Impact of Self-Regulated Learning, Autonomy and Agency on Undergraduates' Achievement in Research Method Exposed to Online Learning

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Abstract

The study investigated the impact of self-regulated learning, autonomy and agency on university undergraduates' achievement in research exposed to online learning. Online teaching and learning particularly in its asynchronous form, required students to embrace a variety of learning styles and skills, including self-regulation and autonomy. The study participants consisted of 256 undergraduate students taught research methods through online platform. Three instruments titled: Students' Self-Regulated Learning Questionnaire (SSLQ), Learners' Autonomy Questionnaire (LAQ) and Students' Agency Questionnaire (SAQ) were developed by the researchers and used to collect data

for the study. Our result revealed a high positive relationship (r = 0.862) between students' self-regulated learning, learners' autonomy and students' agency on undergraduates' achievement in research method. In addition, the coefficient of determination (R^2) of 0.744 implies that 74.4% of undergraduates' achievement in research is due to the combine impact of their self-regulated learning, learners' autonomy and agency. The result of the hypotheses further revealed that the combine impact of self-regulated learning, autonomy and agency on students' achievement in research exposed to online learning is significant. Students should be taught how to develop self-regulated learning strategies, autonomy and agency and the constructs should be included in the designing and implementation of online instructions in higher institutions of learning.

Keywords: self-regulated learning, learners' autonomy, students' agency, asynchronous and synchronous online learning & research method

Introduction

The outbreak of COVID-19 in Wuhan China by the end of 2019 took the world by surprise. The disease spread so fast that by the first quarter of 2020, the WHO declared it a major pandemic. By this period, many citizens of different countries have contracted the disease. Hospitals were filled and health care services world over were becoming overstretched. To curb the spread of the disease, the WHO (2020) made some recommendations to be followed by people. Among the WHOs' recommendations, maintenance of physical and social distancing was highly emphasized. By implication, large gatherings in places such as churches, night clubs, parties, sporting events and schools are to be avoided. This led to the closing down of these places as non-medical measures aimed at curbing the spread of the disease. However, it was very important that learners continued schooling because of the social nature of education and its importance to national development. Accordingly, the WHO and other sister agencies advice that teaching and learning may be switched from the traditional face-to-face method to online learning.

As a result, the Nigerian government urged all schools in the country to shift their teaching and learning activities to online learning as soon as possible. When the COVID-19 outbreak hit, this was the greatest option because immunizations were in short supply to stop the disease from spreading (Mahyoob, 2020). Online learning is the use of technology to improve teaching and learning activities with the goal of boosting educational accessibility, cost, and productivity (Doculan, 2016). Oguguo, et al., (2021) defined e-learning as the process of using technology to electronically provide education and training applications, observe learners` performances and provide feedback on learners` progress. eLearning NC (2020) also defined e-learning as any form of learning involving electronic technologies to gain access to educational curriculum outside the traditional or conventional classroom. Online learning, according to Waryanto (2014), is the electronic transmission of learning content or a learning experience using a multimedia computer. The goal of online teaching and learning was to eliminate any social contacts between students and teachers in a physical environment.

Higher education institutions in Nigeria have used asynchronous and synchronous online learning to teach and learn a variety of course topics. Asynchronous online courses, according to Doan (2020), do not take place in real time. Students are more self-directed in an asynchronous learning platform, completing course material and assignments within a set time frame. Teachers and students communicate using a variety of mediums, including discussion boards, blogs, and email. The asynchronous online learning method does not have a predetermined class time. For students with time constraints or hectic schedules, this is a useful and adaptable method. Instructors frequently release course materials that students are required to download and read at their own pace and schedule in this type of learning. Synchronous online courses, on the other hand, require the instructor and student to engage online at the same time. In a virtual classroom, students receive instruction from their teacher and engage with their teacher and classmates via texts, voice chats, and video chats, just as

they would in a traditional classroom. This allows students to participate in a course in real time from their homes.

Literature Review

Online teaching and learning were implemented by a large number of universities throughout the world, according to UNESCO (2020a), who stated that roughly 429 universities around the world were closed, resulting in the usage of online classrooms and e-learning. Most Nigerian universities were also involved in the transition to online teaching by distributing all of their course content, particularly those courses like research methods that are offered to all undergraduate final year students in education faculties. Online teaching and learning particularly in its asynchronous form, required students to embrace a variety of learning styles and skills, including self-regulation and autonomy. Because of the problems connected with new learning, some students have found ways to adapt and cope with these changes in order to maximize the benefits of the new learning paradigm, while others have struggled with the paradigm shift and have failed to profit (Zhang, 2013). This may have an effect on students' achievement in the subject area.

Students' achievement is a major concern to researchers, educationists, examinations bodies and other critical stakeholders all over the world. The reason is that achievement is an important measure of how well the students and school are faring. Academic achievement, according to Nwagbo (2013), refers to students' school learning outcomes. It's also used to assess a student's knowledge following a time of learning, usually in the form of scores, grades, or a final result (Bitrus, 2014). It depicts the performance results that demonstrate the degree to which an individual has achieved specific goals that were the emphasis of instruction, according to Steinmayr, et al., (2015), particularly in educational settings. Academic achievement, according to these definitions, refers to a person's scores, grades, and learning outcomes after a time of instruction on a certain subject's material. Therefore, academic achievement in the present study may refer to scores, grades, and other learning outcomes

acquired by student through exposure to research method. Research method is a faculty wide course offered by all students in the faculty of education. The course is a three-credit unit course which means that it contributes greatly to the great point average of the students. However, based on observation from the researchers who are teachers of the course and available statistics on students' achievement in the course, many students do not perform well in the course. This is a worrying situation and imply that factors responsible for the poor level of achievement in the course should be investigated through empirical research. This factor may be students' related factors relating to their learning approaches such as self-regulated learning, learning autonomy and agency.

Self-regulated learning (SRL) is defined as self-generated thoughts, feelings, and actions in order to attain educational goals that include such processes as planning and managing time; attending to and concentrating on instruction; organizing, rehearsing, and coding information; establishing a productive work environment; and using social resources effectively (McInerney, 2008). It can also be characterized as the extent to which students are active participants in their own learning in terms of metacognition, motivation, and conduct (Maram et al., 2020). Self-regulated learning is defined as the ability to effectively control one's own learning in order to achieve personal objectives (Nietfeld et al., 2014). Self-regulated students can keep track of their progress and employ effective learning tactics. This is in contrast to learners who are unable to employ suitable tactics to improve their performance because they are not self-regulated. Learners who are self-regulated may be able to do better in asynchronous environments than those who are not. According to Hart et al., (2019), if a physically present teacher is not present to focus their attention to the subject content, students who are not incompetent in self-directed learning may suffer performance reductions. Learners must build new learning habits, negotiate alternative meanings and relationships, and accomplish academic work utilizing computers as a medium when learning online.

Students can be involved and self-regulate their learning in online learning environments because the structures are adaptable. In such circumstances,

students' ability and willingness to manage their resources, time, and available tools to achieve goals are critical to their learning results (Newman et al., 2014). According to Febriani et al., (2020), online learning benefits pupils by increasing their creativity and freedom. Zhang (2013) found that learners who use strong self-regulation skills and are motivated to learn and adapt gain more from online learning, but those who do not use such tactics and are motivated are more likely to be frustrated. Another study by Maram et al., (2020) claims that there is a strong link between the variables of self-efficacy and self-regulation, cognitive methods, and students' exam performance. Furthermore, Khaled et al., (2019) found a substantial and favorable association between self-regulated learning and student academic progress in their research. In terms of self-regulation in online learning, studies such as (Samruayruen et al., 2013; Tsai, 2010) have found that many students have difficulties, and that students in online environments are less successful than students in other situations. Based on the premise, it is required to investigate this claim by looking into the impact of self-regulated learning on student achievement in research methodologies that include online learning.

Learner autonomy is another student characteristic that may influence students' achievement when using online learning. Learners' autonomy, according to Dundon (2012), is described as the ability to manage their own learning by choosing what goals they can reach and how they can achieve them, as well as their past achievements and mistakes. Dundon continued, "Learner autonomy might be thought of as an inborn capacity that learners possess." Individuals who regulate their own learning are said to be autonomous learners (Yvan, 2012). This means that learning begins with the person; in this case, students direct their own learning rather than the teacher. Students plan what they will learn and how they will study it in order to meet a set of objectives. When it comes to student learning and knowledge acquisition, autonomous learning is more effective than non-autonomous learning. It means that pupils should be permitted to work at their own pace because time constraints might lead to anxiety (Mark et al., 2012). In essence, autonomous learning means

allowing students to develop, control data, apply techniques or skills, make decisions, study at their own speed, explore, and demonstrate their abilities independently. Learners who use online learning, for example, must establish some autonomy in order to tailor their classes to fit their learning speed. As a result, students can be classified according to their level of autonomy in using online learning, which may have an impact on their academic performance. Learner autonomy has been shown to boost students' academic performance in studies (Iji & Anyor, 2014). There was a significant difference in the mean achievement scores of students in the experimental group, according to a study by Iji and Anyor on the effect of learners' autonomy on undergraduate students' achievement in system of linear equations. This suggests that pupils who used autonomous learning techniques performed better than their peers who did not. Beshel et al., (2019) found a substantial difference in performance between students who were taught using the autonomous learning approach and those who were taught using the expository method in a similar study.

The concept of agency is closely linked to the autonomy of learners. Student agency, according to Arnold and Clarke (2014), is defined as students' ability to act purposefully toward individual goals, disrupt the established pattern of classroom interactions, and actively evaluate learning practice in the context. Student agency is something that students produce on their own or in collaboration with others, materials, and ideas in a specific socio-structural and relational context of action (Biesta, 2008). Agency, according to Biesta, is a trait of self-reflective and intentional action and connection, not a possession. Bandura (2006a) describes students as self-organizing, proactive, self-regulating, and self-reflective, with these characteristics shaping their agency to varying degrees. Students gain agency when they consciously act and interact with someone or something, and this includes critical reflexive self-engagement. Students must act with intention in order to be agentic. As a result, students must actively participate in online learning activities, they must download materials, engage with the teacher and other pupils, and as a result gain knowledge and become more agentic as their interaction level increases. As

a result, individuals may be able to acquire answers to their unclear difficulties and queries from the teacher and coworkers during engagement, which may have an impact on their accomplishment. The online learning environment, on the other hand, does not allow for much interaction between students and teachers, as well as amongst students. This could also have an impact on students' academic performance.

The favourable impacts of student agency on academic performance, cognitive growth, and learning experiences are generally supported by empirical data. Pym and Kapp (2013), for example, analyzed the 5-year performance of an undergraduate program at the macrolevel and attributed its success to marginalized students' greater agency. Student agency was found to be a critical predictor of learning achievement and satisfaction by Reeve and Tseng (2011) at the course level. Researchers such as (Crick et al., 2015; Rappa & Tang, 2017) suggested that increasing student agency is associated with cognitive development such as critical reflection, creative thinking, meaning building, problem-solving, and self-regulation.

Understanding the influence of students' self-regulation learning, autonomy and agency is very important so as to develop models and teaching methods that may improve these dispositions in the students. However, less is known about the instructional strategies teachers can use to develop self-regulation, autonomy and agency in students. This calls for research on the impact of these variables on students' achievement especially those exposed to online learning. Hence, the problem of the study is to determine the impact of self-regulated learning, autonomy and agency on university undergraduates' achievement in research exposed to online learning.

The purpose of the study was to determine the impact of self-regulated learning, autonomy and agency on university undergraduates' achievement in research exposed to online learning. The following research questions guided the study;

1. What is the impact of self-regulation learning on students' achievement in research exposed to online learning?

2. What is the impact of learners' autonomy on students' achievement in research exposed to online learning?
3. What is the impact of students' agency on achievement in research exposed to online learning?
4. What is the combine impact of self-regulation learning, autonomy and agency on students' achievement in research exposed to online learning?

Methods

The researchers adopted correlation research design in conducting the study. Correlational research design determines whether or not two variables change together as well as the degree of relationship that exists between the variables. This research design suits this study because it established the relationship that exists among self-regulation learning, learners' autonomy, students' agency (predictor variables) and academic achievement of undergraduate students in research method exposed to online learning (criterion variable). The study was conducted in University of Nigeria, Nsukka in the first semester of 2020/2021 academic session. The population of the study consisted of all final year students in the faculty of education. The students were taught research methods using asynchronous and synchronous online format. The participants consisted of 256 students who volunteer to participate in the study.

Three instruments titled: Students' Self-Regulated Learning Questionnaire (SSLQ), Learners' Autonomy Questionnaire (LAQ) and Students' Agency Questionnaire (SAQ) were developed by the researchers and used to collect data for the study. The SSLQ consisted of 20 items eliciting information on students' self-regulated learning strategies. It covered the following areas of self-regulation learning: goal setting strategies (4 statements), strategic planning (4), self-evaluation (3 items), task strategies (3 items), elaboration (3 items), and help seeking (3 items). The LAQ had 20 items divided into four components of learners' autonomy; desire, resourcefulness, initiative, and persistence with five items each. The SAQ also had 20 items covering areas of students' action while learning

(7 items), students' engagement (7 items) and self-reflection (6 items). The instruments were rated on a modified four points Likert style questionnaire with response options ranging from strongly disagree to strongly agree coded 1 to 4. The instruments were faced validated by three experts. The instruments were trial tested on a sample of 20 students from a different university. The reliability estimates for the instruments were established using Cronbach Alpha method and the reliability coefficients obtained were 0.88, 0.74 and 0.79 respectively for the SSLQ, LAQ and SAQ. Information on students' achievement in research method was gotten from student's examination scores in the faculty. This was done with permission from the faculty ethics and research committee board.

The instruments were administered to all 256 participants who volunteered to participate in the study. All the instruments were retrieved, and coded for analysis using SPSS version 24. Data generated were analyzed using simple regression analysis. The Pearson's product moment coefficient (R) and the coefficient of determination (R^2) were used to answer the research questions while the regression ANOVA was used to test the null hypotheses at 0.05 level of significance.

Results

Result in Table 1 shows that the correlation coefficient (R) of 0.659 and a coefficient of determination (R^2) of 0.435 were obtained. The correlation coefficient (R) of 0.659 means that there is a high positive relationship between the variables. In other words, there is a high positive relationship (r = 0.658) between students' self-regulation learning and undergraduates' achievement in research. Furthermore, the coefficient of determination (R^2) of 0.435 implies that 43.5% of undergraduates' achievement in research is due to the impact of their self-regulated learning strategies.

Table 1. Impact of Self-regulated Learning on Students' Achievement in Research Method

Model	R	R^2	Adjusted R^2	Std. Error	Change Statistics R^2 Change
1	.659[a]	.435	.433	4.759	.435

a. Predictors: (Constant), sumSRL

The result in Table 2 showed that students' self-regulated learning significantly impact on undergraduates' achievement in research methods $F(1, 255) = 195.44$, $p < .05$, thus the hypothesis was rejected. This is because the associated probability (P) value of 0.00 is less than 0.05 level of significance. Thus, inference drawn is that the impact of self-regulation learning on undergraduates' achievement in research exposed to online learning is significant.

Table 2. Test of Significant Impact of Undergraduates' Achievement in Research Method by their Self-regulated Learning

Model		Sum of Square	Df	Mean Square	F	Sig.
1	Regression	4426.670	1	4426.670	195.439	.000[b]
	Residual	5753.080	254	22.650		
	Total	10179.750	255			

a. Dependent Variable: RAT

b. Predictors: (Constant), sumSRL

Result in Table 3 showed that the correlation coefficient (R) of 0.795 and a coefficient of determination (R^2) of 0.633 were obtained. The correlation coefficient (R) of 0.795 indicates that there is a high relationship between the variables. There is a high positive relationship ($r = 0.795$) between learners' autonomy and undergraduates' achievement in research methods. In addition, the coefficient of determination (R^2) of 0.633 implies that 63.3% of

undergraduates' achievement in research method is due to the impact of their learning autonomy.

Table 3. Impact of Learners' Autonomy on Undergraduates' Achievement in Research Method

Model	R	R^2	Adjusted R^2	Std. Error	Change Statistics R^2 Change
1	.795[a]	.633	.631	3.837	.633

a. Predictors: (Constant), sumAL

The result in Table 4 showed that learners' autonomy significantly impact on undergraduates' achievement in research method $F(1, 255) = 437.34$, $p < .05$, thus the hypothesis was rejected. This is because the associated probability (p) value of 0.000 is less than 0.05 level of significance. Inference drawn is that the impact of learners' autonomy on undergraduates' achievement in research exposed to online learning is significant.

Table 4. Test of significant Impact of' Undergraduates' Achievement in Research Method by their learning Autonomy

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6439.677	1	6439.677	437.339	.000[b]
	Residual	3740.073	254	14.725		
	Total	10179.750	255			

a. Dependent Variable: RAT

b. Predictors: (Constant), sumAL

Result in Table 5 showed that the correlation coefficient (R) of 0.834 and a coefficient of determination (R^2) of 0.696 were obtained. The correlation coefficient (R) of 0.834 indicates that there is a high relationship between the variables. This means high positive relationship (r = 0.834) between students' agency and undergraduates' achievement in research. In addition, the

coefficient of determination (R^2) of 0.696 implies that 69.6% of undergraduates' achievement in research is due to the impact of their agency.

Table 5. Impact of Students' Agency on Undergraduates' Achievement in Research Method

Model	R	R^2	Adjusted R^2	Std. Error	Change Statistics R^2 Change	
						F Change
1	.834[a]	.696	.695	3.491	.696	581.053

a. Predictors: (Constant), sumSA

The result in Table 6 showed that students' agency significantly impact on undergraduates' achievement in research method $F(1, 255) = 581.05$, $p < .05$, thus the hypothesis was rejected. This is because associated probability (p) value of 0.000 is less than 0.05 level of significance. Inference drawn is that the impact of students' agency on achievement in research exposed to online learning is significant.

Table 6. Test of Significant Impact of' Undergraduates' Achievement in Research Method by their Agency

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7083.351	1	7083.351	581.053	.000[b]
	Residual	3096.399	254	12.191		
	Total	10179.750	255			

a. Dependent Variable: RAT

b. Predictors: (Constant), sumSA

Result in Table 7 showed that the correlation coefficient (R) of 0.862 and a coefficient of determination (R^2) of 0.744 were obtained. The correlation coefficient (R) of 0.862 indicates that there is a very high relationship between the variables. This means that, there is a high positive relationship (r = 0.862) between students' self-regulated learning, learners' autonomy and students' agency on undergraduates' achievement in research. In addition, the coefficient

of determination (R^2) of 0.744 implies that 74.4% of undergraduates' achievement in research is due to the combine impact of their self-regulated learning, learners' autonomy and agency.

Table 7. Combined Impact of Students Self-regulated Learning, Learners' Autonomy and Agency on Undergraduates' Achievement in Research Method

Model	R	R^2	Adjusted R^2	Std. Error	Change Statistics R^2 Change	
						F Change
1	.862[a]	.744	.740	3.219	.744	243.521

a. Predictors: (Constant), sumSA, sumSRL, sumAL

The result in Table 8 showed that students' self-regulated learning, autonomy and agency significantly impact on undergraduates' achievement in research $F(1, 255) = 243.52$, $p < .05$, thus the hypothesis was rejected. This is because associated probability (p) value of 0.000 is less than 0.05 level of significance. Inference drawn is that the combine impact of self-regulation learning, autonomy and agency on students' achievement in research exposed to online learning is significant.

Table 8. Test of Significant of the Combine Impact of' Undergraduates' Achievement in Research Method by their Self-regulated Learning, Autonomy and Agency

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	7568.931	3	2522.977	243.521	.000[b]
1	Residual	2610.819	252	10.360		
	Total	10179.750	255			

a. Dependent Variable: RAT

b. Predictors: (Constant), sumSA, sumSRL, sumAL

Discussion

The findings revealed high positive relationship between students' self-regulated leaning and undergraduates' achievement in research method. Furthermore, the results of the hypothesis test shows that students' self-regulation learning impact on undergraduates' achievement in research method. Self-regulated learning strategies adopted by undergraduate students have a high impact on their achievement scores. The findings corroborate previous findings from the study of Zhang (2013) who reported that learners who use strong self-regulation skills and motivated to learn and adapt gain more from online learning than those who do not use such tactics. The findings also lend support to the findings of Maram et al., (2020) who revealed that there is a strong link between the variables of self-efficacy and self-regulation, cognitive methods, and students' examination performance. The present findings agree with the findings of Khaled et al., (2017) who found that substantial and favourable association exist between self-regulated learning and student academic progress in their research. The above result could be true because students who are self-regulated plan their activities and work at their own pace to learn. They never procrastinate and as such gain a lot from asynchronous learning settings than students who are not self-regulated.

The findings further revealed high positive relationship between learners' autonomy and their achievement in research method. The findings of the hypothesis indicates that learners' autonomy has significant impact on undergraduates' achievement in research method. By inference, learners who apply autonomous learning style improve in their achievement scores and those who do not sees a reduction in their achievement scores. The findings are in line with previous findings of Iji and Anyor, (2014) who found that learner autonomy boost students' academic performance in studies. The authors asserts that there was a significant difference in the mean achievement scores of students due to learners' autonomy. The findings also agree with previous findings from Beshel and Emma, (2019) who discovered that there was a substantial difference in performance between students who were taught using the autonomous

learning approach and those who were taught using the expository method. By inference, students who can study on their own in online learning settings perform better than those who cannot study on their own. This could be true because students receive less assistants in online learning than in face-to-face learning. Hence, autonomous learners tend to gain more than those that are not. Therefore, autonomous learning will surely impact on undergraduates' achievement in research method exposed to online learning.

The findings further revealed that student's agency have a very high relationship with their achievement in research method. This was supported by the hypothesis which revealed that students' agency has a significant impact on undergraduates' achievement in research method exposed to online learning. This finding affirms the findings of Reeve and Tseng (2011) who stated that student agency is critical predictor of learning achievement and satisfaction. The findings also support previous findings by Crick et al., (2015); Rappa and Tang (2017) who in their separate studies revealed that increasing student agency is associated with cognitive development such as critical reflection, creative thinking, meaning building, problem-solving, and self-regulation. The findings are true because agentic students are self-reflective. They stop during learning and ponder asking and answering questions. This built in them critical thinking abilities that could be used in solving problems. Also, agentic students interact with others as well as asking questions where they find difficulties during learning. All these attributes help them to gain knowledge while learning. Hence, students' agency could impact on their academic achievement.

We also find out that the three variables (self-regulated learning, learners' autonomy & students' agency) have a significant impact on undergraduates' student academic achievement in research. This is in line with the report of Newman et al., (2014) who revealed that students' ability and willingness to manage their resources, time, and available tools to achieve goals are critical to their learning results. This means that if students can plan their own activities, manage their time, learn autonomously and interact with others, ask questions

and are self-reflective, they will improve their learning which will culminate into improvement in their achievement scores.

Conclusions and Implications

Self-regulated learning has an impact on undergraduates' achievement in research method. Learners' autonomy also has an impact on undergraduates' achievement in research method and students' agency also have an impact on undergraduates' achievement in research methods. It was further concluded that the combine impact of self-regulated learning, learners' autonomy and students' agency is significant. The findings of the study made it very clear that self-regulated learning, learners' autonomy and students' agency are important factors in university students learning especially in online learning where there is no face-to-face interaction between the teacher and the students and among the students. Furthermore, the study has made some contributions to research on the relationship between self-regulated learning, learners' autonomy and students' agency on achievement. Students should be taught how to develop self-regulated learning strategies, autonomy and agency. Self-regulated learning strategies, learners' autonomy and agency should be included in the designing and implementation of online instructions in schools.

The relationship between the variables of the study and students' achievement is very important to students, educators and policy makers because the major aim of education should be to teach students these skills since the skills are very important in helping them guide their own learning, to be able to educate themselves and also be able to update their knowledge after leaving school.

However, there were some limitations to this study. The generalization of the findings of this study may be impacted by the sample size. Hence future researchers in this area could involve a larger sample size drawn from different universities. Another limitation of the study was that self-regulation learning, autonomy and agency are complex phenomena with various dimensions. These dimensions were not treated separately in this study. This may impact on the

findings of the study. Therefore, future researchers need to pay greater attention to the dimensions of these constructs.

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References

Arnold, J., & Clarke, D. J. (2014). What is agency? Perspectives in science education research. *International Journal of Science Education, 36*, 735–754. https://doi.org/10.1080/09500693.2013.825066

Bandura, A. (2006a). Autobiography. In MG Lindzey & WM Runyan (Eds.), *A history of psychology in autobiography* (Vol. IX). Washington, DC: American Psychological Association.

Beshel, C.U., Ema, I.B. & Gabrel, C.J. (2019). Autonomous learning strategy and academic performance of senior secondary two students in agricultural science. *International Journal of Innovative Social & Science Education Research, 7*(1), 31-39. https://seahipaj.org/journals-ci/mar-2019/IJISSER/full/IJISSER-M-5-2019.pdf

Biesta, G. (2009). Good education in an age of measurement: on the need to reconnect with the question of purpose in education. *Educ Asse Eval Acc* **21,** 33–46. https://doi.org/10.1007/s11092-008-9064-9

Bitrus, Z. (2014). Causes of poor achievement in WAEC mathematics examination in River State secondary schools Nigeria. *International Journal of Mathematics Education, 21*(3), 110-120

Crick, R. D., Huang, S., Shafi, A. A., & Goldspink, C. (2015). Developing resilient agency in learning: The internal structure of learning power. *British Journal of Educational Studies, 63,* 121–160. http://dx.doi.org/10.1080/00071005.2015.1006574.

Doan, T.D. (2020). The advantages and disadvantages of virtual learning. *IOSR Journal of Research & Method in Education (IOSR-JRME), 10*(3), 45-48. https://doi.org/10.9790/7388-1003054548

Doculan, A.A.D. (2016). E-learning readiness assessment tool for Philippine higher education institutions. *International Journal on Integrating Technology in Education, 5* (2), 33-43. https://doi.org/10.5121/ijite.2016.5203

Dundon, P. (2012). The effect of learner autonomy on student performance in GCSE mathematics in a private school in Dubai, U.A.E. *(An Unpublished Masters' Thesis)*. The British University in Dubai. https://bspace.buid.ac.ae/bitstream/handle/1234/180/90028.pdf?sequence=1&isAllowed=y

ELearningNC (2020). What is e-learning? http://www.elearningnc.gov/about_elearning/what_is_elearning/

Febriani, S.R., Rizka Widayanti, M. & Afif Amrullah, N.M. (2020). Arabic learning for elementary school during Covid-19 emergency in Indonesia. OKARA: *Journal Bahasa dan Sastra, 14(*1). http://ejournal.iainmadura.ac.id/index.php/okara/article/download/3194/1781.

Hart, C.M.D, Berger, D., Jacob, B., Loeb, S., Hill, M. (2019). Online learning, offline outcomes: Online course taking and high school student performance. *AERA Open. 5*(1), 1-17 https://journals.sagepub.com/doi/pdf/10.1177/2332858419832852?download=true

Iji, C.O. & Anyor, J.W. (2014). Effect of learners' autonomy on undergraduate students' achievement in system of linear equations in university of agriculture. *IOSR Journal of Research & Method in Education (IOSR-JRME), 4*(2), 24-27. www.iosrjournals.org

Khaled, A., Riyad, T. & Omar, J. (2019). The relationship between self-regulated learning and academic achievement for a sample of community college

students at King Saud University. *Education Journal. 6*(1), 28-37. https://doi.org/10.11648/j.edu.20170601.14

Mahyoob, M. (2020). Challenges of e-learning during the covid-19 pandemic experienced by EFL learners. *Arab World English Journal, 11*(4),351-362. https://dx.doi.org/10.24093/awej/vol11no4.23

Maram, I.Q., Mohamed, J.S.A., Mohammad, K. & Tolgahan, A. (2020). Impact of the covid-19 pandemic on academic achievement and self- regulated learning behavior for students of the faculty of pharmacy, Middle East University. *Multicultural Education, 6*(5), 24-29. https://doi.org/10.5281/zenodo.429113

Mark, L., Barbara, S. Rens, V.S., Petra, W. Monica, F & Christiana, E. (2012). Life-long learning as a goal. Do autonomy and self-regulation in school result in well prepared pupils? *Journal of learning and instruction, 22*(27-38). https://doi.org/10.1016/j.learninstruc.2011.06.001

McInerney, D. M. (2008). The motivational roles of cultural differences and cultural identity in self-regulated learning. In D. H. Schunk, & B. J. Zimmerman (Eds), *Motivation and Self-regulated Learning. Theory, Research, and Applications*. NY, London: Lawrence Erlbaum Associates. https://psycnet.apa.org/record/2008-03967-015

Newman, D., Deyoe, M., Connor, K., & Lamendola, J. (2014). Promoting active learning through the flipped classroom model, *Review of Education,* 113-131.

Nietfeld, J. L., Shores, L. R., & Hoffmann, K. F. (2014). Self-regulation and gender within a game-based learning environment. *Journal of Educational Psychology, 106*, 961–973. https://doi.org/10.1037/a0037116

Nwagbo, D. (2013). *Relationship between home environmental factors and secondary school students' academic achievement in Geography* (Ph.D Thesis), Department of Science Education, University of Nigeria

Oguguo B.C.E, Ocheni A.O & Adebayo F.K. (2021). Students' achievement in online test and measurement course in synchronous and asynchronous e-

learning platform. European Journal of Open Education and E-learning Studies, 6(2), 137-151. https://doi.org/10.46827/ejoe.v6i2.3966

Pym, J., & Kapp, R. (2013). Harnessing agency: towards a learning model for undergraduate students. *Studies in Higher Education, 38*, 272–284. https://doi.org/10.1080/03075079.2011.582096

Rappa, N. A., & Tang, K. S. (2017). Student agency: an analysis of students' networked relations across the informal and formal learning domains. *Research in Science Education, 47*, 673–684. https://doi.org/10.1007/s11165-016-9523-0

Reeve, J., & Tseng, C. M. (2011). Agency as a fourth aspect of students' engagement during learning activities. *Contemporary Educational Psychology, 36*, 257–267. https://doi.org/10.1016/j.cedpsych.2011.05.002

Samruayruen B, Enriquez J, Natakuatoong O., & Samruayruen, K. (2013). Self-regulated learning: A key of a successful learner in online learning environments in Thailand. *Journal of Educational Computing Research, 48*(1):45-69. https://doi.org/10.2190/EC.48.1.c

Steinmayr, R., Meibner, A., Weidinger, A. F. & Wirthwein, L. (2015). Academic achievement. https://doi.org/10.1093/obo/9780199756810-0108

Tsai, C.-Y. (2010). Applying the theory of planned behavior to explore the independent travelers behavior. *African Journal of Business Management, 4(2),* 221-234.

UNESCO. (2020a). *Education: From disruption to recovery*. https://en.unesco.org/covid19/educationresponse

Waryanto, N. (2014). Tingkat kesiapan implementasi e-learning di sekolah menengah Atas Kota Yogyakarta, *Jurnal Pendidikan Matematika dan Sains, 1*(2), 117-124. https://doi.org/10.21831/jpms.v2i2.2478

World Health Organization (WHO) (2020). Coronavirus. *www.who.int/health-topics/coronavirus#tab=tab_1*

Yvan. D. (2012). Teaching approaches encouraging autonomous learning. *Educations 2*(4), 96-100. https://doi.org/10.5923/j.edu.20120204.06.

Zhang, J. (2013). Learner agency, motive, and self-regulated learning in an online ESL writing class. *IALLT Journal of Language Learning Technologies, 43* (2), 58-81. https://doi.org/10.17161/iallt.v43i2.8526.