



International Journal of Education, Teaching, and Social Science

Vol. 1 No.1, October 2021
e-ISSN 2809-0489

EDITORIAL TEAMS

Editor

Elizabeth A. Amalo, DipTESL, GradDipEdSt, MEdLeadership, PhD

(Politeknik Elektronika Negeri Surabaya)

Co-Editor

Dr Susan Olivia (University of Waikato, New Zealand)

Dr Harun Harun (University of Canberra, Australia)

Dr. Sri Hardiningsih H.S., M.Hum. - (Politeknik Negeri Semarang, Indonesia)

[Dr. Jemakmun](#) - (Universitas Bina Darma, Indonesia)

[Dr. Dian Cahyawati](#) - Universitas Sriwijaya

Rini Susanti - Monash University, Australia

Dr. Nafiu Olaniyi Oladokun - [Scopus ID](#) [GS ID](#) Curtin University Malaysia, Malaysia

Fitriya, Ph.D. – [Scopus ID](#) [GS ID](#) RMIT University, Vietnam

[Faqeer Muhammad](#) - Karakoram International University, Pakistan

[Dr. Sara Cristina Valente dos Santos](#) - Universidade de Aveiro, Portugal

[Dr. G.D.V. Kusuma](#) - Sree Kavitha Institute of Management, India

Dr. [Lin Yan Syah](#) - Sekolah Tinggi Ilmu Ekonomi Serelo Lahat, Indonesia

[Mohammed Saud Mira](#) - Multimedia University, Malaysia

[Mohammad Rashed Hasan Polas](#) - Limkokwing University of Creative Technology

[Sanni Olawale Nurudeen](#) - Ahmadu Bello University, Zaria, Nigeria

[Robert T Salvador](#) - Riverside College, Philippines

TABLE OF CONTENTS

TITLES and AUTHORS	pages
Exploring the Factors in Student's Retention of E-learning Mathematics: A Case of Grade 12 Senior High School Students at the University of Perpetual Help System-Pueblo de Panay Campus <i>Ace N. Bombaes, Jeric S. Fuasan, Winston N. Garcia</i>	1 - 7
Paradigm Shift for Online Learning: Voices of Undergraduates from a National University in Sri Lanka <i>L A P Madhuwanthi, Aruna Muthulingam, M G H Madusha</i>	8 -20
Perceived Influence of Socio-Economic Infrastructure on Vocational Skills Acquisition and Practice Among Youths in Bonny Local Government Area <i>A.U. Nnodim, Matilda T. Allison</i>	21 - 27
How Demographic Features and Attitudes of Student affect the Mathematics Performance of Students? With special reference to the Ordinary Level Students in Ratnapura Educational Zone in Sri Lanka <i>H.V.R.G Hathella, Hunuwala Malawarage Priyanath</i>	28 - 47
COVID 19 and Higher Education Institution Operation: Unpacking the Potential of Higher Education through Acceptance of Online Learning <i>Alberto Ndekwa</i>	48 - 58

Exploring the Factors in Student's Retention of E-Learning Mathematics: A Case of Grade 12 Senior High School STEM Students at the University of Perpetual Help System-Pueblo De Panay Campus

Ace N. Bombaes*, Jeric S. Fuasan & Winston N. Garcia

University of Perpetual Help System-Pueblo de Panay Campus, Philippines

*Corresponding Author: bombaes_21@yahoo.com

Abstract

The study aims to determine the effects of teacher's factors, student attitude, and motivation on student's ability to absorb, recall and maintain the learned concepts. This research measures the effects of the said factors on student's mathematics retention. For this study, the data were collected through convenient sampling from 101 STEM students of the University of Perpetual Help System-Pueblo de Panay Campus. With the help of google survey forms, the data were analyzed by using Paired t-test, Cronbach's Alpha and Pearson r. The results have revealed that teacher's factor, students' attitude and motivation have significant differences. Results indicate that the three factors have statistical effect and significant impact on student's ability to absorb, recall and maintain the learned concepts in Mathematics via e-learning platform. Based on the findings, teacher's factor is one of the factors the school should give much focus on since teacher has the ability to motivate and influence the attitude and performance of the students and they are accountable for the performance for the students.

Keywords: emerging methodology, e-learning, retention

1. Introduction

As one of the identified factors, teacher's influence towards the learning of a student has a vital role in education (Bombaes, 2017). Teacher's factor contributes to the students' academic performance. Moreover, under this factor, other variables are taken identify the sub-factors that fall under teacher's influence are teacher motivation (Thoonen et al., 2011), punctuality of teachers (Sahito et al., 2016), learners' exercises (Min, 2008), teacher preparedness and teacher teaching aid (Siachifuwe, 2017). This also includes teacher's ability to utilize e-learning platform as a mode of teaching and learning to deliver information and instruction to student. Other factors like attitude (Briz-Ponce et al., 2017) and motivation of students (Augustyniak et al., 2016) can influence and affect their academic performance most specifically in learning mathematics. In this regard, the perceived enjoyment is regarded as one of the components which determines students behavior towards math retention using the e-learning platform (Panay et al., 2019).

In today's generation, education is enhanced by the use of technology integration particularly the e-learning platform and teaching using this platform is regarded as an emerging methodology of teaching and learning. Teaching and learning via e-learning platform brings changes in pedagogical strategies and improves the efficiency of teaching and learning (D. Doculan, 2016). It is regarded as an emerging methodology. This platform bridges the students and teacher relationship to the next level of education. Digital technology has changed the very notion of what being a human means (Borba et al., 2016).

Retention of learned concepts can be defined as having the information stored in long-term memory in such a way that it can be readily retrieved, for example, in response to standard prompts (Karpicke & Roediger, 2007). Retention attempts to describe the ways in which the student and the institution interact with one another. The theoretical principles convey the

importance of having knowledge of student attributes that influence retention (READ, 2017).

This paper confirms the relationship between teacher's factors, student attitude, and student motivation where the role of the teacher in on-line education and the degree of student's attitude and motivation are substantiated. Therefore, there is a need to find out whether the identified factors have a relationship between student's retention of Mathematics. To further understand this relationship between these factors towards student 'retention of learned concepts of mathematics, the paper is explained and discussed in different sections as follows.

2. Literature Review

With the advanced technological innovation and development, the use of e-learning platform has become very prominent especially during the COVID-19 pandemic period. E-learning has become the primary way of teaching and learning and become a necessary teaching method (Moreno-Guerrero et al., 2020). The study aims to determine the effects of teacher's factors, student attitude, and motivation on student's ability to absorb, recall and maintain the learned concepts presents contributing factors towards student's retention of mathematics via e-learning as a mode of delivery in teaching.

3. Research Method

The study is quantitative research. A case study has been designed to measure the teacher's factor, students' attitude, and students' motivation towards student's retention of learned concepts in mathematics. The delivery of teaching and learning was done through the use of e-learning as an emerging methodology. To assess the said factors, the study was done through correlational research. The total number of populations consisted of 101 grade 12 STEM students has been covered, for it serves the purpose of the study. To find out the relationship and significant difference of the variables of the study, a self-made questionnaire was used to gather the needed data. The questionnaire was made by the researchers in accordance with the current study.

3.1 Instrumentation

The study took place at the University of Perpetual Help System – Pueblo de Panay, Roxas City, Capiz, Philippines. All STEM students of Grade 12 were covered to gather the information. The questionnaire has only one part which measures the student's retention in terms of teacher factor, student's attitude and student's motivation towards student's retention of learned concepts using five-point Likert Scale.

3.2 Sample Design

For statistical analysis the data were collected from Grade 12 STEM students, all are active users of e-learning platform of the university. There were 101 participants and they were given a structured questionnaire to identify and perform the relationship of every variable using the correlation analysis. Cronbach's Alpha was used to determine the reliability of each item from the questionnaire. This study is quantitative with the support of SPSS.

3.3 Pilot Testing

The number of participants was identified based on the 15% of total Grade-12 STEM students and it was conducted in Grade-11 STEM students first in order to test the applicability and objectivity of the research tool.

3.4 Data Analysis

Pearson r correlation analysis was utilized for measuring the model that consists of validity test.

4. Finding and Discussion

All factors were tested to be greater than 0.5. In the reliability test, Cronbach's Alpha value was determined and found to be higher than 0.8. This is a manifestation that questions under each construct are significantly valid and reliable with $\text{Sig. (2-tailed)} = 0.000 < p = 0.05$ and $r(x,y) \geq 0.5 > r = 0.195$ in order to measure the teacher's factor, students' attitude and perceived enjoyment towards students' retention in mathematics using e-learning platform.

Table 1. Correlation

Items	Teacher Factor
Q1	.738**
Q2	.728**
Q3	.694**
Q4	.809**
Q5	.770**
Q6	.663**
Q7	.582**
Q8	.592**
Q9	.786*
Q10	.760**
Total	1

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

* . Correlation is significant at the 0.05 level (2-tailed)

Table 1.2 Correlation

Items	Student's Attitude
Q1	.600**
Q2	.635**
Q3	.803**
Q4	.784**
Q5	.738**
Q6	.695**
Q7	.685**
Total	1

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

* . Correlation is significant at the 0.05 level (2-tailed)

Table 1.3 Correlation

Items	Perceived Value
Q1	.889 ^{**}
Q2	.910 ^{**}
Q3	.718 ^{**}
Q4	.855 ^{**}
Total	1

^{**}. Correlation is significant at the 0.01 level (2-tailed).

Table 2. Teacher factor Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.887	0.894	10

Table 3. Inter-Item Correlation Matrix Teacher Factor Inter-Item Correlation Matrix

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Q1	1	0.743	0.605	0.282	0.443	0.526	0.585	0.489	0.443	0.307
Q2	0.743	1	0.626	0.324	0.458	0.33	0.351	0.402	0.458	0.216
Q3	0.605	0.626	1	0.465	0.415	0.527	0.444	0.308	0.732	0.507
Q4	0.282	0.324	0.465	1	0.681	0.368	0.563	0.537	0.341	0.393
Q5	0.443	0.458	0.415	0.681	1	0.637	0.325	0.592	0.304	0.371
Q6	0.526	0.33	0.527	0.368	0.637	1	0.51	0.228	0.386	0.557
Q7	0.585	0.351	0.444	0.563	0.325	0.51	1	0.57	0.325	0.579
Q8	0.489	0.402	0.308	0.537	0.592	0.228	0.57	1	0.408	0.325
Q9	0.443	0.458	0.732	0.341	0.304	0.386	0.325	0.408	1	0.639
Q10	0.307	0.216	0.507	0.393	0.371	0.557	0.579	0.325	0.639	1

Table 4. Student attitude Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.85	0.864	7

Table 5. Reliability Statistics Perceived Enjoyment Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.893	0.892	4

Table 6. Statistics (Teacher Factor, Student Attitude and Perceived Enjoyment)

	Mean	N	Std. Deviation	Std. Error Mean
Teacher Factor	4.4072	101	0.51276	0.05102
Perceived Enjoyment	3.843	101	0.64014	0.0637
Student Attitude	3.2896	101	0.80291	0.07989

Table 7. Paired Samples Correlations Paired Correlations (Teacher Factor, Student Attitude and Perceived Enjoyment)

		N	Correlation	Sig.
Pair 1	Teacher Factor & Perceived Enjoyment	101	0.565	0
Pair 2	Teacher Factor & Student Attitude	101	0.308	0.002
Pair 3	Perceived Enjoyment & Student Attitude	101	0.714	0

Table 8. Paired Samples Test Paired Test (Teacher Factor, Student Attitude and Perceived Enjoyment)

	Paired Differences					T	df	Sig. (2- tailed)
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair Teacher 1 Factor - Perceived Enjoyment	.56415	.54950	.05468	.45567	.67263	10.318	100	.000
Pair Teacher 2 Factor - Student Attitude	1.11755	.80887	.08049	.95787	1.27723	13.885	100	.000
Pair Perceived 3 Enjoyment - Student Attitude	.55339	.56630	.05635	.44160	.66519	9.821	100	.000

After signifying the validity of the measurement model, the next step was to hypothesize the significant difference and relationship using paired T-test and person r. The results based on the structural model support that all proposed hypotheses were supported by the data.

Teacher Factor (mean = 4.4072, SD = .51276) is higher than *Perceived Enjoyment* (mean = 3.8430, SD = .64014) in terms of mean which signifies that teacher factor has higher effect than perceived enjoyment on student's retention. Based on the result, there is a high significant difference between teacher factor and perceived enjoyment with $t = 10.318$, $df = 100$ and sig. (2 tailed) = .000. Also, the correlation value of teacher factor and perceived enjoyment is equal to .51276 which indicates that there is a positive or direct relationship between these two variables.

Teacher Factor (mean = 4.4072, SD = .51276) is higher than *Student attitude* (mean = 3.2896, SD = .80291) in terms of mean which signifies that teacher factor has higher effect than student's attitude on student's retention. Based on the result, there is a high significant difference between teacher factor and student attitude with $t = 13.885$, $df = 100$ and sig. (2 tailed) = .000. Also, the correlation value of teacher factor and student attitude is equal to .308 which indicates that there is a positive or direct relationship between these two variables.

Perceived Enjoyment (mean = 3.8430, SD = .64014) is higher than *Student attitude* (mean = 3.2896, SD = .80291) in terms of mean which signifies that perceived enjoyment has higher effect than student's attitude on student's retention. Based on the result, there is a high significant difference between teacher factor and student attitude with $t = 9.821$, $df = 100$ and sig. (2 tailed) = .000. Also, the correlation value of perceived enjoyment and student attitude is equal to .714 which indicates that there is a positive or direct relationship between these two variables.

5. Conclusion

This study examines the influence and impact of teacher's factor, student's motivation, and students on student's ability to absorb, recall, and maintain the learned concepts in Mathematics of Grade 12 STEM students of the University of Perpetual Help System-Pueblo de Panay Campus, Roxas City, Philippines. The results of this study assemble by t-test and Pearson r which indicate that teacher factor, student attitude and student motivation towards students' retention. These findings support that these factors are significant and have a positive impact on the findings generated with the use of Paired t-test analysis.

As part of the investigation, it reveals that based on 101 respondents who participated in the data collection; Teacher Factor has the highest influence on student's ability to absorb, recall and maintain the knowledge she or he learned. With the help of e-learning the students along with teacher factors, teacher was able to successfully and effectively deliver his lessons thus contributing to the success of teaching and learning. The findings show that teacher preparedness and ability to deliver his lesson through e-learning platform, teacher motivation, marking of learner's exercises, punctuality of teacher and teaching aid which fall under teacher factor should be considered in teaching mathematics. Teachers who are successful in establishing an online learning community encourage student participation and discourage lurking behavior. This was followed by the student motivation and student attitude have the least effect on student's retention.

Based on the findings, the study recommends that, teachers should enrich better the teacher factor such as teacher preparedness, teacher motivation, marking of learner's exercises, teaching aid, together with student motivation and student attitude for these contribute to student's retention of learned concepts and knowledge in Mathematics. In order to make learning appears more profound, teachers should engage students in a more challenging online environment by reflective teaching where teachers can make of their lessons more interactive and the e-learning platform fun since students find it enjoyable to use.

References

- Augustyniak, R. A., Ables, A. Z., Guilford, P., Lujan, H. L., Cortright, R. N., & DiCarlo, S. E. (2016). Intrinsic motivation: an overlooked component for student success. *Advances in Physiology Education*, 40(4), 465–466. <https://doi.org/10.1152/advan.00072>, 2016.
- Bombaes, A. Student's Intentions to Use M-Learning: An Empirical Perspective from the Philippines. *Business and Economic Research*, 8(1), 68. <https://doi.org/10.5296/ber.v8i1.12305>, 2017.
- Borba, M. C., Askar, P., Engelbrecht, J., Gadani, G., Llinares, S., & Aguilar, M. S. Blended learning, e-learning and mobile learning in mathematics education. *ZDM - Mathematics Education*, 48(5), 589–610. <https://doi.org/10.1007/s11858-016-0798-4>, 2016.
- Briz-Ponce, L., Pereira, A., Carvalho, L., Juanes-Méndez, J. A., & García-Peñalvo, F. J. Learning with mobile technologies – Students' behavior. *Computers in Human Behavior*, 72, 612–620. <https://doi.org/10.1016/j.chb.2016.05.027>, 2017.
- Karpicke, J. D., & Roediger, H. L. Repeated retrieval during learning is the key to long-term retention. *Journal of Memory and Language*, 57(2), 151–162. <https://doi.org/10.1016/j.jml.2006.09.004>, 2007.
- Min, H. T. The impact of supplemental reading on vocabulary acquisition and retention with EFL learners in Taiwan. *Journal of National Taiwan Normal University: ...*, 53(1), 83–116. <http://www.ord.ntnu.edu.tw/ntnuj/j53/j531hs-5.pdf%5Cnpapers2://publication/uuid/D19D6F76-D474-4C66-986D-6E909FD66F15>, 2008.
- Moreno-Guerrero, A. J., Aznar-Díaz, I., Cáceres-Reche, P., & Alonso-García, S. E-learning in the teaching of mathematics: An educational experience in adult high school. *Mathematics*, 8(5). <https://doi.org/10.3390/MATH8050840>, 2020.
- Panay, S. De, City, R., & Bombaes, A. N. *Measuring the Impact of E-learning Adoption : A Case of University of Perpetual Help*. 5(3), 2019.
- Read, L. Community College. *Instructions for My Mother's Funeral*, 2005, 71–72. <https://doi.org/10.2307/j.ctt1b4cxbv.43>, 2017.
- Sahito, Z., Khawaja, M., Panhwar, U. M., Siddiqui, A., & Saeed, H. Teachers' Time Management and the Performance of Students: A Comparison of Government and Private Schools of Hyderabad, Sindh, Pakistan. *World Journal of Education*, 6(6). <https://doi.org/10.5430/wje.v6n6p42>, 2016.
- Thoonen, E. E. J., Slegers, P. J. C., Oort, F. J., Peetsma, T. T. D., & Geijssels, F. P. How to improve teaching practices: The role of teacher motivation, organizational factors, and leadership practices. *Educational Administration Quarterly*, 47(3), 496–536. <https://doi.org/10.1177/0013161X11400185>, 2011.

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>)

Paradigm Shift for Online Learning: Voices of Undergraduates from a National University in Sri Lanka

L. A. P. Madhuwanthi*, Aruna Muthulingam & M. G. H. Madusha

Department of Public Administration, University of Sri Jayewardenepura, Sri Lanka

*Corresponding Author: pavithra@sjp.ac.lk

Abstract

The abrupt eruption of the COVID-19 pandemic made drastic shifts in doing many things under new normal conditions. Consequently, the education sector too had a giant leap from traditional physical mode to an online learning method, giving a novel experience to students. Online learning is a form of education in which the main elements include the physical separation of teachers and students during instruction and the use of various technologies to facilitate student-teacher and student-student communication. Hence, this paper focuses on exploring problems faced by undergraduates in online learning in a national university in Sri Lanka. This is a qualitative study that used a convenient sample of 30 undergraduates who have undergone both the traditional learning mode and online learning method. Data collection was carried out through a self-administered, semi-structured questionnaire and thematic analysis was employed for the study. The study found that undergraduates are undergoing problems in online learning as; technical issues, absence of conducive learning environment, financial burden, issues encountered from lecturers, pedagogical issues, and personal issues. This study provides useful implications for both the education policy formulators and educational institutions for the improvement of their online learning methods.

Keywords: *Online Learning Problems, Undergraduates, National University*

1. Introduction

The sudden outbreak of the COVID-19 pandemic has become a game-changer for individuals and countries across the world by temporary shutting down operations of the economies for a considerable period. Yet gradual reopening of economies allowed people to begin their work under new normal conditions by adopting alternative means of operations such as work from home, virtual employment, hybrid work model, etc. Among others, education is one of the hardly interrupted sectors due to the pandemic by experiencing nationwide closure of schools and universities (OECD, 2020).

Ensuring inclusive and quality education for all has been identified as the fourth Sustainable Development Goal by the UN, as it enables upward socioeconomic mobility and is a key to escape poverty (United Nations Organization, 2020). However, with the ongoing COVID-19 pandemic, the delivery of quality education was at a risk. Education institutions in more than 188 countries were closed for months (UNESCO, 2020), and some still remain closed due to the second and third COVID-19 waves. According to the most recent data, there are 211,161,647 affected learners, 12.1% of total enrolled learners and 25 country-wide closures all over the world due to the COVID-19 pandemic (UNESCO, 2021). The education sector in Sri Lanka is also severely affected by COVID-19 including the state university system of the country. Just as many countries did, Sri Lanka also converted the mode of delivery of education from a traditional face to face physical system to a technology-based online learning system.

Accordingly, the university system of Sri Lanka has also fully converted the mode of education to online, with the support of several telecommunication providers of the country, to continue higher education without disruptions. According to ADB brief, a survey among

universities has found that nearly 90% of student respondents have been able to access online education, marking a compatible rate similar to developed countries like Japan. However, ADB itself mentioned that the result of this survey might overrepresent students with online access due to sampling limitations, which creates a clear gap requiring to seek out students' perspective of online education in Sri Lanka (Hayashi et al., 2020). Further, another study carried out in a national university in Sri Lanka affirmed that smooth functioning of university education is seriously suffering from issues of online teaching and learning environment and a lack of online teaching and learning skills among academic staff and students (Rameez et al., 2020). Therefore, this study intends to explore problems faced by undergraduates in online learning in a national university in Sri Lanka.

1.1 Context

With the identification of the first COVID-19 positive case in March 2020, the government of Sri Lanka has decided to close all the educational institutions, including the higher education institutions (HEI). Thus, 15 state universities and nearly 40 other state and non-state tertiary education institutions halted their operations. With the purpose of facilitating the continuity of higher education, the University Grants Commission (UGC) of Sri Lanka launched a Moodle-based online learning platform with the collaboration of the Lanka Educational and Research Network (LEARN).

Once the platform was ready, the UGC was concerned about maintaining equity among the students when getting access to online learning. For that purpose, the UGC initiated discussions with the government and the Telecommunications Regulatory Commission of Sri Lanka (TRCSL). The UGC and TRCSL reached an agreement with all internet service providers in Sri Lanka to provide free access for university learning management systems and remote learning facilities through the LEARN. Although it was a fruitful initiation, the agreement was only active until August 2020 (Hayashi et al., 2020). Consequently, all the HEIs opened their online learning platforms and gradually commenced teachings.

The national university selected in this study operates under the UGC unveiled its online learning platform via Zoom and MS Teams applications. For the effective implementation of the online learning method through the Learning Management System (LMS) both the lecturers and undergraduates were given the training. Undergraduates are encouraged to join online real-time lectures actively and those who are unable to join, due to various reasons are given the opportunity by uploading the recorded lecture video to LMS. All the other relevant information, lecture materials, reading resources and assignments are given to undergraduates through LMS. It is expected to continue the online learning method until the re-opening of the universities for traditional physical lectures.

2. Literature Review

Recent past trends happening in the higher education sector has indicated significant progressive changes in the system. Even before the COVID-19 outbreak, some HEIs have already been laying the groundwork for a new approach to higher education (Bonfield et al., 2020), in order to produce more skilful graduates for the industries. Such institutions were highly investing in novel educational technologies and shifting towards virtual teaching and assessments methods. This education revolution has enabled active learning away from the traditional lecture-based education system. Further, non-traditional education is contextually interpreted as distance learning, e-learning and online learning (Moore et al., 2011). Further, these different types of learning environments depend on diversified learning objectives,

target audience, access (physical, virtual and/or both), and type of content to be delivered.

2.1 Online Learning

Distance learning dates back to two centuries and often designates the effort of providing access to learning for those who are geographically distant (Moore et al., 2011). It has evolved from correspondence through postal service to modern education technologies (Spector et al., 2008). E-learning utilizes information communications technology (ICT) to promote educational interaction between students, lecturers and learning communities (Holley, 2002).

Online learning is coined as the most recent and improved version of distance learning (Moore et al., 2011), which enables access to learning experiences through technology (Carliner, 2004). Such learning experiences are non-traditional. The diversified reasons have influenced HEIs across the globe to adopt online learning. Specifically, the COVID-19 global pandemic has urged HEIs to expand their education approaches to facilitate online learning (United Nations, 2020). It impacted the way higher education has been designed, implemented and delivered. The HEIs must be structurally flexible to embrace these new capabilities to support online learning. Thus, education applications such as Zoom, Microsoft Teams, Webex, Google classroom and Moodle have been extensively utilized. Despite this urgency, online learning has resulted in viabilities as saving time and travel costs, scalability, and convenience.

2.2 Problems Encountered in Online Learning

Although online learning promotes a higher level of connectivity, flexibility and varied interactions (Hitz & Turoff, 2005), it marginalizes certain groups of learners (OECD, 2020). Online learning offers endless opportunities for innovative teaching (Macharia & Pelsner, 2012), the success predominantly depends on the level of students' engagement. Student attitude, training and experience are important to use technology for learning (Islam et al., 2015). Despite admiring how best the education technologies are, focusing on the needs of the undergraduates to use the technology for learning is a timely requirement specifically for the HEIs in developing countries. The pandemic is widening the gap and restrain equitable access to online learning (Hicks et al., 2021).

Dhawan (2020) emphasizes that accessibility, affordability, flexibility, learning pedagogy, life-long learning, and policy are the main concerns related to online learning. Technical challenges, student characteristics, learning environment and instructor characteristics are crucial problems involved in online learning and determine the effectiveness of online learning (Bonfield et al., 2020; Islam et al., 2015). Technical challenge refers to various technical issues related to accessibility to devices, the internet, and online learning systems. These problems might have been associated with modern technology range from downloading errors, issues with installation, login problems, problems with audio and video, and etc. (Dhawan, 2020). Consideration of access to technology is an indispensable element of effective online learning (Bryson & Andres, 2020). These issues lead to poor performance and questioning the education service quality.

The second problematic factor is the student characteristics. It includes intelligence, motivation, learning styles and technical experience of undergraduates (Islam et al., 2015; Paulsen & McCormick, 2020). Online learning enables a more flexible learning process, yet learners could fail to benefit due to their characteristics. For instance, students' learning styles are different. Some learn through interacting, some prefer learning through visual

presentation, and some by listening to instructions and using written notes (Islam et al., 2015). The online learning method could restrict certain learning styles.

Retaining personal attention is also a huge issue facing online learning (Dhawan, 2020). Therefore, to perform as an independent learner, students must be competent, confident, and self-aware.

The other issue related to online learning is the learning environment of learners. A large number of students hailing from low-income backgrounds are undergoing difficulties to afford the cost of learning technologies (OECD, 2020). Further, it leads to marginalizing students. Online learning moves away from teacher-centred to self-directed learning. Thus, the learner should possess a favourable learning environment at their end. In other words, students can be anywhere (independent) to learn and interact with instructors and other students (Singh & Thurman, 2019). Thus, it calls for attending live lectures, engaging in real-time interactions between educators and learners, and obtaining instant feedback. However, after the COVID-19 outbreak, a merely overnight shift of traditional physical classrooms into online learning has posed learning environment-related problems to the students.

Instructor characteristics also determine the success of online learning. To be responsive and resolve emergencies, the instructor must have the competencies to adopt the right teaching aids and mode of delivery. Instructors' role is crucial for students to become active online learners (Jo et al., 2020). In the online learning process students struggle to develop a sense of community (Tichavsky et al., 2015). Therefore, the instructor has to be the facilitator and maintain frequent communication with the learners.

Online learning facilitates teaching and learning opportunities, but there is a dire need to weigh the pros and cons of this method to harness its potentials. Therefore, it is important to study the issues of online learning from the students' perspective.

3. Research Method

This is a qualitative study conducted in a selected management faculty of a national university in Sri Lanka. Data were collected from 30 undergraduates who were studying the management degree in the second, third and final years. Since those undergraduates have undergone the traditional physical learning mode, they were able to compare it with the online learning method that they are currently experiencing. A self-administered, semi-structured survey questionnaire was distributed among the undergraduates when the selected university has re-opened for few months. The researchers used the convenient sampling method and the participation in the survey was voluntary. However, on the cover letter of the questionnaire, it was clearly stated the purpose of the research, informed consent statement, anonymity of the undergraduates in the survey, and confidentiality of the collected data. The total number of completed questionnaires received was 30. For data analysis six-phase, top-down thematic analysis proposed by Braun and Clarke (2006) was used.

4. Findings and Discussions

The analysis of data collected from undergraduates has given different perspectives about the problems they are experiencing with online learning in the chosen national university in Sri Lanka. Their responses preceded us to identify emerging themes, and they are explained with excerpts in this section.

4.1 Technical Issues

Accessibility to the appropriate technology is a foremost requirement to engage in online learning. However, the undergraduates emphasized that they have faced many technical issues including unavailability of devices, internet connectivity issues, frequent power cuts or failures and inability to handle technical problems.

Although the Sri Lankan university system shifted to online learning, the readiness of the undergraduates has been affected by multiple challenges related to technology and devices.

Further, the internet service is not available in all parts of the country, especially the learners in the remote areas are highly excluded. As per the responses of undergraduates, the majority of them resides outside the town areas. Therefore, they are affected because of poor internet connection and study from home has become a hurdle. In normal times, some undergraduates have been isolated due to the non-coverage of mobile service in their residential area. All these circumstances obstruct them to access real-time information about the lecture sessions, schedules, notices, evaluations, etc. These conditions neglect them from receiving the real-time learning experience. As a result, undergraduates often miss out on the in-class assessments and continuous assessments, which again leave them in a very stressful situation. Some excerpts from the respondents were stated below.

“Usually, electricity in our area cut once within a week for numerous reasons. So, I am unable to join the online lectures on such days.” (Respondent 02)

“Major issue is connection failures. Sometimes due to power cuts we were unable to participate lectures in some days.” (Respondent 05)

Another technical issue that the undergraduates pointed out was the unavailability of devices required for online learning. Many of them do not have a laptop or computer. Instead, they solely depend on their mobile phone for online learning. Further, some mobile phones are not compatible with the requirements of online learning applications. Hence, students are unable to participate in online learning. This situation is worsening in the case of frequent failures in the supply of electricity. It has become a crucial issue for undergraduates. They have to use electronic devices with limited battery capacity, for instance, mobile phones or laptops and Wi-Fi routers that need an uninterrupted power supply to operate. Therefore, when there is a power outage, students are unable to continue their studies. It demands reworking to cover the missed sessions and interrupts their academic performance.

Moreover, several technical issues including hardware and software related problems such as ownership issues, software updates and extension requirements, storage limitations, faults and break-downs, security issues are demanding the technical know-how to sort them out on time. Thus, trouble-shooting is a competency that an undergraduate should possess to solve technical issues and errors. As per the responses, lack of technical literacy and trouble-shooting skills have become an obstacle for undergraduates to resolve the technical issues on time.

4.2 Absence of conducive learning environment

The effectiveness of online learning is greatly determined by self-directed learning rather than the teacher-guided method. Hence, a learner has to prepare a favourable learning environment to reap the benefits. However, according to the undergraduates revealed it is difficult to learn from their homes. The surrounding must be noise-free and have fewer disruptions. Conversely, a home environment for all learners is not supportive of online learning. According to the respondents, they have to deal with external disturbances and manage

interactions with family members while participating in online lectures. It is hard to focus and retain the attention for online lectures.

Apart from the external disturbances, the undergraduates are unable to keep interactions with their peers like in a traditional classroom. Although the online learning platforms enable some features for live interactions, respondents revealed that there were minimal interactions between the lecturer and undergraduates and peers during an online lecture. In the physical classroom, a variety of interactions among learners and lecturers could be observed. As per their opinion, such interactions do motivate them to engage in learning.

“In the physical classroom, we have a different learning which is not felt in online classes” (Respondent 23)

“Though the physical classroom has more interactions, it is more focused than online class” (Respondent 15)

Also, the undergraduates have to continue their studies from home and, they cannot meet their friends to discuss, learn and share. It is more of a solo engagement, which needs higher self-motivation to actively engage in the learning process. Learn from home demands for self-motivation to actively engage in the learning process.

Further, in the absence of meaningful non-verbal communication via online learning, undergraduates explained that their attention deviates often. And they were not able to take down notes as required. Also, this online learning has limited the connectivity between the teacher and learner.

“Even without other disturbances from the environment, I can’t take lecture notes properly due to losing my attention many times during the online class.” (Respondent 11)

Sometimes prevailing bad weather conditions of the country also caused severe obstacles for the online classes for undergraduates. At the time of data collection for this study, there was a rainy season in the country and many disturbances happened due to bad weather conditions. Heavy rain with thunder and storms which caused damages to the power lines and connection was frequently interrupted. As to prevent the damages happening from lightning and thunder, undergraduates have to disconnect all the electric equipment which often took them away from online lectures. When the rain continued for days, there were flooding, land sliding and many other calamities occurred in some areas where the online learning activities were badly affected. As a result, undergraduates were unable to participate regularly in online lectures.

“Some connection problems happen and because of bad weather conditions, I did not join to the lectures on that day”

(Respondent 20)

4.3 Financial Burden

One of the primary requirements for online learning is having a device with internet access. It might be a smartphone or a new generation computer. Undergraduates have to bear device purchasing and maintenance costs, data charges and electricity charges when they engage in online learning. Due to the huge demand for devices, delays in importation during the pandemic period and price hikes, purchasing costs of such devices are at a higher price, which an average or poor family is not able to afford that cost at once. Since the majority of the

undergraduates belong to average or poor families, they are facing difficulties when purchasing and maintaining such devices.

In addition to the device cost, undergraduates also have to incur the cost of internet services. To access uninterrupted internet access, the financial burden of online learning has doubled for them. Sri Lanka does not have free internet access or nationwide coverage. Therefore only those who pay would get internet access, which forces the undergraduates to use data packages offered by the mobile service providers for prepaid or postpaid mobile or Wi-Fi connections.

4.4 Issues Encountered from Lecturers

The undergraduates were concerned about the issues encountered by lecturers in the online learning process such as scheduled time of the lectures, online lecture delivery speed and audio and video quality. The majority pointed out that it is hard to concentrate during lengthy lecture hours without a break. Undergraduates suggested having morning lecture sessions than evening sessions and a break if the lecture is scheduled for more than 1.5 to 2 hours. Other than that, the speedy delivery of online lectures made undergraduates worried about grasping subject knowledge, taking down notes, and inability to meet the lecturer face to face for clarifications.

“The delivery of the lecture is very speedy and difficult to catch up” (Respondent 11)

“Some lectures are conducting the lecture in a very fast manner” (Respondent 07)

Further, the audio and video quality from the lecturer’s end has a greater impact on offering an effective online learning experience for undergraduates. The noises from the lecturer’s end cause audible difficulties for undergraduates. In addition, lecturers are required to upload the recorded lecture so that those who are unable to join the lectures can refer to that later. However, it was found that when uploading the lecture recordings, there are some missing parts in the lecture. This has become an issue for the undergraduates who refer to the lecture recording when studying.

“Sometimes online recordings are incomplete because some parts are missing in the video. Also, external noises in the recording make it irritating to listen”

(Respondent 30)

4.5 Pedagogical issues

Whenever there are online real-time assessments and presentations, undergraduates stated that they often lose marks due to connectivity issues, which lead them to stress and anxiety. They are not comfortable during the presentations or online assessments as they are unsure about the internet connection and other potential interruptions. Even if everything goes according to the plan, there may still be disruptions due to unexpected guests at home or by the surrounding noises. As a result, undergraduates have to be on alert whenever they are participating in real-time online assessments, which keep them under very stressful conditions.

“It is unfair to have online assessments for some subjects amidst all sorts of online learning difficulties. It is definitely affect the final grading of the student”

(Respondent 23)

The undergraduates in the study perceived that online learning is very ineffective for

quantitative/ analytical subjects. As management undergraduates, they are supposed to take compulsory quantitative subjects such as business mathematics and statistics, which are useful for doing research/project components in their degree programmes. However, learning quantitative subjects online does not provide a better understanding of the subject, not clear the numbers and signs displayed in the online screen, less opportunity to get clarified unclear points, led to failing such subjects. Some stated that when learning quantitative subjects online, they were unable to do the required calculations fast, which left them lagging.

"Online learning is not appropriate to study quantitative/analytical subjects such as mathematics and statistics. We missed important lessons largely." (Respondent 14)

"Quantitative subjects were really difficult to learn since some calculations are doing for the very first time" (Respondent 22)

Further, undergraduates have expressed that they are uncomfortable with long-hour online lectures, as they have to participate in more than one lecture per day.

"It is difficult to connect online lectures for more than 2 hours" (Respondent 02)

"Some were boring because of the time slots and the duration of 2 to 3 hours per lecture" (Respondent 13)

4.6 Personal Issues

Online learning methods created not only academic-related issues. But also lead to having some personal issues, which is a serious consideration among undergraduates. Under the normal conditions, starting from the very first day at their university, undergraduates practiced learning as groups. But with the new normal conditions, they had to restrict education only to home. They have to engage in isolated learning, which was less energetic compared to their previous experiences. They have to pay more attention to catch up with the lecture, and the long-hour lectures were hard to concentrate on. Due to the deviation from the traditional learning environment, many undergraduates stated that sitting on a chair and seeing on the screen constantly feeling sleepy, bored or fed up during online lecture sessions.

Also, few undergraduates have found it very difficult to engage with online lectures as they have some health issues. Those are adversely affecting their online learning experience. For them, online learning was exhausting.

"I'm suffering from migraine, so it's difficult for me to use headphones for more than 15 minutes. I can somehow manage one lecture. But when there are subsequent lectures during the day, I am not in a position to handle it. I end up being nauseous" (Respondent 23)

Few other undergraduates missed their lectures sometimes due to family commitments. Some were helping their parents with their cultivations. And some have to extend their support for domestic chores while staying at home, which disturbs their academic concentration.

"When you are at home, you need to attend domestic work and help other works. Sometimes supporting the family being the family driver" (Respondent 28)

The above findings indicated the numerous problems faced by undergraduates while undergoing the online learning experience. All those problems are summed up in the table below.

Table 1: Thematic table on problems faced by undergraduates in online leaning

Research Objective	Themes	Sub Themes
Problems faced by undergraduates in online learning	Technical issues	Internet connectivity issues
		Mobile service issues
		Unavailability of devices
		Frequent power cuts or failures
		Trouble shooting
	Absence of conducive learning environment	External disruptions
		Less peer interactions
		Minimal interaction with lecturer
		Absence of non-verbal communication
		Weather conditions
	Financial burden	Purchase of required devices
		Internet service subscriptions
		Other supplementary expenses
	Issues encountered from Lecturers	Speedy delivery of the content
		Non-concern about break in between
		Unavailability of meet-ups beyond lecture time
		Poor audio and video quality
		Unavailability of complete content in recordings
	Pedagogical issues	Long hour lectures
		Assessment methods
		Delivery of quantitative/analytical courses
	Personal issues	Boredom and tiredness
		Difficulties in retaining attention for long hours
		Feeling isolated
		Stress and other health issues
		Family related commitments

When comparing the findings of this study with the existing empirical literature, it was found that many researchers have confirmed the similar problems undergone by the students in online learning. Islam et al. (2015) and Bonfield et al. (2020) have identified technical challenges, student characteristics, learning environment and instructor characteristics as the main problems faced by the students when engaging in online learning. The same has been emphasized by the undergraduates considered in the study under the themes of technical challenges, personal issues, no learning environment and problems encountered from the lecturers.

Under the technical issues, access to technology was considered as one of the main factors of effective online learning by Bryson & Andres (2020) and in this study, undergraduates confirmed that they are facing challenges due to no or less access to the internet and technology. The undergraduates in the study have mentioned that connectivity issues, frequent power cuts and unavailability of proper devices have minimized their access to technology, which exclude them from effective participation in the online learning process. Similarly, Dhawan (2020) also stated that downloading errors, issues with installation, login problems, problems with audio and video are major issues faced by students when studying online.

In this study, under personal issues undergraduates have stated that feeling sleepy, boredom, tiredness during online learning, made them difficult to retain attention during the lecture. However, retaining personal attention was identified as an important element by Dhawan (2020). According to Islam et al. (2015), students learn through interacting, through visual presentation, by listening to instructions and using written notes. Paulsen & McCormick (2020) have also identified learning style which affects online learning. The change of the mode of education to online have influenced the most familiar styles of learning, and as a result, undergraduates in this study pointed out that they faced difficulties when learning quantitative subjects. The reasons may be this change of learning style and their inability to retain attention in the online platform.

Many scholars have identified the issues relating to the learning environment as a key problem in online learning, which was confirmed by our study too. Singh & Thurman, (2019) have identified the importance of interact with instructors and other students. This requires attending live lectures, engaging in real-time interactions between educators and learners, and obtaining instant feedback, however, undergraduates of this study were not able to do due to the interruptions caused by the cost of online learning and connectivity issues. According to this study, no interactions, external disturbances, inability to make effective non-verbal communication have been identified as barriers to a conducive learning environment.

According to the literature, instructor characteristics also determine the success of online learning. As Tichavsky et al. (2015) and Jo et al. (2020) stated, the instructor's role is crucial in online education. This was confirmed through the findings of this study as well. Undergraduates pointed out that the problems encounter by the lecturers as a major issue in online learning. Speedy lectures and lengthy lectures, poor audio-video quality of the lecturer's send have reduced the amount of interaction and understanding of the undergraduates.

In addition to that, there was literature suggesting the cost embedded with online learning as a problematic factor in online learning. OECD, (2020) report stated that students from low-income backgrounds undergo many difficulties due to the cost involved in learning technologies. It was reflected by the current study too as device and accessories purchasing

cost and internet subscription in online learning, which consumes a huge proportion for a low-income family.

Apart from the above, the undergraduates in this study have revealed few more concerns relating to online learning including issues with online real-time assessments and issues due to bad weather conditions. Issues arising from online real-time assessments which the majority of undergraduates are suffering from mainly due to the poor connectivity problems caused by lower internet coverage in the country or strength of the technical devices used by the students. Probably they may not have financial comfort to go for expensive devices considering their family income. Further, the impact of bad weather conditions can be considered as a contextual matter that is occurring in the monsoon season. Health issues and family commitments have also been identified under the theme of personal issues, which the referred literature has not mentioned. All those problems stated in the study caused the undergraduates to feel that online learning experience is stressful and uncomfortable, especially during a pandemic period. Yet, the ultimate purpose of learning is to develop a competent individual both physically and mentally.

5. Conclusion

The transition from traditional physical learning mode to online learning method due to the COVID-19 pandemic created drastic changes in the education sector in Sri Lanka. Therefore, this study intends to explore problems faced by undergraduates in online learning in a national university in Sri Lanka by gathering data from undergraduates. The findings revealed that undergraduates in the selected national university are facing different types of problems due to the online learning method. They are technical issues, absence of conducive learning environment, financial burden, issues encountered by lecturers, pedagogical issues, and personal issues. Considering the nature and ramifications of problems identified in the study, it would not suggest the higher education institutes continue the online learning method without providing sustainable solutions for those issues emphasized by undergraduates. Otherwise, it would create a huge inequity in access to education and an inevitable knowledge gap among the current generation who are pursuing studies online. Therefore, this study provides useful implications for both the education policy formulators and higher education institutions for the improvement of their online learning methods. Since Sri Lanka is implementing a free education policy up to the university level, the policy makers are required to reconsider the equity aspect in adapting island-wide online education. Also, higher education institutions are needed to concern about the appropriate delivery methods and diversity in skills among undergraduates to grasp the knowledge given through online education.

References

- Bonfield, C.A., Salter, M., Longmuir, A., Benson, M., & Adachi, C. (2020). Transformation or evolution?: Education 4.0, teaching and learning in the digital age. *Higher Education Pedagogies*, 05(01), 223-246, DOI: 10.1080/23752696.2020.1816847
- Braun V, & Clarke V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2) 77-101.
- Bryson, J.R., & Andres, L. (2020). COVID-19 and rapid adoption and improvisation of online teaching: curating resources for extensive versus intensive online learning experiences, *Journal of Geography in Higher Education*, 44(04), 608-623,

DOI:10.1080/03098265.2020.1807478

Carliner, S. (2004). *An overview of online learning* (2nd ed.). Armherst, MA: Human Resource Development Press.

Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems*, 49(01) 5–22.

Hayashi, R., Garcia, M., Maddawin, A., & Hewagamage, K. P. (2020, September). Online learning in Sri Lanka's higher education institutions during the COVID-19 pandemic. *ADB Briefs*, 151

Hicks, A.B., Goodman, J., & Mulhern, C. (2021). Inequality in household adaptation to schooling shocks: Covid-induced online learning engagement in real time. *Journal of Public Economics*, 193(01), DOI: 10.1016/j.jpubeco.2020.104345

Hiltz, S.R. & Turoff, M. (2005). Education goes digital: The evolution of online learning and the revolution in higher education. *Communications of the ACM*, 48(10), 59-64

Holley, D. (2002). Which room is the virtual seminar in please? *Education and Training*, 44(3), 112-121.

Macharia, J. K., & Pelser, T. G. (2012). Key factors that influence the diffusion and infusion of information and communication technologies in Kenyan higher education. *Studies in Higher Education*, 1-15.

Moore, J.L., Deane, C.D., & Galyen, K. (2011). E-learning, online learning, and distance learning environments: Are they the same? *Internet and Higher Education*, 14(01), 129–135.

OECD. (2020). *The impact of COVID-19 on student equity and inclusion: Supporting vulnerable students during school closures and school re-openings*. OECD Policy Responses to Coronavirus (COVID-19).

Paulsen, J., & McCormick, A.C. (2020). Reassessing disparities in online learner student engagement in higher education. *Educational Researcher*, 49(01), 20-29.

Rameez, A., Fowsar, M. A. M., & Lumna, N. (2020). Impact of COVID-19 on higher education sectors in Sri Lanka: A study based on South Eastern University of Sri Lanka. *Journal of Educational and Social Research*, 10(6), 341-349.

Singh, V., & Thurman, A. (2019). How many ways can we define online learning? A systematic literature review of definitions of online learning (1988-2018). *American Journal of Distance Education*, 33(4), 289–306.

Spector, J. M., Merrill, M. D., Merrienboer, J. V., & Driscoll, M. P. (2008). *Handbook of research on educational communications and technology* (3rd ed.). New York, London: Lawrence Erlbaum Associates.

Tichavsky, L.P., Hunt, A.N., Driscoll, A., & Jicha, K. (2015). “It’s just nice having a real teacher”: Student perceptions of online versus face-to-face instruction. *International Journal for the Scholarship of Teaching and Learning*, 09(02), 02, DOI: 10.20429/ijstl.2015.090202

UNESCO. (2020). *Global monitoring of school closures caused by COVID-19*. Retrieved from <https://en.unesco.org/covid19/educationresponse>

UNESCO. (2021, May 21). *Education: From disruption to recovery*. Retrieved May 21, 2021,

from UNESCO: <https://en.unesco.org/covid19/educationresponse#schoolclosures>

United Nations Organization. (2020). *Sustainable Development Goals*. Retrieved November 19, 2020, from United Nations: <https://www.un.org/sustainabledevelopment/education/>

United Nations. (2020). *Policy Brief: Education during COVID-19 and beyond*. New York.

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>)

Perceived Influence of Socio-Economic Infrastructure on Vocational Skills Acquisition and Practice Among Youths in Bonny Local Government Area

Nnodim, A.U. & Allison, Matilda T.

Department of Vocational and Technology Education, Rivers State University, Port Harcourt, Nigeria

Email: ukachi68@gmail.com

Abstract

The study was conducted to investigate the perceived influence of socio-economic infrastructure on vocational skills acquisition and practice among rural youths in Bonny Local Government Area, Rivers State. Three objectives, three research questions and three hypotheses guided the study. The total population of the study was 78,373 rural youths while the sample size was 398 youths sampled from the population using Taro Yeman sample determination model. A structured questionnaire was used to gather data for the study. Data were analyzed using mean and standard deviation, while z-test was used to test the hypotheses at 0.05 level of significance. The findings revealed that youths in Bonny Local Government Area agreed that they were exposed to varied vocational skills training. Also, the respondents agreed that transportation influences their acquisition and practice of vocational skills, and finally, the youths agreed that electricity influences their vocational skills acquisition and practice amongst other. It was then recommended that government should provide more training centres for youths, employment should not be on paper and pen qualifications alone but also on skills acquisition related to the job areas.

Keywords: influence, socio-economic, infrastructure, vocation, skills, acquisition.

1. Introduction

Vocational skills acquisition and practice now has taken the centre stage in the social and economic development of a nation. In line with this statement, Lawal (2014) opined that for a country to advance socially, economically and technologically, its citizens must be creative and productive, with a majority becoming job creators rather than job seekers, Lawal therefore concluded by emphasizing that optimum attention and recognition must be given to vocational and technical education in Nigeria, if the country would attain great achievements. According to a report by Industrial Training Fund (2014), the acquisition of relevant skills by citizens of nations is stressed as one of the critical factors for industrial and by extension economic development. Igwe and Oragwu (2014) stated that vocational skills acquisition provides the strategies for the effective training of individual in various skills areas. Igwe and Oragwu further stated that vocational skills are knowledge indices and attitudinal development of potential abilities to perform a given task according to specification. Gaiba (2010) confirmed that vocational skills contribute greatly towards creating new jobs, wealth, poverty eradication and income generation for both Government and individuals, especially those in rural areas. Through vocational skills, a pool of people such as rural youths could be equipped with skills and technical knowledge on how to manage small and medium scale industries.

Skill is observable competence to perform a learned behavior regarding the relationship between mental activity and body movements (Thomas & Amaechi, 2016). This means that to possess a skill is to demonstrate that habit of acting, thinking and behaving in a specific activity,

in such a way that the process becomes natural to the individual through repetition. Skill could be seen as a kind of education acquired without emphasis on white collar jobs, while acquisition according to Thomas and Amaechi is the act of setting new knowledge and skills that can be transferable from one person to another. Ezeji and Okorie in Anaele (2018) noting the importance of skills acquisition in national development averred that the nation's socio-economic problems will be ameliorated when people are given adequate vocational skill. Vocation as defined by Anaele (2018) is an occupation or trade which is practiced by an individual in order to earn a living. While vocational skills is defined by Ojingwa (2018) as the process of making superlative output and the general characteristics of one's behavior in a given field. Vocational skills are skills that focuses on specific trade with a hands-on approach, in areas such as agriculture, health or construction as well as general employment skills (Revermann, 2015). Human Capital Theory in Inyang and Agwadu (2017) best explains vocational skills acquisition as the sure therapy to check raging poverty as well as stimulate rapid socio-economic development of the rural poor.

Kabiru (2016) defined infrastructure as the basic facilities that are essential for the development of a nation. Kabiru described infrastructure as the final consumption item by households and as intermediate consumption item for firms. World Development Report in Goel (2002) categorized infrastructure into economic and social infrastructure. Economic infrastructure according to World Development Report includes services such as electricity, transportation, water system, communication, irrigation, energy, financial institution amongst others while social infrastructure includes services such as hospitals, schools, housing, correctional facilities amongst others. Availability of infrastructures be it social or economic according to World Bank Report in Goel (2002) significantly influences development, especially in rural communities. Also, infrastructure provision enhances the production and distribution network of key sectors in the economy as well as promotes overall economic growth.

International Labour Organization in Nwafor (2018) described youth as an individual with full life promise, energy and aspiration between childhood and adulthood. Youths need to develop and acquire necessary skills to enable them meet the challenges of particular jobs, aspirations as well as prepare for higher responsibilities and for future needs. Okoye (2017) noted that the solution to youth unemployment in Nigeria is vocational skills acquisition and practice. When youths are skillful in life, the chances of associating themselves with social vices will not be there. Dada (2007) states that practical work contributes in molding the mind of youths. According to Ekesionye and Okolo (2012), youth empowerment and their full participation is the basis of equity in all spheres of society such as access to power, land, credit are fundamental for the achievement of equality, peace and societal development. Empowerment of youths could mean encouraging youths to be self-reliant, economically independent, having positive self-esteem, generating confidence to face any difficult situation and incite active participation in various socio-economic and political endeavors. The benefits derived from any empowerment programme must not only be relevant to the needs of the intended beneficiaries but efforts must be made to ensure the target population is also able to retain the benefits which is particularly significant to youths.

2. Literature Review

The contribution of youth to national development has been acknowledged, as they form bulk of the labour force required in all sectors of the economy. However, this contribution could only be possible if the youths acquire the necessary skills, through vocational training to fit in

properly in the job vocations or alternatively become self-reliant and employers of labour. Advocates of skills acquisition believed that it would reduce joblessness and unemployment which majority of them are experiencing. Regrettably, the youths appear not interested, hinging their argument on lack of social infrastructure as a catalyst in skills acquisition and making use of the skills acquired. They complained lack of electricity, good transportation among others. The question is, are social infrastructure critical to vocational skill acquisition and practice? An attempt to answer this question makes a study of this nature necessary.

The main purpose of the study is to examine the perceived influence of socio-economic infrastructure on vocational skills acquisition and practice among rural youths in Bonny Local Government Area. The study intends to: (1) Identify the vocational skills extended to Bonny Youths in Bonny Local Government Area; (2) Determine the influence of transportation on vocational skills acquisition and practice among youths in Bonny Local Government Area; (3) Determine the influence of electricity on vocational skills acquisition and practice among youths in Bonny Local Government Area; (4) Determine the influence of market on vocational skills acquisition and practice among youths in Bonny Local Government Area.

The following null hypotheses were postulated and tested at 0.05 level of significance.

1. There is no significant difference in the mean responses of male and female youths on the vocational skills extended to them in Bonny Local Government Area
2. There is no significant difference in the mean responses of male and female youths on the influence of transportation on their vocational skills acquisition and practice in Bonny Local Government Area
3. There is no significant difference in the mean responses of male and female youths on the influence of electricity on their vocational skills acquisition and practice in Bonny Local Government Area

3. Research Method

The study adopted a descriptive survey research design. The population of the study consist of all rural youths in the 34 chieftaincy houses that made up Bonny Local Government Area which according to the National Bureau of Statistics (2006) is a total of 78,373. The sample size was 398 youths sampled from the population using Taro Yamen sample determination model. To select sample, multi-stage sampling techniques was adopted. Firstly, Bonny Local Government Area was clustered into 34 chieftaincy houses. Secondly, 11 burusus were randomly sampled from each chieftaincy house giving a total of 374 burusus. Thirdly, 1 respondent was selected from each burusu giving a total of 374 burusus while an addition of 24 respondents were selected from the major houses giving a total sample size of 398 used for the study. The instrument used for the research was a structured questionnaire designed to elicit responses to answer the research questions. A Likert five point rating scale of High Influence (HI), Moderate Influence (MI), Undecided (U), Low Influence (LL), Very Low Influence (VLI) was used for the research questions. In order to validate the instrument, the questionnaire was given to three experts who extensively carried out face and content validity relating to the appropriateness of the content of the questionnaire which was used for the study. In order to establish the reliability of the instrument, the validated instrument was tested using 30 respondents (rural youths) selected from non Ibani (Bonny) speaking area. Data collected were analyzed using Cronbach Alpha to determine the internal consistency of the items. This gave the overall reliability co-efficient value of 0.70 for the instrument indicating that the instrument is reliable and therefore appropriate for the study. The instruments were personally administered to the respondents

alongside two other trained research assistants. Mean and standard deviation were used to answer the research questions while z-test was used to test the hypotheses at 0.05 level of significance. Mean values less than 3.00 was rejected while mean values greater than or equal to 3.00 was accepted. The data were analyzed with the aid of SPSS 20.0 version and excel software.

4. Findings and Discussions

The findings in research question 1 revealed that the male and female youths in Bonny Local Government Area believe there are vocational skills extended to them, such as provision of quality catering services, welding, hair dressing, dress making, pipe fitting, soap making, sandblasting & spray painting, out-sourced business services, bead making, electrical & instrumentation, decoration of wedding venue and shoe making.

Also result in hypothesis one indicates that there is no significant difference in the mean responses of male and female on the vocational skills extended to them in Bonny Local Government Area. The findings is in agreement with Okwelle and Deebom (2017) who in their study noted that youths are fully aware that there is vocational skills training as well as its benefits in national development.

From the finding in research question 2, all the respondents agreed that transportation influences their vocational skills acquisition and practice in Bonny Local Government Area.

The hypothesis testing in research question 2 equally indicates that there is no significant difference in the mean responses of male and female youths on the influence of transportation on their vocational skills acquisition and practice in Bonny Local Government Area. The findings is in line with Aminu (2015) who noted that adequate rural roads could influence socio-economic development such as transportation in rural areas.

Respondents from the findings in research question 3 agreed that electricity influences their vocational skills acquisition and practice in the study area.

The hypothesis testing in research question 3 showed that there is no significant difference in the mean responses of male and female youths on influence of electricity on their vocational skills acquisition and practice in Bonny Local Government Area. The findings is in agreement with Foluke (nd) who in her study noted that vocational skills acquisition programmes are designed to enhance the skills and knowledge of youths for immediate employment whether in the private or public sector or be self employed. Similarly, Omotara (2012) argued that rural development would only be possible when physical inputs like electricity are provided in the areas concerned.

Respondents from the findings in research question 4 agreed that market influences their vocational skills acquisition and practice in the study area. The findings agreed with those of Ambakaderemo & Kalu (2018) who noted that markets help in the enhancement of vocational skills acquisition and practice by bringing together people of divergent culture and religion for social interaction as well as promoting inter-communal harmony which by extension promotes peace and development.

Table 1. z test of difference between male and female youths on the vocational skills Extended to Bonny youths in Bonny Local Government Area.

Rural Youths	N	M	SD	df	Z-cal	Z-crit	Remark
Male		214	2.98	0.88			
					396	2.00	1.96 Accepted
Female		184	2.89	1.09			

Table 1 revealed that there is no significant difference in the mean responses of male and female youths on the influence of electricity on their vocational skills acquisition and practice in Bonny Local Government Area. The calculated Z value of 1.00 is less than the Z critical of 1.96 at 0.05 level of significance leading to the acceptance of the hypothesis.

H02: There is no significant difference in the mean responses of male and female youths on the influence of transportation on their vocational skills acquisition and practice in Bonny Local Government Area.

Tablen 2. z-test difference between male and female youths on the influence of transportation on their vocational skills acquisition and practice in Bonny Local Government Area.

Rural Youths	N	M	SD	df	Z-cal	Z-crit	Remark
Male		214	2.96	0.79			
					396	2.00	1.96 Accepted
Female		184	2.84	1.05			

Table 2 showed that there is no significant difference in the mean responses of male and female youth on the influence of transportation on their vocational skills acquisition and practice in Bonny Local Government Area. The Calculated Z value of 1.00 is less than the Z critical of 1.96 leading to the acceptance of the hypothesis.

Ho3: There is no significant difference in the mean responses of male and female youths on the influence of education on their vocational skills acquisition and practice in Bonny Local Government Area.

Table 3. z-test difference between male and female youths on the influence of electricity on their vocational skills acquisition and practice in Bonny Local Government Area.

Rural Youths	N	M	SD	df	Z-cal	Z-crit	Remark
Male		214	2.93	1.06			
					396	2.00	1.96 Accept
Female		184	2.83	1.11			

Table 3 revealed that there is a significant difference in the mean responses of male and female youths on the influence of electricity on their vocational skills acquisition and practice in Bonny Local Government Area. The Z calculated value of 2.00 is greater than the Z critical of 1.96 at 0.05 level of significance leading to acceptance of the hypothesis.

5. Conclusion

From the findings, it was deduced that male and female youths in Bonny Local Government Area agreed that there are vocational skills training in Bonny Local Government Area,. findings

also revealed that youths in Bonny Local Government Area agreed that transportation influences their acquisition of vocational skills. Similarly, findings, revealed that electricity influences vocational skills acquisition and practice among youths in Bonny Local Government Area, finally, youths in Bonny Local Government Area agreed that market influences their vocational skills acquisition and practice.

References

- Ambakaderemo, B., & Kalu, E. (2018). Rural Markets and Nigeria's Economic Development: A Case Study of Selected Markets in Bayelsa State. *International Journal of Advanced Academic Research, Social and Management Sciences* 4 (4),16-28.
- Aminu, A. A. (2015). Influence of Rural Roads on the Patronage of Rural Markets in Kadau Local Government Area, Kaduna State. unpublished Dissertation, Ahmadu Bello University Zaria, Nigeria.
- Anaele, E. O. (2018). Vocational Skills Acquisition Leveraging: Unemployment, Social Vices, Insecurity and Technological Retardation for Sustainable Development in Nigeria. Book Of Proceedings for 3rd Annual Conference of the Faculty of Vocational & Technology Education, Ignatius Ajuru University of Education, Rumuolumini, Port Harcourt.
- Dada, J. (2007). Small-Scale Business Enterprises Available in Clothing and Textile Education For Economic Empowerment of the Family. *Journal of Home Economics Research*, 8,174-175.
- Foluke, F. (nd). Effectiveness of Vocational Skills Acquisition Programme on Women Empowerment: National Open University of Nigeria as Case Study. National Open University of Lagos.
- Goel, D. (2002). Impact of Infrastructure on Productivity: Case of Indian Registered Manufacturing: Shri Ram College of Commerce. *Working Paper No. 106*.
- Igwe, E. B. & Oragwu, A. A. (2014). Techo-Vocational Sills Acquisition and Poverty Reduction Strategies on Vocational Institutions; the case of Rivers State. *African Journal of Educational Technology*, 4(1), 47-5.
- Industrial Training Fund (2014). *An Appraisal of Skill Acquisition Centres in Nigeria*. Jos. Research & Curriculum Development Department.
- Inyang, M. N. & Agwadu, D. K. (2017). Empowering the Rural Poor through Vocational Skills Acquisition: Nasarawa State in Focus. *International Journal of Development And Sustainability*, 6(3),115-129.
- Kabiru, S. A. (2016). Socio-Economic Infrastructure and National Development: An Analytical Assessment from Nigerian Perspective. *Journal of Humanities and Social Sciences*, 21(10),36-42.
- Lawal, A. W. (2014). Teachers and Vocational Education, A Tool for National Development in Nigeria. *International Journal of Social and Humanities Sciences*, 14(1), 53-59.
- Nwafor, S. (2018). Vocational Skills Acquisition in Agriculture Leveraging: Unemployment, Social Vices, Food Insecurity and Technological Retardation for Sustainable Development in Nigeria. Book of Proceedings for 3rd Annual Conference of the Faculty Of Vocational & Technical Education, Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt.
- Ojingwa, A. (2018). Vocational Skills Acquisition in Technical learning. Unemployment, Social Vices, Food Insecurity and Technological Development in Nigeria. Book of Proceedings For 3rd Annual Conference of the Faculty of Vocational and Technical Education, Ignatius Ajuru University of Education, Port Harcourt.
- Okoye, A. C. (2017). Entrepreneurship Education: A Panacea for Graduate Unemployment in Nigeria. *Online Journal of Arts, Management & Social Sciences*, 2(1).

Okwelle, P. & Deebom, T. M. (2017). Technical Vocational Education and Training as a Tool for Sustainable Empowerment of Youths in Niger Delta, Nigeria. *International Journal of Innovative Studies & Science Education Research*, 5(1),29-38.

Omotara, O.A. (2012). Effect of Rural Infrastructure on Social Well-being of Farmers in Ifedayo Local Government Area of Osun State. Nigeria. *Nigerian Journal of Rural Sociology* 13(2), 55-62.

Revermann, S. (2015). What is the Difference Between Vocational & Technical Courses? Education by Demand Media. Retrieved on 7th November 2019 from <http://education.seattlepi.com/difference.between.vocational-technical-courses-3063.html>.

Thomas, C. G. & Amaechi, O. (2016). The Relevance of Technical and Vocational Skills Acquisition Programme in the Development and Empowerment of Rural Youths in Niger Delta Region, Nigeria. *Journal of Scientific and Engineering Research* 3(6),473-478.

Zayyard, M. (2018). So, Nigeria is World's Poverty Capital? Vanguard Newspaper, July 2, 2018. Retrieved from <http://www.vanguardngr.com/2018/06/nigeria-overtakes-india-as-Worlds-poverty-capital-report>.

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>)

How Demographic Features and Attitudes of Student Affect the Mathematics Performance of Students?

(With special reference to the Ordinary Level Students in Ratnapura Educational Zone in Sri Lanka)

H. V. R. G. Hathella* and H. M. S. Priyanath

Department of Economics and Statistics, Sabaragamuwa University of Sri Lanka, Belihuloya, Sri Lanka.

*Corresponding Author: ruwandihathella@gmail.com

Abstract

The present study attempts to examine the effect of demographic characteristics and students' attitudes on the mathematics performance of Ordinary Level (OL) students in Sri Lanka. Data were collected from 110 students who sat for the 2019 OL examination, in Ratnapura Educational Zone in Sri Lanka. A structural questionnaire was used for data collection via a google form. ANOVA, t-tests, correlation tests, and descriptive statistics were employed for the data analyzing process. The results indicated that there are significant associations between mathematics performance and the demographic factors: residence, school type, parents' educational level, and father's occupation while the remaining factors; gender, mother's occupation, family income, and some family members didn't show significant relationships with mathematics performance. Results revealed a strong and significant association between mathematics performance and attitudes of students towards mathematics. Thus, the study provides empirical evidence which will support education officials, teachers, parents, and students to plan for achieving a higher performance of mathematics of OL students.

Keywords: Attitudes, Demographic Factors, Mathematics Performance.

1. Introduction

Mathematics is possible to develop students' ability to think over quantitative terms (Tahir, 2009). It also enhances skills such as analytical and problem-solving skills (Tahir, 2009). As stated by Ajisuksmo and Saputri (2017), mathematics is constructive in helping students to think and understand other areas of study and to be clever to think within logical, analytical, systematical, critical, and creative manners. Andamon and Tan (2018) claim that mathematics is quite important and useful for all every day as well as it is used to solve problems in areas such as astronomy, business, computer science, technology, economics, navigation, physics, including statistics. Mathematics especially equips students with a uniquely powerful set of tools including logical reasoning, problem-solving skills, as well as the ability to think in abstract ways, to understand and change the world. According to Michael (2015), almost all the learning students should be able to understand, make sense of, practice and apply mathematics. Mathematical competencies can give better chances of employability, higher wages, and higher on-the-job productivity when the individual is employed (Geary & Hamson, 2000). Hence, during the last two decades or so there has been increased interest in the role of detecting affective factors in the learning of mathematics (Grootenboer & Hemmings, 2007). Ismail and Awang (2007) also declare that mathematics learning and students' performance in mathematics receive considerable attention from teachers, parents, governments, educational institutions and it is, therefore, important to identify and recognize the factors that could influence students' mathematics performance.

In the Sri Lankan context, the education curriculum includes mathematics as a compulsory subject that every student has to go through in their education path starting from primary

education to secondary education. General Certificate of Ordinary Level (GCE OL) education is a major national examination that helps to select students for General Certificate of Advanced Level (GCE AL) education. There, the students who obtain a pass for Mathematics will have the chance to gain further education till the next national examination, General Certificate of Education (Advanced Level) which is the final examination of a student in his/her school life. Those who fail in the subject have to give up their schooling. However, they have one more chance to sit for Mathematics where the same rule is applied on getting passed. For the reasons of mathematics being a core and compulsory subject, performance in Mathematics in GCE-OL is critical.

There has been an average pass percentage of 62% - 67% for mathematics in previous years (Nearly, 550,000 students sit for the OL examination in Sri Lanka per year). More than 33% of students who sit for OL fail in Mathematics. Therefore, it is important to be concerned about the leading factors that can cause this situation of low performances in mathematics (Kim-Choi, 2015). There is evidence to mention, demographic factors are the main concern affecting academic performance (Kim-Choi, 2015). Kim-Choi (2015) has endorsed that demographic factors are noted as high predictors of students' mathematics achievement. Demographic factors are often identified in terms of gender, age, high school, language spoken as well as parents' details regarding mathematics performance. According to White (2001) several demographic factors have been recognized related to mathematics achievement. She focused on gender, family structure, and parents' educational level. Although some studies are there relating to demographic factors and academic achievement (Vierra, 2014), only a very few studies have been done on demographic factors of students and mathematics performance. In pursuit of Ma and Kishor (1997), the variant 'attitude' is one of the most potent factors that relate to achievement. Unless on the demographic factors and mathematics performance, plenty of research has been conducted on attitude and mathematics achievement relationship. Those studies have been carried out for the most part in Western countries including the United States (Schenkel, 2009), and United Kingdom (Odell & Schumacher, 2010), and South-East Asian countries including Malaysia (Kargar, Tarmizi, & Bayat, 2010). However, scholars have not given adequate attention to study this issue and there is no adequate empirical evidence regarding how both of these factors; demographic factors plus attitudes affect mathematics performance and particularly in the Sri Lankan context. Therefore, this study attempted to explore how the demographic factors and attitudes affect the mathematics performance of OL students in Sri Lanka.

This study is timely and consequential at a national level because it provides evidence regarding a common issue related to students in the country. The paper is organized as follows; first, it reviews the literature on mathematics performance and its link with both demographic factors and attitudes. Based on the literature review, the hypotheses are formulated. Then the study describes the materials and related methods followed. Results are presented and discussed in the next section. Finally, the paper concludes by reviewing its findings, contributions, recommendations, limitations with providing directions for future research.

2. Literature Review

2.1 Demographic Factors

According to Chen and Wu (2009) the term 'demographic' literally means writing about people or studying population. Demographic factors are the specific information on people,

on the whole including information on age, gender, religion, income, race, and other data. Moreover, they explain that the relevance of data will depend on the study's field. Studying demographic factors is the statistical study of human populations regarding various factors and characteristics, including geographical distribution, sex and age distribution, size, structure, and growth trends (American Psychological Association, n.d.). Vierra (2014) defined demographic factors as, the factors which are used to describe the characteristics of an individual or a population; some commonly addressing demographic factors can be stated as race, age, income, marital status, and educational achievement among groups of people. A very simple exposition has been given to demographic factors by Global Educational publications (2020), as statistics dealing with human populations. Thus, including all the characteristics stressed in different definitions, demographic factors can be defined as certain features of populations including gender, nationality, education attainment, school type, residence, income level, and parental education that also can be studied statistically.

Gender refers to the characteristics of women, men, girls, and boys that are socially constructed together with norms, behaviors, and roles associated with being a female, male, girl, or boy, and also relationships with each other. Gender issues have been a rich area, and probably initiated interest in research on the effect of gender on mathematics learning. Results indicate that progress has been made in studies on mathematics achievement over the past twenty-five years while former gender differences appear to be eroding and changing, there continues to be a concern that mathematics achievement needs to improve (White, 2001). The residence is the place where someone lives (Aydin, Topal, Sahin, & Sahin, 2008). The category of school is considered as the school type. Studies in Sri Lanka also found large disparities in students' performance between the three types of public schools – 1AB, AC, and Type 2 (National Education Research and Evaluation Centre, 2015). Parents' education is the literacy of parents of a student. It is mostly referred to as "home education" and the education level of parents can affect a student's academic performance (Slaughter, 2007). Literature does not provide an exact definition of these terms. However, it can be defined as the main work or job undertaken by the father, mother. Family income, often called household income, is the income shared by people living in the same household. The family income, which is directly joined with the economic status is strongly inferred to be a predictor of mathematics operation and achievement (Saritas & Akdemir, 2009). The family structure is discussed under this; some persons live in the house (Lal, 2014).

2.2 Attitudes

Attitude lies related to a psychological tendency that is being expressed by evaluating a particular entity or status together with some degree of favor or disfavor/ interest or boredom (Mohamed & Waheed, 2011). Kruschler, Powell, and Cate (2019) simply define attitude as a condition associated with a mental object. It is a state of a person that predisposes a favorable or unfavorable response to an object, person, or idea (Olson & Zanna, 2013). However, Williams and Williams (2010) come up with a more descriptive annotation on attitude, "evaluation constitutes a central, perhaps predominant, aspect of attitudes, attitudes are presented in memory, and affective, cognitive, and behavioral antecedents of attitudes can be distinguished, as consequences of attitudes". When it comes to attitude towards mathematics, it is the students' mental dispositions and feelings toward mathematics achievement, as related to their attitude towards success in mathematics, confidence in learning mathematics, mathematics anxiety, the usefulness of mathematics, and reflectance motivation in mathematics (Alibraheim, 2019). Martino and Zan (2001) define mathematics attitude as the

disposition towards mathematics. Ajisuksmo and Saputri (2017) explain attitude for mathematics by way of emotional response either positive or negative associated with mathematics, confidence to succeed in studying mathematics, and strategies in coping with mathematical problems. Thus, with this memoir, attitude can be defined as feelings, beliefs, and emotions a student has towards mathematics, in a negative, positive or neutral way.

2.3 Mathematics Performance

Mathematics is important for child development because it is strongly associated with science, technology, engineering, and mathematics performance, college enrolment, and adulthood outcomes (Principles and standards for school mathematics, 2000). Thus, mathematics learning and students' activities in mathematics receive high attention from teachers as well as parents (Ismail & Awang, 2007). Michael (2015) defined mathematics performance as the accomplishment or achievement of specific goals and set of objectives in any academic undertaken in basic mathematics. Identification of relevant quantities, encoding into an internal representation, mental comparisons, and calculations is the performance in mathematics (Musso, Kyndt, Cascallar, & Dochy, 2012). The Program for International Student Assessment (PISA) (2020) states that mathematics performance is "the mathematical literacy to formulate, employ and interpret mathematics in a variety of contents to describe, predict and explain phenomena, recognizing the role that mathematics perform in the world". Pietsch, Walker, and Chapman (2003) define mathematics performance as the average scores of children for modules such as mathematics literacy and advanced mathematics scores. Summarizing the ideas of many authors, mathematics performance can be simply but smartly referred to as the student's mathematics-related ability as a subject.

Many studies have been conducted to investigate the impact of demographic factors and attitudes on the mathematics performance of students. Most of the researchers related to these facts pay attention to observing the relationship between demographic factors and mathematics performance, the relationship between attitudes and mathematics performance separately. Plural investigations try to combine various areas of demographic factors with mathematics performance. The studies have not observed the same results in the observations of attitude and mathematics performance. Most of the scholars study the attitudes and demographic factors, mathematics performance variables, but only a very few quests on the combined relationship between demographic factors, attitudes, and mathematics performance. Terzi and Kirilmazkaya (2020) study all these variables and their association. Their results were demographic factors: parental education, number of siblings, and preschool education directly affect mathematics performance while gender and computer ownership do not. According to that study, attitudes have a significant impact on mathematics performance.

3. Research Method

The research aims to observe whether there is an association of demographic factors and attitudes with the mathematics performance of O/L students. The reality of the outcome, whether there are significant relationships between the variables, cannot be predicted. This subjective relationship leads the reality to change constantly bringing out doubts. Some demographic factors and attitudes have chances of changing with time or with individuals. Thus, the research is identified as pragmatic. The outcome may be found in different viewpoints in different situations. In that manner, this cross-sectional study follows a mixed inquiry with a correlational design. The objective of this applied research can be pointed out as explanatory.

As mentioned above, the mixed method has been employed with a combination of both qualitative and quantitative forms to study the research problem. Primary data were used in the analysis to evaluate the hypotheses. The population of interest was the students who sat for the GCE-OL examination held in December 2019. As the population is dispersed over a wide geographic region, it was not feasible to conduct a sampling procedure covering the whole population. Therefore, the respective sample was selected with a multi-stage sampling procedure. Sabaragmuwa province was considered the first of the 9 provinces in Sri Lanka. Then Ratnapura district was selected. Then selected a simple random sample from the students who sat for Ordinary Level examination in 2019 that represented the Ratnapura Education Zone. It was decided to take 384 responses from over 15000 students in the area as the sample following the sample size determination table developed by Krejcie and Morgan in 1970. But, due to the prevailing COVID-19 situation in the country, the details of only 110 students could be obtained.

The data were collected in two forms: survey and case study. The survey was conducted with a questionnaire; a google form for the convenience of distribution. The questionnaire was developed using two step procedures. Initially, it was designed by carefully selected items reviewing literature for all dimensions in constructs. Then a pilot survey was conducted prior to the original questionnaire in order to identify whether the questionnaire is fitted to achieve the research problem, whether it is understood by the respondent as well as whether it is clear and accurate to gather relevant data. This process assisted in enhancing and confirming both the validity and reliability of data.

The dimensions of the independent variable demographic factors which were also suggested by the literature: 1=gender, 2=residence, 3=school type, 4=parents' highest education, 5=father's occupation, 6=mother's occupation, 7=monthly family income and 8=number of family members were employed. These were measured by asking eight questions covering all the aspects. T-tests and ANOVA tests were computed for observing the relationship the demographic factors had with the mathematics performance. The other independent variable, the attitude was determined by the Attitude towards Mathematics Indicator (ATMI) developed by Lim & Chapman (2013). ATMI is a forty-question, four-factor survey which has been specially designed for measuring attitude towards mathematics. The factor structure of the ATMI covers the domain of attitudes toward mathematics, providing evidence of content validity. The inventory is composed of four subscales. In this study, ATMI is shortened (SHORT ATMI) according to the need of the research, so it has 12 questions in total. Accordingly, the four sub-scales and their number of items are i) self-confidence in mathematics (3 items), ii) perceived value of mathematics (3 items), iii) mathematics enjoyment (3 items), and iv) mathematics motivation (3 items). The 12 variables on ATMI measure on the five-point Likert Scale were related to the students' attitudes towards mathematics.

Scores of attitudes towards mathematics are the total score of the four subscales in ATMI. The first domain describes students' self-esteem and self-concept on their mathematics ability, the second domain describes student's beliefs on usefulness, relevance, and value of mathematics in life, the third domain talks about the pleasure of students in learning mathematics and the final domain describes students' willingness to further study mathematics and interest towards mathematics. ATMI is a five-point Likert scale ranging from strongly disagree, disagree, neutral, agree to strongly agree. The students were asked to select their degree of agreement with the 12 statements. ATMI scores were taken by summing up the entire item contained in

ATMI subscales. The components in ATMI were tested especially for reliability because attitudes were tested in a Likert scale procedure. Chronbach's alpha statistic was used for that. The data were used for the analysis after the confirmation of reliability and consistency in data. In order to measure the study's dependent variable - the mathematics performance of students, the students' term tests marks were taken. Marks obtained for mathematics at the six school term tests (3 terms in grade 10, 3 terms in grade 11) were added together and obtained the average marks of each student.

ANOVA tests, T-tests, and Pearson correlation tests which are basic statistical tools were used to test the hypotheses. Those tests are designed for examining the correlations, effects and associations between variables. Descriptive statistics were used other than the above tests. The tests helped to investigate the correlations and significance of correlations between the independent variables: demographic factors, attitudes and the dependent variable, mathematics performance. The Statistical Package for Social Sciences (SPSS – 21) and Minitab (Version 17) were used to analyze data.

4. Findings and Discussions

Table 01 below shows demographic characteristics of students who participated in the study, in terms of gender, residence, school type, parents' highest education level, father's occupation, mother's occupation, monthly family income, and some family members. The percentage of girls in the sample is higher than boys. The percentage of students representing the three school types represents the national level composition of the criterion. At the national level, the percentage of students in the 1 AB school category is the highest.

Table 01. Demographic Characteristics of Students

Frequency			Percentage %
Gender	Female	54	70
	Male	38	41
Residence	Rural	64	70
	Urban	28	30
School Type	1 AB	85	92
	1 C	6	7
	Type 2	1	1
Parents' Highest Education	O/L or Below	28	30
	A/L	47	51
	Degree/ Higher Education	17	18
Father's Occupation	No Job	5	5
	Labor	29	32
	Government Sector	22	24

	Private Sector	21	23
	Business	15	16
Mother's Occupation	No Job	60	65
	Labor	4	4
	Government Sector	20	22
	Private Sector	3	3
	Business	5	5
Monthly Family Income	<= 35000	27	29
	35000 - 50000	24	26
	50000 - 75000	14	15
	75000 - 100000	9	10
	>= 10000	18	20
Number of Family Members	Less than 4	6	7
	4	46	50
	5	25	27
	More than 5	15	16

Source: Survey Data, 2021.

4.1 Gender and Mathematics Performance

To test if there was a significant difference in mathematics performance between males and females, the independent sample *t*-test was applied. Table 02 shows the results. As shown in the table, males' mathematics performance is higher than that of the girls. Here, the homogeneity of variances assumption was met as assessed by Levene's test of equality of variances, but the *p*-value ($>.05$) of the *t*-test was insignificant. Therefore, even though males are having higher performance than girls, there is no statistically significant difference in mathematics performance between males and females. The difference is slight.

Table 02. Two-sample T for Mathematics Performance

Gender	N	Mean	StDev	SE Mean
Female	54	71.5	21.7	3.0
Male	38	72.7	17.9	2.9
T-Value = -0.30 P-Value = 0.767				

4.2 Residence and Mathematics Performance

The independent sample *t*-test was run to see if there was a significant difference in students' performance in mathematics concerning the residence. The results are given in Table 03. Students living in urban areas have achieved a higher mathematics performance than those who are living in rural areas. The *t*-test confirms that the difference in mathematics performance between students living in urban areas and students living in rural areas is statistically significant.

Table 03. Two-sample T for Mathematics Performance

Residence	N	Mean	StDev	SE Mean
Rural	64	69.0	20.5	2.6
Urban	28	78.9	17.7	3.4
T-Value = -2.35 P-Value = 0.022				

School Type and Mathematics Performance: Students of 1AB schools outperformed their counterparts in both 1C and Type 2 schools. To find if there is a statistically significant difference in students' mathematics performance between the three school types, a one-way ANOVA was run. The results are presented in Table 04. The p-value of the test revealed that the difference between mathematics performance of students of Type 1AB, Type 1C, and Type 2 is significant ($<.05$).

Table 04. Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
School Type	2	4490	2245.1	6.18	0.003
Error	89	32357	363.6		
Total	91	36847			

Table 05 depicts the high performance of 1AB school category students when compared to the other school categories' students.

Table 05. Means

School Type	N	Mean
1 AB	85	73.90
1C	6	51.5
Type 2	1	31.33

4.3 Parents' Highest Education Level and Mathematics Performance

Table 06 clearly shows that parents' education levels appear to affect their children's mathematics ability. An ANOVA test was used to check whether the students' mathematics performance differs between their parents' education level; the highest education level of either mother or father

Table 06. Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Parents Highest Education					
	2	3488	1743.9	4.65	0.012
Error	90	33360	374.8		
Total	91	36847			

Further testing confirmed that the obtained differences were statistically significant. Tukey's Post Hoc test was applied to identify the pairs, which were significantly different from each other. Those pairs are shown in Table 07.

Table 07. Grouping Information Using the Tukey Method

Parents Highest Education	N	Mean	Grouping
Degree or Higher Education	17	83.08	A
Up to A/L	47	72.16	A B
Up to O/L or Grade 10/9	28	64.93	B

Statistically significant differences in mathematics performance were observed between students whose parents have gained education up to O/L and whose parents have completed degrees and had higher studies.

4.4 Father's Occupation and Mathematics Performance

To test how the differences can be seen between mathematics performances of students, according to their fathers' occupations an ANOVA test was run. Table 08 depicts the output. The p -value ($<.05$) of the ANOVA test indicated that there is a statistically significant difference between students' mathematics performance with related to their fathers' occupation.

Table 08. Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Occupation of Father	4	4038	1009.6	2.68	0.037
Error	87	32809	377.1		
Total	91	36847			

Tukey's test showed that a considerable difference is between the mathematics performance of children of the labor sector and government sector fathers. The statistics and results are shown in Table 9.

Table 9. Grouping Information Using the Tukey Method

Occupation of Father	N	Mean	Grouping
Government Sector	22	82.88	A
Private Sector	21	71.88	A B
Business	15	70.51	A B
No Job	5	67.6	A B
Laborer	29	65.29	B

4.5 Mother's Occupation and Mathematics Performance

To test the difference between students' mathematics performance and their mothers' occupation, an ANOVA test was used. The obtained results are illustrated below in Table 10. It depicts that the Mother's occupation is not significant enough to decide the children's mathematics ability and performance. The Tukey's test as shown in Table 11 also gives the relevant results as there are no differences between any group of students whose mothers are doing different types of occupations (or not doing any job).

Table 10. Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Occupation of Mother	4	1121	280.3	0.68	0.606
Error	87	35726	410.6		
Total	91	36847			

Table 11. Grouping Information Using the Tukey Method

Occupation of Mother	N	Mean	Grouping
Private Sector	3	77.4	A
Government Sector	20	76.93	A
No Job	60	71.10	A
Laborer	4	68.1	A
Business	5	62.63	A

4.6 Monthly Family Income and Mathematics Performance

An ANOVA test was used in order to test whether family income influences students' mathematics performance. This is the economic status of the students and their families. The

ANOVA test output as shown in Table 12 indicates that there is no statistically significant difference between the family income levels and mathematics performance of students.

Table 12. Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Monthly Family Income	4	2528	632.1	1.60	0.181
Error	87	34319	394.5		
Total	91	36847			

Table 13 shows that the mathematics performance of students of all income levels do not show significant differences. The mathematics performance cannot be predicted with the monthly family income of students.

Table 13. Grouping Information Using the Tukey Method

Monthly Family			
Income	N	Mean	Grouping
75000 - 100000	9	83.61	A
>= 100000	18	77.27	A
35000 - 50000	24	70.87	A
50000 - 75000	14	69.20	A
<= 35000	27	67.00	A

4.7 A number of Family members and Mathematics Performance

The number of family members sometimes can affect students' mathematics performances. To test whether there is a relationship or there is a statistically significant difference between

students' mathematics performance and the number of their family members, an ANOVA test was applied. It specifies that the mathematics performances are not much different either student who have fewer family members or more family members in their houses. Table 14 showing statistics indicates that the difference is not statistically significant.

Table 14. Analysis of Variance

Source	DF	Adj SS	Adj MS	F-Value	P-Value
Number of Family Members	3	364.4	121.5	0.29	0.830
Error	88	36482.9	414.6		
Total	91	36847.3			

The Tukey's test also proves it further as shown in Table 15.

Table 15. Grouping Information Using the Tukey Method

Number of Families			
Members	N	Mean	Grouping
Below Four Members	6	73.50	A
Four Members	49	73.32	A
Above Five Members	15	72.07	A
Five Members	22	68.52	A

4.8 Attitudes and Mathematics Performance

The Attitude towards Mathematics Inventory (ATMI) consists of four categories, i.e.: self-confidence in mathematics, the perceived value of mathematics, mathematics enjoyment and mathematics motivation. Each subscale consisted of 3 items. The internal consistencies of the items are as follows (Table 16).

Table 16. Attitude towards Mathematics Inventory

Subscale	Number of Items	Item numbers	Cronbach's α
Self - confidence	3	1,2,3	0.8008
Value	3	4,5,6	0.7112
Enjoyment	3	7,8,9	0.7267
Motivation	3	10,11,12	0.7003

The analysis of correlation among variables in the ATMI and mathematics performance was executed through the Pearson Correlation test since this study is intended to observe the association between attitude towards mathematics and mathematics performance. Table 17 gives the results of Pearson correlation statistics.

Table 17. Pearson Correlation

Subscale of ATMI	Pearson Correlation	P-Value
Self - confidence	0.952	0.000
Value	0.845	0.003
Enjoyment	0.907	0.000
Motivation	0.892	0.002

All the subscales are significant in association with mathematics performance (p values > 0.05). Also, the Pearson correlations show that there are positive relationships. Not only the individual subscales but also the overall correlation of ATMI was significant showing a strong positive association between ATMI and mathematics performance of students. Results are given in Table 18.

Table 18. Correlation: ATMI, Mathematics Performance

Pearson correlation of ATMI and Mathematics Performance = 0.960
P-Value = 0.000

Accordingly, the results of the study show that there is neither any significant relationship between gender and mathematics performance nor any significant effect of gender on mathematics performance. As the table depicts, the p -value of the t -test is 0.767. This means the difference in gender, being a girl or a boy does not noticeably matter on anyone's ability in mathematics. T-statistic value, 0.30 is less than 1.98 suggesting that the mathematics performance of the two groups is equal for the most part. This result is relevant to the prior study (Ajisuksmo & Saputri, 2017). It also says that there is no significant difference in mathematics achievement between male and female students, but differs from the results of the study carried out by Rothman, Slattery, Vranek, & Resnick (2002). They had found that gender was shown to be a statistically significant influence with the mathematical achievement of females lower than of the males. The Performance gap between rural students

and urban students could be seen significantly. The p-value of 0.022 and T-test value of -2.35 indicate that the difference is highlighted. The means obtained through the tests show that students who live in urban areas have higher performances than rural students. Wide gaps in students' performance towards mathematics are found between school categories. The mean of performance of students in the three school types differs with large gaps. However, students in the 1AB category perform very well than the students in other school categories. Students of all levels of ability in the case study follow the same mathematics curriculum offered by all categories of public schools. In Sri Lanka, children are entitled to get admission to public schools closer to their residence. However, 1 AB schools enroll a group of students at grade 6, who perform well in the national level examination - the grade 5 Scholarship Examination. The average number of students in 1 AB-type school is considerably high compared to the other school types. The government has taken special actions to develop infrastructure facilities in selected 1 AB all over the country, even though per-pupil expenditure on public schools is the same. Therefore, 1 AB schools are well-equipped compared to the other school categories, with more facilities for students to learn. It may be the reason behind this wide gap in performance.

It certifies the findings of De Silva and Khatibi (2017) which states the provision of school resources affects the development of student's performance to a lesser extent in both developing and developed countries. Parents' education level also has significant effects on the students' mathematics performance. ($P = 0.012 < \alpha$). Results reveal not only the significant association but also there exists a positive relationship between parents' level of education and their students' mathematics accomplishment. Higher the parents' education level, the higher the student's mathematics performance and vice versa. This result tallies with the finding of Kadriye (2005) revealing parents' highest education level was the highest predictor of mathematics achievement of students in his case related to the USA. According to the statistical outputs obtained here, there is a significant effect of fathers' occupation on their children's mathematics performance. The p-value 0.037 of ANOVA and the mean values obtained at the pairwise comparisons show the discrepancy of mathematics performances of students compared with their fathers' jobs. This is parallel to the findings of McCoy (2010) as he has discovered that his father's occupation significantly contributed to mathematics performance. When looking at the mother's occupation, the results are opposite to the fathers' situation. Though the father's occupation results in students' mathematics performance, the mother's occupation does not. Alibraheim (2019) has found that there is a positive relationship between a mother's career type and students' confidence in learning mathematics. In accordance with this study, the insignificant p-value (0.606) discloses that the effect of a mother's job is not important for children's mathematics abilities. Even though the pairwise comparisons state the means in the way that students of mothers who work in private sectors perform very well in mathematics, the results are not considerable. Family income is very critical for most things. According to the study, family income can do nothing substantial on students' mathematics performance.

0.181 p-value, as well as the Tukey's test's results, give out that even the low-income students can perform well as high-income level students. It cannot be observed that there are considerable differences in achievements related to mathematics between the corresponding income levels they have been categorized into. This finding is divergent from the findings of White (2001) as he has found family income is significantly associated with math achievement. However, students in high-income families may score more due to the reason

that they are able to acquire many educational sources by spending more money. A number of family members also is not shown to be significant towards students' mathematics performance. The p-value of 0.830 obtained through the test statistic indicates its insignificance. Whatever the number of family members, it does not influence much on students' mathematics performance. Yet, Terzi & Kirilmazkaya (2020) discusses the association between academic achievement and the number of siblings. There he has found that a number of siblings can cause lower achievement due to limited opportunities because they have to share resources with other family members. Thus, H1 is considered in a way as follows (Table 19).

Table 19. Association between demographic factor and mathematics performance

Demographic Factor	Association/ Effect
Gender	Not Significant
Residence	Significant
School Type	Significant
Parents' Highest Education	Significant
Father's Occupation	Significant
Mother's Occupation	Not Significant
Monthly Family Income	Not Significant
Number of Family Members	Not Significant

The outcomes of this study indicated that the independent variable attitudes towards mathematics highly contribute to the changes in students' mathematics performance. Therefore, H2 is accepted. The scores obtained through ATMI on how the attitudes of students produce a 96% correlation between attitudes and mathematics performance. It is a very strong positive association. It indicates that when the attitudes become more positive, the performance level rises up. This result conforms to many research findings of the researches done by the scholars such as Andamon & Tan (2018), Ajisuksmo & Saputri (2017), Schenkel

(2009), and White (2001). It shows up that students' attitudes towards mathematics are the best predictors of their mathematics performance which shows a significant positive relationship.

5. Conclusion

This study contributes to extant research by analyzing the causes for mathematics performance by referring to multiple factors. The study has identified that residence, school type, parents' education, and father's occupation are considerably associated with the mathematics performance of OL students in Sri Lanka. At the same time, gender, mother's occupation, family income, and the number of family members do not show noticeable relationships with mathematics performance. The other important finding is that students' attitude towards mathematics highly causes their performance in the subject. The study has addressed empirical issues or matters that have been all long not attended by the literature. More especially in all the aspects: OL students, mathematics performance, and Sri Lankan context. Although many scholars have different views on demographic factors and their dimensions regarding students, this study has ascertained that it is a multi-dimensional predictor. It encompasses students' parents, family, and regional features. Any study has not been conducted yet by considering eight dimensions related to demographic factors even with the help of the same test statistics. Although mathematics has traditionally been a masculine-stereotyped subject, this study reveals OL students do not show significant differences as boys and girls, in the case of mathematics. Therefore, before concluding that changes in mathematics performance are generated by gender, educators and scholars need to be sensitive to the high correlation between attitudes towards mathematics as evidenced by current research. There were wide gaps in the performance of students towards mathematics. Especially in developing countries, these gaps are merely seen as consequences of discrepancies in resource allocation among schools. Thus, educational authorities have to pay attention to the provision and development of physical as well as human resources in a fair manner. There were recognizable effects from demographic factors; gender and family income on the mathematics performance of students. But the influences were not important at considerable levels. The study argues that positive relationships could exist without being significant. Hence, it was concerned about the significance of causal cognition among attitudes and mathematics performance. Based on the argument, results revealed that there remains a high significance between the two variables. Also, the study has used the measure Attitude towards Mathematics Inventory (ATMI) which has never been used by a Sri Lankan scholar previously for measuring attitudes of people. Moreover, finally, students' demographic factors and attitudes towards mathematics have significant impacts on their mathematics performances.

The results of the current study provide some useful findings and insights into the mathematics performance of OL students of Sri Lanka. These results can contribute to the education decision-makers in administration as well as the students to increase their performances; regarding attitudes. Also, the educational authorities can take actions to minimize the mathematics failing percentage of O/L students; regarding school type. The study reveals that parents' education can affect students' mathematics performance and literature shows it in all educational performances. Therefore, the current educational authorities can take necessary steps to improve the education level of present students, as they will be the next parent generation.

Regarding this study, it considered information of only 92 students as the available sample. The reason for this was the prevailing COVID-19 situation in the country which came across for data collection. It will be more successful if future researchers can use appropriate sample sizes to minimize generalization issues. Operationalization of the independent variable demographic factors has been done only considering the students' aspect. This research was conducted regarding Ratnapura district in Sri Lanka and especially the Sri Lankan researchers are encouraged to conduct this kind of experiment in different regions in different education, social and cultural environments, as this kind of study has not been conducted with insufficient contents. As some of the demographic factors' effects were insignificant, re-examining those relationships may help to confirm the results here. The educators must determine how to increase performance in such major subjects in a school curriculum, which can decide students' further education path.

References

- De Silva, A. D., Khatibi, A., & Azam, S. M. (2017). Do the demographic differences manifest in motivation to learn science and impact science performance? Evidence from Sri Lanka. *International Journal of Science and Mathematics Education*, 16, 47-67.
- Ajisuksmo, C. R., & Saputri, G. R. (2017). The influence of attitudes towards mathematics, and metacognitive awareness on mathematics achievements. *Creative Education*, 08(03), 486-497. <https://doi.org/10.4236/ce.2017.83037>
- Andamon, J. C., & Tan, D. A. (2018). Conceptual understanding, attitude, and performance In the mathematics of grade 7 students. *International Journal of Scientific & Technology Research*, 7(8), 96-105.
- Aydin, R., Sahin, H., & Tapol, T. (2008). Türkiye'de ilköğretime sınıf öğretmeni yetiştirmede nitelik arayışları [Searching for quality in the training of primary school teachers in Turkey]. *Türkiye Sosyal Araştırmalar*, 12(2), 119-142.
- Chen, C., & Wu, C. (2009). How motivations, constraints, and demographic factors predict seniors' overseas travel propensity. *Asia Pacific Management Review*, 14(3), 301-312.
- Geary, D. C., Hamson, C. O., & Hoard, M. K. (2000). Numerical and arithmetical cognition: A longitudinal study of process and concept deficits in children with a learning disability. *Journal of Experimental Child Psychology*, 77(3), 236-263. <https://doi.org/10.1006/jecp.2000.2561>
- Grootenboer, P., & Hemmings, B. (2007). Mathematics performance and the role played by effective and background factors peter grootenboer and brian hemmings. *Mathematics Education Research Journal*, 19(3), 3-20. <https://doi.org/10.1007/bf03217459>
- Ismail, N. A., & Awang, H. (2007). Differentials in mathematics achievement among eighth-grade students in Malaysia. *International Journal of Science and Mathematics Education*, 6(3), 559-571. <https://doi.org/10.1007/s10763-007-9109-4>
- Kargar, M., Tarmizi, R. A., & Bayat, S. (2010). Relationship between mathematical thinking, mathematics anxiety and mathematics attitudes among university students. *Procedia - Social and Behavioral Sciences*, 8, 537-542. <https://doi.org/10.1016/j.sbspro.2010.12.074>
- Kim-Choi, S. (2015). Math-related, school contextual, and demographic variables associated with mathematics achievement of low-performing high school students.

- Krischler, M., Powell, J. J., & Pit-Ten Cate, I. M. (2019). What is meant by inclusion? On the effects of different definitions on attitudes toward inclusive education. *European Journal of Special Needs Education*, 34(5), 632-648. <https://doi.org/10.1080/08856257.2019.1580837>
- Lal, K. (2014). Academic stress among adolescents in relation to intelligence and demographic factors. *American International Journal of Research in Humanities, Arts and Social Sciences*, 3(2), 123-129.
- Ma, X., & Kishor, N. (1997). Assessing the relationship between attitude toward mathematics and achievement in mathematics: A meta-analysis. *Journal for Research in Mathematics Education*, 28(1), 26-37. <https://doi.org/10.2307/749662>
- Mohamed, L., & Waheed, H. (2011). Secondary Students' attitude towards mathematics in a selected school of Maldives. *International Journal of Humanities and Social Science*, 1(15), 277-281.
- Musso, M., Kyndt, E., Cascallar, E., & Dochy, F. (2012). Predicting mathematical performance: The effect of cognitive processes and self-regulation factors. *Education Research International*, 1-13. <https://doi.org/10.1155/2012/250719>
- Odell, P. M., & Schumacher, P. (1998). Attitudes toward mathematics and predictors of college mathematics grades: gender differences in a 4-year business college. *Journal of Education for business*, 74(1), 34-38. <https://doi.org/10.1080/08832329809601658>
- Olson, J. M., & Zanna, M. P. (1993). Attitudes and attitude change. *Annual Reviews Psychology*, 44, 118-145.
- Pietsch, J., Walker, R., & Chapman, E. (2003). The relationship among self-concept, self-efficacy, and performance in mathematics during secondary school. *Journal of Educational Psychology*, 95(3), 589-603. <https://doi.org/10.1037/0022-0663.95.3.589>
- Rothman, R., Slattery, J. B., Vranek, J. L., & Resnick, L. B. (2002). Benchmarking and alignment of standards and testing. *PsycEXTRA Dataset*. <https://doi.org/10.1037/e647862011-001>
- Slaughter, S. D. (2007). Demographic profiles associated with academic performance for third-grade students in North forest and Aldine Independent School Districts in Texas. *The Journal of College Admission*, 7(2), 67-79.
- Tahir, I. M., & Bakar, N. M. (2009). Influence of demographic factors on students' beliefs in learning mathematics. *International Education Studies*, 2(3), 59-71. <https://doi.org/10.5539/ies.v2n3p120>
- Terzi, R., & Kirilmazkaya, G. (2020). Examining predictive effects of attitudes toward STEM and demographic factors on academic achievement. *Issues in Educational Research*, 30(2), 217-229.
- Williams, T., & Williams, K. (2010). Self-efficacy and performance in mathematics: Reciprocal determinism in 33 nations. *Journal of Educational Psychology*, 102(2), 453-466. <https://doi.org/10.1037/a0017271>

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>)

COVID-19 and Higher Education Institution Operation: Unpacking the Potential of Higher Education through Acceptance of Online Learning.

Alberto Gabriel Ndekwa

Ruaha Catholic University

albandekwa@gmail.com

Abstract

This paper focused on analyzing the acceptance of online learning for unpacking the potential of higher education during COVID-19 lock down. Quantitative data was collected using questionnaire to a total sample of 258 respondents of a higher education institution. Systematic Sampling was used to pick a sample of students and academic staff where questionnaire was used to collect data for statistical analysis. Documentary review was used to get data to support and interpret findings from survey questionnaire.

Data analysis using SEM revealed that usefulness and easiness of technology tend to influence the acceptance of using online learning method among students and academic staff of higher education. The significance influence of usefulness is explained by the fact that online learning is compatible to higher education environment which offer virtual learning and offer class to the students all the time while the easiness was found to be significant by the fact that online technology is ease to learn, ease to use and ease to access in higher education institution. It is concluded that for the higher education community to accept online learning the technology should offer perceived benefit in terms of compatibility, virtual class, class should be available all the time and the technology should be simple and affordable. Addition, it is concluded that the technology should be easy to use, learn and access by the community of higher education institutions for them to accept it. This study recommends that the education institutions should design and implement the online learning system which is compatible, easy to use, easy to learn, easy to access, and simple and affordable for every member of the institution to unpack the COVID-19 Crisis. On the other hand, this paper recommends that training should be conducted to higher education institution communities in order to educate them and create the awareness of the usefulness and easiness of online learning for them to unpack the COVID-19 Crisis.

Keywords: low case, comma, paper template, abstract, keywords, introduction (up to 5)

1. Introduction

Worldwide, higher educational institutions are based only on traditional methods of learning, which are set up face-to-face lectures in a classroom. Although many higher education institutions have implemented online facilities, still a lot of them are stuck with old procedures. The sudden outbreak of COVID-19 pandemic shook the entire world of higher education institutions. As argued by Dhawan (2020) that lock down of higher education institutions and social distancing have frozen the operation of higher education institutions. To address COVID-19 challenge, scholars worldwide have evidenced the acceptance of online learning as a major solution to unlocking the operation of the higher education institution in time of COVID-19 pandemic diseases. Notably Shahzad et al. (2020) commented that due to COVID-19 outbreak universities were closed and locked down; most teachers and students are happy by the shift to online learning to exploit the potential of university education in Malaysia. On the other hand, Ali (2020) advocates that in these unprecedented times of COVID-19, higher education institutions worldwide are moving more and more towards online learning to unpack the locked education system. Hence online learning is considered more important to unpack the potential of education in a locked education system due to COVID-19 pandemic diseases.

To realize the importance of online learning in addressing COVID-19 outbreak, various policy

initiatives are being launched by governments across the world to continue teaching activities so as to contain the coronavirus. Notably, the government of China initiated a Suspending Classes without Stopping Learning policy to see that learning was not compromised at any time during COVID-19 pandemic lockdown (Zhang et al., 2020).

In spite of the effort to unlock the education system in higher education institutions through online education, there is ambiguity and disagreement about what to teach, how to teach, the workload of teachers and students, the teaching environment, and the implications for education equity. This is because the online learning system has come as a mergence strategy to unlock the higher education institution while staff and students of this institution are locked out from the institution. Al-Adwan et al. (2013) argued that many higher education institutions that offer online learning services encounter various difficulties in terms of adopting successful strategies including the acceptance and effectiveness of delivering courses at the beginning. Hence students' involvement and acceptance must be considered; otherwise online learning systems will most likely fail. This paper filled the gap by analyzing the acceptance of technology in Tanzania private universities.

2. Literature Review

2.1 Theoretical Literature Review

Technology Acceptance Model (TAM) was used in this paper to inform about the constructs understudy. TAM originated from Theory of Reasoned Action (TRA) by replacing TRA's attitude beliefs with the two technology acceptance measures namely perceived usefulness and perceived ease of use and by ignoring subjective norm constructs of TRA (Davis, 1989). Due to the dominant impact of perceived usefulness and perceived ease in acceptance of technology, this theory has become one of the most cited theories in the area of acceptance of online technology among users. Notably, Baki et al. (2018) found these constructs to be dominant and most cited. On the other hand, Perceived usefulness (PU) referring to the degree to which a person believes that using a particular system would enhance his/her job performance; and Perceived ease of use (PEOU) referring to the degree to which a person believes that using a particular system would be effort free (Davis, 1989). According to Davis (1989) and Davis et al. (1989) in explaining TAM, perceived usefulness (PU) and perceived ease of use (PEOU) influence one's attitude toward one's intention to accept technology. The goal of TAM is to provide an explanation of the determinants of computer technology acceptance that is general. Therefore, in this paper, this theory will help to inform and to provide further analysis on the influence of usefulness and ease of use on acceptance of online learning among students and academic staff in higher education institutions.

2.2 Empirical Literature Review

2.2.1 The Influence of Usefulness on Acceptance of Online Learning

Abdullah and Ward (2016) carried out a study on identifying the most commonly used external factors of Technology Acceptance Model (TAM) in the context of e-learning acceptance. Findings indicated that Perceived Ease of Use (PEOU) and Perceived Usefulness are the predictors of e-learning. On the other hand, Budu et al. (2018) carried out a study on E-learning Systems Usage among Tertiary Education Institutions in Ghana. Findings using Partial Least Squares Structural Equation Modeling revealed that perceived usefulness influenced individual's behavioral intentions to utilize E-learning systems. These findings from the empirical evidence

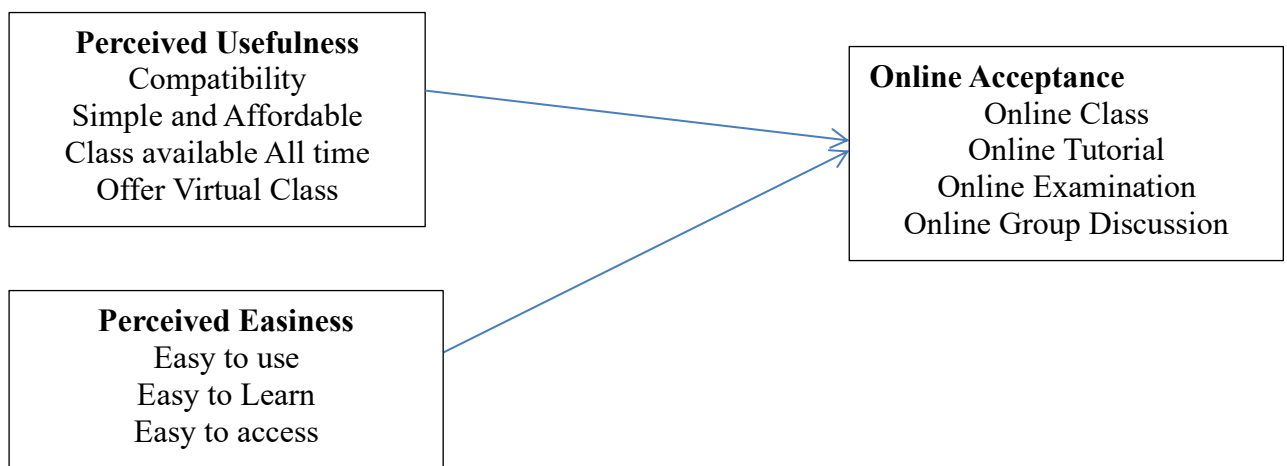
have posited a hypothesis that: *Perceived usefulness has positive and significant influence on acceptance of online learning by higher education institutions.*

2.2.2 The Influence of Perceived Easiness on Acceptance of Online Learning

Abdullah and Ward (2016) carried out a study on identify the most commonly used factors in the context of e-learning acceptance. Findings indicated that Perceived Ease of Use (PEOU) is a predictor of e-learning acceptance. On the other hand, Abdullah and Toykan (2018) carried out a study on successful e-learning services acceptance. Findings confirm the importance of perceived ease of use Successful E-Learning Services acceptance. Moreover, Budu et al. (2018) carried out a study on e-learning systems usage among tertiary education institutions in Ghana. Findings using Partial Least Squares Structural Equation Modeling reveled that perceived ease of use influenced individual's behavioral intentions to accept e-learning systems. These findings from the empirical evidence have posited a hypothesis that: *Perceived easiness has positive and significant influence on acceptance of online learning by higher education institution.*

2.3 Conceptual Framework

The conceptual framework depicts the hypothetical influence of perceived usefulness and perceived easiness on acceptance of online learning as shown in Figure 2.



Source: Developed by author based on literature review (2020)

3. Research Method

3.1 Research Paradigm

This paper used a positivism paradigm set of assumptions to understand the reality and acquire knowledge on acceptance of online learning to unpack the COVID-19 crisis. Saunders et al. (2012) advocate that the positivism paradigm asserts that real events can be observed empirically and theoretically, and explained with statistical logical analysis. In this paper, empirical evidence and theories from different contexts were used in understanding the reality and in guiding knowledge acquisition about acceptance of online learning methods in higher education institutions. Hence the positivism paradigm was used to capture statistical data and in testing hypotheses on the influence of usefulness and easiness of technology on acceptance of online learning.

3.2 Study Area

The study was conducted in Tanzania's private higher education sector. The private sector was selected because they suffered a lot during COVID-19 lockdown due to the fact that their operation depends on fees that students pay while they are in the study at their institution. The higher education institution has been in operation for a long time and started implementation of the online learning method to address the lockdown challenge which affected institution operation during the pick of COVID-19. Therefore collecting data from this population helped to come up with valid evidence.

3.3 Targeted Population

The population of this study was the higher education community of students and academic staff. This population was considered important because most students were affected by the decision to shift from face-to-face learning methods to online methods while they were at home. Academic staff also were important to evolve in this study as they were the one to accept the new life of lecturing in online methods. Hence this population of the higher education community was considered to be potential in studying the acceptance of online learning to curb the lockdown and flees of the higher education operation.

3.4 Sampling Technique

Systematic sampling method was used with n^{th} term of 2 to pick the sample of 258 respondents of the higher education students and academic staff. The data collector seated at the main entrance of the institution applying systematic sampling by picking the respondent who was appeared at the value of n^{th} term which was 2. The suitability of using systematic sampling was observed as a sampling technique which was used to reduce biases of a sample by avoiding selection of homogenous sample.

3.5 Validity and Reliability

In this paper, content validity was ensured by conducting a pilot study before the main survey in order ensure that all content targeted to be included in the questionnaire are observed by few respondents and are included before the actual data collection. This means that the pilot study assisted to refine and strengthen the questionnaire to include contextual issues. On the other hand, construct validity was also conducted to ensure that those unobserved variables which do not fit well from the model are all eliminated from the model. Figure 4.1 shows the unobserved variable which fitted well to the model while the following unobserved variables were eliminated from the model during factor analysis due to the fact that they did not perform well to the model: UF4, UF6, ES2, AC1 and AC4.

Apart from that, predictive validity was assessed during data analysis using KMO, Bartlett's Test and total variance of the model using exploratory factor analysis. The results are presented in Table 4.2 and Table 4.3. For confirmatory factor analysis, the predictive validity is presented using CFI, GFI, AGFI and RMSEA as presented in Figure 4.1. Reliability test was done using Cronbach's alpha, the findings are presented in Table 3.1 below.

Table 3.1

Observed Variable	Unobserved Variable	Cronbach p-value	Remarks
Acceptance	Online tutorial, Online Class	0.820	Accepted

Usefulness	Compatibility, Class Available all times, Simple and affordable technology, Offer virtual class	0.712	Accepted
Easiness	Ease to learn, ease to use, ease to access	0.806	Accepted

3.6 Data Collection Tools

In this particular paper, a structured questionnaire was used for data collection in order to collect data which are suitable for statistical analysis. Roopa and Rani (2012) advocated that for positivism studies, questionnaires are considered useful as they offer a chance to collect highly structured data suitable for statistical analysis. While the current study was dominated by questionnaires, documentary review techniques were also employed in this study to strengthen and give evidence of the data gathered in a study. As argued by Saunders et al. (2012) that documentary review method supports the viewpoints or arguments of an academic work, and also it brings up some issues not noted by other techniques. The current study used a documentary review method of data collection to provide more evidence of the finding from the questionnaire and in providing more interpretation of the data collected using the questionnaire.

3.7 Data Analysis

This paper has two hypothesis designed with observed and unobserved variables. Structural Equation Modeling was used as multivariate data analysis technique for arranging a large amount of complex information that is observed and unobserved variables into a simplified visible form. As argued by Hox and Bechger (2012) that the use of multivariate data analysis in research helps a researcher to arrange a large amount of complex information into a simplified visible form. The current study had complex model composed of complex structure of constructs and their underlying indicator variables collected from large sample of more than 258 respondents, hence the use of SEM was considered important. Besides this characteristics cover all multivariate data analysis techniques such as regression method, Hox (2008) argued that SEM surpasses traditional regression models by including multiple independent and dependent variables with multiple indicators variable to test associated hypotheses about relationships among observed and latent variables. The current study model was designed to capture both observed and latent variables to explain the acceptance of online learning method. This kind of conceptual framework setting is aligned with the use of SEM and has put SEM to be very powerful data analysis technique in the current study.

4. Findings and Discussions

4.1 Validity Test

4.1.1 Construct Validity

Exploratory factor analysis was conducted to ensure that each observed variable is aligned to their underlined unobserved variable. Four unobserved variables out of fifteen were removed from the model in the fact that they did not perform well to the model while ten unobserved variables were retained to the model. Table 4.1 presents those items remaining in the model.

Table 4.1 Rotated Component Matrix^a

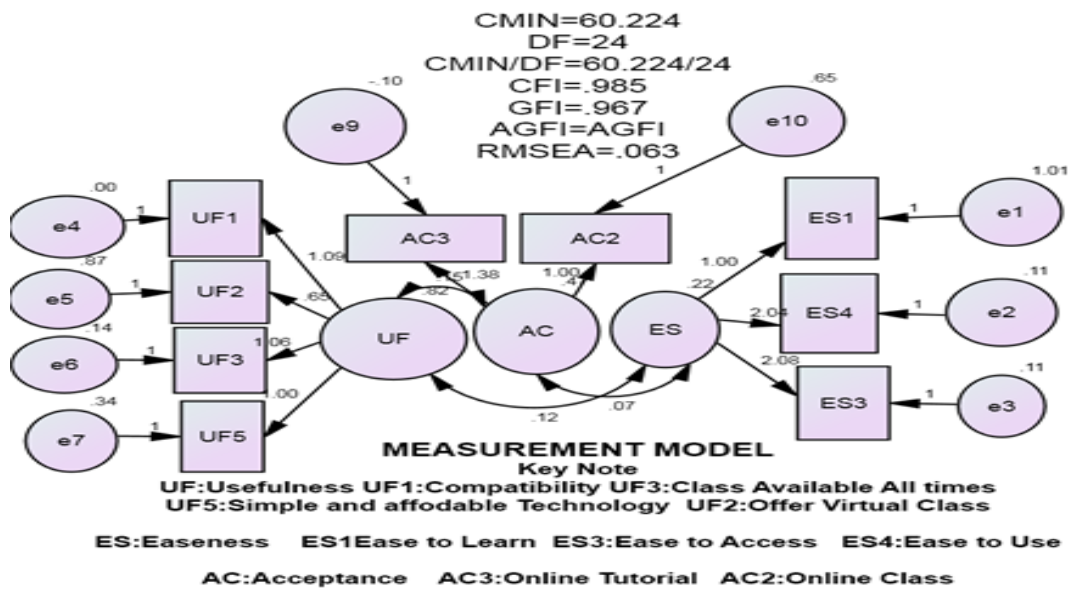
Observed Variables	Component of the Model		
	Usefulness	Easiness	Acceptance
UF1	.953		
UF3	.937		
UF5	.888		
UF2	.600		
ES4		.918	
ES3		.909	
ES1		.627	
AC3			.896
AC2			.869
AC4			.643
Initial Eigenvalues	4.000	1.832	1.581
% of Variance	40.002	18.322	15.811

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 4 iterations.

After exploratory factor analysis, then confirmatory factor analysis was carried out to further assess if the observed variable is aligned to their underlined unobserved variable by accounting the measurement error. Confirmatory factor analysis tends to account for measurement error compared to EFA and that is why it was necessary to carry out confirmatory factor analysis. Figure 4.1 indicates the results of confirmatory factor analysis where all model fit indices have achieved the recommended value. Only one unobserved variable AC4 was removed for the model to fit well.



4.1.2 Predictive Validity

Predictive validity was assessed using various techniques as explained below. Kaiser-Meyer-Olkin Measure of Sampling Adequacy was used to measure sample adequacy, the p-value which is greater than 0.6 in Table 4.2 indicates that the sample was adequate for factor analysis. On the other hand, in Table 4.2 Bartlett's Test of Sphericity produced a p-value of 0.00 which is significant that components correlate well for EFA to be conducted.

Table 4.2 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.742
Approx. Chi-Square		2570.293
Bartlett's Test of Sphericity	Df	45
	Sig.	.000

The total variance was further assessed and the results are displayed in Table 4.3 which indicate that the model performed well by accounting a total variance of 74.135%.

Table 4.3 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.000	40.002	40.002	4.000	40.002	40.002	3.059	30.594	30.594
2	1.832	18.322	58.324	1.832	18.322	58.324	2.296	22.962	53.556
3	1.581	15.811	74.135	1.581	15.811	74.135	2.058	20.579	74.135
4	.752	7.517	81.651						
5	.632	6.323	87.975						
6	.556	5.559	93.534						
7	.269	2.691	96.225						
8	.213	2.134	98.358						
9	.103	1.026	99.384						
10	.062	.616	100.000						

Extraction Method: Principal Component Analysis.

4.2 Structural Model and Path analysis

4.2.1 Structural Model

After confirmatory factor analysis, the measurement model was converted to a structure model in order to enable testing of the hypothesis formulated. The structural model is presented below in Figure 4.2 to assess the strength of the hypothesis formulated.

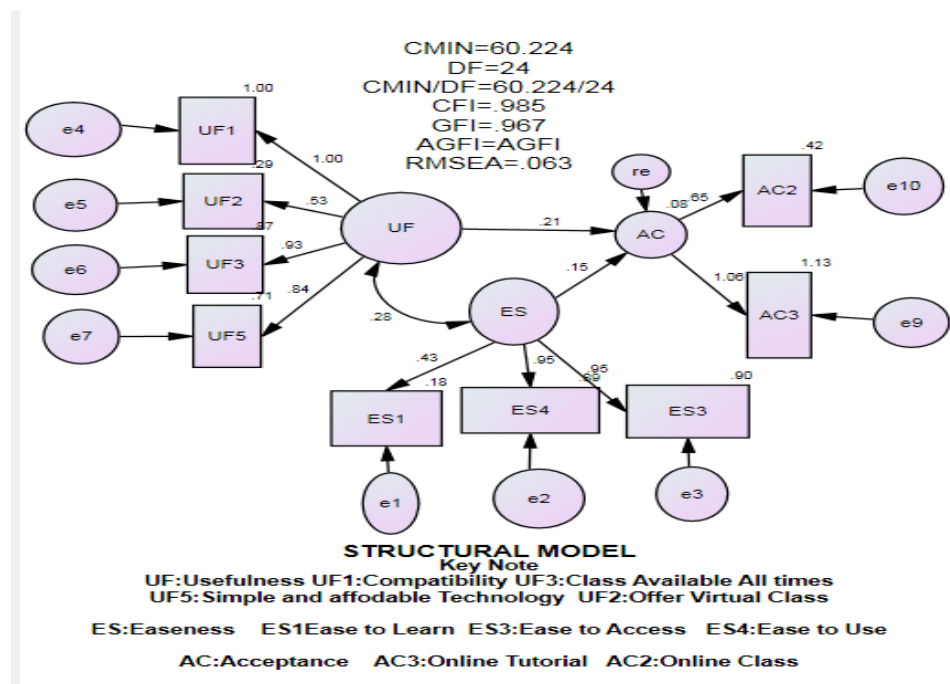


Figure 4.2 STRUCTURAL MODEL

4.3.2 Path Analysis and hypothesis testing

Table 4.4 indicates the influence of perceived usefulness on online learning acceptance using the path UF and AC to test the hypothesis which state that: *Perceived usefulness has positive and significant influence on acceptance of online learning by higher education institutions.*

Table 4.4 Path analysis for perceived usefulness on online learning acceptance

Relationship			Estimate	S.E.	C.R.	P	S.R.W	REMARKS
AC	<---	UF	.157	.050	3.115	.002	0.208	ACCEPTED
AC2	<---	AC	1.000					
AC3	<---	AC	1.377	.280	4.911	***		
UF5	<---	UF	1.000					
UF3	<---	UF	1.061	.041	25.882	***		
UF2	<---	UF	.653	.057	11.422	***		
UF1	<---	UF	1.089	.038	28.481	***		

The results from Table 4.4 using standardized regression weight (S.R.W) revealed that the path from UF to AC is positive while critical ration (C.R) of the path from UF to AC indicated that the path is significant. Hence this finding signify that *Perceived usefulness has positive and significant influence on acceptance of online learning by higher education institution*

On the other hand, Table 4.5 indicates the influence of perceived easiness on online learning acceptance using the path ES to AC to test the hypothesis which state that: *Perceived easiness has positive and significant influence on acceptance of online learning by higher education institutions.*

Table 4.5 Path analysis for perceived easiness on online learning acceptance

Relationship			Estimate	S.E.	C.R.	P	S.R.W	REMARKS
AC	<---	ES	.214	.088	2.419	.016	0.148	ACCEPTED
ES1	<---	ES	1.000					
ES4	<---	ES	2.043	.235	8.689	***		
ES3	<---	ES	2.079	.240	8.673	***		
AC2	<---	AC	1.000					
AC3	<---	AC	1.377	.280	4.911	***		

The results from table 4.5 using standardized regression weight (S.R.W) revealed that the path from ES to AC is positive while critical ration (C.R) of the path from ES to AC indicated that

the path is significant. Hence this finding signify that *Perceived easiness has positive and significant influence on acceptance of online learning by higher education institution*

This study hypothesized the influence of usefulness and easiness on online learning acceptance in higher learning institutions. The findings predicted well that usefulness and easiness have positive and significant influence on online learning acceptance in higher learning institutions. The findings aligned with the technological acceptance model by providing support that usefulness and easiness have positive and significant influence on online learning acceptance. These imply that the theory and mode from other contexts can be used to explain acceptance of technology in one context to another. Namisiko et al. (2014) found and concluded that perceived usefulness of online learning by Students and Perceived Ease of Use of online learning by students is significantly predicting acceptance of online learning. This implies that perceived usefulness and Perceived Ease of Use serve as a basis for educational institutions seeking to accept and implement eLearning in developing countries. In the current study the possible explanation to why usefulness is significantly influencing acceptance of online learning is explained by compatibility of technology to fit the learners' learning environment and the availability of class all the time more specific in this time of COVID-19 Pandemic diseases. In addition, the influence of easiness on online learning acceptance is explained by the fact that online learning is easy to learn, easy to use and easy to access. This implies that for higher education institutions to accept online learning it is required to design an online learning which is easy to use, easy to learn and easy to access for the purpose of addressing the challenge facing education institutions in this time of COVID-19 outbreak. This implication support the argument made by

Al-alak and Alnawas (2011) that there is a positive relationship between perceived usefulness, perceived ease of use and intention to accept online learning in higher education institutions. They further added that electronic media such as computer video conferencing, audio, internet, interactive TV and satellite as medium to conduct online learning, has fueled the opportunity to introduce a new learning environment and scenarios to potential benefiter.

5. Conclusion

This chapter concluded that when higher education institutions accept online learning, they should ensure that the online system of learning is easy to use, easy to learn and easy to access. Addition the users should see the opportunity that users from higher education are exploring. This led to the general conclusion that usefulness and easiness of technology have positive and significant influence on acceptance of online among higher education institutions in this time of COVID-19. Therefore, to unlock the education institution which is locked by the government to prevent the spread of coronavirus, the institutions of education should ensure that the online learning system is useful and easy.

References

- Ali, W. (2020). Online and remote learning in higher education institutes: A necessity in light of COVID-19 pandemic. *Higher Education Studies*, 10(3), 16-25, doi:10.5539/hes.v10n3p16
- Al-Adwan, A., Al-Adwan, A. & Smedley, J. (2013). Exploring students acceptance of e-learning using Technology Acceptance Model in Jordanian universities. *International Journal of Education and Development using Information and Communication Technology*, 9(2), 4-18.
- Abdullah, F., & Ward, R. (2016). Developing a General Extended Technology Acceptance Model for E-Learning (GETAMEL) by analysing commonly used external factors. *Computers*

in *Human Behavior*, 56, 238 - 256. doi:10.1016/j.chb.2015.11.036.

Al-alak, B. A., & Alnawas, I. A. M. (2011). Measuring the acceptance and adoption of e-learning by academic staff. *Knowledge Management & E-Learning: An International Journal*, 3(2), 201-220.

Budu, K.W. A., Yinping, M. & Mireku, K. K. (2018). Investigating the effect of Behavioral Intention on e-learning systems usage: Empirical study on tertiary education institutions in Ghana. *Mediterranean Journal of Social Sciences*, 9(3), 201- 216.

Baki, R., Birgoren, B. & Aktepe, A. (2018). A meta-analysis of factors affecting perceived usefulness and perceived ease of use in the adoption of e-learning systems. *Turkish Online Journal of Distance Education*, 19(4), 4-42.

Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.

Davis, F.D., Bagozzi, R.P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8), 982-1003.

Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems*, 49(1), 5–22, DOI: 10.1177/0047239520934018

Hox, J. J & Bechger, T. M. (2012). An Introduction to Structural Equation Modeling. *Family Science Review*, 11(2), 354-373.

Hoe, S. L. (2008). Issues and procedures in adopting Structural Equation Modeling technique. *Journal of Applied Quantitative Method*, 3(8), 79-83.

Namisiko, P., Munialo, C. & Nyongesa, S. (2014). Towards an optimization framework for e-learning in developing countries: A case of private universities in Kenya. *Journal of Computer Science and Information Technology*, 2(2), 131-148.

Roopa, S., & Rani, M. S. (2012). Questionnaire designing for a survey. *The Journal of Indian Orthodontic Society*, 46(4), 273-277.

Shahzad, A., Hassan, R., Aremu, A.Y., Hussain, A. & Lodhi, R. N. (2020). Effects of COVID-19 in E-learning on higher education institution students: The group comparison between male and female. *Springer*. <https://doi.org/10.1007/s11135-020-01028-z>

Saunders, M., Lewis, P., & Thornhill, A. (2012). *Research methods for business students* (6th ed.). England: Harlow Pearson Educational Limited.

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>)



International Journal of Education, Teaching, and Social Science
Training & Research Institute – Jeramba Ilmu Sukses
Jln. Brigjen Hasan Kasim No 22 Palembang, Indonesia
www.journal.jis-institute.org

Email: contact@jis-institute.org

