Dinamika Pendidikan

The Effectiveness of Digital Literacy in Economic Learning

P. Eko Prasetyo[1]✉, Oki Anggraeni[2]

[1]Department of Development Economics, Faculty of Economics, Universitas Negeri Semarang, Semarang, Indonesia
[2]Department of Economic Education, Postgraduate Program, Universitas Negeri Semarang, Semarang, Indonesia

Abstract

The purpose of this research is to increase students' economic learning interest and outcomes using digital literacy technology, such as Sparkol Video Scribe (SVc) and media chart (MC). This is an experimental research comprising of the control and treatment classes with international trade discussed as a sub-topic of the economic material. The learning activities method used the ADDIE model. While, the research subjects are high school students in Central Java. N-Gain model was used to determine the most effective level of analysis as well as the modification and path analysis. The main results showed that the application of SVc and MC learning models can attract students' interest in economic learning well. Although the SVc application was not effective in improving their overall performance, the MC literacy model was still effective. However, students' interest in learning about the second model has not been able to improve its performance significantly. The results further showed that the digital literacy method was not always able to improve student learning and performance effectively and efficiently.

How to Cite

Prasetya, P. E. & Anggraeni, Oki.(2020).The Effectiveness of Digital Literacy in Economic Learning.*Dinamika Pendidikan*, 15(2), 136-147.

✉ Correspondence Author:
L1 Faculty of Economics Building, Sekaran Campus, Gunungpati, Semarang 50299
Email: pekoprasetyo@mail.unnes.ac.id

INTRODUCTION

In the digital technology era, learning methods are considered increasingly liberal, fun and effective. However, there is no standard learning model that is invariably able to attract learning in an interesting, fun, effective, efficient way which also improves the learning outcomes in all educational fields. This is due to the fact that this problem is highly related to several other important factors involved in the learning process. Furthemore, there is an opinion that the important points in liberal education include substantial content, rigorous methodologies, and active involvement with social, ethical, and practical implications of learning (Chick, 2009). Student academic freedom can be effectively safeguarded through the articulation of 'essential freedoms for liberal learning', with the main focus not on the behavior or affiliations of a teacher, but on the intellectual needs and circumstances of students (Garnett, 2009). Therefore, technological interventions in digital learning are able to effect positive changes and offer practical implications to guide future practice (Chang, 2019). Furthermore, digital technology has been deemed able to change the learning methods of students and has become an integral requirement in their lives. However, the current study showed that students do not have individual digital literacy skills that positively affect their performance (Anthonysamy, Egan, 2020).

On the other hand, developing a learning culture as a framework for growing teaching skills is highly important (Chick, et al., 2018). This is because the digital success of individuals is believed to be easily achieved through learning and increasing personal digital literacy (Urbancikova, 2017). Meanwhile, in this paper, digital literacy is interpreted as the response of students to the innovations in digital technology that supports their learning activities, which is related to other internal elements such as cultural, cognitive, creative thinking, communicative, self-confidence, creativity, critical attitude, adaptive as well as

personal and social responsibility. Essentially, any learning method cannot be absolutely effective for all students in different places, as different methods involve various dimensions and measuring instruments (Prasetyo, 2020a, 2020b). Therefore, the purpose of this paper is to explain the level of effectiveness of digital literacy using economic learning models involving SVc and MC methods for Senior High School's students in Central Java.

The main originality of this issue is related to the digital literacy implementation to learning in the field of economics with "subtopics of international trade discussion" that have not been usually conducted by researchers, as part of social science which tends to be uncertain. Digital economic literacy can be interpreted as the ability to use information and communication technology (ICT) to equip individuals and groups with equal access to socio-economic opportunities and abilities that have to be possessed to participate in the digital economy, (Bowles, 2015). Therefore, the digital economic literacy index needs to be measured, organized, assessed and applied swiftly, responsively and adaptively, in order to enhance educational and business methods (Chetty, 2018; McDougall, 2018; Igun, 2011). Meanwhile, digital literacy methods as learning resources, are often declared effective for the pure sciences. However, in the practice of economics and social sciences, its methods require further testing, both locally and nationally. Therefore, modern teaching techniques with digital literacy for the professional development of teachers and students need to be explored (Vijayalakshmi, 2019). Furthermore, at the vertical level, different teaching and learning strategies are presently required in order to ensure the realization of more effective and efficient learning (Molnár, 2015). Nevertheless, the fact that a teaching process is effective does not make it efficient (Prasetyo, 2020a).

Literature studies found that digital literacy using the Sparkol videoscribe technique has been widely used in the field of pure sciences (Yousef, 2014; Molnar, 2015; Indriyani,

2018; Nurrohmah, 2018; SiRicord, 2018; Nurdin, 2019). SiRicord (2018) asserts that the effectiveness of digital literacy using videoscribe learning methods improves the listening and speaking skills of students. Meanwhile, (Nurrohmah, 2018) stated Sparkol videoscribe is feasible and interesting for student learning, but requires further adjustment and refinement in order to remain effective and efficient. Whereas, digital literacy involving chart learning media can convey messages, stimulate thoughts, feelings and further encourages the learning process (Ramdhani, 2017).

The learning behavior theory (Akdemir, 2016), focuses on how learning behavior is easily accepted by students, Leon, (2017) explained that student literacy is mainly motivated from their comments in class which shows a deeper reflection of the topic. They also admit that the visual Sparkol videoscribe report is more interesting than the written or chart models. However, the problem stemming from the digital and economic literacy concept is still being studied distinctively, (Al-Kalai, 2004; Igun, 2011; Eshet, 2012; Urbancikova, 2017; Chetty, 2018; McDougall, 2018). Therefore in this paper, the incorporation of digital economic literacy concept in the state of the art can be considered as a more meaningful novelty. Basically, the novelty of the new digital economy (NDE) literacy concept can be used as a more effective, efficient measure for learning, which will further improve the quality of the educational process, both theoretically and practically. Furthermore, the emergence of NDE concept dimension in the present industrial revolution can be considered as the most sophisticated theoretical dimension, (Sturgeon, 2017). According to Sturgeon, (2017), the NDE concept arises from technology combination, especially from ICT, which subsequently becomes increasingly pervasive throughout the academic, mechanical, communication, infrastructure, and environmental sectors. Hence, the use of NDE theory dimension plays a highly important role, and not only in socio-political life, but in research, manufacturing, services, transportation, as well as in agricultural robots. Therefore, this dimension can be considered as an important novelty.

Meanwhile in other literature studies, educational research experts have stated that it is important to develop skills and recognize a wider range of digital literacy which goes beyond information transmission. Digital literacy has to be valued scholastically, culturally and economically, and policy makers need to effect curricular changes in its recognition (Facer, 2001; Lankshear, 2016; Spiers, 2018; Anthonysamy, 2020). Tang (2016) also reported that digital literacy is a prerequisite for students to learn effectively in a mixed learning environment. The model for such an environment can be measured from technical and social-emotional dimensions. The technical dimension involves the skills and network infrastructure required to operate the digital literacy technology. Meanwhile, the social-emotional dimension is more associated with a person's behavior (students) in using digital technology (Ng, 2012). Furthermore, this technical and social-emotional dimension can be used as a basis for measuring the digital literacy effectiveness in economic learning in this study. Subsequently, this content on digital literacy can be regarded as an educational media (Spires, 2018).

METHODS

Based on the subject matter, objectives and basic theory of NDE and the dimensions above, this research method was arranged to facilitate activities in finding answers to the objectives. The general theoretical basis used is the NDE and learning behavior theory that focuses on how both learning interest and outcomes with digital literacy are obtained. Furthermore, the measurement dimensions used include the technical and social-emotional dimensions as explained above. Meanwhile, the analytical technique for testing the effectiveness level is the Gain Index basic method and its modification, as well as the path analysis model and statistical tests. The specific

purpose of this evaluation is to ascertain the effectiveness level of digital literacy using the Sparkol videoscribe and chart method. In the methodology stage, the basic method of development and research theory is based on the analysis, design, development or production, implementation or delivery, and evaluation (ADDIE) research model that was developed from Branch (2009). Furthermore, this study uses the basic theory of the new ADDIE model as shown in Figure 1, as one that has been integrated with the ICT approach. This is due to the fact that the model in Figure 1 is commonly used by researchers (West, 2020).

Ascertaining the effectiveness level in this study required the design and score results from the pre-test and post-test in order to determine the student ability level. It also involved making a comparative approach based on the measuring dimensions of the normalized Gain Index value (Gn) in order to determine the effectiveness level. Novelty of research methods in this study used the normalized Gain index (GI) modification (Hake, 1999, 2002; Meltzer, 2002 and Prasetyo, 2020). In order to obtain better research results, a combination of the normalized value of the Gain index from Hake (GiH) and Meltzer (GiM) is used which has a 100% correlation value (Meltzer, 2002; Pratiwi, 2020). From the modification of these two models (GiH and GiM), the novelty

and originality of the new method is obtained, precisely the normalization of the Prasetyo model Gain index (GiP). Furthermore, based on the (GiP) value, the effectiveness level of digital literacy with SVc and charts learning models can be observed. The result is, if the value (GiP) increases or reaches 100%, it is considered to be more effective. Conversely, if the value (GiP) reduces or approaches zero, it is considered to be increasingly ineffective. If the index value (GiP) is negative, then the model is highly ineffective and therefore considered to have damaged the structure or basic conditions that already exist. A new learning method or model that occurs must not damage an existing structure (Adebiyi, 2019).

The derivative model to produce a new Gain normalization index (GiP) is to use the following formulation.

Gain Normalization (Hake,1999, 2002)

$GiH = (Score_{post\ test} - Score_{pre\ test}) / (Score_{maximum\ posible} - Score_{pre\ test})$

Gain Normalization (Meltzer, 2002; Pratiwi, 2020)

$GiM = (Score_{post\ test} - Score_{pre\ test}) / (100 - Score_{pre\ test})$

Gain Normalization (Prasetyo, 2020) $GiP = (Score_{post\ test} - Score_{pre\ test}) / (Score_{maximum\ posible} - Score_{minimum\ posible})$

Furthermore, in order to provide a better understanding and use it as a basis for making
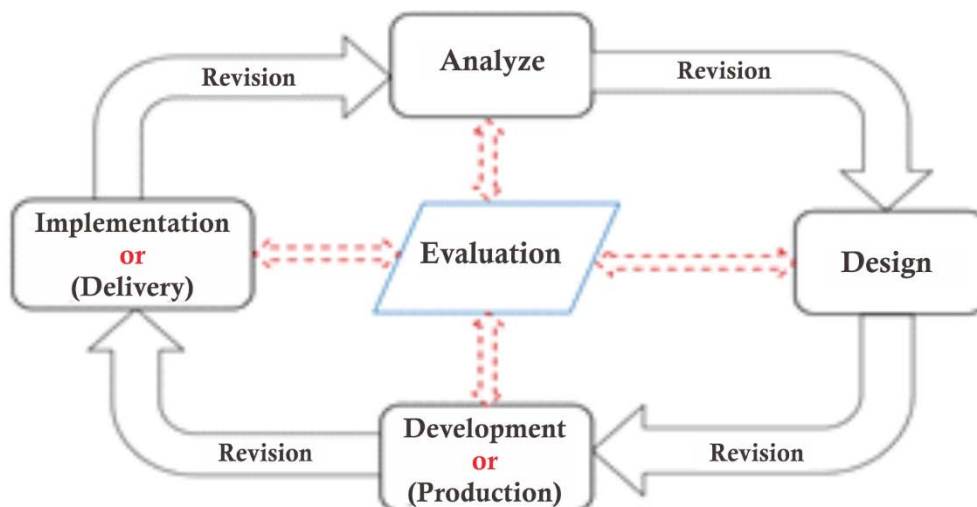
Figure 1. Design Stages of the ADDIE Learning Model Research Development Activities
Source: Branch (2009) and West (2020)

decisions on the effectiveness level of digital literacy using Sparkol videoscribe and media chart learning methods, the measurement dimensions of the comparative approach are shown in Table 1.

The novelty of research methodology and the scientific argumentation underlying the gain normalization index used with the N-Gain Prasetyo (GiP) model, is due to the extreme results between the values of the N-Gain Hake (GiH) and the N-Gain Metzer (GiM) model. Therefore, it is difficult to make good decisions, and if enforced, they will be wrong. Furthermore, by using a new approach from the N-Gain Prasetyo (GiP) model index, the middle value between the two N-Gain model index values can be obtained, therefore the decision making method tends to be more objective, easy and precise.

Furthermore, the research methodology used to determine the role of digital literacy in the SVc and MC methods towards students' interest and learning outcomes both directly, indirectly and in total involved the path analy-

sis model. This model has been previously described in Figure 2. However, to enhance understanding in statistical theory, it is necessary to form a structural equation model, which is based on the theory and dimensions of measurement as well as the main variables that make up mathematical function equations. Subsequently, this structural model is simply made on the basis of standard, multiple, linear regression correlation equations in the form of ordinary least squares (OLS) in Figure 2 (Prasetyo, 2020c).

$Yn = p_Y.X_1 + p_Y.X_2 + \varepsilon 1$ .... (1)
$Zn = p_Z.X_1 + p_Z.X_2 + p_Z.Yn + \varepsilon 2$ ... (2)

RESULT AND DISCUSSION

Digital literacy in this study is interpreted as the ability of teachers and students to use digital media or learning tools, including information and communication technology (ICT), as a means of communication, information and evaluation creatively, wisely, intelligently, carefully, precisely, effectively, ef-

Table 1. Categories of Gain Index Value and Gain Normalization Index Value

Gain Index Value Category (Score Gi)		Normalization Gain Index Value Category (%)		
Score Criteria	Conclusion	Index Score (GiP)	Percentage (Gn)	Interpretation
Gi > 0.7	High	1,00 – 0,76	> 76	Effective
0.3 > Gi >= 0.7	Medium	0,56 – 0,75	56 - 75	Effective Enough
		0,41 – 0,55	41 - 55	Less Effective
Gi≤ 0.3	Low	0,00 – 0,40	< 40	Ineffective

Source: Modification of: (Hake, 1999; 2002; Meltzer, 2002; Pratiwi, 2020)
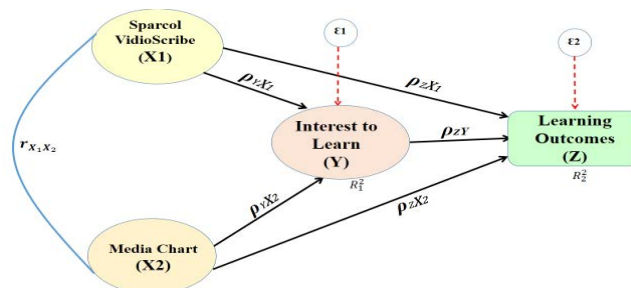
Figure 2. Digital Literacy Path Analysis Method with a Double Lane Recursive Form Correlation Model
Source: Processed Primary Data (2020)

ficiently and adaptively. It is applicable in economic learning as well, depending on many elements or factors including cultural, cognitive, innovative, communicative, critical, creative, self-confident, social responsibility and internet network infrastructure. Therefore, digital literacy media in economic learning, studied in theory and application, can at the same time create opportunities, challenges, advantages and disadvantages, depending on which of these factors are properly understood. Therefore, this means that digital literacy in economics learning involves the ability of teachers and students to use and adapt to the ICT development to support the learning and evaluation in the international trade subtopics as an educational subject being studied.

From the normalized Gain index model analytical technique as described in the research method above, the results can be obtained as shown in Table 2. This table helps to describe the effectiveness level of digital literacy using SVc and charts learning models in the economic subject of "international trade" learning. Furthermore, especially for the experimental class, it appears that if the N-Gain method from Hake is used, a score of 0.71785 is obtained, which is high, and therefore concluded as effective. However, if used with the index value of N-Gain Meltzer, a score of 0.49482 or 49.48% is obtained, which means it is less effective. Meanwhile, the difference in scores is quite large, and this poses a difficulty to conclude objectively and accurate-

Table 2. The Effectiveness Level of Digital Literacy Based on The Gain Index Normalization

No.	Treatment	Experiment Class			Control Class			Comparative	
		Pre-Test	Test Post	Change	Pre-Test	Test Post	Change	Pre-Test	Test Post
1	Total Observation	36	36	0	36	36	0	36	36
2	Average	51,72	75,61	0,4619	50,08	70,22	0,4022	50,9	72,92
3	Minimum	20	53	1,65	20	47	1,35	20	50
4	Maximum	77	93	0,2078	77	87	0,1299	77	90
5	Maximum Posible	85			82			83,5	
6	Minimum Posible	46,5			33,5			35	
	Decision Treatment	Score	(%)	Decision	Score	(%)	Decision	Decision	
7	N-Gain Hake (GiH)	0,71785	71,79%	High	0,63095	63,09%	Medium	0,67546	67,53%
8	N-Gain Meltzer (GiM)	0,49482	49,48%	Less E.	0,40345	40,34%	Less E.	0,44847	44,84%
9	N-Gain Prasetyo (GiP)	0,62052	62,05%	Enough	0,41526	41,53%	Less E.	0,45402	45,39%
10	Conclusion (GiP)	Effective Enough			Less Effective			Less Effective	

Source: Processed Primary Data (2020)

ly. Hence, it used the value of the new Gain normalization index, named N-Gain Prasetyo (GiP). From the N-Gain Prasetyo (GiP) results, a finer middle score or score of 0.62052 or 62.05% can be obtained, which means it is effective. Therefore, digital literacy in economic learning on the subject matter of "international trade" using the Sparkol videoscribe and chart methods can be concluded as quite effective.

The conclusion from the research results is stated to be quite effective, and even tends to be considered less effective, because quantitatively, the comparative N-Gain value of 45.39% is within the score limit of 41.00% to 55%, which signifies that the group is less effective. Based on the qualitative critical analysis, it can be concluded principally that digital literacy learning models with Sparkol videoscribe and chart methods improves learning outcomes and make the learning process quite enjoyable. This is because the digital literacy method is able to attract students' interest in learning. However, it can be stated that the Sparkol videoscribe and chart approach methods are less effective in improving learning outcomes. It means that, the learning model with digital literacy in economic lessons are quite effective, enjoyable, and increases the interest of students in learning, but less significantly in improving the learning outcomes. If the results are compiled from the dimension of social-emotional responsibility based on observations and interviews with teachers and students, the Sparkol videoscribe method is quite interesting and exciting, but too extensive to be understood. Meanwhile, creating

Sparkol videoscribe media is a technical process which requires lots of time (ineffective). Therefore, these results challenge the theory which states that the digital literacy technology model is absolutely capable of attracting interest in effective and efficient learning as untrue. This is due to the fact that in the learning behavior theory, there are various important elements influencing it, both in technical and non-technical dimensions.

These research results prove that there is no single model of learning that is absolutely effective and efficient all the time. This is because the model is closely related to several factors influencing it, including the techniques and measuring instruments used. As in the case of this research, if the original Gain index model technique is modified (Hake, 1999, 2002), then the digital literacy model can indeed be declared effective because of the relatively high index score obtained. However, if the Metzer (2002) model normalization Gain index technique is used, the results are not effective. If this research phenomenon is forced to use only one of these models, then it will produce a misleading conclusion. The conclusion of these results was based on the value of the Prasetyo model Gain normalization index (GiP) which influences the theory and practice, and hence, can act as a middle ground for the theory. Furthermore, these arguments can be strengthened by the path analysis model results which can be seen in Table 3, Table 4, Table 5, and Figure 2.

From the values shown in Table 3 it is increasingly clear that the R^2 value in model-1 is 0.801 or 80.1% and in model-2, it is 0.995

Table 3. Determination Value of Digital Literacy with SVc and MD Learning Models

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	,801	,641	,619	,170229	,641	29,466	2	33	,000	1,154
2	,995	,991	,990	,298792	,991	1115,085	3	32	,000	2,281

Source: Processed Primary Data (2020)

or 99.5%. This means that according to model-1, digital literacy with SVc and charts learning models makes a positive and significant contribution to student interest in learning by 80.1%, and the rest is influenced by other factors. Meanwhile, in model-2, digital literacy using SVc and charts models is able to contribute to student learning outcomes by 99.5%. Critical analysis in table-3 reinforces the above results that digital literacy using Sparkol videoscribe and the chart learning model increases learning interest with fun. Furthermore, the role of each factor can be seen in Table 4.

The partial critical analysis, based on the results in Table 4, show that the digital literacy using the SVc learning model is 46.8%, which significantly and positively affected student learning interest than the chart model which was only 40.0%. However, the role of SVc was more significant, and the positive influence was lower by 31.3% regarding the increase in student learning outcomes, compared to the chart method which was 68.3%. The research results in table 4 are consistent with the Gain index technique above, and found that literacy using the SVc model increases student interest in learning, but is less effective in improving learning outcomes.

Based on further critical analysis, if digital literacy is integrated in the abilities of teachers and students to use media or digital learning tools (ICT) as communication tools, information transmission and evaluations will be done wisely, smartly, accurately, precisely, effectively and efficiently. Therefore, the facts which can be interpreted from these results are, the case of education at the Senior High School level in the research area at Central Java regarding the level of digital literacy is presently low, or lagging behind. The argument which supports digital literacy as a learning prerequisite for students and teachers can be seen from the technical dimension that has been ineffective and inefficient. Low technical dimensions related to the skills of teachers and students for proper operation of digital technology are weak. Furthermore, local internet infrastructure as the main network in the school is also low and does not support the activities and processes of digital learning and literacy. The technical impact of the weakness on local internet infrastructure in the sample schools was increasingly felt, especially when the online learning model was implemented

Table 4. The Results of Digital Literacy Path Analysis With A Recursive Double Path Correlation Model

	Model	Unstandardized Coefficients		Standardized Coefficients	t-stc.	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1,196	,221		5,416	,000		
	X_1 (VSc)	,304	,095	,468	3,206	,003	,510	1,961
	X_2 (MC)	,179	,066	,400	2,736	,010	,510	1,961
2	(Constant)	-9,240	,533		-17,346	,000		
	Y (Learning Interest)	,871	,306	,082	2,852	,008	,359	2,786
	X_1 (VSc)	2,159	,191	,313	11,335	,000	,389	2,572
	X_2 (MC)	3,261	,127	,683	25,598	,000	,416	2,406

Model-1: Dependent Variable (Learning Interest)
Model-2: Dependent Variable (Learning Outcomes)
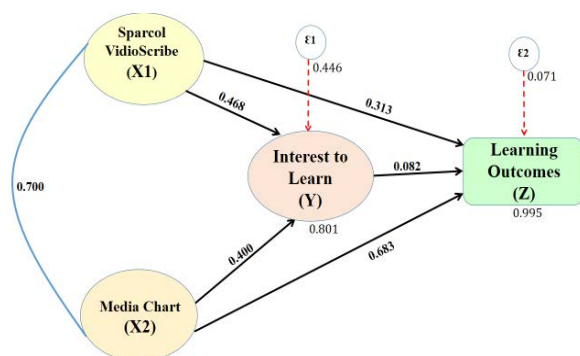
Source: Processed Primary Data (2020)

during the Covid-19 pandemic.

Meanwhile, from the dimension of social-emotional responsibility which is related to the behavior of students and teachers in using digital technology in economic learning, it can presently be described as weak, and the students feel less interested when compared to other practical, mathematical materials. Furthermore, if the effectiveness of digital literacy using the SVc method is further studied with other related elements, it will be weaker and more ineffective. It means that, if this digital literacy is forced and enacted as a standard educational media in the new curriculum, it may not be useful, and can result in further inequality. Therefore, this research results support the opinions of experts and researchers which stated that it is very important to develop digital skills which range further than the scope of information, and avoid the enactment of curricular policies which are solely dependent on SVc digital literacy. (Facer, 2001; Lankshear, 2016; Spires, 2018; Anthonysamy, 2020).

Figure 3. The Results of A Digital Literacy Path Analysis Diagram With A Double Track Recursive Form Correlation Model
Source: Processed Primary Data (2020)

Furthermore, critical analysis based on the path analysis diagram on the above phenomenon can be described based on the identification results in figures-3 and table-5. From figure-3, it appears that the direct influence of digital literacy on the Sparkol videoscribe (SVc) model has greater contribution to student learning interests than the direct influence on their learning outcomes. Conversely, for digital literacy using a chart model (MC) there is a direct and even greater influence on improving student learning outcomes than their interests. Arguments and critical research on this phenomenon have obtained results according to the students' recognition, that the SVc digital literacy model is considered newer than the chart method, therefore it is natural to consider it more interesting, but the SVc method has not been great in improving their learning outcomes. This is because students also realize that they are not familiar and require more focus, therefore they generally find it difficult to assimilate, and take down notes or summaries. Additionally, digital literacy using the chart method is well known and understood, therefore it is less attractive to students' learning interests when compared to SVc, but actually better at improving the learning outcomes. Quantitatively, this phenomenon can be further described based on the results in Table 5.

From Table 5, it is increasingly apparent that the total influence of digital literacy using the chart model is able to make the greatest contribution of 63.58% from a total influence of 93.64%. Meanwhile, the total influence of digital literacy using the SVc method was only able to contribute 25.95%. Furthermore, student interest in learning only contributed the smallest total influence of 4.11%. Consequently, these results make it increasingly clear that digital literacy using the chart method is highly able to make the largest contribution to improving student learning outcomes both directly and indirectly. However, the role of digital literacy model charts has a smaller contribution towards student interest in learning. Hence, a temporary conclusion can be drawn that older learning methods which are better understood and easily mastered by students will actually have a greater, positive impact on their learning outcomes, than new learning models, which, are more interesting during learning, but it cannot guarantee improved outcomes.

Table 5. Description of The Direct, Indirect and Total Roles Towards Learning Outcomes

Variable	Direct Influence	Indirect Influence			Sub Total	Total Influence
		X_1	X_2	Y		
X_1 (VSc)	0,0979		0,1496	0,0120	0,1616	0,2595
X_2 (MC)	0,4665	0,1496		0,0224	0,1693	0,6358
Y (Interest to Learn)	0,0067	0,0120	0,0224		0,0344	0,0411
Total	0,5711				0,3653	0,9364

Source: Processed Primary Data (2020)

CONCLUSION

The purpose of using any learning model is to increase learning interest and learning outcomes pleasantly, creatively, effectively, efficiently, innovatively and adaptively. In this era of digital literacy and technology, learning methods are becoming increasingly practical, productive, liberal and fun. This is because the digital literacy of individual and community resources also increase accordingly. However, there is neither a standard technology nor learning method that is invariably effective, efficient and able to fulfill all the important elements of learning objectives in various places and situations. This research therefore concludes that digital literacy with Sparkol videoscribe and media charts learning models in economic learning can be fun and increase student interest in terms of comprehension, but less effective in improving the learning outcomes. Consequently, digital literacy using both Sparkol videoscribe and media chart learning model partially determine and influence the learning intentions positively and significantly. However, the influence of learning interest in association with an increase in student learning outcomes is low. Basically, digital literacy using Sparkol videoscribe learning model has a greater influence on increasing interest in learning, than that of increasing learning outcomes. Meanwhile, digital literacy with media chart learning models is greater in improving student learning outcomes than that of interest.

This research may contain weaknesses, as the study took place in a localized area, which makes it improper to generalize its findings. However, these results are theoretically and practically able to make a better and neutral contribution as well as an increased propensity to improve the Gain index normalization method that has been frequently used by researchers in education. This research paper recommends to other researchers in the future to conduct a study using a wider range of variables by incorporating other important elements that are more complex and comprehensive. Furthermore, the results provide recommendations to policy holders, hence they do not necessarily include any of the compulsory learning methods in the standard curriculum at various levels and situations. Also, it is believed that learning models are dynamic, therefore every good model of digital literacy in the modern era has to remain adaptive, productive, innovative, efficient and effective.

REFERENCES

Adebiyi, A. (2019). *Understanding Effective Learning*. Dept. of Curriculum Studies and Educational Technology, University of Minho, 1(1), 1-11.

Akdemir, S., & Kaya, Z. (2016). *Learning and Teaching: Theories, Approaches and Models*, ResearchGate, https://www.researchgate.net/publication/304119354.

Al-Kalai, Y.E. (2004). Digital Literacy: A Conceptual Framework for Survival Skills in the Digital Era. *Journal of Educational Multimedia and Hypermedia*, 13(1): 93-106.

Anthonysamy, L. (2020). Digital Literacy Deficiencies in Digital Learning Environment among University Students. *Understanding Digital Industry*, ResearchGate publication, Routledge, 133.

Bowles, M. (2015). *Digital Literacy and E-skills: Participation in the Digital Economy*, Innovation & Business Skills Australia, Ltd. Esusan@ibsa.org.au.

Branch, R.M. (2009). *Instructional Design: The ADDIE Approach*. Springer Science-Business Media, LLC. www.springer.com

Chang, M.-M., & Hung, H.-T. (2019). Effects of Technology-Enhanced Language Learning on Second Language Acquisition: A Meta-Analysis. *Educational Technology & Society*, 22(4), 1–17.

Chetty, K., et al. (2018). Bridging the digital divide: measuring digital literacy. *Open Assessment E-Journal Economics*, 12(23): 1-18.

Chick, N., Kenny, N., Berenson, C., Johnson, C., Keegan, D., Real, E., & Reid L. (2018). *Developing a Learning Culture: A Framework for the Growth of Teaching Expertise*

Chick, N., & Hassel, H. (2009). "Don't Hate Me Because I'm Virtual": Feminist Pedagogy in the Online Classroom. *Feminist Teacher,* 19(3), 195-215.

Egan, J. P. (2020). Beyond the afterglow: Effective transfer of learning through instructional design. *Teaching & Learning Inquiry,* 8(1), 173-186. http://dx.doi.org/10.20343/teachlearninqu.8.1.12

Eshet, Y. (2012). Thinking in the Digital Era: A Revised Model for Digital Literacy. *Journal Informing Science and Information Technology*, 9(1); 267-276.

Facer, K. & Furlong, R. (2001), Beyond the Myth of the 'Cyberkid': Young People at the Margins of the Information Revolution. *Journal of Youth Studies*, 4 (4), 451–469. http://www.tandfonline.com/loi/cjys20

Garnett, R.F. (2009). Liberal Learning as Freedom: A Capabilities Approach to Undergraduate Education. *Stud Philos Educ,* 2009(28),437–447.

Hake, R.R. (2002). Relationship of Individual Student Normalized Learning Gains in Mechanics with Gender, High-School Physics, and Pretest Scores on Mathematics and Spatial Visualization. *Journal physics education research conference*, 8(1), 1-14.

Hake, R.R. (1999). *Analyzing Change/Gain Scores*. Dept. of Physics, Indiana University, 13(3), 1-4. http://www.physics.indiana.edu/

Igun, S. (2011). Bridging of Digital Divide in Africa. *International Journal of Information and Communication Technology Education*, 7(1): 11–20.

Indriyani & Putra, F.G. (2018). Media Pembelajaran Berbantuan Sparkol Materi Program Linier Metode Simpleks. *Desimal: Jurnal Matematika*, 1(3), 353-362

Lanshear, C., & Knobel M. (2016). Digital Literacy and Digital Literacies: *Nordic Journal of Digital Literacy*, 2006(2016), 8-20.

Lyons, A.C., Hanna, J.H., & Cobo, C. (2019). *The Future of Work and Education for the igital Age: Bridging the Gap Between Digital Skills and Employability for Vulnerable Populations*. G20 Governance of Digitalization in Japan.

McDougall, J., Readman, M., & Wilkinson, P. (2018). The uses of digital literacy. *Journal Learning, Media and Technology,* 43(3): 263–279.

Meltzer, D.E. (2002). The relationship between mathematics preparation and conceptual learning gains in physics: A possible "hidden variable" in diagnostic pretest scores. Am. *J. Phys.*, 70(12), 1259-1268

Molnar, G. (2015). Teaching and Learning in modern digital Environment. *IEEE 13th International SMAI*, Har'lany, Slovakia, January 22-24 (2015), 213-317.

Ng, Wan (2012). Can we teach digital natives digital literacy. *Computers & Education,* 59 (3), 1065–1078. https://doi.org/10.1016/j.compedu.2012.04.016.

Nurdin, E., Ma"aruf, A., Amir, Z., Risnawati, Noviarni, & Azmi, M.P. (2019). Pemanfaatan video pembelajaran berbasis Geogebra untuk meningkatkan kemampuan pemahaman konsep matematis siswa SMK. *Jurnal Riset Pendidikan Matematika,* 6(1), 87-98

Nurrohmah, F., Putra, F.G., & Farida. (2018). De-

velopment of Sparkol Video Scribe Assisted Learning Media, *Formatif: Jurnal Ilmiah Pendidikan,* 8(3): 233-250.

Prasetyo, P. E., & Dzaki, F. Z. (2020a). Efficiency Performance and Productivity of Creative Industries. *International Journal of Scientific & Technology Research*, 9(6), 122-132. http://www.ijstr.org/paper-references. php?ref=IJSTR-0620-36569

Prasetyo, P.E. & Dzaki, F.Z. (2020b) Institutional performance and new product development value chain for entrepreneurial competitive advantage. *Uncertain Supply Chain Management,* 8(4), 657-668. http://growingscience. com/uscm/online.html

Prasetyo, P.E., & Kistanti, N.R. (2020c). Human capital, institutional economics and entrepreneurship as a driver for quality & sustainable economic growth. *Entrepreneurship and Sustainability Issues,* 7(4), 2575-2589. https://jssidoi.org/jesi/issue/28.

Prasetyo, P.E. (2020d). The Role of Government Expenditure and Investment for MSME Growth: Empirical Study in Indonesia. *Journal of Asian Finance, Economics and Business,* 7(10) 471–480.

Pratiwi, U., Setyaningrum, R.A., & Kurniawan, E.S. (2020). Implementation of sparkol videoscribe physics-based learning media pace to improve students' analytical skills. *Gravity*, 6(1), 21-27.

SiRicord, T.S., Yunus M. (2018). Learners' Perceptions on the Effectiveness of VideoScribe on Improving Listening & Speaking in Rural School of Sarawak. *The Asian EFL Journal*,

20(8): 56-68.

Spires, H.A., Paul, C.M., & Kerkhoff, S.N. (2018). Digital Literacy for the 21st Century. *IGI Global Information Science Reference,* 701(E), 2235- 2242. http://www.igi-global.com

Sturgeon, T.J. (2017). *The 'New' Digital Economy and Developmen*t, United Nations, (UNCTAD); ICT4D/08, Devision on Technology and Logistics

Tang, C.M., & Chaw, L.Y. (2016). Digital Literacy: A Prerequisite for Effective Learning in a Blended Learning Environment. *The Electronic Journal of e-Learning*, 14(1), 54-65. www.ejel.org

Urbancikova, N., Manakova, N., & Bielcheva, G. (2017). Socio-Economic and Regional Factors of Digital Literacy Related to Prosperity. *Journal Quality Innovation Prosperty,* 21(2), 124-141. https://www.qip-journal.eu/index.php/QIP/article/view/942

Vijayalakshmi, M. (2019). Modern Teaching Techniques in Education, *Educational Technology in Teacher Education in the 21st Century, Conference*, 2016/5/26, 448-451.

West, R.E. (2020). Foundations of Learning and Instructional Design Technology The Past, Present, and Future of Learning and Instructional Design Technology. Historical Roots, *Outstanding Book*, Version; 1.43, pp. 1-1103.

Yuosef, A.M.F., Chatti, M.A., & Schroeder, U. (2014). The State of Video-Based Learning: A Review and Future Perspectives, *International Journal on Advances in Life Sciences,* 6(3 & 4), 122-135