Jigsaw using animation media for elementary school

Rahmatina¹, A K Kenedi², R Eliyasni¹, R Fransyaigu²
¹Universitas Negeri Padang, Jl. Prof Dr. Hamka Air Tawar, Padang, Indonesia
²Universitas Samudra, Jl. Meurandeh, Langsa, Indonesia

E-mail: rahmatina61@gmail.com

Abstract. This research is motivated by the need for innovation in the learning process in the 4.0 Industrial Revolution era. The purpose of this study is to determine the effect of jigsaw cooperative learning using animation media for elementary school students. This research is quasi-experimental using posttest only. The results show a significant positive effect of the application of jigsaw cooperative learning by using animation media towards the learning outcomes of elementary school students. The implication of this study is that elementary school teachers can use cooperative learning models using animation media as an effort to improve the learning outcomes of elementary school students in the 4.0 industrial revolution era.

1. Introduction
The 4.0 industrial revolution era is the era of change from analogous life systems into digital life systems [1]. This change is accompanied by the development of technology use in every community life [2]. This can be seen that many people make technology as a foundation in the daily life process. 4.0 industrial revolution era also has an impact on the education system [3]. The education system in the era of 4.0 industrial revolution requires new innovation in the learning process in the classroom [4]. This is due to the challenge in the industrial revolution which demands a change in the learning system from traditional to the modern learning system. This challenge must be carried out by the teacher to produce graduates who have competitiveness in line with the expectations. Included in the learning process in elementary school.

Elementary school is the first formal education level in Indonesia [5]. Therefore learning innovation in the era of 4.0 industrial revolution can be started from learning in elementary school. Thus students get used to and are trained in adjusting themselves in the process of changing the learning system in elementary schools.

One of the innovations that can be developed in class learning systems is learning models and technology-based learning media [6] [7] [8]. The learning model is a series of learning processes that have patterns in each process. The learning model is a planned and systematic procedure that aims to organize the learning process through learning experiences to achieve learning objectives [9]. The learning model is a systematic process in the learning process that aims to achieve learning objectives. One model that can be used by teachers is a cooperative learning model. Cooperative learning model is identical to the learning process by the way students learn in groups [10]. Cooperative learning model is learning using small groups of students who are mutually responsible and interact in the learning...
process together [11]. The cooperative learning model provides various advantages such as being able to improve student achievement, student self-esteem, student motivation, love of the learning atmosphere, student retention and student socialization in the learning process [12] [13] [14]. The cooperative learning model has a variety of types, one of which is a jigsaw.

Jigsaw is a cooperative learning model implemented in groups and consists of several heterogeneous students who are responsible for learning certain problems from the material given and conveying the material to other groups [15]. Jigsaw is a type of cooperative learning model that requires students to take responsibility in the learning process [16]. This is because each group has the responsibility to mastering the learning material and in charge of delivering the material to other groups. If one group member is not responsible for understanding the material, the other learning process will not be carried out properly.

Jigsaw aims to train students to develop their abilities and facilitate teacher in delivering material [17]. In addition, a jigsaw can also improve student learning outcomes, positive attitudes, mutual respect for differences and significantly to increase responsibility [18] [19] [20]. This is in line with the challenge given by the 4.0 industrial revolution era that the graduates must have responsibilities and strong competitiveness in the globalization era market.

Besides the learning model, another innovation is learning media. Learning media is a set of tools that help the learning process with the purpose to facilitate the delivery of meaning and the message to be conveyed [21]. Learning media is used by teachers to compose communication and interaction with students in the learning process. Learning media aims to convey learning messages, make learning interesting, make learning interactive, time efficiency, improve the quality of learning, enhance students' positive attitudes and make teacher's role more positive [22] [23] [24] [25] [26].

A learning media following the characteristic of 4.0 industrial revolution era is animation learning media. This is because animation is an audio-visual product of technological development. Animation media is an interesting form of pictorial presentation because it is a simulation of a moving picture depicting the movement of an object [27]. Animation can be interpreted as a process of changing the shape or property of an object displayed within a certain period of time. The animation is considered capable of being an innovation in elementary school learning because the media of animation can display objects that do not exist physically (imagery) [28]. Besides, animation can combine virtual elements such as text, images, video, audio into an integrated product [29]. Animation can also harmonize student learning styles such as visual, audio, kinesthetic or others and animation facilitates teachers in developing the learning activity.

Based on the facts above, it can be concluded that the animation media is suitable to be applied in the elementary school learning process. This is because elementary school students have concrete operational characteristics [30]. Thus the animation media can connect learning with the mindset of elementary school students.

Therefore, the learning model and learning media can be used as a new innovation in the learning process in the era of 4.0 industrial revolution. The use of jigsaw in the learning process has often been carried out in elementary schools and has a positive impact on learning outcomes. But further research into the application of jigsaw using animation media in elementary school learning is needed. Therefore the purpose of this study is to determine the effect of the jigsaw cooperative learning model by using animation media in the learning process in elementary schools.

2. Methods
This is a quasi-experimental research. This is post-test research. The technique used in this research is simple random sampling. The samples are grade V students of Elementary School number 11 Koto Gadang and grade V students of Elementary School number 12 Koto Tinggi, amounting to 40 people who have been tested previously for normality and homogeneity with normal distribution results. The experimental class is a class given a jigsaw using animation media while the control class is a class that only uses jigsaw without using animation media. In this research, the researcher uses tests in collecting data.
3. Result and discussion

This study starts with the implementation of the prerequisite test, namely the normality test and homogeneity test.

**Table 1.** Results of Post-Test Normality Test for Experimental and Control Classes

| No | Class   | N  | L\(_{\text{count}}\) | L\(_{\text{table}}\) \(\alpha = 0.05\) | Conclusion            |
|----|---------|----|-----------------------|----------------------------------------|-----------------------|
| 1  | Experimental | 20 | 0.04143              | 0.190                                  | Normal Data           |
| 2  | Control  | 20 | 0.05108              | 0.190                                  | Normal Data           |

The results of the posttest normality test of the experimental and the control class in the study. It is known, L\(_{\text{count}}\) of the experimental class is 0.04143 and L\(_{\text{count}}\) of the control class is 0.05108 with the number of samples each 20. At the significance level \(\alpha = 0.05\), the L\(_{\text{table}}\) value is 0.190. Thus the experimental class obtained L\(_{\text{count}}\) < L\(_{\text{table}}\) (0.04143 < 0.190), and the control class also obtained L\(_{\text{count}}\) < L\(_{\text{table}}\) (0.05108 < 0.190). Normality test aims to see whether the residual value is normally distributed or not [31]. Based on these data, it appears that the experimental class and control class data are normal.

Next is the homogeneity test. Homogeneity test can be seen in the table below.

**Table 2.** Results of Post-test Homogeneity Test for Experimental and Control Class

| No | Class   | N  | Variance | F\(_{\text{count}}\) | F\(_{\text{table}}\) | Conclusion         |
|----|---------|----|----------|----------------------|---------------------|--------------------|
| 1  | Experimental | 20 | 197.853  | 1.2773               | 2.12                | Variant            |
| 2  | Control  | 20 | 154.895  |                       |                     | Homogeneous        |

The results of the Post-test Homogeneity Test for Experimental and Control Class in this study are known that the calculated experimental class and control class are 1.80299 with a sample of 20 each. At a significance level of \(\alpha = 0.05\) obtained F\(_{\text{table}}\) of 2.12. Thus we get F\(_{\text{count}}\) < F\(_{\text{table}}\), i.e. (1.2773 < 2.12).

Thus, it can be concluded that the data in the experimental class and the control class have a homogeneous variant. The homogeneity test is done by examining whether the two samples come from the population with the same variance or not. This test is conducted to discover whether the assumption of homogeneity in each data category has been fulfilled or not [32]. If the assumption of homogeneity is proven, the researcher can carry out the advanced data analysis stage. However, if it is not, the researcher must make methodological corrections.

The next step is to use a hypothesis test. A hypothesis test is carried out on the post-test value of the experimental class and the control class. Based on the prerequisite data analysis, post-test data for both groups is normally distributed and has a homogeneous variant. Hence hypothesis test can be done using a variant polled t-test. The T-Test results for the experimental class and the control class are as follows.

**Table 3.** Results of T-Test for Experimental and Control Classes

| No | Class   | N  | Mean | T\(_{\text{count}}\) | T\(_{\text{table}}\) \(0.05/2\) | Conclusion         |
|----|---------|----|------|----------------------|--------------------------|--------------------|
| 1  | Experimental | 20 | 83.4 | 13.8024              | 11.6859                  | H\(_{0}\) Accepted |
| 2  | Control  | 20 | 73.6 |                       |                          | H\(_{0}\) Rejected  |

It is known that the calculated t\(_{\text{count}}\) is 13.8024 and t\(_{\text{table}}\) is 11.6859 at the level of significance \(\alpha = 0.05\). Because 13.8024> 1.6859 hen Ho is rejected, and Ha is accepted. Consequently, it can be concluded that there is a significant influence on the use of Jigsaw Cooperative learning model using animation media in elementary school learning. Nevertheless, the average of the control class is categorized as quite good.

Jigsaw is a learning model requires students to work together in groups and each group is responsible for understanding the material delivered to each other group members [33]. Those who study in groups will improve learning outcomes. In group work, students will be trained to explore both
existing and non-acquired knowledge. Students will easily exchange information and ask questions about the subject matter between peers. This makes the cognitive development of students trained in finding information. Furthermore, the jigsaw can improve student activity in the learning process [34]. Active ness is a part of social knowledge (Vygotsky social development theory) [35]. Student activity is a manifestation of social knowledge development of elementary school students. The activeness arising from the collaboration will affect the learning process such as the ability to understand and solve problems [36]. Moreover, the activeness builds students' curiosity thus students eagerly look for the information they want. Student responsibility given to jigsaw learning will make students stronger and more focused on finding the information given to other members. This sense of responsibility makes students continue to practice their ability to understand the material delivered [37] [38] [39] [40]. Therefore the social development produced in the jigsaw learning process has a high impact on the process of student learning outcomes. This what makes the control and experimental classes have high learning outcomes.

However, in the experimental class, the student learning outcomes are higher than the control class. This is supported by the fact that the experimental class gets jigsaw learning using animation media. Animation media plays an important role in the process of increasing learning outcomes. Animation media can motivate students in the learning process and improve the positive attitude of students [41]. This is because animation is a motion illusion product that can present information in an entertaining way [42]. Children in elementary school tend to use the principle of playing while learning in line with the animation media. Therefore, students will be motivated to learn without pressure.

Animation media can also improve student learning outcomes [43]. Animation media knows how to present visualization that cannot be raised in a real way in the classroom, making it easier for students to understand difficult abstract concepts permanently [44]. This is what stimulates the formation of a concrete mindset of elementary school students thus elementary school students can imagine the information. This is because of elementary school students considered as children in the concrete operational phase.

As a result, the application of jigsaw using animation media is very appropriate to be used for elementary school students. This proves that this innovation will have a positive impact on student learning outcomes in elementary school.

4. Conclusion
This study concluded that the application of jigsaw using animation media had a positive effect on the learning outcomes of elementary school students.

Acknowledgment
Thank you to Universitas Negeri Padang for permitting collaborative research. Thank you to the Universitas Samudra that permitted research collaboration.

References
[1] Lasi H, Fettke P, Kemper, H G, Feld T, and Hoffmann M 2014 Business & information systems engineering 6 239
[2] Kinzel H 2017 Journal of Urban Culture Research 15 70
[3] Jones C and Pimdee P 2017 Asian International Journal of Social Sciences 17 4
[4] Puncereburu V 2016 St. Theresa Journal of Humanities and Social Sciences 2 2
[5] Kenedi A K, Helsa Y, Ariani Y, Zainil M and Hendri S 2019 Journal on Mathematics Education 10 69
[6] Serdyukov P 2017 Journal of Research in Innovative Teaching & Learning 10 4
[7] Subramani P N and Iyappan V 2018 Journal of Applied and Advanced Research 3 2
[8] Ala-Mutka K, Punie Y and Redecker C 2008 ICT for learning, innovation and creativity. Institute for Prospective Technological Studies (IPTS) (European Commission, Joint Research Center) Technical Note: JRC

[9] Ahmad Zaki 2018 J. Phys.: Conf. Ser. 1028 012165

[10] Singh Y P and Agrawal A 2011 Indian Streams Research Journal 12

[11] Yassin A A, Razak N A and Maasum T N R T M 2018 Advances in Social Sciences Research Journal 5 8

[12] Pateşan M, Balagi A and Zechia D 2016 International Conference Knowledge-based Organization 22 478

[13] Yoyok Soesatyo Y and Dewie Tri Wijayati Wardojo D 2018 Interciencia Journal 43 124

[14] Cornelius-Ukpepi, Aglazor G N and Odey C O 2016 Advances In Multidisciplinary & Scientific Research 26 7

[15] Tran V D and Lewis R 2012 International Education Studies 5 99

[16] Alabekee E C, Samuel A and Osaat S Dm 2015 International Journal of Education Learning and Development 3 67

[17] Garcia A, Abrego J and Robert R 2017 Global Journal of Human Social Science: G Linguistics & Education 17 5

[18] Melinamani S, Francis F, George R, Pushpa L M and Vergheese S 2017 Asian J. Nursing Edu. and Research 7 2

[19] Adams F H 2013 International Journal of Education and Practice 1 64

[20] Tran V D and Lewis R 2012 International Journal of Higher Education 1 20

[21] Widodo S A 2018 Turkish Online Journal of Educational Technology-TOJET 17 154 [22] Shinn Y H 1997 Teaching strategies, their use and effectiveness as perceived by teachers of agriculture: A national study (Retrospective Theses and Dissertations: 12244)

[23] Aini W N 2013 Journal of English and Education 1 196

[24] Naz A A and Akbar R A 2008 Journal of elementary education 18 35

[25] Falahudin and Iwan 2014 Jurnal Lingkar Widyaiswara 1 104

[26] Anjarwati D, Winarno A and Churiyah M 2016 IOSR Journal of Research & Method in Education 6 5

[27] Daly C J, Bulloch J M, Ma M and Aidulis D 2016 Advances in physiology education 40 201

[28] Nurizmawati C, Apriliaswati R and Arifin Z 2013 Jurnal Pendidikan dan Pembelajaran 4 3

[29] Omar M A M and Ishak M S A 2012 Understanding Culture through Animation: From the World to Malaysia. Jurnal Pengajian Media Malaysia 13 2

[30] Kiswanto A 2017 The Effect Of Learning Methods And The Ability Of Students Think Logically To The Learning Outcomes On Natural Sciences Of Grade IV Student (ICSET 2017: Atlantis Press)

[31] Das K R and Imon A H M R 2016 American Journal of Theoretical and Applied Statistics 5 5

[32] Conover W J, Johnson M E and Johnson M M 1981 Technometrics 23 351

[33] Karacop A 2017 Universal Journal of Educational Research 5 420

[34] Suendarti M 2017 International Journal of Environmental and Science Education 12 1617

[35] Shabani K 2016 Cogent education 3 1252177

[36] Sharan Y 2014 Annales De Psychologia/Annals of Psychology 30 802

[37] Huang Y M, Liao Y W, Huang S H and Chen H C 2014 Journal of Educational Technology & Society 17 128

[38] Buhr G T, Heflin M T, White H K and Pinheiro S O 2014 Journal of the American Medical Directors Association 15 429

[39] Maden S 2011 Educational Sciences: Theory and Practice 11 911

[40] Berger R and Hänze M 2015 International Journal of Science Education 37 294

[41] Baglama B, Yucesoy Y and Yikmis A 2018 TEM Journal 7 670.

[42] Martinez O O L 2015 Animation 10 42

[43] Siregar U A, Hadi W and Daulay S 2017 Journal of Education and Practice 8 35
[44] Berney S and Bétrancourt M 2016 Computers & Education 101 150