Nexus between Student Engagement variables and their Academic Achievement in Quantitative Economics that aid entrepreneurship in Osun State, Nigerian

Kehinde Lateef ADEBISI
Federal College of Education
Iwo, Osun State, Nigeria.
adebisikehindelateef@gmail.com or kehindela@fceiwo.edu.ng

Abstract
Quests for solutions to various economic crisis befalls Nigeria deserves multi-facet approaches, ranges from solution to educational problems to generation of engaged youth on entrepreneurship skill. Studies have shown that students are not properly skilled on quantitative analysis of economy. It was against this background that the study examined relationship between Students' Engagement (intellectual engagement, emotional engagement and social engagement) and their achievement in Quantitative Economics. Expo facto design of correlational type was adopted for the study. The population comprised of all economics student in public secondary schools in Osun State. One thousand and eighty students were sampled from twenty-four schools in twelve local government areas across three senatorial districts in the state. Multi-stage sampling procedures were used. Two instruments were used; Students' Engagement questionnaire (SEQ) and Quantitative Economics Achievement Test (QEAT). SEQ was validated using Cronbach Alpha with reliability coefficient of 0.91 while QEAT was validated using KR20 and the reliability coefficient was 0.88. Multiple regressions were used to analyse data collected. It was found that Students Achievement in Quantitative Economics is accounted for by certain percent of the predictor variables, and the ANOVA was significant. Three independent variables contributed significantly to prediction model at 0.05 Alpha level. The findings show that there is relationship between the independent variables and Students Achievement in Quantitative Economics. Therefore, students should be adequately engaged to improve their performance in quantitative aspects of economics as it is one of the aspects for developing entrepreneurship skill of the students

Keywords: Students' engagement variables, Academic achievement, Quantitative Economics

Introduction

Nigeria, one of the developing countries of the world had been witnessing variety of Economic mess for several decades, and the problems has been attracting attentions of the stakeholders across the sectors including Education. These problems range from low productive activities to under-utilization of man-power that has cause the demand to be more than supply, which has developed demand-pull-inflation and this called for encouraging entrepreneurship skills. Economic problem do not just occur in a country, it happens as a result of the several wrong policies and many things left undone. One of the important areas for sustainable development is man-power development, and it is most achievable through right Educational Policies, which may

encourage entrepreneurship, and Economics is one of the subjects that can assist in this direction, particularly Quantitative Economics. Because, business cannot strive without quantitative skills.

In Nigeria, educational development has not been given it expected priority to merge the goal 4 of sustainable development goals. And this could be related to the under achievement of senior secondary students in their Senior Secondary Certificate Examinations (SSCE) across the subjects including Economics. Meanwhile, Economics is a social science subject that guides student in the area of human capital development and this could only be achieved through quality Education.

Economics as a subject plays a significant role in human capital development, it exposes students to ways to minimise cost and maximise benefit. It goes a long way to explain how and the ways by which man can make rational decisions. Economics broadening the students' knowledge on the basis for understanding the complexities of how resources are managed to minimise cost and waste with a view to yielding more benefits. The subject looks at how governments, businesses, societies, households and individuals make decisions about how, when and where to best use their resources. Economics involves many theoretical and conceptual models to study behaviour and predict how entities will respond to given changes in market conditions and fiscal policies, among other factors. The subject built mathematical models to formulate hypotheses where theories are derived to explain interactions among contingences in human behaviours. The use of mathematics in economics allows economists to precisely define and test economic theories against real world data. Similarly, use of mathematics models allows economics to makes information to be concise and precise. Economic policies and decisions are rarely made without mathematical models; because mathematical models allow economics concepts to be far away from ordinary abstractions as they present concepts in Economics in such a way that issues will be quantifiably presented.

Meanwhile, despite the importance of Economics and the huge benefits derivable from using mathematical models and equations in Economics to explain human reactions and behaviours to cost and price analysis regarding ends and satisfactions. Studies over the years indicate there is continuous under-achievement of students in Economics at the secondary school level. Obiezu (2018) reported that the academic performance of secondary school students in the Senior Secondary Certificate Examinations (SSCE) has taken a dramatic decline in the recent times. According to Abubakar (2013), the students' achievement in Economics fluctuates yearly,

that students are not performing to the expected standard, considering the amount budgeted for education yearly. Besides, Okoro (2013), and Duruji, Azuh and Oviasogie (2014) corroborate the fact that the declining in students' achievement worries parents, teachers, school administrators, and other stakeholders in the educational system in Nigeria. Indeed, the achievement did not measure up with other subjects when compared with the resources invested on education in general. Considering Economics as an important subject that exposes students to basic concept of human capital development, the under-achievement of student in the subject call for investigation and remediation, despite the enormous government investments on education in Osun state, one of the states in Nigeria.

Past studies in and outside of Nigeria such as Ajayi (2024), Calil, Lazimi1, & Ippoliti (2024) are concerned about the problem of under-achievement of students in Economics, but much has not been done in some areas, particularly in the section A of paper II of Economics questions that involves statistics, price analysis and mathematical concepts, which is referred to as Quantitative Economics. Meanwhile, from the observation of the researcher during classroom interactions and marking exercise of unified promotion examination in Osun state and other external examinations, it was observed that students perceived varying level of difficulties in this aspect of Economics. In addition, WAEC Chief Examiner's reports pointed out that, students' performances in the essay part of Economics examination (section A) are not encouraging. It was reported that students had poor understanding of data presentation and basic mathematical skills to tackle the questions in the data response section, also larger percent of the candidates show great deficiency in the application of graphical representation to economic analysis and this resulted in poor performance in questions where analyses are required (WAEC 2017; 2020 & 2021). And this will affect their aggregate achievement in the subject. Furthermore, in the WASSCE Chief Examiner's Report, it was identified that the students' weaknesses include; poor graphical representations to economic analysis and simple calculations, use of wrong terminologies, failure to expatiate points, among others (WAEC 2017 & 2018).

Meanwhile, according to the analysis on the curriculum, more than 44.6 percent of the topics in Economics involve the use of mathematics, data response and statistics. They are topics that in one way or the other, students will be exposed to quantitative aspects of the topic. Also, larger percent of these topics are topics to be taught in SSS one and SSS two. Moreover, more than

47.2 percent of SSS two topic are expect to be taught with mathematical, statistics and data response aspect (Researcher Economics Curriculum Analysis. 2023, Ande C.E. 2018).

Other empirical studies on students' achievement in Economics reveal that variables such as learners' readiness, engagement in other business apart from schooling, students' poor attitude and poor self-esteem, poor teaching methodology and length of time allocated for reading are equally responsible for the students' persistent under-achievement in senior secondary school Economics (Kola and Sunday, 2015; Obiezu, 2018; Spring, 2013). Although, Calil. Lazimi1 & Ippoliti (2024), Obiezu (2018), Ajayi (2024) and many other studies have been pointing toward several factors that have serious implications on students' achievement in Economics at secondary school, but variables that relate to engagement have not been adequately investigated, therefore this calls for quarry and remediation.

Mind is thought to be an invisible and restless organ or part of the body; human mind is always engaged with several task or thought. Students who are active members of society where they belong use to be actively engaged both on their mind and in the academic tasks. In nutshell students are usually considered to continuously and regularly engage; and this is perceived to adequately affect students' academic achievements. Meanwhile, from the available literatures, Carmona, Salanova, Llorens & Schaufeli (2021), Delfino (2019), Kim, Hong & Song (2019) and several other studies have not been adequately related students' engagement to their achievement in Economics generally and to achievement in Quantitative Economics in particular. Therefore, this study examined the students' engagement levels and their achievement in Quantitative Economics.

Moreover, Students could be intellectually, socially, emotionally engaged to promote their academic achievement. Engagement in education refers to the degree of attention, curiosity, interest, optimism, and passion that students show when they are learning or being taught, which extends to level of motivation they have to learn and progress in their Education (Ali and Hassan. 2018). Engagement is perceived as energy in action, it represents the connection between an individual and the activity in which they are involved (Appleton, 2017).

Engagement has been studied as a multidimensional construct (Fredricks, Blumenfeld, and Paris, 2014). In this study, three constructs of engagement will be examined, which are emotional engagement, intellectual engagement and social engagement. Adeyemi (2017) claims that students learn best when they are engaged in the work that is interesting, personally relevant, appropriately

challenging and when they receive regular feedback on their progress. The feedback does invoke intellectual engagement. Therefore, intellectual engagement develops aspects of personality that are closely related to intelligence and knowledge. Intellectual engagement occurs when the class, the teacher and the strategies allow learners to explore topics with the desire to discover and make connections. It creates intrinsic motivation to learn, possibly with others to construct knowledge, and knowledge do prepare personal state of mind which is consider as emotion, hence person with regular positive state of mind is perceived to be emotionally engaged. Emotional engagement refers to the student's feeling, attitude, and perception towards learning, and the learning environment (Sheard. 2010; Yazzie-Mintz and McCormick 2012). Emotional engagement focused on the extent and nature of positive and negative reactions of students to teachers, classmates, academics, and school. It is a construct that explains the enjoyment and interest identified as indicators that involves the emotion of learners and the level of both emotional engagement and intellectual engagement of a person contributes to the contents, which an individual can offer when presenting issues in a social gathering. This proves that intelligence and emotion are very important in social involvement which is otherwise known as social engagement.

Social engagement can be defined as the interactions between students and their peers, between staff and students, between students and environment and so on; it is an enactment of potential ties in real life activity (Mohd Nazan, 2017). Social engagement is generally refers to as involvement in your community, interacting with others, and feeling connected to a larger group. Research have shown that the kind of social interactions that students maintain with peers and instructors within their academic community influence their connectedness, social capital and influence their academic achievement (Wellman and Frank, 2001). Students' Social Engagement influences their access to resources that facilitate academic success usually from peers and academic community (Wellman and Frank, 2001). Social engagement also helps to build relationships and friendship, strengthen sense of belonging and purpose, allows students to participate in meaningful activities, as well as improve students' physical and mental health, reduces stress and anxiety, and contributes to lifestyle.

Despite the important roles these engagement variables play in the students' personality growth, which is conceived by the researcher to have serious connection with school effectiveness, it appears studies have not shown their connection in general, and on students' achievement in particular. This study, therefore, focuses on the connection of the indicator variables of school

effectiveness and student's engagement and how they affect students' achievement in Quantitative Economics in senior secondary schools. Consequently, their relative and holistic contribution in predicting the criterion variable (Academic Achievement of the students in Quantitative Economics) will be researched into. Likewise, it is imperative to ascertain which of the predicting variables is actually responsible for poor academic achievement of students in Economics in secondary schools in Osun state.

Objectives of the study

The study specifically:

1. investigated relationship between Students' engagement variables (intellectual engagement, emotional engagement and social engagement) and their Academic Achievement in Quantitative Economics in Public Secondary Schools

2. examined the set of predictor variables that significantly predict Students' Academic Achievement in Quantitative Economics in Public Secondary Schools

3. examined Students' engagement variable(s) that is/are most influential in predicting Students' Academic Achievement in Quantitative Economics in Public Secondary Schools

4. outline the predictor variables that do not contribute significantly to the prediction model of the study?

Research Questions

1. What type of relationship exists between Students' engagement variables (intellectual engagement, emotional engagement and social engagement) and their Academic Achievement in Quantitative Economics in Public Secondary Schools?

2. Does the obtained regression equation resulting from the set of predictor variables; Students' engagement variables (intellectual engagement, emotional engagement and social engagement) allow a reliable prediction of Students' Academic Achievement in Quantitative Economics in Public Secondary Schools?

3. Which of the predictor variable(s) is/are most influential in predicting Students' Academic Achievement in Quantitative Economics in Public Secondary Schools?

4. Are there any predictor variable(s) that do not contribute significantly to the prediction model of the study?

Methodology

Expo facto design of correlational type was adopted for the study. The population comprised of all Economics students in public secondary schools in Osun State. One thousand and eighty students were randomly sampled in multistage procedures, from twenty-four purposively selected schools in twelve purposively sampled local government areas based on location (on three categorization of measurement; urban semi-urban and rural areas) across three senatorial districts in the state. Two instruments were used; Students' Engagement questionnaire and Quantitative Economics Achievement Test. Students' Engagement questionnaire was validated using Cronbach Alpha with reliability coefficient of 0.91 while Quantitative Economics Achievement Test was validated using KR20 and the reliability coefficient was 0.88. Multiple regressions were used to analyse data collected.

Results

Research question 1

What type of relationship exists between Students' engagement variables (intellectual engagement, emotional engagement and social engagement) and their Academic Achievement in Quantitative Economics in Public Secondary Schools?

Table 1 : Correlation Matrix of correlation among the variables

Coefficient Correlations[a]					
Model		Location	Social engagement	Intellectual engagement	Emotional engagement
Correlation	Location	1.00			
	Social engagement	-.009	1.00		
	Intellectual engagement	.027	-.290	1.00	
	Emotional engagement	-.031	.279	-.380	1.00

a. Dependent Variable: quantitative_economics_achievement

Table 1, presents the correlation matrix of location, students' intellectual engagement, students' social engagement, and students' emotional engagement. It was revealed that, Emotional engagement has significant relationship with Social engagement (r =-.009; $p < .05$), also Intellectual Engagement and location (r = .027; $p < .05$). This shows that some of the independent

variables revealed significant relationship. The correlation among the independent variables is both positive and negative relationship; the study shows that the intellectual engagement and location is positive while the correlation between emotional engagement and intellectual engagement is negative.

Research question 2

Does the obtained regression equation resulting from the set of predictor variables; Students' engagement variables (intellectual engagement, emotional engagement and social engagement) allow a reliable prediction of Students' Academic Achievement in Quantitative Economics in Public Secondary Schools.

Table 2: Model Summary of Regression Analysis of Students' Engagement Variables, School Location and Academic Achievement in Quantitative Economics

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.512[a]	.262	.259	8.905

a. Predictors: (Constant), location_, social_engagement, intellectual_engagement, emotional_engagement

Table 2 (model summary) revealed that engagement accounted for 26.2% the variation in the academic achievement in quantitative economics in Public Secondary Schools, as denoted by the coefficient of determination, R square=.262. This was a sizeable effect from independent variable on the dependent variable.

Table 3: Analysis of variance of Students' Engagement Variables, School Location and Academic Achievement in Quantitative Economics

ANOVA[a]					
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	30303.252	4	7575.813	95.526	.000[b]
	Residual	85254.615	1075	79.307		
	Total	115557.867	1079			

a. Dependent Variable: quantitative_economics_achievement

b. Predictors: (Constant), location_, social_engagement, intellectual_engagement, emotional_engagement

Table 2 and 3 present the model summary and ANOVA representatively. The multiple regression correlation coefficient (R) showing the linear relationship among location, students' engagement variables (intellectual, emotional and social engagement) and Academic Achievement in Quantitative Economics in Public Secondary Schools shown in Table 2 is 0.512, the multiple R^2 is 0.262, and Adjusted R square value is 0.259. This means that the variation in Achievement in Quantitative Economics accounted for by the predictor variables is approximately 26.2% and it is statistically significant. Moreover, table 3, shows the analysis of variance of the multiple regression data. This produced an F-ratio of $f(4,1079) = 95.526$ and found to be significant at 0.05 Alpha level.

Research question 3

Which of the predictor variable(s) is/are most influential in predicting Students' Academic Achievement in Quantitative Economics in Public Secondary Schools?

Table 4: Relative contributions of Students' Engagement Variables, School Location to Students' Academic Achievement in Quantitative Economics

Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	20.510	1.885		10.881	.000
intellectual_engagement	.203	.035	.167	5.792	.000
1 emotional_engagement	-.207	.031	-.193	-6.650	.000
social_engagement	.396	.028	.398	14.225	.000
location_	.235	.545	.011	.432	.666
a. Dependent Variable: Quantitative_Economics_Achievement					

Table 4 shows the contribution of each of the independent variables to the prediction model and to the 88.7% of the variation of Academic Achievement in Quantitative Economics. Three of the independent variables contributed significantly to the prediction model at 0.05 Alpha Level. These variables are intellectual engagement ($\beta = .203$; $t(1075) = 5.792$; $p < .05$), emotional engagement ($\beta = -.193$; $t(1075) = -6.650$; $p < .05$) and social engagement ($\beta = .398$; $t(1075) = 14.225$; $p < .05$). The findings show that intellectual engagement, emotional engagement and social engagement correlate Academic Achievement in Quantitative Economics in Public Secondary Schools. The

Table 4 shows that, Intellectual Engagement, Emotional Engagement and Social Engagement contributions are significantly correlated.

Research question 4

Are there any predictor variables that do not contribute significantly to the prediction model of the study?

Table 4 revealed that location (β = .011; t(1075) = .432; p < .05) does not contributed significantly to the prediction model for the Academic Achievement in Quantitative Economics in Public Secondary Schools.

Discussion of Findings

Economics is one of the secondary school subjects that train man's mind on ways of become an entrepreneur, and the performance of students in this subject is an indicator of become a successful entrepreneur in any field of endeavor. Also, to become an entrepreneur, the person needs to be properly engaged and versatile in the quantitative analysis of situation. On this premise the study investigated the relationship between students' engagement and their achievement in quantitative economics.

The finding shows that students' engagement (intellectual engagement, emotional engagement, social engagement) School Location and their academic achievement in quantitative economics are significantly related. The finding supports the studies of Aloka and odongo (2018), Weiss & García (2015) and Ali and Hassan (2018) that established significant correlation among social engagement, intellectual engagement and students' academic performance in university.

Moreover, the study revealed significant relationship between emotional engagement and academic achievement in quantitative economics. The finding shows that emotional engagement predicts students' academic aachievement, and the finding supports the study of Temizel et al (2018), Engels et al (2021), and Carmona, Salanova, Llorens & Schaufeli (2021) and Ganotice, Chan, Chan, Chan, Chan & Chan (2022) that emotional engagement can be positively predicted by students' learning motivation and their performance. Also the finding is in line with the study of Pöysä, Vasalampi, Muotka, Lerkkanen, Poikkeus, & Nurmi (2018) that studied the Variation in situation-specific engagement among lower secondary school students, and revealed that the relationship between students' specific engagement and the performance is correlated. Likewise, the study confirmed the study of Liu, Ma & Chen (2024) emotional engagement of college students

directly and positively influences their academic performance significantly within the blended learning environment.

The study also revealed that Intellectual Engagement and Social Engagement contributions are significantly to the prediction of students' academic achievement in quantitative Economics. The finding supported the opinion of the views of Weiss & García (2015) that Student school engagement correlate significantly to academic performance in Mexico, and the finding is also in line with the study of Chang, Chien, & Chou, (2022) while using Meta-analysis approach to detect the effect of student engagement on academic achievement, also the study of Sukor, Ayub, Abd-Rashid & Halim (2021), and Calil, Lazimi and Ippoliti (2024) that students' engagement reliably predicts students' academic performance.

Likewise, it was revealed in the study that location of the school does not significantly predicts students' academic achievement in Quantitative Economics, this mean that location of the school does not have any implication on the student performance in Quantitative Economics. The finding contradicts the findings of Ajayi (2024) that location determines students' academic achievement in economics objective test formats. But corroborate the finding of Purdul, Chege, & Thinguri (2014) that location significantly predicts students' performance in Kenyan public secondary schools.

Conclusion

The findings of the study revealed that there is significant relationship among the variables. The independent variables significantly correlate the student academic achievement in quantitative economics, therefore the researcher concluded that the students that are properly engaged across the various levels of engagement will perform effectively in quantitative economics and this will also encourage their calculative characteristics that is considered as one of the integral features of a good entrepreneur. The study also revealed that the three levels of engagement in the study significantly correlate the dependent variable, therefore the researcher conclude that engagements is important predictors of student academic achievement in economics, especially in Quantitative Economics. The findings make the researcher concludes that students who properly engaged and sound in quantitative economics can make teaching quantitative aspect of economics as a lucrative area to make normal standard of living as an Edupreneurer.

Recommendations

The findings of this study provide indications to take steps to improve the students' achievement in public secondary schools Economics through various levels of engagements. Therefore, the researcher recommends that;

1. Schools particularly public secondary schools should take all the available steps to engage students intellectually, emotionally and socially so as to improve their academic achievement in quantitative and this will thereafter assist their entrepreneurship skills.

2. Teachers should adopt appropriate therapy techniques geared towards the enhancement of intellectual, emotional, and social engagement of all students in the schools to boost their academic achievements.

3. Location is not a barrier to students' engagement; therefore, wherever the school is located the teachers should always put programmes together to boast the level of students' engagements.

References

Abubakar, A.B. 2013. Education and sustainable national development in Nigeria: challenges and way forward. *Social and Humanistic Science*. *14*: 65-72.

Ajayi, P.O. (2024) Sex and location as determinants of students' academic achievement in economics objective test formats. *Journal of Education and Emerging issues (JEEI). Research Gate. vol., 2 No 1*.

Ali, M. M. & Hassan, N. (2018) Defining Concepts of Student Engagement and Factors Contributing to Their Engagement in Schools. Creative Education.

Alkis, N, & Taskaya Temizel, T (2018) the impact of motivation and personality on academic performance in online and blended learning environments. *Educ. Technol Soc. 21;37*

Aloka, P.J & Odongo (2018) Relationship between Emotional Engagement and Academic Achievement among Kenyan Secondary School Students. *Academic Journal of Interdisciplinary Studies Vol 7 No 1*

Ande C.E. (2018). *Essential Economics for Senior Secondary Schools*; Fifth Edition; Tonad Publisher Limited, Ibafo Ogun State.

Appleton, J.J. 2017. Beyond school records: The value of cognitive and affective engagement in predicting dropout and on-time graduation. *Future research.* 9(4), 415–427

Calil, M. Lazimi1, L. & Ippoliti, B.M. (2024) Relationship between student engagement and academic performance. *International Journal of Evaluation and Research in Education* (IJERE) 13(4), 2210 - 2217 ISSN: 2252-8822, DOI:10.11591/ijere.v13i4.28710 2210

Carmona, H.M., Salanova, M., Llorens, S. & Schaufeli, W.B. (2021) linking positive emotions and academic performance: the mediated role of academic psychological capital and academic engagement. *Curr. Psycho. 40. 2938- 2947. Doi:*10.1007/s12144-019-00227.

Chang, D. F. Chien, W. C & Chou W. C (2016) "Meta-analysis approach to detect the effect of student engagement on academic achievement," *ICIC Express Letters*, 10(10), 2441–2446.

Delfino, A. P. (2019) Student engagement and academic performance of students of Partido State University, *Asian Journal of University Education*, 15(3), 42 – 55, doi: 10.24191/ajue.v15i3.05.

Duruji, M.M., Azub, D & Oviasogie, F. 2014. Learning environment and academic performance of secondary school students in external examination: A study of selected schools in Ota. *Proceedings of EDULEARN 14 Conference 7th – 9th July, 2014*, edu.ng. Pages 5042 – 5053, Barcelona,

Engels, M. C., Spilt, J., Denies, K & Verschueren, K. (2021). The role of affective teacher-student relationships in adolescents' school engagement and achievement trajectories. *Learn. Instr.* 75:101485. doi: 10.1016/j.learninstruc.2021.101485

Ganotice, F. A. Jr., Chan, C. S., Chan, E. W., Chan, S. K. W., Chan, L. & Chan, S. C. S. (2022). Autonomous motivation predicts students' engagement and disaffection in interprofessional education: scale adaptation and application. *Nurse Educ. Today* 119:105549. doi: 10.1016/j.nedt.2022.105549

Glapaththi, I., Dissanayake, R, Welgama, T. Somachandara, U. Weerarathna, R.S & Pathirana, G.Y. (2019) "A study on the relationship between student engagement and their academic achievements," *Asian Social Science*, 15(11), 1–16, Oct. 2019, doi: 10.5539/ass.v15n11p1.

Kim, H. J. Hong, A. J. & Song, H. D. (2019) "The roles of academic engagement and digital readiness in students' achievements in university e-learning environments," *International Journal of Educational Technology in Higher Education*, 16(1), 21, Dec. 2019, doi: 10.1186/s41239-019-0152-3.

Kola, A.J. & Sunday, O.S. |(2015).A review of teachers' qualification and its implications on students' academic achievement in Nigerian schools. *Inter. J. Edu. Res. Information Science. 2*(2): 10-15.

Libbey, H.P. (2004). Measuring student relationships to school: Attachment, bonding, connectedness and engagement. *Journal of School Health.* 74 (7), 274 – 283.

Liu, Y., Ma, S., & Chen Y. (2024). The impacts of motivation, emotional engagement and psychological capital on academic performance in a blended learning university course. *Front. Psychol.* 15:1357936. doi: 10.3389/fpsyg.2024.1357936

Moubayed, A. Injadat, M. Shami, A. & Lutfiyya, H. (2018) "Relationship between student engagement and performance in e-learning environment using association rules. in *2018*

IEEE World Engineering Education Conference (EDUNINE), Mar. 2018, pp. 1–6. doi: 10.1109/EDUNINE.2018.8451005

Obiezu, M. *(2018).* *Factors affecting students' poor performance in economics in senior secondary school certificate examination in Enugu north local government area.* diploma thesis, Godfrey Okoye University, Enugu.

Okoro, R.C. (2013). Effects of project-based learning on secondary school students' academic achievement, interest and retention in Home-Economics. *Retrieved 6th November, 2017 from http://www.unn.edu.ng*.

Purdul, J. N., Chege, E., & Thinguri, R. (2014). A Study of Factors Affecting Students' Performance in Kenyan Certificate of Secondary Education in Public Secondary Schools in Amboseli Division, Loitokitok District, Kenya. *Educational Research International*.

Pöysä, S., Vasalampi, K., Muotka, J., Lerkkanen, M. K., Poikkeus, A. M., & Nurmi, J. E. (2018). Variation in situation-specific engagement among lower secondary school students. *Learn. Instr.* 53, 64–73. doi: 10.1016/j.learninstruc.2017.07.007

Spring (2013). Teacher Characteristics on Student Achievement – An examination of higher schools in Ohio. Retrieved October 29, 2017 from. http://www.martin.uky.edu.

Sukor, R. Ayub, A. F. M. Abd-Rashid, N. K. M. & Halim, F. A. (2021) Relationship between students' engagement with academic performance among non-food science students enrolled in food science course," *Journal of Turkish Science Education*, 18(4), 638–648, doi: 10.36681/tused.2021.95.

Wellman, B. and Frank, K. (2001). Does the internet increase, decrease or supplement social capital?; social networks, participation and community commitment. *Sage journal.* http://Doi.org/1177/00027640121957286

West African Examination Council. (2018). Chief Examiner's Report. Abuja: West African Examination Council.

West African Examination Council. (2020). Chief Examiner's Report. AbujaWest African Examination Council.

Weiss, C.C and García, E. (2015) Student engagement and academic performance in Mexico: evidence and puzzles from PISA," *Comparative Education Review*, 59(2), 305–331, doi: 10.1086/680170.