0.5079	Moderate	0.8095	Excellent

Based on the table above, there is an average value of pre-test warrants of 5.0 and post-test of 8.6. The average value of pre-test backings was 4.6 and the post-test was 7.3. The average value of the post-test is greater than the average value of the pre-test, so it can be concluded that there is an increase in the argumentation ability of students after learning to apply the Discovery Learning model. It concludes that the Discovery Learning learning model is effective for improving the argumentation skills of students. The improvement of students' argumentation skills in the pre-questionnaire and post-questionnaire is as follows Figure 1.

The chart below reports three main findings. In Indicator 1, the ability to propose a claim before and after the learning experience with Discovery Learning is. This implies no increase or decrease because participants have been adept at formulating claims. The next indicator deals with warrants, on which students reach 41% before the engagement in Discovery Learning and 72% after being engaged in Discovery Learning. This marks an increase of 31%. The last one is backings. Before taking part in Discovery Learning, the students gain 52%, and after engaging in Discovery Learning they markedly reach 91%, indicating that there is an increase of 39%.

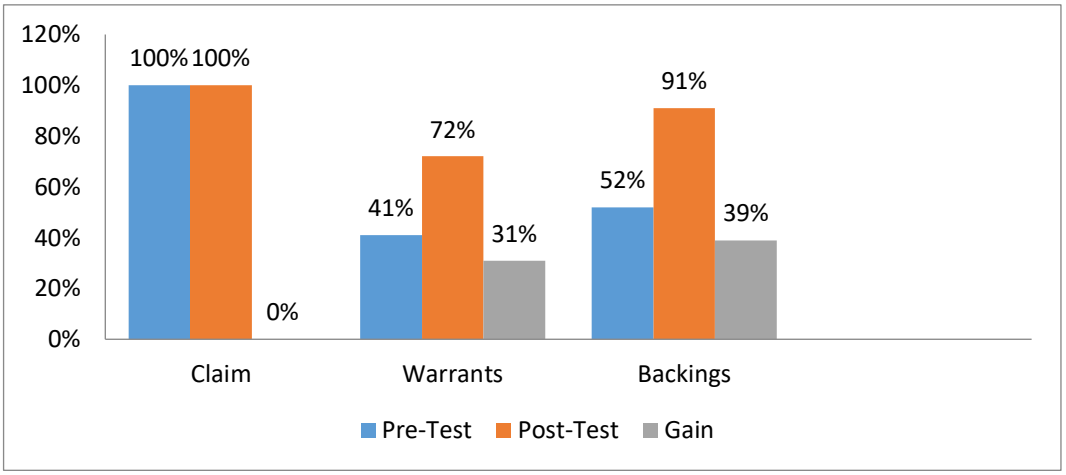

Figure 1. The Increase in Students' Argumentation Skills

Based on the analysis results, Discovery Learning has been proven effective to develop argumentation skills. This finding coheres with a previous work related to Discovery Learning geared to improve students' argumentation skills, but there is a previous study entitled "The Effect of the Discovery Learning Model with Contextual Teaching Learning Approach on Residual Written Argumentation Skills in terms of Academic Ability". The purpose of this study was to determine the impact of Discovery Learning with a Contextual Teaching and Learning (CTL) approach on the students' written argumentation skills at Senior High School of Karangpandan. This study is an experimental study using a non-equivalent group design with pre-test and post-test. The samples were students in the eleventh grade in the 2017/2018 academic year. There were 6 classes involved in this study, selected through cluster sampling. Learning is carried out in two classes by applying Discovery Learning and Discovery Learning coupled with the CTL approach. Data collection techniques involved tests, observations, and documentation. Normality tests and homogeneity tests were carried out as the requirement for hypothesis testing. The hypothesis test operationalized the t-test with a significance level of 5%. The research procedure included planning, implementation, and data analysis. The study has corroborated the influence of Discovery Learning with the CTL approach to improve the students' argumentation writing skills at Senior High School of Karangpandan (Anugraheni, et al., 2018). The overall discussion in this study has evinced that Discovery Learning can improve students' argumentation skills.

Conclusion

The findings of this study acknowledge the potential of Discovery Learning to elevate students' argumentation skills. The research results evident of 3 indicators for argumentation skills document several essential insights. First, the ability to propose claims before and after the learning experience with Discovery Learning is similar as both are documented at 100%. This implies no increase or decreases because participants have been adept at formulating claims. The other indicator deals with warrants, on which students reach 41% prior to the engagement in Discovery Learning, and they mark 72% after being engaged in Discovery Learning. This signifies an increase of 31%. The last indicator is backings. Before taking part in Discovery Learning, the students gain 52%, and after engaging in Discovery Learning they markedly attain 91%, indicating that there is an increment of 39%.

Another essential finding of this study marks that students have different rates of increment with regard to their argumentation skills. Efforts to improve students' argumentation skills can be done in History learning. Given that argumentation skills are not innate, but are formed in interaction through the learning process individually or

collaboratively, encouraging students' argumentation skills through discussion and reflection in Discovery Learning can be an efficacious initiative.

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