THE EFFECT OF STEAM LOADING DISTANCE LEARNING ON CREATIVE CHARACTER AND INDEPENDENCE

Dina Amalia

Early Childhood Education, Faculty of Education Universitas Negeri Semarang
dinamalia11@gmail.com

Joko Sutarto

Early Childhood Education, Faculty of Education Universitas Negeri Semarang
jokotarto@gmail.unnes.ac.id

Yuli Kurniawati Sugiyo Pranoto

Early Childhood Education, Faculty of Education Universitas Negeri Semarang
yuli.kurniawati.sp@gmail.unnes.ac.id

Abstract: *The purpose of this research is to find out the influence of STEAM-charged distance learning on creative character and independence in several PAUD in Central Java. This research is descriptive quantitative research, with a survey approach. The population and samples in this study were teachers and parents (n=140) in several PAUD in Central Java. Based on data processing and analysis that STEAM loaded distance learning has mostly been implemented in several PAUD in Central Java. Based on the results of the hypothesis test calculation obtained the value of creative character Fvalue of 125,851 and Fvalue independence of 78,082 so that the results obtained that STEAM loaded distance learning affects the creative character and independence, with the hope that the child is more effective and able to solve the problems faced. Obstacles in this study include many parents who do not understand the task of child development and the process of distance learning of children, so this article seeks to explain the importance of strengthening STEAM charged distance learning in children so that the child has an effective learning experience to improve creative character and independence, it can be done by improving cooperation between teachers and parents.*

Keywords: *STEAM, Creative Character, Independence*

A. Introduction

Based on the ministerial circular letter number 4 of 2020 issued on March 24, 2020 regarding the execution of instruction strategies in the crisis time of the spread of Covid sickness (Coronavirus), one of the substance is gaining from home with on the web or distance learning exercises. During the pandemic, web based learning has now been completed practically everywhere (Goldschmidt, 2020). So during the Coronavirus pandemic, each school did instructive exercises with distance learning.

The Coronavirus pandemic is a wellbeing emergency that has hit practically all sides of the world (Purwanto et al., 2020). This pandemic an affects different fields, one of which is training. Numerous nations have chosen to briefly close schools and grounds during the Coronavirus pandemic. Every nation makes strategies to beat the issues that are occurring. To conquer the Coronavirus pandemic, all nations executed an activity, one of which was via completing social separating developments, to be specific social removing intended to decrease the communication of individuals in the more extensive local area (More stunning Smith and Freedman, 2020). With social separating, learning in schools is hampered and is impossible straightforwardly, this likewise influences the execution of instructive exercises.

Schooling, which was initially an up close and personal strategy at instructive foundations, has now been changed to web based taking in and did from the home to forestall and conquer the spread of the COVID-19 infection. This approach applies to all degrees of training, from PAUD to tertiary foundations. This is an underlying advance from the public authority since learning doesn't need to meet up close and personal, it doesn't need to be eye to eye, yet is completed utilizing web-based media, innovation media, and applications. This learning is known as online learning (Adiwijaya, 2020).

The suitable picking up during distance learning is by utilizing STEAM-charged learning. The Ministry of Education and Culture Repository (2019) says STEAM is a collaborative learning content that leads to the provision of motivation, an innovations that can give birth to creative people towards achieving communities that not only strengthen learning in scientific disciplines. STEAM is used to focus on understanding the integrated nature of the disciplines of science, technology, engineering, arts, and mathematics and their importance in children's long-term academic success, economic well-being (Quigley & Herro, 2016). STEAM learning content has an

impact on early childhood, one of which is increasing children's interest and understanding in technology and the ability to solve problems in the real world (Thuneberg, Salmi, & Bogner, 2003). 2018). As explained by (Kofac, 2017) that STEAM contains scientific technology-based learning and the ability to solve problems in the real world.

Ministry of Education and Culture Repository (2019) says STEAM is a collaborative learning content that leads to the provision of motivation, innovation that can give birth to creative people towards an accomplished society that not only strengthens learning in scientific disciplines. But between disciplines through the opportunity to explore the expected connection between science, technology, engineering, art, and mathematics by utilizing existing facilities in the surrounding environment to solve problems in building positive knowledge.

STEAM-based learning (Science, Technology, Engineering, Art, and Mathematic) can assist understudies with invigorating reasoning cycle abilities and face the difficulties of the globalization time (Henriksen, 2017; Sheffield, Koul, Blackley, Fitriani, Rahmawati, and Resek, 2018). STEAM learning is presently a worry of the universe of schooling (Kang, 2019; Sheffield et al. 2018). With the goal that the utilization of STEAM in the study hall can deliver perplexing and wonderful learning items in working on the nature of schooling (Henriksen, 2014). In the STEAM learning measure, the educator has many errands like noticing, giving boost by posing inquiries, offering viewpoints and ideas, and assessing the kids' work. Adding to the description above, STEAM content learning can encourage children to develop curiosity, openness to experience (Perignat & Katz Buonincontro, 2019) and ask questions so that children build knowledge around them by exploring, observing, discovering, and investigating things around them (Munawar, 2019).

Besides that STEAM content is used based on its advantages, namely learning content that has been well integrated has the opportunity to create programs through social discourse to integrate complementary learning theories as desired (Kelley & Knowles, 2016). This statement can be interpreted that a well-integrated STEAM content has the opportunity to create social programs to integrate complementary theories. Schools are asked to integrate STEAM-charged learning well and develop pedagogical abilities so that schools can fully utilize the potential of STEAM to children (Margot & Kettler, 2019; Estapa & Tank, 2017).

Adding to the depiction above, when distance learning youngsters can in any case impart innovative and free characters. as per Becker and Park (2019) that imaginative person and autonomy can be coordinated through STEAM-charged learning, on the grounds that STEAM is a significant issue in training today. STEAM content is a coordination of learning science, innovation, designing, expressions, and math that is proposed to help the achievement of 21st-century abilities (Brews, 2011). STEAM can create in case it is related with the climate, so that learning is understood that presents this present reality experienced by youngsters in regular day to day existence (Subramaniam et al, 2012). This implies that through STEAM content, kids don't simply retain ideas, yet rather how kids comprehend and comprehend logical ideas and their connections in day to day existence.

In view of the depiction above, it tends to be inferred that STEAM content is an abbreviation for science, technology, engineering, art, and mathematic. The content of learning these five sciences, STEAM has an impact on early childhood, one of which is increasing children's creative character and independence, by applying STEAM-charged learning, children understand and understand science concepts and their relationships, and children can instil the habit of being creative and independent in life. so that children have the awareness and commitment to apply in everyday life.

Based on the results of interviews with teachers and principals of Hidayatullah Islamic Kindergarten and Cahaya Ilmu Islamic Kindergarten in Semarang City that through STEAM content children will learn without realizing that they are learning, because STEAM is packaged in the form of fun games for children, especially during a pandemic like this how to interpret effectiveness STEAM so that children in learning at home can still bring up creative and independent characters because without direct teacher assistance, so that using STEAM content is expected to be effective in making parental activities play with children at home, and in other situations, it is hoped that children's creative and independent characters can develop.

There needs to be good support and cooperation between the school and parents in the success of distance learning containing STEAM such as the availability of learning media used by children when studying at home, this has been anticipated from the school with efforts to provide play materials that parents can take at school to support playing activities using STEAM content during distance learning at home so that these

efforts are effective in distance learning. In addition to this, in the assessment of distance learning, the school also asks parents for help to assess the child's life skills at home through a google form sent by the school to parents. Moreover, this article will clarify the impact of distance picking up containing STEAM on innovative person and freedom for kids matured 5-6 years in a few PAUD in Focal Java, by expanding collaboration among instructors and guardians, as accomplices in the learning system at home.

B. Discussion

1. Relevant Theory

In writing this article, the researcher explores information from previous studies as a comparison material, both regarding the existing advantages or disadvantages. In addition, researchers also dig up information from journals in order to obtain previously available information about theories related to the titles used to obtain the basis for scientific theories.

a. Research by Muniroh Munawar, S.Pi., M.Pd, Universitas PGRI Semarang in 2019 with the title Implementation Of Steam (Science Technology Engineering Art Mathematics)-Based Early Childhood Education Learning In Semarang City. This research is a type of qualitative research. Data was collected through observation, interview and documentation. While the results of this study describe: 1) Storytimes in STEAM class, 2) STEAM Process in learning, 3) STEAM activities in class. The results show that the implementation of STEAM-based learning is not fully integrated. Assistance is needed by a team of experts and there is no comprehensive learning media tool.

b. Research by Siti Wahyuningsih, et al. In 2019 with the title Effect of the STEAM Method on the Creativity of Children aged 5-6 Years, the method in this study used pretest and posttest experimental research with a total of 25 children as respondents. The results showed that there was a difference in creativity in children before the child received treatment and after the child received treatment with the application of the STEAM method. The STEAM method in its application uses loose parts which can increase children's creativity.

c. Research by Irmayani Limbong, Muniroh Munawar, and Nila Kusumaningtyas, in 2019 with the title STEAM-Based PAUD Learning Planning. This study used qualitative research me thods. Data collection techniques used in the form of inter views, field observations and reflective journals. Planning is the most important part in a learning process, which focus es more on the 4C (Communication, Collaborative, Creative Thinking, and Creativity). STEAM-based learning (Science, Technology, Engineering, Art and Mathematics) will help train children to be able to analyze existing problems using various approaches, both science, technology, engineering, art and mathematics so that it becomes a strategy to maintain survi val. in order to remain able to survive in today's fast-paced era.

d. Arsy, I., & Syamsulrizal, S. Research in 2021 with the title The Effect of Steam Learning (Science, Technology, Engi neering, Arts, and Mathematics) on Student Creativity, this research uses a literature review method from vari ous sources. Sources of this information can be obtained through books, journals, ebooks, or other scientific articles. The results of the study show that using STEAM content has an influence on the creativity of students.

Based on some of the literature reviews above, it can be concluded that the STEAM content gap analysis is the result of the integration of STEM by adding A (Art) in it, because through STEAM learning children will emerge creativity and be able to solve their own problems.

2. METHODS

The exploration configuration picked is graphic quantitative examination, depicting the present status of the subject or object of examination dependent on the realities that show up or as they are. As per Sugiyono (2018) quantitative enlightening examination is research directed to decide the presence of the worth of autonomous factors, possibly at least one (free) factors without making correlations or associating with different factors and the issues contemplated are clear, fixed, the fact of the matter is viewed as single, designs are noticed. deductive thinking. This review utilizes a study strategy where the creator asks a few group (respondents) about the information that the creator needs to know. By

utilizing the google structure interface.

The population of this research is whole teachers and parents in several PAUD in Central Java. In this study, the population of PAUD in Central Java (n=140), with sampling in each district/city in Central Java, consisted of 4 teacher respondents and 4 parent respondents. The instruments used were a learning questionnaire containing STEAM, a creative character questionnaire, and an independence questionnaire. The questionnaire was made using a google form so that respondents only filled out the questionnaire provided online by the researcher. Through the questionnaire, it is hoped that the respondent's response can be seen as a whole so that researchers can conduct an analysis related to distance learning containing STEAM on creative and independent characters. For more details, the steps in data collection are as follows:

a. The author went to the school for initial observation and gave a certificate of permission for observation from the campus which was addressed to the principal of the school concerned.

b. Coordination with teachers in several PAUD in Central Java through teacher coordination groups in the regions and asking for their willingness to assist researchers in finding the necessary data, related to distance learning containing STEAM in several PAUD in Central Java.

c. The author records the existing data with the guide sheet of the instrument that has been made previously.

d. Re-checking the data that has been recorded in the instrument sheet, just in case if there is something wrong/wrong or missing data.

The analytical technique used in this quantitative descriptive study uses observation, interview, documentation, and questionnaire techniques. Then an analysis is carried out by the author to conclude for the steps taken are as follows:

a. Analyzing how the influence of distance learning with STEAM on creative characters.

b. Analyzing how the influence of distance learning with STEAM on independence.

c. Analyzing how the influence of distance learning with STEAM on creative character and independence.

While the analysis used is descriptive quantitative with a simple linear regression test.

3. RESULTS

The results of data analysis show that there is an influence between distance learning containing STEAM on innovative person and freedom in a few PAUD in Central Java. However, these results still need further discussion to provide a more in-depth interpretation of the research results obtained about the theories and frameworks that have been stated previously.

Based on a research survey in the field of distance learning with STEAM content, the teacher conducted the following efforts:

a. The teacher invites children to develop higher-order thinking skills and provides opportunities for children to observe events experienced by children
b. Availability of various media or tools capable of developing STEAM fields
c. The teacher can provoke those who support the inquiry process in children, but sometimes the theme goes out
d. There has been the collaboration between teachers and children in exploring and experimenting to produce a work
e. The availability of learning media makes it easier for children to understand mathematical concepts through play activities such as recognizing shapes, numbers, and patterns.

The results of this study are supported by the results of previous studies such as Arsy, I., & Syamsulrizal, S. (2021) and Wahyuningsih, S. et al. (2019), with the hypothesis that STEAM content affects the creative character and independence of children aged 5-6 years-6. One of the impacts of the application of the STEAM learning model in learning activities for children aged 5 to 6 years is the development of creative attitudes and children's independence, or as a means to improve problem-solving skills in daily activities (Perignat & Katz-Buonincontro, 2019).

STEAM is an abbreviation for Science, Technology, Engineering, Art, and Mathematic. The STEAM learning model affects youth, one of which is expanding kids' revenue and comprehension in innovation and the capacity to take care of issues in reality (Thuneberg, Salmi, and Bogner, 2018). As clarified by Kofac (2017) that STEAM contains logical innovation

based learning and the capacity to tackle issues in reality.

In addition, the STEAM learning model encourages children to develop curiosity, openness to experience (Perignat & Katz-Buonincontro, 2019) and ask questions so that children build knowledge around them by exploring, observing, discovering, and investigating things around them (Munawar, 2019). STEAM's focus is on creating i.e. the final product and the manufacturing process. The manufacturing process is more important than the final product because in the process there are aspects of exploration, creative thinking, independence, engineering design, creative expression, evaluation, and redesign (Perignat & Katz-Buonincontro, 2019). In the process, the STEAM can teach children to proceed through observing, playing, and recognizing patterns.

Based on the calculation of data analysis, the percentages related to distance learning containing STEAM on creative and independent characters are obtained as follows: a) Analysis of the effect of distance learning containing STEAM on creative characters; b) Analysis of the influence of distance learning far loaded STEAM towards independence; c) Analysis of the influence of distance learning with STEAM content on creative and independent characters.

Tabel 1. Figure of Regression Test Output (ANOVA) Between Variable STEAM (X) and Character Creative (Y1) ANOVAa

Model		Sum of Squares	df	Mean-Square	F	Sig
1	Regression	5860.054	1	5860.054	125.851	.000b
	Residual	6425.739	138	46.563		
	Total	12285.793	139			

a. Dependent Variable: character creative
b. Predictors: (Constant), steam

Based on Table 1, it is known that the calculated F is 125,851 with a significant level of 0.000, because $p < 0.05$, the regression model can be used to predict STEAM. This shows that there is an effect of STEAM on creative characters, so the research hypothesis is accepted.

Tabel 2. Figure of Regression Test Output (ANOVA)
Between Variable STEAM (X) and Independence (Y2)
ANOVAa

Model		Sum of Squares	df	Mean-Square	F	Sig
1	Regression	36655.948	1	36655.948	78.082	.000b
	Residual	64784.988	138	469.456		
	Total	101440.936	139			

a. Dependent Variable: independence
b. Predictors: (Constant), steam

Based on Table 2, it is known that the calculated F is 78,082 with a significant level of 0.000, because $p < 0.05$, the regression model can be used to predict STEAM. This shows that there is an effect of STEAM on independence, so the research hypothesis is accepted.

Table 3. STEAM Variable Data Analysis Techniques (X)
Creative Characters (Y1) and Independence (Y2)
Correlations

		Karakter Kreatif	Kemandirian
Karakter Kreatif	Pearson Correlation	1	-.420**
	Sig. (2-tailed)		.000
	N	140	140
Kemandirian	Pearson Correlation	-420**	1
	Sig. (2-tailed)	-000	
	N	140	140

**Correlation is significant at the 0.01 level (2-tailed)

Based on Table 3, it is known that creative character and independence have a relation with a significance value of 0.000 (<0.05) and a person value of 0.420 (>0.138 rtable).

This study found many obstacles including many parents who do not understand the task of child development and the learning process of children during distance learning, so this article tries to explain the importance of strengthening STEAM-charged distance learning in children so that children have an effective learning experience, especially in improving character. creative and independent. In addition, the online learning process causes children to get bored quickly and cannot always focus on the laptop screen. Another obstacle,

the teacher cannot directly assess the child's performance, thus helping parents to assess a child's life skills at home through a google form sent by the school to parents. By increasing the cooperation between teachers and parents, it is hoped that these obstacles can be overcome.

C. Conclusion

The pandemic condition has changed almost all sectors of activity, including education. However, to support children's education, it is appropriate for schools and teaching staff to immediately arrange for optimal distance learning programs. Each school certainly has its policies, but the use of STEAM-loaded learning can be a good step effective in distance learning, especially in improving the creative character and independence of children aged 5-6 years. In addition, the acronym for science, technology, engineering, art, and mathematics, which is abbreviated as STEAM, makes children more capable of solving the problems they face more effectively.

PAUD teachers are expected to be able to design innovative, creative and technological STEAM learning activities, as well as attract and encourage children's curiosity to learn about the surrounding environment while maintaining active communication with parents. For parents themselves, it is hoped that they will not only accompany children in the learning process but be actively involved in providing STEAM-charged learning stimuli to children so that all aspects of child development are well stimulated.

REFERENCES

Adiwijaya, S., & Ningrum, PA (2020). *Shifting Public Consumption Patterns as the Impact of the Corona Virus Outbreak*. Journal of SOCIOLOGY, 3(2).

Arsy, I., & Syamsulrizal, S. (2021). *The Effect of STEAM (Science, Technology, Engineering, Arts, and Mathematics) Learning on Student Creativity.* Bio learning Journal, 8(1).

Goldschmidt, K. (2020). *The COVID -19 Pandemic: Technology Use to Support the Wellbeing of Children*. Journal of Pediatric Nursing.

Guyotte, KW, Sochacka, NW, Costantino, TE, Walther, J., & Kellam, NN (2014). *STEAM as social practice: Cultivating creativity in transdisciplinary spaces*. Art Education, 67(6).

Henriksen, D. (2014). *Full STEAM ahead: Creativity in excellent STEM teaching practices.* The STEAM journal, 1(2).

Henriksen, D. (2017). *Creating STEAM with design thinking: Beyond STEM and arts integration.* The STEAM Journal, 3(1).

Herro, D., & Quigley, C. (2016). *Innovating with STEAM in middle school classrooms: Remixing education*. On the Horizon, 24(3).

Kang, NH (2019). *A review of the effect of integrated STEM or STEAM (science, technology, engineering, arts, and mathematics) education in South Korea*. Asia-Pacific Science Education, 5(1).

Kelley, TR, & Knowles, JG (2016). *A conceptual framework for integrated STEM education*. International Journal of STEM Education, 3(11), 3–11.https://doi.org/10.1186/s40594-016-0046-z

Kofac. (2017). *Concept and definition of STEAM*. Seoul: The Korea Foundation for the Advancement of Science and Creativity – KOFAC.

Limbong, I., Munawar, M., & Kusumaningtyas, N. (2019, December). *Steam-Based Early Childhood Learning Planning (Science, Technology, Engineering, Art, Mathematics)*. In the 2019 PAUD National Seminar.

Margot, KC, & Kettler, T. (2019). *Teachers' perception of STEM integration and education: a systematic literature review*. International Journal of STEM Education, 2.

Ministry of Education and Culture. (2018). *STEAM Implementation Model for Early Childhood Education*. Ungaran: PP PAUD and Dikmas Central Java.

Perignat, E., & Katz-Buonincontro, J. (2019). *STEAM in practice and research: An integrative literature review*. Thinking Skills and Creativity, 31, 31–43.https://doi.org/10.1016/j.tsc.2018.10.002

Purwanto, A., Pramono, R., Asbari, M., Priyono Budi Santoso, LMW,

Hyun, CC, & Putri, RS (2020). *Exploratory Study on the Impact of the COVID-19 Pandemic Against the Online Learning Process in Elementary Schools*. Journal Education Psychology and Counseling, 2 (1).

Sugiyono. (2018). *Quantitative Research Methods*. Bandung: Alphabeta.

Thuneberg, HM, Salmi, HS, & Bogner, FX (2018). *How creativity, autonomy and visual reasoning contribute to cognitive learning in a STEAM hands-on inquiry-based math module.* Thinking Skills and Creativity.https://doi.org/10.1016/j.tsc.2018.07.003

Wahyuningsih, S., Pudyaningtyas, AR, Hafidah, R., Syamsuddin, MM, Nurjanah, NE, & Rasmani, UEE (2019). *Effects of the STEAM Method on the Creativity of Children aged 5-6 Years*. Journal of Obsession: Journal of Early Childhood Education, 4(1).

Wilder-Smith, A., & Freedman, DO (2020). *Isolation, quarantine, social distancing and community containment: a pivotal role for old-style public health measures in the novel coronavirus (2019-nCoV) outbreak.* Journal of Travel Medicine.

Yakman, G., & Lee, H. (2012). *Exploring the exemplary STEAM education in the US as a practical educational framework for Korea.* Journal of the Korean Association for Science Education, 32(6).

This page intentionally left blank