Online Learning using Interactive Digital Comics in the Era of the Covid-19 Pandemic

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ABSTRACT

The current digital era and the Covid-19 pandemic are the reasons for the need to develop teaching materials that are packaged in the form of interactive digital comics, especially for elementary school students, because these conditions force all teachers to carry out learning activities online. The purpose of this research is to develop interactive digital comic teaching materials for elementary school grade V semester 1 for the theme "Animal and Human Movement Organs" sub-theme "Humans and the environment" which is in accordance with the 2013 curriculum, the characteristics of students and supports online learning in the digital era and the Covid-19 pandemic. This study uses the Bergman & Moore (1990) model development method. This study concludes that the use of teaching materials packaged in the form of interactive digital comics in online independent learning is proven to be effective in increasing student involvement in learning and learning outcomes.

Keywords
learning outcomes, interactive digital comics, online learning, Covid-19 pandemic era

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Introduction

Research has tested the effectiveness of several digital media products for children's learning and has found improvements in children's knowledge and skills to think, plan, observe, solve problems, read, language, math, construct and test hypotheses, creativity, and learning. collaborative (Lieberman, Bates, & So, 2009), motivates and inspires all students to achieve the expected competencies and support lifelong learning (Peters & Araya, 2011). However, the use of digital media must pay attention to the negative impact on children's health (Chassiakos R.J., Radesky, J., Christakis, D., Moreno, M. A., & Cross, C., 2016).

Covid-19 first occurred in Wuhan China at the end of December 2019 (Shereen, Khan, Kazmi, Bashir, & Siddique, 2020). In a short time, Covid-19 has spread and become an epidemic globally (Secon, Woodward, & Mosher, 2020). The Covid-19 pandemic has had a tremendous impact on the order of life of the people and nation of Indonesia, including in the field of education. The learning process that is usually carried out face-to-face in schools is forced to be done online.

The use of digital comic teaching materials developed by themselves or from the internet has the potential to make online independent learning more fun, interesting, and provoke intense student involvement in learning. This is in line with the results of the study that the competence obtained by students is influenced by their activities in surfing the internet continuously (Almarabeh, T., Majdalawi, Y. Kh., & Mohammad, H., 2016). The development and use of interactive digital comic teaching materials is one of the efforts that elementary school teachers must make in improving the quality of the process and learning outcomes as well as the digital literacy of students. Literature studies of a number of previous studies confirm this hypothesis (Açikalin, 2009; Hockly & Dudeney, 2018; Sharples, Graber, Harrison, & Logan, 2009).

The purpose of this research is to develop „Interactive Digital Comic Teaching Materials‟ (IDCTM) for elementary school class V semester 1 for the theme „Animal and Human Movement Organs‟ sub-theme „Humans and the environment‟ which is in accordance with the 2013 curriculum and the characteristics of students and supports online learning in the digital era and the Covid-19 pandemic. The parameters of the success of the interactive digital comic teaching material products developed in this study were seen from the learning outcomes of students.

Method

Research design

The research and development method used is a product-oriented development model, namely the Bergman & Moore (1990) model. Validation is done through content, construct and empirical validity. Field trials were carried out in two stages, namely limited trials and broader trials. After improvements are made based on the results of field trials, the final step is to test the effectiveness using the experimental method.

Participants

This study involved 9 elementary schools randomly selected from 117 elementary schools in the Tapos District of Depok City. The sampling framework is presented in table 1.

Table 1. Sampling Framework

No.	Sampel	Kategori Sekolah	Population	Number of Samples		
				Schools	Classes	Students
1.	Limited field trials	Public Elementary Schools	40	1	1	27
2.	More extensive field trials	Public Elementary Schools	40	6	12	456
		Prevat Elementary Schools	77	3	7	141
	Total		117	9	19	597
3.	Effectiveness test	Public Elementary Schools	40	2	4	152

This study involved 8 school principals and 20 teachers from 9 selected elementary schools, 1 of whom did not respond when the questionnaire was sent. Demographic data for principals and teachers are presented in table 2.

Table 2. Demographic Data of Principal and Teacher Participants

No.	Demographic Aspects		Principals (N = 8)	Teachers (N = 20)
1.	Gender	M	2	2
		F	2	18
2.	Type of School	Public Elementary Schools	5	13
		Prevat Elementary Schools	3	7
3.	Teaching experience	< 5 years	-	4
		5 – 10 years	-	6
		10 – 15 years	2	6
		15 – 20 years	3	2
		> 20 years	3	2

Data analysis

Field trials and testing of the effectiveness of digital comic teaching materials and data collection were carried out online. Data collection used four instruments, namely: 1) Learning Outcomes Test, 2) Questionnaires for Principals and Teachers, 3) Questionnaires for Parents of Students, and 3) Questionnaires for Students. The data analysis technique used techniques are descriptive and inferential statistical techniques. The inferential statistical analysis used was the one-way ANOVA technique.

Results And Discussion

Result

IDCTM Product Description

IDCTM was developed with reference to the results of a theoretical study of the concept of comics, review of the Curriculum 2013, and existing teaching materials in the form of printed books and e-books. The theme chosen was theme 1 about "Human and Animal Movement Organs" and the selected sub-theme was sub-theme 2 on "Humans and the Environment". According to the explanation in the curriculum, learning theme 1 sub theme 2 is translated into six learning activities. For this reason, the IDCTM developed in this study consisted of six topics, namely: 1) Benefits of sport, 2) Human Movement Organs, 3) Indonesian map, 4) Landscape, 5) Muscle in Humans, dan 6) Maintain and Care for Human Muscles.

Description of Limited Field Trial Results

The limited field trial aims to test the ease with which students open IDCTM, readability of IDCTM, the functioning of links with other learning sources, the functioning of interactive exercises, and students' interest in learning online using IDCTM. After the six IDCTMs were studied by students, parents and students were asked to fill out a questionnaire containing questions that were in accordance with the objectives of implementing a limited trial. The questionnaire was created on the google form and the link was sent through the personal WA of the parents of each student with the help of the class teacher. Based on the descriptive analysis of data from limited trial results (data from questionnaires to parents and students), it can be concluded that the six IDCTMs can be declared valid so that they can proceed to the next validation stage, namely validation through more extensive trials.

Description of Extensive Field Trial Results

The extensive trial aims to test the functioning of IDCTM in increasing the involvement and enthusiasm of students in carrying out learning activities independently through asynchronous online learning modes. The sixth interactive IDCTM trial was carried out for 6 days. The duration of time for learning activities for each IDCTM is 5 hours or 1 day of effective learning. After the six IDCTMs have been tested, the teacher is then sent three questionnaires in the form of a google form by sending a URL link, namely: 1) a

questionnaire for the principal and the teacher concerned, 2) a questionnaire to be filled out by the parents of students, and a questionnaire for participants students.

Based on the descriptive statistics of the principal and teacher assessment data on the ten questions posed in the questionnaire after the IDCTM trial was carried out in their schools, it was found that their average assessment was the lowest 2.54 and the highest was 3.00 from the range of assessment scores 1 to 3, with a relatively small standard deviation. That is, there is an agreement between them that the IDCTM developed in this study is in accordance with the learning needs of students. Thus, IDCTM can be used as an addition, complement and even substitute for existing teaching materials that have been used in schools.

The questionnaire for parents of students consists of 10 (ten) questions related to the suitability of IDCTM with students' learning needs for independent study at home using teaching materials that are presented digitally via a handphone, laptop, or PC screen. Based on descriptive statistics on the assessment data of students' parents on the ten questions posed in the questionnaire after their son / daughter studied independently at home using IDCTM, it was found that their average rating was 2.35 and the highest was 2.64 from the assessment score range 1 to 3, with a relatively small standard deviation. That is, there is an agreement among them that the IDCTM developed in this study is in accordance with the independent learning needs of students. Thus, parents of students assess that IDCTM can help them in guiding and directing their children's learning, so as to reduce the difficulties they experience to replace part of the role of the teacher in teaching students.

The function of IDCTM through wider trials in this study is measured from the learning outcomes of students as a measure of the main success (main effect). Descriptive statistics of learning outcomes data are presented in table 8. From the table, it can be seen that the smallest value is 25.00, the highest value is 100. This means that there are students who get perfect scores. The mean (mean) learning outcomes achieved by students were 68.68 from a scale or value range of 0 to 100 with a relatively small standard deviation of 15.90. Meanwhile, the median is 70.00 and the mode is 75.00.

Tabel 8 Statistik Deskriptif Data Hasil Belajar

Statistics		**Hasil Belajar**
N	Valid	391
	Missing	0
Mean		68.6829
Median		70.0000
Mode		75.00
Std. Deviation		15.9061
Variance		253.004
Minimum		25.00
Maximum		100.00

Based on the results of the data analysis of the students 'parents' questionnaire, this study concludes that IDCTM for elementary school grade V semester 1 so that it is designed and packaged in the form of digital comics, equipped with interactive question exercises, and interactively connecting with other relevant learning sources can increase the intensity of the involvement of elementary school students in the online independent learning process.

Based on the mean values, namely mean, median, and mode, it appears that the mode value > median > mean. This shows that the distribution of the learning outcome value data tends to be skewed or shifted to the right. That is, there is a tendency for values that are above the median and mean more than values that are below it. This fact illustrates that the learning outcomes achieved by students in online learning trials using interactive IDCTM can be categorized as moderate to high with the value deviation from the mean not too far away.

Table 9 Frequency Distribution Data of Learning Outcomes

Class Intervals	**f**	**% Cummulative**
23-38	16	4,09
39-54	61	15,60
55-70	127	32,48
71-86	135	34,53
87-102	52	13,30
Total	**391**	**100,00**

The frequency distribution of the learning outcomes data achieved by students is presented in table 9. From this table, it appears that the students who obtained the smallest score of 25 were only 1 person, while those who obtained the perfect score of 100 were 4 people. Meanwhile, the number of students who achieved grades from the average class and above were 227 people (58.06%). This reinforces the conclusion above that the learning outcomes achieved by students can be categorized as being high.

The Results of Effectiveness Test

The descriptive statistics of the learning outcomes of the experimental class and the control class are presented in table 14. Based on this table, it appears that the mean learning outcomes of the experimental class were 69.14 higher than the control class at 62.66.

Table 14 Descriptive Statistics of Learning Outcomes

Statistics Descriptive		**N**	**Mean**	**Std. Deviation**	**Std. Error**	**95% Confidence Interval for Mean**		**Min.**	**Max.**
						Lower Bound	**Upper Bound**		
Learning Outcomes	Experiment	67	69.14	11.98	1.46	66.22	72.06	37.50	95.00
	Control	76	62.66	17.22	1.97	58.73	66.60	27.50	97.50
	Total	143	65.70	15.29	1.28	63.17	68.23	27.50	97.50

The test of the significance of the difference between the mean learning outcomes of the experimental and the control class was carried out using one-way ANOVA. The data distribution normality test used the Kolmogorov-Smirnov and Shapiro-Wilk normality test techniques. The results of the normality test using this technique are presented in table 15. In the table, it can be seen that the significance value p < 0.05, for both the experimental and control classes. Thus, the learning outcome data for the experimental and control classes were both normally distributed.

Table 15 Normality Test

Variabel	Perlakuan	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Learning Outcomes	Eksperimen	.093	67	.200*	.975	67	.192
	Kontrol	.092	76	.177	.981	76	.315
*. This is a lower bound of the true significance.							
a. Lilliefors Significance Correction							

The homogeneity test used in the variance homogeneity test is the Levente test. The results of the variance homogeneity test of the experimental class and control class learning outcomes are presented in table 16. In this table, it appears that the Levene value for learning outcomes is 11.704 with a significance value of p = 0.01. This means that the variance of the distribution of the learning outcomes of the experimental class with the control class is homogeneous.

Table 16 Homogeneity Test of Variance

Variabel	Levene Statistic	df1	df2	Sig.
Hasil Belajar	11.704	1	141	.001

The results of the one-way ANOVA test are presented in table 17. Based on the table, it can be seen that the F value is 6.65 with a significance value of p = 0.011. That is, there is a significant difference in the mean of learning outcomes between the experimental class and the control class.

Table 17 Summary of One Way Anova

Variable		Sum of Squares	df	Mean Square	F	Sig.
Learning Outcomes	Between Groups	1493.97	1	1493.97	6.65	.011
	Within Groups	31698.60	141	224.81		
	Total	33192.57	142			

Based on the results of the two-averaged test using one-way ANOVA as described above, it can be concluded that the use of interactive IDCTM in online independent learning is effective in improving learning outcomes of students. Thus, the interactive IDCTM developed in this study fulfills the appropriate criteria for use in learning activities, both at Public Elementary Schools and Prevat Elementary Schools.

Pembahasan

One of the findings in this study shows that IDCTM which is designed and packaged in the form of digital comics, equipped with exercises interactive, and interactively connected with other relevant learning sources can increase the intensity of the involvement of elementary school students in the online independent learning process. This finding is supported by the results of research on the use of comics in learning activities which show that use of comics can promote engagement, equity, and diversity in science classrooms (Matuk, C., Hurwich, T., Spiegel, A., & Diamond, J., 2019), a situational learning system using comic plays can increase students' learning motivation (Chen, GD, Fan, CY, Chang CK, Chang, YH, & Chen YH, 2018), and the use of comic media in science learning can increase the learning motivation of students (Puspitorini, R., Prodjosantoso, AK, Subali, B., & Jumadi. J., 2014). The findings of this study illustrate the importance of elementary school teachers in developing self-packaged teaching materials and tailored to the characteristics of elementary school age children.

This development research found that the use of interactive IDCTM in online independent learning for fifth grade elementary school students significantly increased student learning outcomes. That is, by presenting teaching materials in the form of interactive IDCTM, learning outcomes as the main effect expected from the learning process can be effectively increased. This finding is supported by research results which show that the use of comics is effective for transferring information or communicating concepts (Caldwell, J., 2012), especially abstract concepts (Tuncel, G., & Ayva, Ö., 2010), increasing scientific competence (Hidayat, N. & Rostikawati, R.T., 2018).

Comics are powerful visual messages that convey deep, direct meaning in a way that conventional texts often cannot (Park, J. S., Kim, D. H., & Chung, M. S., 2011). Digital comics have unique characteristics for critical reflection of texts, because the comic genre encourages multiple meanings, juxtaposing ideas, humor, and counterintuitive lines of direction (Sockman, B. R., Sutton, R., & Herrmann, M., 2016). The two results of this study are strong rational and empirical reasons to explain why the use of interactive IDCTM developed in this study is effective in improving student learning outcomes.

The discussion of the research results as described above gives researchers confidence that the IDCTM developed in this study meets the eligible criteria for use in learning practices. The findings of this study also show the

importance of developing IDCTM for all themes and sub-themes at each grade level in primary schools.

Conclusion

This study resulted in two conclusions, namely:

1. IDCTM which is designed and packaged in the form of digital comics, equipped with narrative explanations using it, integration of instrumental music, interactive question exercises, and linked with other relevant digital learning sources, can increase the intensity of learning. involvement of primary school students in the online independent learning process.
2. The use of IDCTM in online independent learning has been proven to be effective in improving student learning outcomes.

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Reference

[1] Açıkalın, M. (2009). Pre- service elementary teachers‟ beliefs about use of the Internet in the social studies classroom. European Journal of Teacher Education, 32(3), 305–320. doi: 10.1080/02619760802553030.

[2] Almarabeh, T., Majdalawi, Y. Kh., & Mohammad, H. (2016). Internet Usage, Challenges, and Attitudes among University Students: Case Study of the University of Jordan. Computer Information Systems Department, The University of Jordan. 9(12), 577-587 doi: 10.4236/jsea.2016.912039.

[3] Bergman, R. E., & Moore, T. V. (1990). *Managing interactive video/multimedia projects*. Englewood Cliffs, N.J.: Educational Pechnology Publications.

[4] Chassiakos, Y. R., Radesky, J., Christakis, D., Moreno, M. A., Cross, C., Hill, D., … Swanson, W. S. (2016). Children and adolescents and digital media. *Pediatrics*. 138(5), e21062593. doi: 10.1542/peds.2016-2593.

[5] Chen, G. D., Fan, C. Y., Chang, C. K., Chang, Y. H., & Chen, Y. H. (2018). Promoting autonomy and ownership in students studying English using digital comic performance-based learning. *Educational Technology Research and Development*. 66(4), 955-978. doi: 10.1007/s11423-018-9597-7.

[6] Hidayat, N., & Rostikawati, R. T. (2018a). Energize Learners to Use Scientific Approach. *Jurnal Pendidikan Ilmiah*, *4*(2), 1–7.

[7] Hockly, N., & Dudeney, G. (2018). Current and Future Digital Trends in ELT. *RELC Journal*. 49(2), 164-178. doi: 10.1177/0033688218777318.

[8] Lieberman, D. A., Bates, C. H., & So, J. (2009). Young Children‟s Learning With Digital Media. *Computers in the Schools*. 26(4), 271-283. doi: 10.1080/07380560903360194.

[9] Matuk, C., Hurwich, T., Spiegel, A., & Diamond, J. (2019). How Do Teachers Use Comics to Promote Engagement, Equity, and Diversity in Science Classrooms? Research in Science Education. 49(5). doi:10.1007/s11165-018-9814-8

[10] Park, J. S., Kim, D. H., & Chung, M. S. (2011). Anatomy comic strips. *Anatomical Sciences Education*. https://doi.org/10.1002/ase.224.

[11] Peters, M. A., & Araya, D. (2011). Transforming American Education: Learning powered by technology. *E-Learning and Digital Media*. 8(2), 102-105. doi: 10.2304/elea.2011.8.2.102.

[12] Puspitorini, *R., Prodjosantoso, A.K., Subali, B., & Jumadi. J. (2014).* Penggunaan Media Komik dalam Pembelajaran IPA untuk Meningkatkan Motivasi dan Hasil Belajar Kognitif dan Afektif. *Jurnal Cakrawala Pendidikan*, 33(3), 413-420. doi: 10.21831/cp.v3i3.2385.

[13] Secon, H., Woodward, W., & Mosher, D. (2020). A comprehensive timeline of the new *coronavirus* pandemic, from China‟s first case to the present. *Business Insider*. [online]. 23 May 2020, 12, 31. Retrieved

on May 24, 2020 from https://www.businessinsider.com/coronavirus-pandemic-timeline-history-major-events-2020-3.

[14] Sharples, M., Graber, R., Harrison, C., & Logan, K. (2009). E-safety and web 2.0 for children aged 11-16. *Journal of Computer Assisted Learning*. 25(1), 70-84. doi: 10.1111/j.1365-2729.2008.00304.x.

[15] Shereen, M. A., Khan, S., Kazmi, A, Bashir, N., & Siddique, R. (2020). COVID-19 infection: Origin, transmission, and characteristics of human coronaviruses. *Journal of Advanced Research*, 24, 91-98. doi: 10.1016/j.jare.2020.03.005.

[16] Sockman, B. R., Sutton, R., & Herrmann, M. (2016). Comic Relief: Graduate Students Address Multiple Meanings for Technology Integration with Digital Comic Creation. *TechTrends*. 60(5), 475-485. doi: 10.1007/s11528-016-0083-y.

[17] Tuncel, G., & Ayva, Ö. (2010). The utilization of comics in the teaching of the "human rights" concept. In *Procedia - Social and Behavioral Sciences*. 2(2), 1447-1451. doi: 10.1016/j.sbspro.2010.03.216.