Effect of ARCS Model on Learning Independence of 21st Elementary School

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Abstract. This research aims to know the effect of using Attention, Relevance, Confidence and Satisfaction (ARCS) model on the learning independence of 21st century elementary school. The research method used was a quasi experiment with control pretest-post test design. The research population is from elementary school district Minggir, Sleman Yogyakarta of the academic year 2017/2018. The research grade V, samples as many as 82 students in three schools. The samples were taken with simple random sampling technique. Technic of data collection using questionnaire and data analysis techniques. Independent Sample t-Test. The results showed: (1) act more effective model ARCS used in conventional model are compared to; and (2) there is an interaction between ARCS model to the learning independence character of 21st century with had significant 0.000 less than α (0.05).

Keywords: Model ARCS, learning independence

1. Introduction

In the 21st century, education is increasingly important to ensure students have learning and innovation skills, skills in using technology and information media, and can work and survive by using life skills. Therefore, the government prepares the young generation to face challenges in the 21st century through early Indonesian education. It is seen from the goals of national education itself were written in Indonesian Republic Law Number 20 Year 2003 Chapter II Article 3 state that National education aimed at developing and building character as well as dignified civilization in order to educate life of nation, developing student' potentials for being godly and faithful humans, having lofty moral, healthy, knowledgeable, creative, autonomous, and being democratic and responsible citizen [1]. The government not only strives for students who are knowledgeable and have skills but also make students with character. One of the characters that students must possess is learning independence. Learning independence was suitable for all ages. In other words, learning independence is suitable for levels of schooling elementary school in order to improve students' achievements and skill. Therefore, learning independence of students must be trained early.

One way for students to have learning independence can be through learning obtained by students from school. Learning inside and outside the classroom must be able to foster and improve student competencies so they have the ability to obtain, manage and utilizing information that encourage students to have high learning independence to be able to deal with the ever-changing, evolving and competitive life conditions. According Mudjiman said that learning independence could be defined...
as an active learning process, encouraged by attention, motivate to master certain competence for sake of dealing with problems and built by using basis of knowledge or the owned competences [2]. Learning process also leads more to be reality of life so that students can overcome problems that occur in themselves and the surrounding community.

Related to the learning in the school, the use of model would influence students’ learning independence. Therefore, the teacher must be more creative in the learning process especially to foster student learning independence. However, based on observations made in several elementary schools, the thematic learning process in class is more often textual which leads to memorization and group work so that some students expect other group members to work on the task. Students learning independence in learning process was still low which was proven by the fact that there were still students who was overdue to submit and even had not submitted their assignments.

Challenges in learning in the 21st century and changes in the 2013 curriculum require the pedagogical ability of teachers as instructors to be better able to design learning to be more interesting and meaningful, learning activities must be expanded through the boundaries of the classroom so that the independence of students grows and develops. The Attention, Relevance, Confidence and Satisfaction (ARCS) model is a learning model that can be carried out by the teacher in creating student independence. The ARCS model is an acronym of attention, relevance, confidence and satisfaction. This learning model prioritized learning that is designed to attract students’ attention by adapting learning material to student learning experiences so as to create self-confidence and students’ satisfaction. By applying this learning model can provide clues about what students should do because the learning model is strengthened by the design of student-centered form of learning. Four categories of motivational conditions must be considered by students to produce interesting and meaningful learning for students. The ARCS model is also in the form of problems solving that can motivate students to solve the problems and find solution independently. Therefore, the study intends to examine that differences in the effect of ARCS learning models on the learning independence of elementary school students in the 21st century.

The rest of this paper is organized as follow: Section 2 describes the proposed research method. Section 3 presented the obtained results and following by discussion. Finally Section 4 concludes this work.

2. Research Method

This is a quasi-experimental study with a quantitative approach to determine the effect of learning model in the control group and the experimental group. The study design used is non-equivalent (pretest and post-test) comparison-group design that uses two groups as research units, namely the experimental group and class comparison (control) [3]. To avoid the results of research that is merely a coincidence, in the experimental group there are two classes of experimental and control groups, there is one class of control (see Table 1).

| Group       | Pretest | Treatment | Posttest |
|-------------|---------|-----------|----------|
| Experiment 1| $O_1$   | $X_t$     | $O_2$    |
| Experiment 2| $O_3$   | $X_t$     | $O_4$    |
| Control     | $O_5$   | $X_c$     | $O_6$    |

Information:
EC1 : The first experiment class
EC2 : The second experiment class
CC : Control Class
O1 : The first experimental class pretest
O2 : The first experimental class posttest
O3 : The Second experimental class pretest
O4 : The second experimental class posttest
O5 : The Control class pretest
The population in this study involves the students throughout the district elementary class of Minggir area amounting to 24 elementary schools. The sample is partially subject or the representative of the population studied. Sampling this study using simple random sampling technique which is taking sample members randomly from the population so that each population has an equal chance to be a sample. The samples in this study are the fifth grade of Krenjon elementary school as the first experimental group, the fifth grade of Ngrasik elementary school as the second experimental group and the fifth grade of Kriya elementary school as a control group. The material in this research are the

This research data collection technique used a questionnaire. Questionnaire is a number question that is written used to obtain information from respondents in terms of personal or reports about the things he knew. The data collection technique used in this questionnaire was analyzed using a Likert scale. In this study, a questionnaire was designed to obtain character data learning independence of students before and after being taught through the ARCS model of learning.

Assessment instruments used for collection of data on students learning independence, must have a valid and reliable criterion in order to get the preferred results. To test the validity and reliability of the questionnaire for learning independence of students, researchers use the contents of the validation point statement using expert judges were analyzed by Gregory formula. After that, tested empirically instrument (field trial) using correlation analysis and then test reliability (internal consistency test) using Cronbach Alpha technique with a significance level of 5%. Indicators to measure learning independence were used on the group that wanted to learn something new, seen nor felt, felt challenged to solve a problem that is encountered, reading continuously to understand the material, cognitive aspects Integrating the existing reality. Reliability test values obtained Alfa > r at significance level of 5% i.e. \(0.700 > 0.304\). So Questionnaire learning independence construction and point statement has a valid and reliable to measure the learning independence of students.

Before the data analysis through hypothesis test to determine whether or not the influence after a given treatment, researchers to test the prerequisite that data normality test to determine whether a population where taking data learning independence of students with normal distribution and homogeneity to determines whether the obtained data is derived from a sample the same before and after being treated.

Test for normality using the Kolmogorov-Smirnov test with SPSS 20. If Sig > 0.05 means that the data came from a normal distributed population. Statistic Levene homogeneity test was done using SPSS 20.0. Acceptable if the significance is greater than 0.05 means that the same variant data variable (homogeny).

Hypothesis test study conducted by researchers is using Independent Sample \(t\)-Test. This is done because researchers wanted to compare the experimental class control class which is an independent sample. Hypothesis alternative was accepted if its significance is less than 0.05 means that there is a difference of influence between the groups being compared. Then will use gain score to see increasing students’ learning independence for each group research.

2.1 ARCS Model

This model raised by John M. Keller is often known by the ARCS Model of Keller. The ARCS learning model is used to stimulate students' motivation that is required to have a high learning independence. This ARCS learning model can also influence the way students perceive values and raise hopes for success. It was revealed Laura& Cheryl that based on this theory the ARCS model asserts that careful instructional design can influence and improve student perceptions of value and expectancy for success [4]. The effect of learning using the ARCS model also has an impact on the longer term and the application of the ARCS learning model is also more flexible. That was explained
Visser, et al. that the ARCS model, may be considered to touch on longer lasting effects, as the outcomes relate to changes the learner has brought about him or herself internally [5]. The fourth component of the learning model ARCS namely:

2.1.1 Attention
Attention is something that is desperately needed by a learner. Paying attention will encourage students to do something with the maximum concentration. Attention becomes important in the learning process. Keller explained that the concern stimulate interest and encourage the curiosity of learners [6]. With the attention of the child had so the interest and curiosity of children can grow and increase. Abidin argues that attention is a form of guidance for consultation/centralization of power and psychic energy in the face of an object, in this case the events of the process of teaching, learning in the classroom [7]. Therefore, learning must be designed to foster curiosity of learners so that educators are encouraged how the lesson plan that can stimulate and attract the interest of learners in order from beginning to the end. The plan should bring new things, different from the others and thus foster care challenge that appeals to learners during the learning that goes on. Soetarno says attract the attention or interest of the learner to learn is a task that must be created in learning [8].

2.1.2 Relevance
A learning material should be arranged or designed according to the needs or interests of the students and not on the interests of education. Their relevance to meet the needs/ personal goals thereby affecting learner’s positive attitudes [6]. Lessons learned should be useful to the person. What they learn should meet individual needs and benefits and in accordance with the values that are believed or held. In line with the opinion Means, et al. said clearly enhance relevance meaningfulness and academic performance [9].

Learning should be designed on how the learning experience will be valuable for students. Lessons have activities to discover the relationship between each of the lessons learned to real life in accordance with the needs of learners. Keller, John M explained that state personal needs (basic needs) are grouped into three categories, namely:

a. Values personal motives include the need to succeed. The need for power, and the need to make friends.

b. Values instrumental motive, means that success in the task taken as an indication or step to achieve success in achieving the next success.

c. Value cultural motive, means that the objectives of the common values that correspond to and held by the reference group of students [10].

Relevance implementation Strategies are:

a. Explaining the purpose of learning and taking appropriate action in achieving the learning objectives.

b. Extract meaning from learned material.

c. Explains the values that can be taken from the material being studied to be applied in everyday life.

2.1.3 Confidence
Positively interact with the environment requires self-confidence so that they can convey their knowledge to others and can be beneficial to the whole society. Hueet, et al. in [11] said that confidence is the interplay between desire for success and fear of failure. This will encourage learners to make their best efforts to do anything. Confidence will also help learners believe or feel that they will be successful and in control of their success [6]. Therefore, effective learning should be able to relieve anxiety and inability to self-learners to believe that he is capable and able to succeed in learning something. Improving students' confidence, for example by saying words of praise and encouragement even if they make the wrong answer and encourage the student weaknesses as an improvement by motivating them to find correct solutions through many trials, if necessary. Then give
constructive feedback during the learning process, so that students understand their subjects and improve on their weaknesses.

2.1.4 Satisfaction

Satisfaction is a feeling we manage to achieve through learning objectives in the form of academic performance. Student satisfaction is feeling happy, positive feelings that can arise when people gain an appreciation of him [7]. Having a sense of satisfaction that will encourage someone to do something more advanced and challenged. Derbali, et al. in [12] explained that satisfaction aimed to provide feedback on performance and to allow learners to know how they are able to perform well and apply what is learned in real life situation. McConnell, et al. in [13] define satisfaction is achieved when students connect the achievement of learning goals with their individual effort and satisfaction is also achieved when students are stimulated to maintain or increase efforts because of feelings of challenge or accomplishment.

The success in achieving a goal will result in fulfillment of the basic human need for attaining a desired lifestyle. In the learning process the teacher awards the symbol of success, which can serve as a reminder of the successes ever achieved such as stickers, certificates, etc. Then the teacher can give words of gratitude or sing together when students can manage to complete the given work and do well their tasks. it will feel their hard work is appreciated. The fourth component of the ARCS Keller summarized in Table 2.

| Category      | Definition                                                                 | Basic Tactics                                                                 |
|---------------|----------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Attention     | Capturing the learner’s interest; stimulating curiosity to learn           | o Perceptual arousal: capturing learner interest                               |
|               |                                                                             | o Inquiry arousal: stimulating an attitude of inquiry                         |
|               |                                                                             | o Variability: maintaining learner attention over time                         |
| Relevance     | Meeting the learner’s needs and goals, effecting a positive outcome         | o Goal orientation: meeting learner’s needs                                   |
|               |                                                                             | o Motive matching: providing learners with appropriate choices, responsibilities, and influences |
|               |                                                                             | o Familiarity: trying instruction to learner’s Meeting the learner’s needs and goals, effecting a positive outcome |
|               |                                                                             | o Confidence experiences                                                      |
| Confidence    | Helping the learner build the belief that s/he will succeed, and giving the learner control over his/her success | o Learning requirements: building a positive expectation for success             |
|               |                                                                             | o Success opportunities: enhancing learners’ beliefs in their competence        |
|               |                                                                             | o Personal control: illustrating that learner success is based on their efforts and abilities |
| Satisfaction   | Reinforcing the learner’s accomplishments with internal/external rewards    | o Natural consequences: providing meaningful opportunities for learners to use their newly acquired knowledge |
|               |                                                                             | o Positive consequences: providing reinforcement to learners’ success          |

2.2 Independence Learning

Independence is one of the potential that is very influential in success in humans. The terms of independence that are often used include independence, autonomy and self regulation. According to Big Indonesian Dictionary that independence is the state can stand alone, not dependent on others [15]. Little explained autonomy is a capacity for detachment, critical reflection, decision-making, and independent action [16]. Scharle and Szabo define autonomy as the freedom and ability to manage one’s own affairs, which entails the right to make decisions as well [17].

Sentsov & Phillips in [18] define learning independence is: “Most definitions could be divided into the following main groups: 1) Contexts and situations in which learners study on their own; 2) A
set of skills, capacities, strategies needed for self-directed learning; 3) Learners’ responsibility for their own learning; 4) The right or intrinsic motivation of learners for freedom and decision-making in their own learning [18]. Boyadzhieva define learner autonomy is the ability of a person to be responsible for the learning process, so that learner is free to plan and monitor their learning by choosing what, when and how their learning are appropriate to his needs, interests and abilities [19]. Williams said that students who have the independence of learning as independent children [20]. Independent children are either seen as being able to organize themselves and to seek help as necessary, or to work in isolation without recourse to others. It can be concludeed that learning independence is a person’s ability to organize learning and complete their own tasks based on self-motivation and self-confidence without the help of the teacher.

The characteristics of student independence according Cristina namely an autonomous student is a student who is not afraid to express his/her point of view, who argues logically and consistently, engages with passion in new situations arising in school, have initiative, have confidence in his/her own abilities and takes responsibility for his/her actions. He/she is not influenced by the value judgments of others, nor denies the rules governing the order in school and in class [21]. Cristina’s opinion is in line with Murphy which states that one of the characteristics of learning independence is having the motivation shown in the following behaviors: 1) studies to a good grade, 2) remembers most important things when studies, 3) studies to increase job opportunities, 4) works as hard as possible when studies, 5) keeps studying even if material is difficult, 6) studies to ensure financial security, 7) does best to learn what studies, 8) puts forth best effort when studying. Learning independence also related with problem solving skill [22]. Zsoldos-Marchis also examined the independence of learning and problem solving skills and their relationship at 10 to 11 years old. The students’ independence study consistd of three phases, including, forethought phase, performance control phase, and self-reflection phase [23]. Forethought phase includes task analysis, motivational activities to solve problems and goal formulation, strong student motivation if the student’s belief the usefulness of the lesson in the future is also strong. Performance control phase are self-control and self-monitoring of cognitive and behavioral strategies. Help seeking is an important aspect of this phase when students cannot solve problems. Self-reaction phase includes self-evaluation related to achieving results. The results of the study show a possitive attitude towards the lesson is influenced by the possitive experience of students in solving problems and students’ beliefs about the usefulness of the lesson in the future. Students look for the same example, do not give up when facing the problem, keep trying to do the task and ask for help if in the end do not get a solution, and finally a learner must know the learning resources that are related to the learning problems. Based on several characteristics of learning independence, there are several indicators can be formulated in this study to measure learning independence, there are:

a. Learning self-control. Students are able to control themselves by not relying on others.
b. Responsible for learning. Students do all the task given by the teacher. Do assignments according to the learning schedule and complete the task on time.
c. Initiative. This can be seen by arranging the schedule of learning activities and arguing according to their own thinking.
d. Finding Effective ways of learning students understand their ability to achieve their goals so that student behavior is realized by not lazing when learning, planning and having their own learning activities.

Increasing the independence of student learning at school is inseparable from the role of the teacher. William reveals that teachers need to pay attention to several things to develop student learning independence that is to provide opportunities for students to choose and use various learning resources, giving real responsibility to students, children taking message, give clear objectives to students and allow students to determine when to continue learning, assess student achievement through independence activities, give creative approaches to solve problems, give inter-students support, give models and frameworks to support investigative activities, not only provide answers, allow students to try new things and make mistakes, give useful tasks for student independence,
helping students to develop planning activities to manage time, using clear questions and explanations so students can use similar techniques, giving time to express opinions and attention, introducing strategies to manage work that has been completed and that have not been completed, have a fair policy towards behavior that can increase students responsibility, provide opportunities for students to be involved in planning and assessing learning and helping students to understand that there will be a time when the teacher is not with students [21]. Therefore, the role of the teacher is very important in creating student learning independence. Syah in [24] state that the factors that influence learning independence, there are:

a. Internal factors (factors from within students) are physical and spiritual conditions of students, for example students who have high learning motivation will increase their independence ability in learning a subject.

b. External factors (factors outside the control of students) are environmental conditions around students such as the education system, school learning and interactions with friends around them. The learning experienced by participants will influence the way or type of learning efforts of students in conducting learning activities according to materials of subject [24].

Based on learning independence factors presented by the experts it can be concluded that the factors that influence the process of development or growth of children’s independence are the learning process of schools related to the support and guidance of teachers in learning, the education system implemented in schools and the surrounding environment and association with peers.

3. Results and discussion

The results of this study prove that there are differences in the effect of Learning independence of learners who follow learning using the ARCS in the first and second experimental group with which to follow conventional teaching fifth grade elementary Minggir district, Indonesia. In the ARCS model of learning, learners are more involved than the conventional teaching models especially to cultivate the Learning independence of learners.

Comparisons were performed on average to see a higher average and lower in each study group. For pretest and posttest scores in each treatment group was calculated using the average normalized gain analysis. Results of the calculations are presented in the following Table 3.

| Information | Group | pretest | posttest | gain |
|-------------|-------|---------|----------|------|
| mean        | EC1   | 63.26   | 75.71    | 0.43 |
|             | EC2   | 64.32   | 76.06    | 0.42 |
|             | CC    | 67.70   | 69.55    | 0.08 |

Descriptive analysis learning independence show that in the first experiment class posttest had an average of 75.71 and the second experiment class had an average of 76.06. The control class have on average lower than in the first experiment experimental class and the second class of 69.55. Based on the analysis of the gain is normalized scores can be seen an average increase of learning independence at first experimental group of 0.43 and the second at 0.42 experimental class has an average of greater improvement than the control class 0.08. Comparison of the average increase in curious learner’s pretest and posttest can be seen in the following Figure 1.
The diagram above proves that the control class included in the low category and the first and second experimental group included in the medium category. The Figure 1 also showed a greater increase occurring in the first experimental class and the second experimental class compared to that occurred in the control class. Therefore, the use of ARCS Model in learning is very good to apply.

The results of this study prove that the first hypothesis which states that there are differences in the influence of learning in the influence of learning independence of students who take learning using ARCS in the first and second experimental groups with those who follow conventional learning in grade 5th SD Minggir District. In ARCS learning models students are more trained to develop student learning independence than conventional learning models. Learning independence affects the effort and achievement that students will get. Learning independence that requires students to be able to organize learning and complete their own tasks based on their own encouragement and confidence without the help of others. This is in line with opinions Scharle and Szabo define autonomy as the freedom and ability to manage one’s own affairs, which entails the right to make decisions as well [17]. Independence a freedom and the ability to manage one’s own affairs, also have things to make decisions. For this reason, confidence in the taking of activities and actions taken is very important, which affects the business done by themselves and will develop learning independence. Students must have hope for success in each task carried out so that they are encouraged to complete it [25].

On the ARCS learning model that is designed by explaining the overall purpose of the learning structure, notify many items to be tested and time in the assignment that encourages students to find ways to learn and manage learning time according to themselves. Designed learning also involves verbal praise, appreciation, displaying their work to appreciate success and understanding every mistake made is a learning opportunity. In the end, students have satisfaction in learning achievement that has been implemented. In learning process the teacher provides a symbol of success that can act as reminder of the successes that have been achieved such as stickers, charters and others. Then the teacher can clap when the student succeeds in carrying out the task given by the teacher so that the student will feel that the teacher appreciates the results of his hard work [13]. This encourages the improvement of students’ learning independence.

4. Conclusion

The usage of ARCS model study to enable learners have an interest to learn the subject matter, have a learning experience in accordance with the experience of everyday life, give each other ideas or opinions in their mutual learning process. Learners must strive to raise the learning independence to become learners who can learn, create and find something useful for life with a learning experience that is owned him/herself. An educator is expected to not just focus on one learning model just because of the subject matter and the other one definitely has different characteristics, so that the necessary innovation and variation in teaching so that students are not saturated and able to understand the material presented well and one model of learning that can be applied to the model of learning this
ARCS. With this research can also be used as a basis to conduct further research into and with more samples.

References

[1] Departemen Pendidikan Nasional. *Peraturan Menteri Pendidikan Nasional*. Jakarta: Pusat Kurikulum, 2004.

[2] Haris Mudjiman. *BelajarMandiri*. Surakarta: UNS Pres, 2009.

[3] Creswell, John M. *Riset pendidikan: perencanaan pelaksanaan, dan evaluasi riset kualitatif & kuantitatif*. Yogyakarta: Pustaka Pelajar, 2015.

[4] Laura, E., & Cheryl, A. *Motivating the reluctant, novice learner: principles of macroeconomics*. *Journal of Economics Educational Research*, Vol 7, Number 2 page 29, 2006.

[5] Visser, Jan & Keller, John M. *The clinical use of motivational messages: An inquiry into the validity of the ARCS model of motivational design*. *Instructional Science*, 19(6), 467-500.

[6] Keller, J. M. *Motivational design for learning and performance*. New York: Springer.

[7] Abidin, Z. *Motivasi dalam strategi pembelajaran dengan pendekatan “ARCS”. Jurnal SUHUF*, XVIII, 143–155. 2006.

[8] Soetarno, Joyoatmojo. *Pembelajaran efektif: Pembelajaran yang membelajarkan*. Surakarta: UNS Press, 2011.

[9] Means, T., Jonassen, D., & Dwyer, F. *Enhancing Relevance: Embedded ARCS Strategies vs. Purpose*. *Educational Technology Research and Development*, 45(1), 5-17.

[10] Keller, J David, and Francis said oln M. *How to integrated learner motivation planning into lessonplanning: the arcs model approach*. Dalam: VII Semanario Santiago. Cuba, february 2000. Hlm 1-13.

[11] Hueet, B.J, Jon Y, Kimberly, L.M, Marty, B. *Supporting the distant student the effect of arcs-based strategies on confidence and performance*. *The Quarterly Review of Distance Education*, 9(2), 113–126.

[12] Derbali, Lotfi and Claude Frasson. *Assessment of Learners’ Motivation during Interactions with Serious Games: A Study of Some Motivational Strategies in Food-Force*. *Corporation Advances in Human-Computer Interaction*. Volume 20. article ID 624538, 15 pages Hindawi Publishing Corporation

[13] Mcconnell, Cheryl, Gail Hoover & Craig Sasse. Using the ARCS model to design motivating curriculum. *Proceedings of the Academy of Educational Leadership, Volume 6, Number 1 Nashville*, 2001

[14] Marshall, J., Diego, S., Wilson, M., & Diego, S. *Motivating e - Learners: Application of the ARCS Model to e - Learning for San Diego Zoo Global ’ s Animal Care Professionals*, 3(2), 21–30, 2012.

[15] Departemen Pendidikan Nasional. *Kamus Besar Bahasa Indonesia*, 4th edition. Jakarta: PT. Gramedia Pustaka Utama, 2008.

[16] Scharle, A., & Szabo, A.Learner Autonomy: A Guide to Developing Learner Responsibility. Cambridge: Cambridge University Press, 2005.

[17] Sentsov, A. E., & Phillips, C. *Promoting international students’ autonomy: the experience of tomsk polytechnic university*. *Procedia - Social and Behavioral Sciences*, 215 (June), 53–59.

[18] Williams, J. *Promoting independent learning in the primary classroom*. Philadelphia: Open University Press, 2003.

[19] Cristena, T. *International conference education and psychology challenges - teachers the teacher ‘ s role in building the student ‘ s range of autonomy*, 20, 22–27.

[20] Zsoldos-Marchis, I. 10-11 year old pupils’ self regulated learning and problem solving skills. *Review of Science Mathematics & ICT Education*, 8 (1), 33-42, 2014.

[21] Murphy, P.F. *Relationship of parenting practices, independent learning, achievement, and family structure* (Order No. DP18994). Available from ProQuest Dissertation & Thesis Full Text: The Humanities and Social Sciences Collection (1020385577). 2009.

[22] Muhibbin, Syah. *Psikologi pendidikan suatu pendekatan baru. Bandung*: PT. Remaja Rosdakarya, 2015.

[23] Worry, Valerie Ann. *A comparison of high school geometry student performance and motivation between traditional and project-based instruction techniques*. Dissertation Walden University, 2011.