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## **Editor's Welcome Message**

The publication of the Mediterranean Journal of Social & Behavioral Research (MJOSBR) is going to be an important contribution for social and behavioral sciences. This journal has emerged as a result of international collaboration among academic scholars throughout the world. The editorial board consists of different academics from many countries. We welcome submissions to bring international quality of MJOSBR. The strength of any good journal arises from interdisciplinary academic perspectives represented by the members of its editorial board. With the launching of our new publication, we invite readers to submit their manuscripts to the MJOSBR, and welcome all articles contributing to the improvement of social and behavioral sciences. We would like to thank to the editorial board of MJOSBR for their voluntary support. The Mediterranean Strategic Research Center is also a supporting association in collaboration with the journal which publishes books in the related fields. Please do not hesitate to send us your valuable comments and suggestions. The journal will publish refereed papers, book reviews and selected papers from conferences as well as special issues on up-to-date problematic topics. MJOSBR is a platform for exchanging views related to social, behavioral and educational research. We welcome authors with the warm senses of Mediterranean culture and share the common global ethical views of our academic world.

Best Regards

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# University of Port Harcourt Student-Teachers' Self-Determination and Hindrances Towards Learning Online During COVID-19

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## ABSTRACT

This analytical survey focused on investigating the level of student-teachers' self-determination towards learning online during COVID-19 at the University of Port Harcourt and the hindrances they experienced. Two objectives and six hypotheses guided the study. The population was two thousand, seven hundred and sixty-seven (2,767) student-teachers in the Faculty of Education with a sample size of six hundred and twelve (612) drawn randomly from the population. The study gathered data using the researchers' developed questionnaire with a 0.76 alpha reliability coefficient. Data analyses were through mean, standard deviation, t-test, and Welch test. The results disclosed that the University of Port Harcourt student-teachers' self-determination level to learning online during COVID-19 was high; this varies significantly based on study years, departments and gender. Lecturers' inability to develop online courses and distractions during learning online, among others, were the hindrances that affected the student-teachers' self-determination towards online learning during the COVID-19 pandemic. These hindrances vary significantly based on the student-teachers' study years and departments but were insignificant on a gender basis. Among the recommendations were that the University of Port Harcourt should train its lecturers to develop online courses and deliver them through Learning Management Systems dedicated solely for online learning purposes.

**Keywords:** Self-determination, motivation, COVID-19, online learning, hindrances, student-teachers

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## INTRODUCTION

Most students enter university with diverse expectations. Some students may have the goal of graduating with good grades, either first-class or second-class upper division. Some of these students may work hard to obtain Alpha (A) or Beta (B) with fewer Credits (C) in their course grades to achieve their targets, while others may exhibit a nonchalant attitude towards their original ambitions. Students tend to study hard to actualize their dreams when they are in comfortable situations. Events and circumstances can contribute to students' decisions to pursue their set goals in life or not. An ugly situation like the COVID-19 pandemic can be the highest demoralization factor that leads to students losing focus without putting inadequate efforts into their studies. In such a situation that keeps people indoors, students may need to be resolute and continue learning using online courses and resources available on the Internet.

Students' self-determination to learn and succeed in their careers can motivate them to explore different means and educational resources to keep learning and improve themselves academically, whether at home or in an academic environment. Self-determination is someone's

willingness to set goals, act and make good resolutions that lead to the goals' realization. Self-determination refers to personal freedom of choice of action or state of achieving set goals without being compelled externally (Merriam-Webster's Dictionary, 2018). Individuals are, sometimes, driven internally to perform actions based on the values, curiosity, enjoyment, or interest they have in those things. Yet, others may act due to external forces like grades, rewards, promotion, and punishments. Self-determination leads to someone's discretion to take the right decision at the right time; it stimulates hard work, active engagement, confidence, and a sense of direction in any chosen task. Heutagogy (self-determined learning) implies a learner-centered teaching method that results in learners' ability, capacity, and autonomy development, with teachers facilitating students' learning by providing guidance and links to learning materials (UNESCO, 2020).

Doll et al. (1996), cited in Vialu (2018), stated that self-determination, like other skills, can be learned or develop naturally in people. Vialu (2018) further noted that an individual develops self-determination attitudes and skills by setting goals and priorities, making good choices, performing leadership roles, solving problems, adapting to diverse environmental situations, being aware of strengths and weak points, and believing in his capability to achieve set goals.

National Deaf Center on Postsecondary Outcomes (NDC) (2020) averred that self-determined individuals solve problems and reach their set targets at home or in school, even amid difficulties.

Students' determination to learning focused on self-determination theory. Edward Deci and Richard Ryan propounded the self-determination theory in the middle of the 1980s. Self-determination theory identifies the motivational elements that trigger people's choices and recognises two forms of motivation: intrinsic and extrinsic motivations (David, 2014; Neutrino, 2012). Intrinsic motivation refers to the internal motives that instigate people to actions, while extrinsic motivation refers to task execution due to outward benefits. To be self-determined implies to be intrinsically motivated to achieve a goal. The self-determination theory helps instructors address the three fundamental and psychological needs, such as competency, autonomy, and relatedness, to promote intrinsic motivation. Based on the theorists' perspective, competence implies the ability to take charge of the mastery of different experiences; relatedness implies the general desire for interaction, connection, and consideration for other people; while autonomy refers to the need of being responsible for one's actions, choosing among different alternatives, taking control over one's life as well as acting in agreement with one's desires. Meeting these needs may help instructors create opportunities for students' self-determination, which leads to optimal learning and performance. UNESCO (2020) asserted that technology integration into online learning causes students to develop an interest in self-determined learning.

According to Bates (2016), online learning may not have an official definition, but scholars defined it on assumptions. College SA (2017) avers that online learning implies course enrollment and learning using videos and assessments with an Internet connection. Bates (2016) defines online learning as education that occurs partially or totally through the Internet. Online learning involves learning through the Internet-enabled learning platforms with or without a planned educational curriculum. Most Institutions run total or blended online education as an instructional delivery model based on their school curriculum. Some institutions and non-governmental organizations develop online courses to help learners acquire skills and knowledge outside the school curriculum. Online learning with a planned education curriculum is accessible only to all the duly admitted students in an institution. Unplanned curriculum online learning occurs as Massive Open Online Courses (MOOCs) for any interested learners. Dave Cormier developed the MOOC concept in 2008 (NOVA Southeastern University, 2020). MOOCs and other resources on the Internet broaden a learner's opportunity to continue learning whether or not his institution engages in online education.

Online learning focuses on learners' independence, flexibility, and less supervision by instructors. Learning online requires learners to study course content and resources and participate in learning activities and assessments at their convenience, location, and learning speed. This freedom may pose some problems to students with low self-determination and motivation to learn. Since the online world has many distractions that might reduce students' concentration level during learning, participating in and completing online learning tasks during COVID-19 may depend on students' self-determination.

COVID-19 is a dreaded disease that infested the whole world from the first quarter of 2020, leading to the shutdown of every life activity. Schools and businesses were drastically affected and put on hold as

people stay indoors to stay safe from the disease as recommended by the World Health Organization (WHO). Academic activities stopped physically, and online education was the viable alternative for schools to remain open to students' learning. The report shows that above 12.2 billion students study from home globally during the COVID-19 period (Li & Lalani, 2020). Schools with online educational facilities switched swiftly to online learning mode with their students learning from home. Observations showed that most higher institutions in the developing countries that practiced only conventional education were unprepared for the sudden transition to an online learning model due to digital infrastructural deficit and poor teachers' technical competency. The COVID-19 incidence mandated most developing nations' higher institutions to deploy online instructional platforms and start compulsory online workshops to train teachers on online instructional delivery procedures. Although with unexpected curriculum change, Gustiani (2020) reported that during the COVID-19 pandemic, educators exposed students to different online learning applications and conducted lectures through conferencing tools such as Mikogo, Google Meet, WebEx, and Zoom.

The Nigerian Ministry of Education directed higher institutions to commence online learning as a COVID-19 safety measure (Alli, 2020). Many states in Nigeria also started radio and television programmes; to help students in lower educational levels to continue learning while staying indoors. Online education was not a general practice at the University of Port Harcourt before the COVID-19 pandemic; however, the Educational Technology lecturers in the Faculty of Education started using online learning platforms like Edmodo, Google Classroom, and social media in a blended approach to teach the Computer in Education course since 2017. Although, the strike action by the Academic Staff Union of Universities, which started 6th March 2021 and ended 23rd December 2021, halted the 2019/2020 academic activities in the Nigerian federal universities. After school resumption on the 11th January 2021, the University of Port Harcourt responded to the need for online learning transition due to COVID-19 by training its lecturers to use the Google Educational Suite (Google Classroom and Google Meet); and Zoom Cloud Meeting for full online instructional delivery. Students received lectures through voice notes, video recordings, audio/video conferencing, submitted assignments, and interacted with their lecturers online but had a face-to-face examination to complete the first semester of the 2019/2020 academic session, which ended 1st April 2021. At the commencement of the second semester, the University of Port Harcourt gave its lecturers the option of choosing between online and physical classroom instructional delivery modes. Observation showed that most Lecturers resorted to the physical classroom instructional delivery modes.

Despite the interventions by some schools and state governments to bridge the gap created by COVID-19 to students' learning, some students may still be unable to learn. Carr et al. (2020), cited in Sivrikova et al. (2021), remarked that people experienced future uncertainties, boredom, anxiety for death, disappointments, and frustrations owing to unmet expectations during the COVID-19 lockdown. Some students may have difficulties coping with the online education introduced by some higher institutions, owing to the challenges characterized by digital learning. Others may be naturally unwilling to engage in any academic activities, possibly due to lack of self-determination and depression caused by the COVID-19 pandemic.



Understanding the rate at which students were self-determined to engage in online learning activities during the COVID-19 period and beyond will help university instructors and administrators to develop and implement strategies to enhance self-determination in students. Nissman (2020) avers that instructors should help distance learning students build self-determination skills like goal-setting, self-monitoring, choice-making, and problem-solving skills to equip them for the future. UNESCO (2020) remarks that developing learning abilities and reinvention is people's utmost life desire. To foster students' self-determination in online learning, instructors may need to encourage students to write out their expectations for each course, share those expectations with other students and their instructors, choose appropriate learning experiences and monitor their progress towards achieving those expectations.

Some researchers conducted studies related to students' online learning participation and barriers during the COVID-19 pandemic. For instance, Batmang et al. (2021) investigated how student-teachers in Arab perceived online education during the COVID-19 pandemic. Using interviews and observations: their findings indicated that the student-teachers perceived that self-determination, stimulation, connectivity, and competence were the online learning requirements. Gustiani (2020) studied the English students' online learning motivation amid the COVID-19 pandemic at the Sriwijaya Polytechnics and found the students were motivated internally to engage in the online study because they desire new knowledge and enjoy their novel learning experiences; however, poor infrastructure led to the students' poor online learning motivation. Agbejule et al. (2021) investigated elements that motivated and hindered Vaasa University students' online learning participation. They analyzed data with factor and descriptive analyses and found that the online delivery mode caused many students to participate in online learning. Some students reported that their online learning participation was motivated because they were afraid of being left behind. Their online learning hindrances were social interaction and instructional related. Balakrishnan and Long (2020) analyzed the engineering students' motivation in using the WhatsApp platform, a personalized environment for learning in the COVID-19 era. They found that the students were intrinsically motivated and self-determined to learn through the instructional platform.

Onyema et al. (2020) assessed the COVID-19 pandemic educational impact. Their study revealed students' and teachers' reliance on the Internet for learning continuity amid the pandemic, with hindrance due to inadequate facilities, power supply, network, and technical skills. Sari and Nayir (2020) studied the challenges and way forward the lecturers and administrators perceived using eLearning during the COVID-19 pandemic. Their findings revealed were infrastructural, internet access, classroom management, and students' and teachers' behavioural problems. Sari and Nayir (2020) reported that professionals, family members, peers' assistance, effective classroom management, and improving parents' and students' communication would help tackle the listed challenges. Mbunge et al. (2021) investigated the factors that influence Computer students' online learning performance and found that apart from the COVID-19 challenge, lecturers' online teaching competency, poor Internet access and availability, technology literacy, self-motivation and discipline, among others affected the students' performance negatively.

Although there is much research evidence on students' participation in online learning during the COVID-19 pandemic, none

has established the level of students' self-determination to continue learning during the pandemic period and beyond in the University of Port Harcourt. This identified gap led the researchers to investigate the extent to which the University of Port Harcourt student-teachers were self-determined to learn online during the COVID-19 Pandemic the hindrances that may interfere with students' self-determination; with suggestions that will project determination attitudes towards learning online among student-teachers.

### Objectives of the Study

This study sought to:

1. find out the level of University of Port Harcourt student-teacher self-determination towards learning online during the COVID-19 pandemic and
2. determine the hindrances that may affect University of Port Harcourt student-teachers' self-determination towards online learning during the COVID-19 pandemic.

### Hypotheses (Tested at 0.05 Significant Level)

1. The University of Port Harcourt student-teachers' level of self-determination towards learning online did not vary significantly during the COVID-19 pandemic based on the study year.
2. The University of Port Harcourt student-teachers' level of self-determination towards learning online did not vary significantly during the COVID-19 pandemic based on department.
3. The University of Port Harcourt student-teachers' level of self-determination towards learning online did not vary significantly during the COVID-19 pandemic based on gender.
4. The University of Port Harcourt student-teachers' self-determination hindrances to learning online did not vary significantly during the COVID-19 pandemic based on study year.
5. The University of Port Harcourt student-teachers' self-determination hindrances to learning online did not vary significantly during the COVID-19 pandemic based on department.
6. The University of Port Harcourt student-teachers' self-determination hindrances to learning online did not vary significantly during the COVID-19 pandemic based on gender.

## METHODOLOGY

### Research Design

The study adopted an analytical survey design to investigate student-teacher online learning self-determination during the COVID-19 pandemic and hindrances.

### Study Population

The study population consisted the 2,767 student-teachers in the Faculty of Education (from Library and Information Science (LIS), Adults and Non-Formal Education (DAE), Curriculum Studies and Educational Technology (EDC), Educational Psychology (EDP), Educational Management (EDM), Educational Foundation (EDF) and Early Childhood and Primary Education (ECPE) departments) at the

University of Port Harcourt in the 2019/2020 learning session (Source: Faculty of Education Record, 2021).

### Sample and Sampling Technique

The study used a 612 sample size (n) selected through random sampling technique.

### Instrumentation

The researchers used a self-developed instrument called Questionnaire on Self-Determination to Learning Online (QSDLO) for data collection. QSDLO had three sessions. Session 1, 2, and 3 measured student-teacher personal data, objectives 1 and 2, respectively. Session 2 and 3 had four-scale ratings of Very High Level (VHL), High Level (HL), Low Level (LL), and Very Low Level (VLL); and Strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SD), respectively. Their weightings were VHL or SA=4, HL or A=3, LL or D=2, and VLL or SD=1. The weightings criterion point is 2.50, which served as the basis for agreement or disagreement of each item statement. The instrument underwent face and content validation from two Educational Technology lecturers in the Department of Curriculum Studies and Educational Technology of the same University of Port Harcourt, whose corrections improved the instrument's quality. The instrument's reliability testing was through the Cronbach alpha method, which yielded a 0.76 alpha reliability coefficient.

### Data Collection Procedure

The researchers created a Google form of the questionnaire and administered it to the student-teachers via their departmental Whatsapp group platforms with the help of one of the lecturers from the various departments in the Faculty of Education. The researchers collated the responses from the Google sheet and subjected them to data analyses.

### Analyses Techniques

Mean and standard deviation analysed the research objectives 1 and 2. The Welch test served as the statistics to test hypotheses 1, 2, 4, and 5, while the t-test assisted in testing hypotheses 3 and 6. The Welch test is an alternative to ANOVA when the assumption on the homogeneity of variance or equal variance is not met (see [Appendix A](#)).

## RESULTS

### Objective 1

Objective 1 is to find out the level of University of Port Harcourt student-teachers' self-determination towards learning online during the COVID-19 pandemic. [Table 1](#) shows the mean statistics of students' self-determination to learning online. [Table 1](#) reveals that the student-teachers at the University of Port Harcourt agreed to items numbers 1 to 7 with mean values higher than the 2.50 criterion mean and disagreed with item number 8 with a mean value lower than 2.50 criterion mean value. Generally, the student-teachers' level of self-determination towards learning online during the COVID-19 pandemic at the University of Port Harcourt was high, even though they could not communicate online with their lecturers.

### Objective 2

Objective 2 is to determine the hindrances that may affect University of Port Harcourt student-teachers' self-determination towards online learning during the COVID-19 pandemic. [Table 2](#) shows the mean statistics of students' self-determination hindrances to learning online. [Table 2](#) discloses that the student-teachers at the University of Port Harcourt agreed to items numbers 11, 14, and 15 with mean values higher than the 2.50 criterion mean and disagreed to items numbers 9, 10, 12, and 13 with mean values lower than the 2.50 criterion mean. Generally, the student-teachers at the University of Port Harcourt agreed that some hindrances affected their self-

**Table 1.** Mean statistics of students' self-determination to learning online

Items	VHL	HL	LL	VLL	n	Mean	S. dev.	Decision
<b>During this COVID-19 period</b>								
I am self-determined to pursue my set career goals by learning online	225	277	88	22	612	3.15	0.79	Agreed
I am self-determined to participate in online learning activities	220	258	106	28	612	3.09	0.84	Agreed
I am self-determined to complete any online learning course I enroll in	220	257	111	24	612	3.10	0.83	Agreed
My online academic pursuit is my priority	167	251	157	37	612	2.90	0.87	Agreed
I explore different online materials to support my learning	273	238	78	23	612	3.24	0.82	Agreed
My online study habit has increased	169	273	124	46	612	2.92	0.88	Agreed
I collaborate online with my course-mates to solve course-related problems	172	226	147	67	612	2.82	0.96	Agreed
I communicate online with my lecturers.	85	126	210	191	612	2.17	1.02	Disagreed
<b>Grand mean</b>						<b>2.92</b>		<b>High</b>

**Table 2.** Mean statistics of students' self-determination hindrances to learning online

Items	SA	A	D	SD	n	Mean	S. dev.	Decision
<b>During this COVID-19 period</b>								
My institution did not participate in online education	104	178	246	84	612	2.49	0.93	Disagreed
My lecturers did not create online platforms for class communication and collaboration	117	128	267	100	612	2.43	0.98	Disagreed
My lecturers did not develop online courses	147	168	214	83	612	2.62	0.99	Agreed
I was not familiar with online learning platforms	89	161	247	115	612	2.37	0.95	Disagreed
I do not like to participate in online learning	76	112	268	156	612	2.18	0.95	Disagreed
High cost of data subscription to explore online learning materials	328	209	47	28	612	3.37	0.81	Agreed
I easily get distracted when learning online	141	190	204	77	612	2.65	0.97	Agreed
<b>Grand mean</b>						<b>2.59</b>		

**Table 3.** Welch test on student-teachers' level of self-determination towards learning online during the COVID-19 pandemic based on study year

Study year	n	Mean	S. dev.	Statistics <sup>a</sup>	df1	df2	p-value	Decision
YR 1	137	25.03	5.329					
YR 2	270	22.38	5.487					
YR 3	80	24.63	4.175	9.960	3	262.091	0.00	Rejected
YR 4	125	23.05	3.862					
Total	612	23.40	5.112					

<sup>a</sup>Asymptotically F distributed

**Table 4.** Welch test on student-teachers' level of self-determination towards learning online during the COVID-19 pandemic based on department

Department	n	Mean	Std. dev.	Statistics <sup>a</sup>	df1	df2	p-value	Decision
LIS	52	27.92	4.834					
DAE	88	21.57	6.463					
EDC	104	24.46	4.317					
EDP	72	22.67	3.922					
EDM	100	23.20	4.597	13.668	6	247.150	0.00	Rejected
EDF	110	24.20	4.133					
ECPE	86	21.09	5.007					
Total	612	23.40	5.112					

<sup>a</sup>Asymptotically F distributed

**Table 5.** t-test analysis of student-teachers' level of self-determination towards learning online during the COVID-19 pandemic based on gender

Gender	n	Mean	S. dev.	Mean difference	df	t	p-value	Decision
Male	190	24.91	4.86					
Female	422	22.72	5.08	2.19	610	4.99	0.00	Rejected

determination towards online learning during the COVID-19 pandemic. These hindrances include lecturers' inability to develop online courses, the high cost of data subscriptions to explore online learning materials, and distractions when learning online.

### Hypothesis 1

Hypothesis 1 is the University of Port Harcourt student-teachers' level of self-determination towards learning online did not vary significantly during the COVID-19 pandemic based on study year. **Table 3** depicts the Welch test on student-teachers' level of self-determination towards learning online during the COVID-19 pandemic based on study year. **Table 3** shows that the 0.00 p-value is lower than the 0.05 alpha level; this led to the rejection of the hypothesis that the University of Port Harcourt student-teachers' level of self-determination towards learning online did not vary significantly during the COVID-19 pandemic based on study year. Thus, the University of Port Harcourt student-teachers' level of self-determination towards learning online varies significantly, during the COVID-19 pandemic based on study year with student-teachers in year three (3) and year two (2) study year having the highest (24.63 mean value) and lowest (a 22.38 mean value) levels of self-determination towards learning online, respectively.

### Hypothesis 2

Hypothesis 2 states that the University of Port Harcourt student-teacher extent of self-determination towards learning online did not vary significantly during the COVID-19 pandemic based on department. **Table 4** demonstrates the Welch test on student-teachers' level of self-determination towards learning online during the COVID-19 pandemic based on department. **Table 4** indicates that the 0.00 p-value is lower than the 0.05 alpha level; this led to the rejection of the hypothesis that the University of Port Harcourt student-teachers' level

of self-determination towards learning online did not vary significantly during the COVID-19 pandemic based on department. Thus, the University of Port Harcourt student-teachers' level of self-determination towards learning online varies significantly, during the COVID-19 pandemic based on departments with student-teachers in Library and Information Science Department (LIS) and Early Childhood and Primary Education (ECPE) having the highest (27.92 mean value) and lowest (a 21.09 mean value) levels of self-determination towards learning online, respectively.

### Hypothesis 3

Hypothesis 3 is the University of Port Harcourt student-teachers' level of self-determination towards learning online did not vary significantly during the COVID-19 pandemic based on gender. **Table 5** shows t-test analysis of student-teachers' level of self-determination towards learning online during the COVID-19 pandemic based on gender. **Table 5** reveals that the 0.00 p-value is lower than the 0.05 alpha level leading to the rejection of the hypothesis that the University of Port Harcourt student-teachers' level of self-determination towards learning online did not vary significantly during the COVID-19 pandemic based on gender. The University of Port Harcourt student-teachers' level of self-determination towards learning online varies significantly, during the COVID-19 pandemic based on gender, with the male student-teachers having the highest level of self-determination towards learning online.

### Hypothesis 4

Hypothesis 4 states that the University of Port Harcourt student-teachers' self-determination hindrances to learning online did not vary significantly during the COVID-19 pandemic based on study year. **Table 6** depicts the Welch test on student-teachers' level of self-determination hindrances to learning online during the COVID-19

**Table 6.** Welch test on student-teachers' level of self-determination hindrances to learning online during the COVID-19 pandemic on study year

Study year	n	Mean	S. dev.	Statistics <sup>a</sup>	df1	df2	p-value	Decision
YR 1	137	19.83	3.984	5.869	3	262.362	0.001	Rejected
YR 2	270	21.61	4.953					
YR 3	80	20.23	3.656					
YR 4	125	20.34	4.429					
Total	612	20.77	4.542					

<sup>a</sup>Asymptotically F distributed**Table 7.** Welch test on student-teachers' level of self-determination hindrances to learning online during the COVID-19 pandemic on department

Department	n	Mean	S. dev.	Statistics <sup>a</sup>	df1	df2	p-value	Decision
LIS	52	19.54	3.171	10.422	6	251.520	0.00	Rejected
DAE	88	21.07	4.835					
EDC	104	20.24	3.764					
EDP	72	20.94	4.547					
EDM	100	19.90	4.317					
EDF	110	19.75	4.574					
ECPE	86	24.05	4.571					
Total	612	20.77	4.542					

<sup>a</sup>Asymptotically F distributed**Table 8.** t-test analysis of student-teachers' self-determination hindrances to learning online during the COVID-19 pandemic based on gender

Gender	n	Mean	S. dev.	Mean difference	df	t	p-value	Decision
Male	190	20.58	4.248	-0.28	610	-0.71	0.48	Accepted
Female	422	20.86	4.671					

pandemic based on study year. **Table 6** reveals that the 0.001 p-value is lower than the 0.05 alpha level. The hypothesis that the University of Port Harcourt student-teachers' self-determination hindrances to learning online did not vary significantly during the COVID-19 pandemic based on study year is rejected and the alternative accepted. Thus, the University of Port Harcourt student-teachers' self-determination hindrances to learning online vary significantly during the COVID-19 pandemic based on study year with student-teachers in year two (2) and year one (1) study year having the highest (21.61 mean value) and lowest (a 19.83 mean value) hindrances to learning online, respectively.

#### Hypothesis 5

Hypothesis 5 states that the University of Port Harcourt student-teachers' self-determination hindrances to learning online did not vary significantly during the COVID-19 pandemic based on department. **Table 7** shows the Welch test on student-teachers' level of self-determination hindrances to learning online during the COVID-19 pandemic based on department. **Table 7** unveils that the 0.00 p-value is lower than the 0.05 alpha level leading to the rejection of the hypothesis that the University of Port Harcourt student-teachers' self-determination hindrances to learning online did not vary significantly during the COVID-19 pandemic based on department. Thus, the University of Port Harcourt student-teachers' self-determination hindrances to learning online vary significantly, during the COVID-19 pandemic based on the department with student-teachers in Early Childhood and Primary Education (ECPE) and Library and Information Science Department (LIS) having the highest (24.05 mean value) and lowest (19.54 mean value) self-determination hindrances to learning online, respectively.

#### Hypothesis 6

Hypothesis 6 is the University of Port Harcourt student-teachers' self-determination hindrances to learning online did not vary significantly during the COVID-19 pandemic based on gender. **Table 8** depicts the t-test analysis of student-teachers' self-determination hindrances to learning online during the COVID-19 pandemic based on gender. **Table 8** discloses that the 0.48 p-value is higher than the 0.05 alpha level leading to the acceptance of the hypothesis that the University of Port Harcourt student-teachers' self-determination hindrances to learning online did not vary significantly during the COVID-19 pandemic based on gender.

## DISCUSSION OF THE FINDINGS

**Table 1** revealed that the student-teachers' level of self-determination towards learning online during the COVID-19 pandemic at the University of Port Harcourt was high. They were self-determined to pursue their set career goals by learning online, participate in online learning activities, and complete any online learning course they enrolled in. Their online academic pursuit was their priority. They explored different online materials to support their learning and their online study habit increased during the COVID-19 pandemic. The student-teachers collaborated online with their course mates to solve course-related problems; however, they were unable to communicate online with their lecturers. These affirmed that the online learning was the viable option for students to learn during a pandemic and the student-teachers utilized that opportunity to increase their knowledge by being determined to learn by themselves without the support of their lecturers. Batmang et al. (2021), Balakrishnan and Long (2020), and Gustiani (2020) findings showed that students self-

determination and their intrinsic motivation led to participation in online learning during COVID-19 pandemic agree with the present finding. However, Agbejule et al.'s (2021) findings which revealed that students' online learning participation was externally motivated by the use of online delivery mode and the fear of others leaving them behind; disagrees with this finding.

**Table 2** disclosed that the University of Port Harcourt participated in online education during the COVID-19 pandemic, and most lecturers created online platforms for class communication and collaboration. The student-teachers were familiar with online learning platforms and liked participating in online learning; however, the hindrances that affected their self-determination towards online learning during the COVID-19 pandemic were most lecturers' inability to develop online courses, high cost of data subscription to explore online learning materials and distractions during learning online. This result affirmed that most University of Port Harcourt lecturers created and used only social media as online platforms to post class information and assignments, and allowed the student-teachers to share ideas among themselves, without creating course content and delivery instructions via the online learning platforms, possibly because the lecturers were incompetent to develop and deliver courses online. Also, the University of Port Harcourt student-teachers are still learning in an environment without free or subsidized Internet subscriptions, and they allowed environmental and online distractions to interfere with their online studies. Agbejule et al. (2021), Mbunge et al. (2021), Onyema et al. (2020), and Sari and Nayir's (2020) findings, which revealed, among others, that poor Internet access, technical skills, lecturers' online teaching competency, students' discipline, and social interaction were online learning challenges during the COVID-19 pandemic agreed with the present finding.

**Table 3**, **Table 4**, and **Table 5** showed that the University of Port Harcourt student-teachers' self-determination level towards learning online varies significantly during the COVID-19 pandemic based on their study years, departments, and gender, respectively. These results indicate that some student-teachers, especially the year three, Library and Information Science Department, and male student-teachers, attached great values to studies and were self-determined to learning online during the COVID-19 pandemic.

**Table 6**, **Table 7**, and **Table 8** unveiled that the University of Port Harcourt student-teachers' self-determination hindrances to learning online vary significantly based on their study years and departments but did not vary significantly based on gender, respectively, during the COVID-19 pandemic. Therefore, the University of Port Harcourt student-teachers in their different study years (especially, the year two student-teachers) and departments (especially, the Early Childhood and Primary Education Department) experienced more hindrances in their self-determination to learning online than others, irrespective of their gender.

## CONCLUSIONS AND RECOMMENDATIONS

This study centered on the University of Port Harcourt student-teachers' self-determination level and hindrances towards learning online during the COVID-19 era. From the findings, the student-teachers' self-determination level to learning online during COVID-19 was high, although, this varies significantly based on study years, departments and gender. The student-teachers experienced some

hindrances that affected their online learning self-determination. These hindrances vary significantly according to the student-teachers' study years and departments but were insignificant on a gender basis.

This study clarified that most University of Port Harcourt student-teachers were self-determined to making their online learning their priority during the COVID-19 pandemic, despite the hindrances they experienced while learning online. If these hindrances are addressed and taken care of, all the student-teachers will be more enthusiastic, intrinsically motivated, and self-determined to learning online amid any pandemic notwithstanding the study year, department, or gender.

The recommendations from the findings include the followings:

1. The University of Port Harcourt lecturers should create compulsory online interactions and communication sessions with students.
2. The University of Port Harcourt should train its lecturers to develop engaging and interactive online courses and deliver them through Learning Management Systems dedicated solely to online learning purposes.
3. Schools and government should provide free and unlimited data subscriptions for the lecturers and students.
4. Students should dedicate time to their online studies and avoid any distractions to their studies.
5. There should be future research on the effect of online learning platforms on students' self-determination.

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**APPENDIX A**

<b>Test of homogeneity of variances for hypothesis 1</b>			
Levene statistics	df1	df2	Sig.
8.526	3	608	0.000
<b>Test of homogeneity of variances for hypothesis 2</b>			
Levene statistics	df1	df2	Sig.
3.271	6	605	0.004
<b>Test of homogeneity of variances for hypothesis 4</b>			
Levene statistics	df1	df2	Sig.
7.195	3	608	0.000
<b>Test of homogeneity of variances for hypothesis 5</b>			
Levene statistics	df1	df2	Sig.
2.213	6	605	0.040



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## Exploring the Relationship Between Students' Perception, Interest and Mathematics Achievement

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### ABSTRACT

The purpose of this study was to explore the relationship between students' perception, interest and mathematics achievement using purely quantitative approach. The research design used was descriptive survey. The study adopted purposive and simple random sampling techniques to choose a sample of 232 senior high students. The instruments used were questionnaires for measuring students' perception and interest and achievement test. The results were analysed using descriptive and inferential statistics. The results revealed that students had negative perception towards mathematics and positive interest towards mathematics. Also, the results revealed that student's interest and perception significantly predicted students' achievement in mathematics. Again, a positive, moderate and significant relationship was recorded between students' interest and achievements in mathematics. Furthermore, there was a positive weak correlation between students' perception and achievement in mathematics which is also significant. Finally, weak positive significant correlation was recorded for the relationship between students' perception and interest towards mathematics.

**Keywords:** perception, interest, achievement, relationship, correlation

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### INTRODUCTION

Mathematics is the heart of science and its related courses, without mathematics there is no real development in science and technology (Hafiz & Hina, 2016). The competence gained in the study of mathematics is widely known and used in all spheres of human life (Asiedu-Addo & Yidana, 2004). Mathematics plays a very key role in shaping how individuals deal with the various spheres of private, social, and civil life (Walshaw & Anthony, 2009). Mathematics is seen by society as the basis of scientific knowledge that is very important in socio-economic development of a nation (Reeve, 2013). According to Kalhotra (2013), mathematics is one of the most important subjects which act as a bridge to all sources of knowledge. This was intensified by Federal Republic of Nigeria (FRN) National Policy on Education 6th edition (2013) in which mathematics was clearly stated and noted as a necessary requirement for any science related fields of study such as engineering, chemistry, health sciences (Medicine, nursing, and optometry), and the social sciences (communication, economics, and geography). Despite the importance of mathematics to students' careers and its relevance to everyday life, there are a number of observable problems associated with its teaching and learning, especially at the senior high school level. Researchers find it very important to investigate why students still fail in mathematics.

The findings of this study will be of great benefit to students, mathematics teachers, the school administrators, policy makers in education and government. Policy makers are expected through this study to realize the importance of students' interest in mathematics and its influence in their mathematics achievement. Therefore, the study will help improve educational policies that will boost student's interest in mathematics. The findings of the study will contribute to the existing body of knowledge in the area of mathematics in the district as well as other areas. Findings from this study would be very useful to students, teachers and other stake holders in the educational sector to identify teacher-efficacy as a positive contributor to students' interest and achievement in mathematics. It will also be of benefit to educationists as it will open more research gaps for future research in the field of mathematics education. The views from various mathematics students will enrich teaching approaches, identify and give a probable and workable solution to some of the problems facing them in teaching and learning of mathematics. The research findings will be of benefit to mathematics teachers as it will guide them to improve on their method of delivering lessons as well as improving students' mathematics achievement. When teachers understand that learning is not a "one-size-fits-all" approach, it will make it easier for teachers to teach to the strength of their individual students and ensure that mathematics stays on the cutting edge tomorrow.

In Ghana, some of the objectives of learning mathematics at the senior high schools are, as follows: (a) To develop computational skills of students by using suitable method to perform calculations. (b) Students should be able to recall, apply and interpret mathematical knowledge in the context of everyday situations. (c) Learners should develop the ability to translate word problems into mathematical language and solve them with related mathematical knowledge or ideas. (d) They should be able to organize, interpret and present information accurately in written, graphical and diagrammatic forms. (e) Students should use mathematical knowledge and other instrument to measure and construct figures to an acceptable degree of accuracy. (f) Learners should develop precise logical and abstract thinking ideas. (g) They should be able to analyse a problem, select a suitable strategy and apply an appropriate technique to obtain its solution.

## LITERATURE REVIEW

Perception is the process of selecting, organizing, and interpreting data gathered by our senses in order to comprehend the world around us (Greenberg & Baro, 1999, p. 72). The teacher's attitude and teaching technique can have an impact on students' perceptions. The way pupils see mathematics is determined by what they believe mathematics is all about. Mathematical perception refers to a person's interest in or feelings about the subject. Students' interest towards Mathematics learning has a great implication for Mathematics lesson instruction among mathematics teachers at all levels of the educational ladder. Students interest towards Mathematics participation is a significant factor towards students' success in mathematics.

### Studies on Students' Perception Towards Mathematics

Students' positive perceptions of mathematics were greatly influenced by the teacher's method of mathematics teaching and his personality, according to studies conducted in Australia, and that students who lack interest and personal effort in learning mathematics are unlikely to perform well in the subject (Koul & Fisher, 2006).

According to the findings of a study conducted in various Nigerian schools, students' attitudes toward mathematics are favorable, and many of them believe that mathematics is a valuable and necessary subject that would benefit them in their future careers (Olatoye, 2002). Perceptions of mathematics are generally positive, according to Koul and Fisher (2006). Ampadu (2012) in a study indicated that the influence of students' perceptions towards mathematics showed that the teacher's method of teaching mathematics and his personality greatly accounted for the students' positive or negative perception towards mathematics. Ampadu also stressed that students' beliefs and perceptions have the potential to either facilitate or inhibit learning.

Hagan et al. (2020) concluded that students have positive perception towards mathematics when they used 297 students selected via stratified sampling with questionnaire as the main instruments for collecting data in Ghana. Similarly, Daud et al. (2020) purpose was to examine students' perceptions in learning mathematics and how these perceptions contributed to problems in comprehending mathematics among some selected Malaysian Secondary School students. Their study results showed that there was a positive perception towards Mathematics, and a statistically significant relationship between students' perceptions towards mathematics and their mathematics grade using APOS Theory. Furthermore, Arthur et al. (2017)

investigated student perception and its impact on Ghanaian students' interest in mathematics. The study established that 58.1% of total respondents agreed that students' negative perception of math strongly influences their interest in math as they progressed in their studies. In another vein, Kabeera (2018) carried out a study to examine the influence of students' perception on mathematics, the results revealed that student's perception on mathematics either positively or negatively influence their mathematics interest as well as their general mathematics performance. Similarly, Mariam et al. (2016) carried out research on students' perception toward mathematics performance. According to the study's findings, the manner in which Mathematics was being handled by tutors during the process of teaching and learning is the first source of the students' perception toward mathematics. The findings also pointed out that students' perceived mathematics as not useful in their lives and hence no need to develop an interest for it.

### Studies on Students' Interest About Mathematics

A study was conducted by Leonard (2016) on factors affecting students' interest in mathematics in secondary schools in Enugu State. The research findings revealed that, teacher factor, student factor, instructional strategy, mathematics anxiety and infrastructural problem correlated positively with students' interest and their mathematics achievements. Also, in Rimma (2017), the purpose of the study was to investigate how interested and engaging students are, in a mathematics class, and the perception they had about mathematics during the lesson. The results showed that few students indicated that interest is manifested through their engagement in mathematics lessons with a positive perception. The findings also showed that students' interest and engagement was developed by teachers during classroom interaction as perceived by the students in mathematical tasks. Similarly, Mohamed and Charles (2017) conducted research on students' interest in mathematics and academic achievement of high school. The findings showed that there was a significant difference in interest in mathematics and academic achievement of high school level students in respect of their type of management. The study found that there was no significant difference between rural and urban area school students at high school level in respect of their interest and their achievement in mathematics.

### Relationship of Students' Perception Towards Mathematics and Their Achievement in Mathematics

In their findings on perceptions, Ma and Xu (2004), Muijs and Reynold (2002), and Silver et al. (2009) found that there were very positive attitudes or perceptions towards mathematics in countries like Rwanda and Australia where there was an emerging thirst for students' perceptions of mathematics and academic achievement. However, the data revealed that perceptions of mathematics were more neutral in nations with a high degree of technical and industrial growth. In a descriptive survey design, Hagan et al. (2020) reported that there was a very weak and negative relationship between students' perception and achievements in mathematics when they used 180 males and 117 females as the sample. Similarly, Daud et al. (2020) who examined students' perceptions in learning mathematics and how these perceptions may contribute to problems in comprehending mathematics among some selected Malaysian secondary school's students. Their study results showed that there was a positive perception towards Mathematics, and that there was a significant statistical relationship between students' perceptions towards mathematics and their mathematics grade using APOS Theory. As cited

earlier, Olatoye (2002) found that students' perceptions of mathematics had a significant direct influence on their performance in the subject. Furthermore, Nardi and Steward (2003) state that students' perceptions of the value of learning mathematics can be considered both as input variables and as outcome variables because their perceptions of these subjects can be associated with academic achievement in a way that reinforces the highest or the lowest results. Furthermore, Ahmad et al. (2017) conducted a study to investigate the relationship between students' perception toward the teaching and learning methods of mathematics' lecturers and their achievement in pre-university studies. The findings revealed that there was no significant correlation between the average scores of students' perceptions of teaching and learning towards the mathematics lecturers with the average scores of mathematics achievement of the students. The study also revealed that there were no significant differences between the average scores of male and female students' perceptions of the effectiveness of teaching and learning of the mathematics lecturers. The findings of this study showed that the lecturers could improve their teaching skills and techniques which were appropriate to the students' level.

#### **Relationship of Students' Interest Towards Mathematics and Their Achievement in Mathematics**

Arthur et al. (2014) purpose was to investigate the variables perceived to influence students' interest in learning mathematics and the extent to which these variables affected students' interest in learning mathematics. Nonetheless, it also investigated factors affecting Ghanaian students' interest in mathematics to enrich their mathematics potentials. The findings from the study revealed that student's interest in mathematics is dependent on whether students liked mathematics as a subject. The teachers' motivation and access to textbooks was also identified to have very positive impact on student interest in mathematics as well as the method and approach adopted by the teacher during teaching and learning of Mathematics. However, the age of students, the type of school attended by students was found to be independent on the students' interest in mathematics.

In another study by Mohammed and Charles (2017), whose purpose was to investigate students' interest in mathematics and their academic achievement, found that there was no significant difference between rural and urban area school students of high school level in respect of their interest and their achievement in mathematics. Similarly, a study was conducted by Leonard (2016), purpose was to find the possible factors that affected students' interest in mathematics. The research findings revealed that teacher factor, student factor, instructional strategy, mathematics anxiety, and infrastructural problem correlated positively with students' interest and their mathematics achievements. Also, Rimma (2017) whose purpose was to investigate how interested and engaging students were in a mathematics class and the perception they had about mathematics during the lesson. The results indicated that students showed less interest in mathematics due to inappropriate methodology used by teachers and few also testified that interest is manifested through their engagement in mathematics lessons with a positive perception. The findings also showed that students' interest and engagement was developed by teachers during classroom interaction. The study concluded that students' interest and engagement had a very significant relation with mathematics classroom achievement. Also, a study conducted by Madeleine (2013) examined the correlation between fifth grade students' attitudes towards mathematics and their achievement in

the subject. The findings from a Pearson correlation that was conducted indicated that there was a positive relationship between students' attitude towards mathematics and their mathematics achievements.

#### **Relationship of Students' Perception About Mathematics and their Interest Towards Mathematics**

Arthur et al. (2017) aimed at addressing the effect of students' perception and its impact on students' interest in mathematics, using multivariate statistical techniques. The study established that 58.1% of the total respondents agreed that, students' negative perception of mathematics has strong influence on their interest in mathematics as they moved forward on their educational ladder. The results further indicated that the relationship between student perception and interest in Mathematics was statistically significantly.

The overview of the relevant literature describes differing opinions and results on students' perceptions of mathematics and their achievements. A critical review of the above studies indicated that there are positive reports about the relationship between student perception, student interest, and student academic achievement. It is against this background that the present study also examined the influence of perception and interest on student achievement in math at Bole High School.

## **THEORETICAL FRAMEWORK**

It is the 'blueprint' or guide for research (Grant & Osanloo, 2014). It is a framework based on an existing theory in a field of inquiry that is related and/or reflects the hypothesis of a study. Therefore, the theory that underpins this study is the adaptation of Bandura (1986) cognitive theory based on students' perception and their interest on mathematics achievement.

Perception has to do with the individuals' feelings about, or appraisal of, a given object, thing or a person based on the individuals' past and present experiences. According to Bandura (1986), nothing is more powerful than having a direct experience with something. Therefore, students who have excelled in mathematics in the past will definitely have a good perception and interest in learning mathematics leading to high performance. Nevertheless, the interest of the students allows the students to process the understanding of the concepts through different modalities based on their own experiences. Theoretical deliberations about interest development proposed by Baumert and Koller (1998), Hidi (2000), Krapp (2000), and Schiefele (2001) concur in predicting interest declines from childhood through to adulthood. These theorists all seem to agree that interest develops based on observations. Therefore, through vicarious experience, students observe people around us, especially students consider these people their role models or seeing people similar to themselves who have excel in mathematics give students the good perception and interest in mathematics to persevere in learning mathematics leading to high mathematics achievement.

Verbal persuasion or motivation is related to both interest and the desire to learn mathematics (Guy et al., 2015). Students are intrinsically motivated to learn mathematics if they have the desire to do so after finding learning of mathematics interesting (OECD, 2013). It is believed that motivation is the driving force for learning (Yunus & Ali, 2009). Therefore, when influential people such as teachers, lecturers, parents, etc. strengthen our interest by giving students a good

perception about mathematics will lead to high mathematics performance. Lastly, physiological and emotional state: the state of a student influences his/her perception as well as interest in learning mathematics. For instance, depression can dampen student's interest in leaning mathematics where as positive emotions will increase students' interest in learning mathematics.

### Purpose of the Study

The purpose of the study was to explore students' perception about mathematics and the interest students have for mathematics. The study also sought to examine the relationship between students' perception, interest as well as students' mathematics achievement.

### Objectives of the Study

The study was guided by the following specific objectives:

1. To explore students' perception about mathematics,
2. To explore students interest towards mathematics, and
3. To explore the relationship between students' perception, interest and their mathematics achievement.

### Research Questions

This study sought to find answers to the following questions:

1. What is the perception of students about Mathematics?
2. What is the interest of students towards Mathematics?
3. What is the relationship between students' perception, interest and achievement of mathematics?

### Research Hypotheses

To achieve three research questions of the study, the following hypotheses were tested:

- H1:** Students' perception about mathematics significantly influences their achievements in mathematics.
- H2:** Students' interest in mathematics significantly influences their achievement in mathematics.
- H3:** Students' perception about mathematics significantly influences their interest in mathematics.

## METHODOLOGY

This study adopted descriptive correlation survey design with pure quantitative techniques. According to Emaikwu (2012) who indicated that correlation survey is about establishing relationship between two or more variables. Hence, this design was appropriate in view of the conditions or relationships that exist among perception, interest and achievement in mathematics. The target population of the study was form two and three students at Bole Senior High School. Purposive sampling method was used to select the school while Simple random sampling technique was used to select 232 students (99 females and 133 males). The simple random sampling technique ensured that each member of the target population had an equal and independent chance of being included in the sample. The Research Instruments used were Mathematics Achievement Test (MAT) and student's perception and Interest in Mathematics Questionnaire (SPIMQ). The Mathematics Achievement Test (MAT) was set by the researchers which composed of thirty (30) multiple choice items. Also, the Students' perception and Interest in Mathematics Questionnaire (SPIMQ) was adapted from Jang

et al. (2009) by the researchers which composed of 20 items which reflected students' perception and interest towards mathematics. The items were rated on 5 Likert-scales, starting from Strongly Disagree (SD)=1, Disagree (D)=2, Undecided (UD)=3, Agree (SA)=4, and Strongly Agree (A)=5 for students to tick with respect to their opinion. The two instruments were given to three experts in Mathematics Education who have taught mathematics over 10 years for scrutiny and vetting. Their recommendations were the basis for its validation and administration. A pilot study was conducted using the achievement test and the questionnaire in Sankore Senior High School in Asunafo South District to save time and resources. The school also have a similar characteristic as that of Bole Senior High School. The purpose of the pilot study was to ensure validity and reliability of the instruments. Kuder-Richardson formula 20, was used to compute the reliability of the test which yielded 0.86. This figure indicated that the test was good for the main study. Also, Cronbach alpha was used to determine the reliability of the questionnaires, and coefficient of 0.91 was obtained which showed that the items were reliable and could be administered for main study.

### Procedure for Data Collection

One of the researchers visited the selected school with the consent letter seeking permission from the headmaster on consent and cooperation of the students in the school. The researchers after being given the approval to conduct the study addressed the students on the purpose and relevance of the study. After a week of the initial visit the researchers distributed copies of the test and questionnaire to the students participating in the study. The information that the researchers received during the period of this study was treated confidentially and purely for academic purposes. The researchers waited for the completion of the test and the questionnaires which was done within 1 hour 30 minutes.

### Data Analysis

The data gathered were organized and keyed into SPSS for analysis. Both descriptive and inferential statistics were employed. The descriptive statistics (i.e., frequency distribution, percentages, means and standard deviations) were used to address the research questions one and two, whereas the inferential statistics (Pearson moment correlation) was used to analyse the research question three and the hypothesis.

## RESULTS

This section presents the results of the analysis of the research questions and hypothesis raised for this study.

### Analysis of the Research Questions

Research question 1 (What is students' perception about mathematics?) borders on students' perception about mathematics. The results are presented in **Table 1**.

From **Table 1**, the results indicated that mathematics is abstract and boring with (mean=2.10, SD=1.33). Also, the students responded that mathematics is very complex to their understanding with (mean=3.07, SD=1.41) Again, with regards to the statement, mathematics has nothing to improve in my life, yielded a (mean=1.65, SD=1.08). Moreover, on the issue mathematics is meant for students who are talented and higher achievers it resulted in a (mean=1.90 SD=1.25).

**Table 1.** Descriptive statistical analyses of students' perception construct

S/No	Statement	Mean	SD
1	Mathematics is abstract and boring.	2.10	1.330
2	Mathematics is very complex to my understanding.	3.07	1.408
3	Mathematics has nothing to improve in my life.	1.65	1.079
4	Mathematics is full of rules and procedures.	3.94	1.140
5	Mathematics is meant for students who are talented and higher achievers.	1.90	1.251
6	Mathematics is not difficult as compared to other subjects.	2.82	1.465
7	Negative perception of students from basic schools affects student interest in mathematics.	2.51	1.453
8	There are so many formulas in mathematics therefore students cannot do well in mathematics.	2.33	1.369
9	Students' misconception about mathematics affects their perception of mathematics.	2.58	1.349
10	Students feel they are not involved in the teaching and learning process.	3.92	1.300
<b>Grand mean and standard deviation</b>		<b>2.68</b>	<b>1.3100</b>

Source: Field work

**Table 2.** Descriptive statistical analyses of students' interest construct

S/No	Statement	Mean	SD
1	Mathematics is a very interesting subject.	3.74	1.320
2	Students like mathematics because they don't have to memorize it, it could all be figured out.	3.26	1.449
3	Students enjoy studying mathematics in S.H.S than any other subjects.	3.48	1.348
4	Students will like to avoid mathematics if an option is given.	2.69	1.526
5	Students lose interest in mathematics due to the negative misconception held by students.	3.41	1.429
6	Students like solving new problems in mathematics on their own.	2.61	1.490
7	Mathematics makes students feel uncomfortable.	2.53	1.420
8	Students dislike mathematics due to its complex nature.	3.36	1.389
9	When students hear the word "mathematics", they have the feeling of dislike.	3.60	0.444
10	Teachers do not involve students in the teaching and learning of mathematics.	3.32	1.384
<b>Grand mean and standard deviation</b>		<b>3.20</b>	<b>1.320</b>

Furthermore, the students responded that there are so many formulas in mathematics hence they cannot do so well in mathematics with a (mean=2.33, SD=1.37), they again indicated that their misconception about mathematic affects their perception towards mathematics with a (mean=2.58, SD=1.35). From the analysis, students have shown negative perception towards mathematics with a grand mean of 2.68 and standard deviation of 1.31. In conclusion, students have negative perception towards mathematics.

Research question 2 (What is students' interest about Mathematics?) examines students' interest towards mathematics. The results are presented in **Table 2**.

As shown in **Table 2**, majority of the respondents agreed that, mathematics is a very interesting subject (mean=3.74, SD=1.32), others claimed that they enjoy studying mathematics than any other subject with (mean=3.48, SD=1.35). **Table 2** also revealed that students lose interest in mathematics due to the negative misconception held by students with responses corresponding to (mean=3.41, SD=1.43). Again, with regards to when students hear the word mathematics, they have the feeling of dislike yielded a (mean=3.60, SD=0.44). From this analysis, students have shown positive interest towards mathematics with a grand mean of 3.2 and standard deviation of 1.32.

To answer the research question 3 (What is the relationship between students' perception, interest, and achievement of mathematics?), the empirical triangular model of students' achievement in mathematics was used for further clarity and confirmation. The results of the study showed that students' interest in mathematics and students' perception of mathematics significantly predicted students' mathematics achievement. This is attributed to the 49.24% of variations in the students' mathematics achievement. The results further indicated that students' interest in mathematics can explain 28.95% of variance in student's perception of mathematics while students' achievement in

mathematics also explains 40.10% of variance in students' interest to learn mathematics as indicated in **Figure 1**. It therefore concluded that there is a significant positive relationship between students' perception about mathematics and their interest in mathematics as well as their achievements in mathematics. Similarly, **Table 3** depicts Pearson correlation analyses among students' perception, interest, and mathematics achievement.

### Analysis of the Hypotheses

#### *Influence of students' perception on students' achievement in mathematics*

The hypothesis (**H1**: Students' perception about mathematics significantly influences their achievements in mathematics.) that student perception influences student math scores was tested at a significance level of 0.01. The results indicated a significant direct relationship between students' perceptions of mathematics and their math achievement ( $r=0.332$ ,  $p<0.01$ ) with a coefficient of determination ( $r^2=0.110$ ), which is a positive weak correlation. Based on this result the hypothesis stated is upheld.

#### *Influence of students' interest on students' achievement in mathematics*

The hypothesis (**H2**: Students' interest in mathematics significantly influences their achievement in mathematics.) that students' interest influences their achievement in mathematics was tested at a significance level of 0.01 using correlation. The results of the study suggested that there was a direct moderate positive and statistically significant relationship between student achievement in math and students' interest in learning math ( $r=0.509$ ,  $p<0.01$ ) with a coefficient of determination of ( $r^2=0.259$ ). This indicated that students' interest in mathematics accounted for 25.9% of students' achievement. Hence, the hypothesis is accepted.

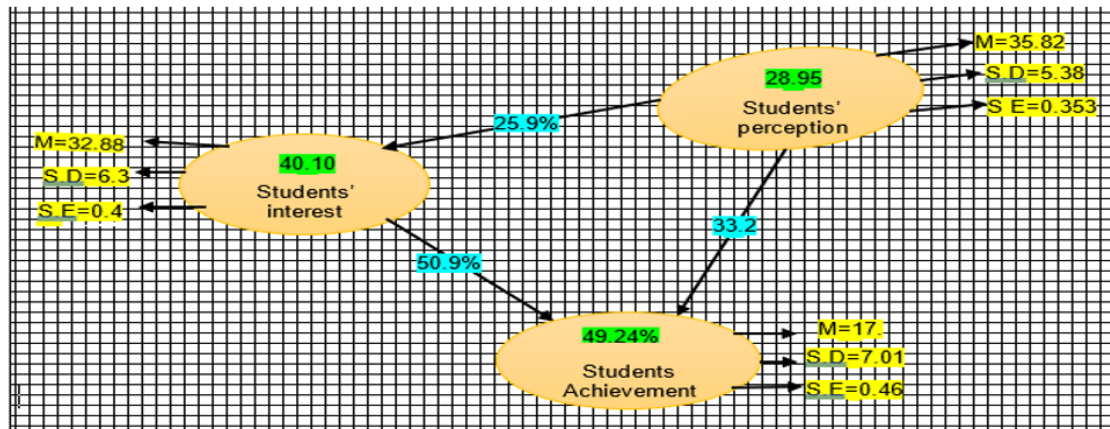


Figure 1. Relationships between students’ perception, interest, and mathematics achievements

Table 3. Pearson correlation analyses among students’ perception, interest, and mathematics achievement

Construct	Students’ perception	Students’ interest	Students’ achievement	p-value	Cronbach’s alpha
Students’ perception	1	0.259	0.332	0.000	0.873
Students’ interest	0.259	1	0.509	0.000	
Students’ achievement	0.332	0.509	1	0.000	

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

**Influence of students’ perception on students’ interest**

The hypothesis (H3: Students’ perception about mathematics significantly influences their interest in mathematics.) that students’ perception influences their interest tested at a significance level of 0.01 was statistically significant. The findings suggested a direct weak positive relationship between students’ perception about mathematics and student’s interest towards mathematics at (r=0.259, p<0.01) with coefficient of determination (r<sup>2</sup>=0.067). That is students’ interest in mathematics accounted for 6.7% of students’ perception. Therefore, the hypothesis is accepted.

**DISCUSSION**

The findings of the study are discussed here and compared to existing literature. From the analysis of the student’s perception towards mathematics was negative. This negative perception was evident because majority of the respondent’s indicated mathematics was meant for students who are talented and higher achievers. They also supported their assertion by indicating that mathematics is abstract, boring and has nothing to improve in my life. This finding agrees with the study of (Arthur et al., 2017; Mariam et al., 2016) which also reported students’ negative perception towards mathematics. However, it contradicts the findings of Daud et al. (2020) and Hagan et al. (2020) who reported that students have positive perception towards mathematics in their studies.

In another development, students’ interest towards mathematics was positive, majority of the students’ responses were between disagree and strongly agree. Their interest towards mathematics were supported by their agreement to their responses that mathematics is very easy, enjoyable in senior high school than other subjects. Their disagreement to this statement that when they hear the word “mathematics” they dislike it also affirmed their positive interest towards mathematics. This finding corroborates with the findings of Leonard (2016) and Rimma (2017) who reported that students had positive interest towards mathematics.

From the results it is evident that students’ achievement in mathematics accounted for 11.0% of students’ perception. The result of the study suggests that the more positive students experience math, the more likely students will exhibit in mathematics achievement. So, since the students perceive mathematics positively by erasing misconceptions about math, the more students are interested in teaching and learning math, the more math skills will be improved. The more positive perception students have of teaching and learning mathematics will significantly increase their interest in mathematics (Ampadu, 2012). When students receive school counseling to renew their perception of mathematics, they increase their interest in mathematics and have an additional impact on math achievement. The results agree with the views of Arthur et al. (2017a) and Arthur et al. (2014) who also had similar findings. This study is also similar to Madeleine (2013) who also found a positive relationship between students’ perception towards mathematics and their mathematics achievement. This study is however opposite to Ahmad et al. (2017) who found no significant correlation between the average scores of students’ perceptions of teaching and learning towards the mathematics with the average scores of mathematics achievement of the students.

Also, it is revealed that, when students have interest in the teaching and learning of mathematics, it will further improve their competency in mathematical concepts as well as their confidence level. The more interested students are in the teaching and learning of mathematics, the more it will significantly develop their confidence in studying mathematics as well as their mathematics achievement. However, observations from the study also indicated that when students are guided by mathematics teachers and given academic counselling to eradicate their negative perception about mathematics, it will improve their interest in mathematics and further impact on their achievement and performance in mathematics. This study result agrees with the studies of Arthur et al. (2014) and Arthur et al. (2017b) who found similar results. Also, this study results tallies with that Leonard (2016) who reported that students’ interest and their mathematics achievements are positively correlated. Again, this study corroborated with that of Rimma (2017) who also found that students’ interest and

engagement had a very significant relation with mathematics classroom achievement.

From the results of the study, it has revealed that student exhibiting a positive perception of mathematics will further increase their interest in mathematics. Furthermore, the analysis of the study indicated a positive and statistically significant relationship between students' interest and perception to learn mathematics. The results further suggested that the more students are interested in mathematics they will have positive perception to learn mathematics. This study corroborates with Arthur et al. (2017) and Arthur et al. (2014) who also found that, the more positive perception students hold about mathematics will significantly improve their interest in mathematics.

## CONCLUSIONS

Based on this study's results, the students' perception towards mathematics was negative, whereas students' interest towards mathematics was positive. Also, there is a direct statistically significant weak positive relationship between students' perception about mathematics and their achievement in mathematics. Again, the students' perception and interest predicted students' achievement in mathematics. Furthermore, students' interest in mathematics is moderately positive and significantly correlate which influences their achievement in mathematics. Finally, there is a weak positive direct relationship between students' interest in mathematics and their perception about mathematics which is statistically significant.

### Recommendations

1. The study recommends for stakeholders and mathematics educators to engage students in activities that will positively improve students' perception and their interests for learning mathematics.
2. It is recommended that teachers be sensitized on how best they could approach mathematics, relate to students and change the attitude of students on mathematics.

### Implications and Suggestions for Further Research Study

The data collected showed that perceptions and interests of students towards mathematics is determined by various factors. The study has established that students' perception and their interest level influenced the confidence and commitment they had towards mathematics which eventually influenced their mathematics achievement. Although the findings are from the Savanna Region of Ghana, more precisely Bole district, the findings are not generalizable because they represented only an urban area whose population was unique. It is recommended that a similar study should be done in other regions in Ghana so as to unearth more about the influences of students' perception and interest on students' achievement in mathematics.

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# Application of SQQ-Based Flipped Classroom Model on Students' Achievement and Engagement in ICT Course

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## ABSTRACT

There is an agitation from teacher educators and experts that the traditional lecture-based method is no longer appropriate in teaching Information and Communication Technology (ICT) courses. Though, the government through its policies and reforms introduced ICT courses to schools and colleges to boost students' ICT knowledge and skills for economic and national development. Studies from across all parts of the world show that using the traditional lecture-based method in teaching the ICT courses had affected students' academic achievement and engagement. Scholars suggested using technologies and student-centered learning approaches to improve students' achievement and engagement, particularly in the ICT courses. Flipped classroom model is one of the teaching and learning pedagogies that can overcome the limitations of the traditional lecture-based method. Few studies have investigated the effect of flipping classroom model for the students taking ICT courses. Hence, this paper presents a modified flipped classroom model to improve students' achievement and learning engagement. The modified flipped classroom model comprises of social constructivist learning theory, bloom taxonomy, cooperative learning model, and study-quiz-question (SQQ) learning strategy.

**Keywords:** ICT knowledge, flipped classroom model, cooperative learning model, bloom taxonomy, social constructivism, SQQ

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## INTRODUCTION

For more than decades, the traditional lecture-based method has been used in most universities, colleges, and schools to impart knowledge and experiences. These institutions are being challenged by the modern days' needs to improve student's ICT knowledge and learning engagement. To accomplish this goal, Nigerian government introduced and made computer and ICT courses mandatory at various levels of education to expose students to several ICT tools and applications. For this study, ICT knowledge refers to the student's ability to use the Internet, computer database, word processing, Microsoft Excel, and presentation softwares for creating, managing, and storing information. ICT knowledge reduces digital illiteracy within society (Karakainen et al., 2018). It allows students to access learning materials online and collaborate with their colleagues, teachers, and experts to attain a certain level of knowledge (Kaware & Sunil, 2015). In Africa, especially Nigeria, most of the students found to have limited ICT knowledge due to some factors such as inadequate resources, financial issues, and lack of appropriate teaching pedagogies (Omotayo et al., 2020). The choice of teaching method had always influenced the students' engagement and learning outcomes (Roorda et al., 2011).

Now a day, teachers are being looking for the appropriate methods to fully engage the students with content in and outside the classroom (Stronge, 2018). Engagement is a student's active involvement in a learning activity. It is a critical element for boosting students' academic progress and promoting active learning (O'Donnell et al., 2011). Students' engagement represents the range of actions they take to progress from not knowing, not understanding, not having skill, and not achieving to knowing, understanding, having skill, and achieving (Reeve, 2013).

Student's engagement during pre-class activities and in-class activities plays a significant role in achieving high learning outcomes in the flipped classroom model. Though engagement is one of the critical factors that enhance learning achievement (Jang et al., 2012). Studies reported that the level of student's engagement during the ICT/computer course lectures in Nigerian universities was low (Samuel et al., 2019; Zakana & Esther, 2019). Study reported that using the traditional lecture-based method was among the causes of students' low engagement in Nigeria (Adedaja, 2016).

Under this circumstance, the teaching of ICT courses needs to change from a traditional-lecture-based approach to a technology based-approach and student-centred learning approach. One such

approach is flipped classroom teaching approach. This article describes the effect of the modified flipped classroom model on students' achievement and engagement. The modified flipped classroom is supported by the cooperative learning model, constructivist theory, bloom's taxonomy, and study-quiz-question (SQQ) learning strategy.

## BACKGROUND OF THE STUDY

ICT knowledge is an essential requirement for every student to work independently, access information, and collaborate with experts to ascertain some levels of education (Karakainen et al., 2018). At the university level, the ICT topics include computer database, Internet skills, Microsoft offices, information security, information networking, image processing, and social networking. Disappointingly, in Nigeria these contents are all taught using the traditional lecture-based method. Hence, may be the reason for the students' limited ICT knowledge and less engagement. Some ICT topics require a technology-based teaching approach and a student-centred learning approach (Wen et al., 2017). Modern teaching models need to be employed to achieve optimal learning outcomes and maximum engagement (Willingham et al., 2015). Research shows that majority of the teachers are rigid to transform their teaching strategies from traditional lecture-based methods to modern teaching methods (Alrahlah, 2016). The modern teaching methods are those that are central to successful learning. These include but not limited to blended learning, flipped, or inverted classroom models, problem-based learning, project-based learning, discovery method, and cooperative learning.

Flipped or inverted classroom model is one of the modern teaching and learning models that combines student-centred learning approach with synchronous e-learning, asynchronous e-learning, or a mixture. Interestingly, in the flipped or inverted classroom, the instructors guide and facilitate the learning process, while the students are responsible for their learning activities and must oversee their own learning pace (Lai & Hwang, 2016). The flipped classroom model utilizes pre-class time (at home) and in-class time (Bishop & Verleger, 2013; Missildine et al., 2013). The model possesses the ability to allow students to manage their learning activities, decide when, where, and how to learn when given learning materials (Xu & Shi, 2018). Though flipped classroom model offered many positive learning outcomes, researchers argued that more innovations need to be integrated into the model to overcome its limitations and challenges (Lin et al., 2019).

### Flipped Classroom Model

Today, the concept of flipped classroom model has been adapted and implemented in different fields of study (science, social science, management, humanities, engineering, and technologies) and at universities, colleges, and schools levels (Hao, 2016). Flipped classroom model is a popular teaching and learning strategy in which the students are exposed to learning materials before the class hour, while in the classroom they solve complex problems, discuss, present, and deal with everyday life situations (Stone, 2012). In other dimension, a flipped classroom is an instructional strategy that allows interactive group-based learning activities in the classroom and direct computer-based individual instruction outside the classroom (Bishop & Verleger, 2013). It was reported that flipped classroom model enhanced students' learning achievement (Long et al., 2018; Missildine et al., 2013; Zainuddin et al., 2019) and engagement (Jamaludin & Zuraidah, 2014; Stone, 2012). The model allows students to access lecture materials in

advance before class time and offers opportunities for in-depth discussion and hands-on practical during class time.

Despite the advantages of the flipped classroom model, many studies reported limitations and challenges associating with the model. For instance, students' disengagement (Lai & Hwang, 2016; Zainuddin et al., 2019), low self-regulated learning behaviours (Sun et al., 2017), and inadequate time to redesigned lesson plans and courses (Schlairet et al., 2014). To date, only few studies (e.g., Heo & Chun, 2016; Lai & Hwang, 2016) have conducted studies toward solving these challenges. Therefore, this study advocates a modified flipped classroom model to overcome the limitations and challenges of a conventional flipped classroom model and enhance students' achievement and engagement.

### Modified Flipped Classroom Model

Due to the limitations and challenges confronting the conventional flipped classroom model, a modified flipped classroom model was developed. The challenges include a lack of a designated strategy for students to complete their learning activities during pre-class activities (Jump, 2013). Students cannot interact with their teachers and peer during pre-class activities (Lo et al., 2018). The conventional flipped classroom model relies heavily on the completion of pre-class learning activities; inadequate preparation may reduce the effectiveness of the flipped classroom model (Samaila et al., 2021). Scholars suggested that sophisticated innovations need to be used to overcome the challenges (Hsia et al., 2019; Lin et al., 2019; Samaila et al., 2021). In the same vein, learning theories should be employed to guide the in-class learning activities (Kim et al., 2014). The modified flipped classroom consists of three main sections (pre-class, in-class, and post-class).

#### Pre-class section

In the conventional flipped model, students reported having challenges during pre-class learning activities such as disengagement, unable to watch instructional videos, and feeling reluctant to complete their tasks. In the modified flipped classroom model, the study-quiz-question (SQQ) strategy is developed to engage the students during pre-class activities. The SQQ strategy is a platform developed using Google Form; it allows students to submit their quizzes and ask questions after watching the given instructional videos. The strategy has three activities that every student can do before the class hour. The three activities explain in the following steps:

**Step 1- Study (S):** In this step, the instructors upload the instructional videos and other learning materials on the learning management system (LMS). Students watch the instructional videos and study the learning materials before the class hour. For example, in an ICT class, an instructor may upload the instructional video of Internet skills on the LMS. The students are expected to watch the video before class time.

**Step 2- Quiz (Q):** The instructor should create questions for the quiz from the video and learning materials. Students should access the Google Form quiz link through the LMS, thereby completing their pre-class activities.

**Step 3- Questions (Q):** Students ask questions from the instructional video and learning materials against the next class. This engages the students and helps the instructor to assess where students need more explanation.

The SQQ strategy has similar functions and characteristics with watch-summarize-question (WSQ). While instructors used the WSQ

strategy to collect students' feedback manually (Hsia et al., 2019), those who used the SQQ strategy collect students' feedback using the technology (Google Form). If this strategy is carefully used, students' engagement during pre-class activities can be enhanced.

#### ***In-class section***

For the in-class learning activities, flexible learning theories are needed to attain optimal learning outcomes through peer-to-peer discussion. Social interaction between teacher-student or student-student plays a significant role in constructing new ideas and knowledge. Therefore, cooperative learning (think-pair-share - TPS) and social constructivist learning were integrated into the modified flipped classroom to reinforce the in-class activities. The TPS model has three different activities that ought to be done in the classroom. The activities are as follow:

**Think (T):** For the in-class activities, the first thirty minutes are for the students to work individually. For instance, each student should use a computer to create PowerPoint presentation slides.

**Pair (P):** At this stage, the instructor divides the students into groups of four based on homogeneous and heterogeneous. Each group should collaborate, work together, and come up with PowerPoint presentation slide with background, pictures, videos, animation, and transition.

**Share (S):** At this stage, students share their experiences in the classroom, present how they made their slides, how they inserted the videos, pictures, and other features in the slides.

#### ***Post-class section***

There are few activities for the students in the post-class. Instructors should facilitate and arrange for the students to make group/individual presentations where necessary. The instructor should evaluate the lesson by asking questions, encourage students to more questions.

### **Application of Learning Theories in Modified Flipped Classroom Model**

Scholars use learning theories to provide a basis to comprehend how students learn; explain how students receive, process, and retain information during flipped learning. This section discusses the application of cooperative learning theory, bloom's taxonomy, social constructivist learning theory, and study-quiz-question (SQQ) strategy in the modified flipped classroom model.

#### **Cooperative Learning Theory in Modified Flipped Classroom Model**

Cooperative learning is a teaching and learning approach that allows learners to work together to achieve a common goal (Johnson & Johnson, 2002). Cooperative learning theory guides the student to think individually towards solving a task, pair with colleagues to solve a task, share thoughts with the colleagues and teachers on how to solve a problem. Empirical studies indicated that students who had used cooperative learning theory were more committed to pursuing their goals (Gillies, 2016; Van Ryzin & Roseth, 2019). However, few studies integrate cooperative learning theory (TPS) into the flipped classroom model to enhance student's learning achievement and engagement (Jian, 2019; Manoj et al., 2019). Therefore, this study explains the impact of integrating the TPS approach into the modified flipped classroom model.

The reason for integrating the TPS approach into the modified flipped classroom model is to strengthen in-class learning. In the modified flipped classroom model, the role of the TPS is to define the role of the instructor and students. The instructor's role is to organize the class, facilitate learning, guide the students, and divide them based on homogeneous and heterogeneous. The role of students is to carry out the task based on the TPS strategy and lead the process of learning.

#### **Bloom's Taxonomy in Modified Flipped Classroom Model**

Bloom's taxonomy has been used as an academic framework that assists the teacher to categorize what learners are expected to learn during the learning process (Sarawagi, 2013). Modified bloom's taxonomy has six main categories in the cognitive domain. The categories were remembering, understanding, applying, analysing, evaluating, and creating. Though studies integrated bloom's taxonomy into flipped classroom model in developed countries (Sarawagi, 2013; Zainuddin et al., 2018), few or no studies were conducted in West African countries. Thus, this study integrates bloom's taxonomy in the modified flipped classroom model to describe and categorize what students should do during pre-class, in-class, and post-class sections.

Bloom's taxonomy classified the learning process into lower levels (remembering and understanding) and higher levels (applying, analysing, evaluating, and creating) (Sarawagi, 2013). Zainuddin et al. (2018) argued that taxonomy and flipped classroom model have similar ideology as both agreed that lower levels of learning should occur before class hour while higher levels of learning take place in the classroom under the supervision of the instructors. In addition, both agreed that transmission of knowledge occurs before going to the class and assimilation of knowledge which requires critical thinking happens inside the classroom.

For example, in an ICT class, the topic of "Internet skills" was to be taught using a modified flipped classroom model and bloom's taxonomy. In the pre-class section, the students should be guided to have basic knowledge (e.g., the meaning of the Internet, uses of the Internet, and Internet facilities) and let the students understand and remember the learning contents (lower level of bloom's taxonomy). For in-side class and post-class activities, the students should be exposed to higher levels of learning such as applying, analysing, evaluating, and creating (e.g., downloading a picture from a website, editing a PDF file online, and sending an email).

#### **Social Constructivist Learning Theory in Modified Flipped Classroom Model**

The social constructivist learning theory believes that students are the subject of cognition and the core of teaching. Compared with the conventional teaching method, the social constructivist teaching method encourages students to participate in the learning process and manage their learning pace independently. The theory values the opinions of the students and recognizing students as the active constructors of knowledge meaning. On the other hand, the theory argues that teachers should only facilitate and guide the students to construct meaningful knowledge and are not allowed to disseminate information or impart knowledge directly to students (Eppard & Rochdi, 2017). Unlike in the conventional method of teaching where a teacher is the source of information and knowledge, in the social constructivist teaching method, the teacher creates a conducive learning environment for a student to expand their learning through social interaction and cooperative learning (Alzahrani, 2016).

Likewise, in a flipped classroom, students are the centre of teaching and active constructors of knowledge. Before going to the class, students access relevant learning materials through LMS or YouTube to have their autonomous construction of knowledge. Both flipped classroom model and social constructivist learning theory believed that students are the constructors of knowledge, the leader, and the controller of their learning process.

The reason for integrating social constructivist theory into the modified flipped classroom model is to back in-class activities with theoretical justification. To help instructors understand their roles as facilitators, planners, and organizers of the learning process. To spell out the role of the students as active participants in the learning process.

### Application of SQQ Strategy in Modified Flipped Classroom Model

The SQQ strategy is one of the strategies that assist students to complete their learning activities in the pre-class section of the flipped learning model. The learning activities in the SQQ strategy include studying learning materials, taking quizzes, and asking questions in the pre-class stage. These activities promote students' engagement and ensure students acquire basic knowledge before the class hour. Furthermore, the SQQ strategy supports the teachers to understand the level of students' understanding before class time. The completion of pre-class activities in the flipped classroom is the key to the successful implementation of in-class activities in flipped learning. Therefore, the SQQ strategy was introduced in the modified flipped classroom model to support pre-class activities and enhance students' engagement. If there is a high level of student's engagement, the student's learning achievement will be positive. In summary, the SQQ strategy is directly influenced students' engagement by supporting students with a platform to complete their learning activities. It is believed that students who have high level of engagement will have better learning achievement (O'Donnell et al., 2011).

## PROPOSED METHODOLOGY

A quasi-experimental study is mostly used to examine the effectiveness of a specific intervention on student's academic achievement. For example, a researcher wanted to examine the effect of a modified flipped classroom model on students' achievement and engagement in ICT course. The students can be divided into two groups (A and B). Group A should use a modified flipped classroom model, and group B should use the conventional flipped classroom model or traditional teaching method. The student's achievement is measured using the ICT achievement test and student engagement is measured using an engagement questionnaire. A Pre-test can be administered before the intervention and a post-test after the intervention. Analysis of variance (ANOVA) can be used to analyse the data where there are two groups or three groups with two or more dependent variables. In a situation where pre-test serves as covariant, the analysis of covariance (ANCOVA) can be used to analyse the data.

The following is the summary of how the flow of modified flipped classroom work:

1. Initially, before the class time, instructors are expected to create and upload instructional videos and other learning materials on the LMS of a particular ICT course. Generate SQQ activities using Google Form. Students are to log in to the LMS, access

and study the materials (at home). After that, complete the SQQ activities. These are the pre-class activities of both instructors and students in the modified flipped classroom model.

2. After completing the pre-class activities, the next step is in-class activities. The instructors should conduct a mini lecture to clarify issues and misconceptions that may arise. The instructor should share the students into groups of four and guide them to learn based on the TPS and social constructivist learning approach. The construction of knowledge (applying, analysing, evaluating, and creating) occurs in this stage.
3. After students completed the in-class activities, the instructor should encourage the students to share their experience with the class members and guide them to make individual/group presentations where necessary. In the end, new instructional videos and SQQ activities' links should be uploaded to the LMS.

## CONCLUSIONS

The flipped classroom model has been widely accepted and applied across many disciplines. Compared with the traditional lecture-based method, the conventional flipped classroom teaching method encourages student-centered learning. Despite the positive impact of the conventional flipped classroom model, some of its challenges need to be tackled. The challenges are the lack of a designated strategy for students to complete their learning activities while at home, students' disengagement, and limited integration of learning theories to support in-class activities. The issue of a designated strategy to guide students during out-of-class activity has been overcome by developing the SQQ strategy. This strategy serves as a guide and platform that support students to complete their activities. Teachers and lecturers can adapt the strategy to strengthen their pre-class section while implementing flipped classroom model. This study argues that the integration of the SQQ strategy in the pre-class stage reduces the level of students' disengagement in flipped learning. Cooperative learning theory, bloom taxonomy, and social constructivist learning theory can be integrated to support in-class activities. Flipped educators are advised to adopt at least two of the theory to strengthen their in-class learning activities

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## Creative Teaching as a Component of the New Standard-Based Curriculum in Ghana: Curriculum Rushed or Curriculum Planned?

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### ABSTRACT

The study was about the creative nurturing behaviors of in-service teachers in Ghana. Using the descriptive cross-sectional survey design, a sample of 768 (out of 1,321) in-service teachers were surveyed using online Google forms. The data for the study were collected with an adapted version of the Sharma and Sharma (2018) creativity nurturing behavior scale (15-items;  $\alpha=.79$ ). The data were descriptively and inferentially analyzed. Overall, the study found that majority of respondents exhibited low levels of creativity nurturing behaviors. Specifically, most of the respondents had moderate levels of creative curiosity and creative motivation, but some respondents had low levels of creative abstractions and critical thinking. Again, the study revealed that male and female respondents did not differ in their creative nurturing behaviors. Finally, differences were not established in creativity nurturing behaviors of in-service teachers based on the experience. In-service teachers were found to have insufficient knowledge on creative teaching. Therefore, it was recommended that in-service teachers need to be re-trained in the core competent areas of the new standard-based curriculum.

**Keywords:** curriculum, creativity, teachers, teaching

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### INTRODUCTION

Globally, it is agreed that creativity is essential for social and economic progress, as well as for individuals' personal and professional fulfillment (Collard & Looney, 2014). According to Collard and Looney (2014), in a knowledge society, creativity is required for advancement as work is carried out in nonpermanent project-oriented teams, with each team member taking on a large amount of responsibility. New situations and problem-solving methodologies must be learned regularly by individuals through creativity. The ability to tailor services and products to meet individual needs is increasing in individuals' personal lives. In addition to the economic motivations for encouraging creativity (Voogt & Roblin, 2012), the reasons for re-igniting the fostering of creativity are considered as a social good, both on an individual and societal level (Beghetto & Kaufman, 2010). So it should come as no surprise that creativity is seen as a top priority in education on all continents and that it is at the heart of the discussion about 21st century learning. As the Organisation for Economic Co-operation and Development (OECD) points out, it is critical to prepare students for the unknown: for jobs that do not yet exist, for technologies that have not yet been conceived, and for issues that have not yet been foreseen (OECD, 2009).

Furthermore, the OECD Innovation Strand places great emphasis on the development of creative abilities in children and young people around the world. Based on this, schools are required to teach and measure creativity in the future workforce, given the requirement for individuals with the ability to be creative in the workplace (Lee et al., 2004). The nurturing of creativity among students appears to be the sole responsibility of teachers because it is not only about teachers teaching techniques and in-service habits that are influenced by teachers' innovative behaviour, but it also has an impact on students' ability to come up with fresh and original ideas (Nemeržitski et al., 2013).

Education, especially in an age of computerization, standardization, accountability, and testing has had a tremendous influence on teachers and their professional practice (Hargreaves & Shirley, 2009; Sahlberg, 2010). According to Sahlberg (2010), in-service teachers encounter two primary challenges in developing creativity and innovation in the classroom. First, they believe they are not original people, and second, even if they were to involve in more creative teaching events, it is school policies and measures that prohibit innovation and originality. Another barrier Sahlberg (2010) mentioned, is the standardization of teaching and learning, where the stress is placed on the standardization of assessment and preset consequences, which leads to a decline in collaboration between teachers and ultimately a decrease in innovation.

Doyle (2019) and Har and Abd-Razak (2017) note that it has long been recognized that teacher creativity plays a vital role in developing

students to become imaginative and innovative in their lives. According to Baruah and Paulus (2019) and Karwowski et al. (2013), the promotion of teacher creativity and innovation is an important component in the teaching profession. Again, teachers with adequate creative abilities inure teacher-student interaction (Sawyer, 2012). In a similar vein, Davies et al. (2013) and Ucus and Acar (2018) opined that creativity in the classroom allows students to possess different expectations, engage in mutual respect, exhibit innovative conduct, flexibility, and conversations. Expatiating the essence of creativity in the classroom, Saibon et al. (2017) were of the view that teaching and learning processes based on traditional methods such as chalk and speak, one-way input delivery, and one-to-many interactions should be progressively changed into adopting and implementing innovative training. As part of 21st century teaching and learning objectives, improving and fostering creativity and critical thinking skills are imperative (Bloom & Doss, 2019). This is so because creativity possesses the required impetus to arouse positive change in methodological practices that could spur teaching and learning into a lively and exciting learning community.

However, paucity of the literature shows that students' creative abilities are not nurtured in the teaching and learning environment because teachers appear to possess less knowledge in honing such natural potentials (Ahmadi et al., 2019; Beghetto, 2010; Bloom & Doss, 2019; Fasko & Rizza, 2019; Sawyer, 2010). According to Apak et al. (2021) and Karpudewan and Chong-Keat (2017), this trend might be a result of the fact that teaching and learning have continued to be traditional with a focus on rote memorization of facts that could curtail the identification of new ideas that could bring about positive economic transformation for various nations. The seeming lack of knowledge among teachers about the nurturing of creativity in the classroom defeats the assumption that 21st century teaching and learning must enhance the change process of nursing a future workforce that is fortified with familiarity and abilities to face the ensuing global encounters (Karpudewan & Meng, 2017). As a tricky construct, creativity defies a precise definition. Accordingly, creativity can be defined as mental ability, a process, and human behaviour (Andriopoulos, 2000). Dimensionally, creativity is of two facets: the notion of novelty (occurs in everyday life and possessed by everyone), and the notion of usefulness (referring to material or practical techniques of evaluating the value of new ideas (Shalley et al., 2004). Regarding this study, the creative nurturing behaviour of teachers is about their scaffolding attributes in guiding learners to become geniuses in their learning situations.

In Ghana, recent curriculum reform (New Standard-based Curriculum) in education has brought about an enormous call for creativity in learning. As part of the core competence areas (critical thinking and problem solving, creativity and innovation, communication and collaboration, cultural identity and global citizenship, personal development and leadership, as well as digital literacy) for students to achieve, the Government of Ghana included creativity and innovation and critical thinking and problem solving, which must be nurtured in students by in-service teachers (Ghana Education Service, 2019; Ministry of Education, 2018; National Council for Curriculum and Assessment [NaCCA], 2019). The curriculum reform placed a major responsibility on teachers to propagate the government drive of implementing the New Standard-based Curriculum. Before the implementation, some in-service teachers (kindergarten to primary six) were taken through the tenets of the new

curriculum for five (5) days between 13<sup>th</sup> to 19<sup>th</sup> August 2019. Later, some other groups of in-service teachers (Junior High School 1 to Senior High School 1) were trained on the new curriculum between 11th to 15th January 2021 (Ghana Education Service, 2021; NaCCA, 2019).

Looking at the periods of training for both cohorts, the days appeared to be inadequate because of the extensive nature of the outlined content areas. However, in-service teachers were required to absorb every aspect of the competent areas within the short period for onward training on students. In creativity nurturing training, the ideal duration is two academic semesters (making up 140 credit hours) (Birdi, 2016; Ritter et al., 2020) but this was not the case in Ghana as the training that teachers were taken through could not have moved beyond the introductory aspects of creativity. This calls for concern as many in-service teachers given the mantle to implement the New Standard-based Curriculum might not be creative themselves because they may still be glued to the old or the objective and examination-based curriculum (Apau, 2021). Beghetto (2007) alleged that teachers trained using objective-based and examination-based curriculum prefer standardization over originality because it promotes duplication of concepts rather than understanding. Extant literature on creativity reveals teachers' unfavourable views towards behaviours and qualities that are commonly associated with creativity because they are not creative themselves (Kampylis et al., 2009). As a result, in-service teachers might not possess the required abilities to teach and coach their students to become creative and prepare for the ever-advancing technological world. This supports the fact that teachers who respect creativity are more likely to be creative, but their capacity to nurture students' creativity mostly depends on their level of training (Fasko, 2001).

Just like many educational curriculum reforms in Africa, the Ghanaian version was a top-down approach that denied teachers the opportunity to contribute their quota (Abudu, 2015; Okoth, 2016). However, these teachers are the only group required for curriculum execution in the educational landscape. The blame of inadequate mindset of teachers in creativity cannot be placed on the door-steps of the in-service teachers only but the creators (Government of Ghana, Ministry of Education, Ghana Education Service, and NaCCA) of the curriculum because of the perceived haste at which the curriculum was implemented. This perceived rush could deny teachers ample time to keep up with the entire curriculum package. Based on this circumstantial information, the current study sought to address the following question and hypotheses:

1. What is the level of creative nurturing behaviours among in-service teachers in Ghana?
2. **H<sub>1</sub>**: The creativity nurturing behavior of in-service teachers will not differ based on their biological segregation (gender).
3. **H<sub>2</sub>**: The creativity-fostering behavior of in-service teachers will not differ based on their teaching experience.

## LITERATURE REVIEW

Applying the main strategies of creativity, Cropley (1997) summarized the creativity fostering behavior of teachers as inspiring learners to learn autonomously, personally, applying supportive and social incorporation instruction styles, and inspiring them to take



control of basic knowledge in diverse thinking skills or styles. Affirming the findings of this, Soh (2015) suggests that teachers should engage in creative nurturing behaviours as a legitimate response; when done at the appropriate time, it will invariably motivate students to work harder in the future.

Teacher creativity nurturing behaviour is further described in detail by Soh (2017), who identified some aspects of teacher behaviour that foster creativity. These aspects are autonomy, incorporation, inspiration, reflection, suppleness, valuation, interrogative, prospects, and displeasure. Instructional practice aimed at nurturing learners' creativity through precise behaviour and approaches, informed by their classroom proficiency, is defined as follows: being open to creative ideas and showing mastery over one's opinions and activities, as well as appreciating the freedom to think. Stone (2015) and Turner (2013) resolved that teachers' previous knowledge had no impact on their creativity nurturing conduct in the classroom while looking into the behaviour of teachers in the classroom. However, less experienced teachers demonstrated higher levels of creativity and novelty in the execution of e-learning activities compared to teachers with more experience, according to Loogma et al. (2012). In another study, it was found that although most teachers shared similar opinions on what makes good creative practice, the relationship between these beliefs and teacher instructional practice was not consistently observed, according to Gong et al. (2012). In similar vein, Snell (2013) discovered that disparities in instructors' levels of experience did not result in changes in their perceptions. However, the study by Al-Nouh et al. (2014) found that teachers' opinions about creativity in the classroom were good.

Teachers with less experience preferred creative thinking compared to their counterparts who were more experienced. Huang et al. (2019) found that the perceived usability of creative ideas by teachers by teachers and the creative behaviour of teachers were substantially related to the aim of teachers of teachers to involve themselves in creative teaching. Apak et al. (2021) conducted a study among 500 randomly selected high school teachers and analyzed the data using the one-way ANOVA test. They discovered that teachers with more than 20 years of teaching experience received higher mean scores than their less experienced counterparts. Those with more experience demonstrated greater creativity and originality than teachers with less experience. Despite inconsistent revelations, Dikici (2014) indicated that teacher experience in creative abilities played a role in shaping the relationship between thinking style and creative development.

A study by Davies et al. (2013) discovered that teachers' implicit beliefs affect their behaviours, and thus, their students' creativity. According to Chan and Yuen (2015), the concepts of creativity differ and vary between subcultures. To Hong et al. (2009), a study among Korean teachers revealed that they encouraged their students to be creative, as such students frequently had a high inherent wish for creative activity, and hold sophisticated attitudes about knowledge attainment. Teachers who held erroneous ideas about creativity experienced difficulties with creative learners (Aljughaiman & Mowrer-Reynolds, 2005). Soh (2015) conducted a study including 34 faculty members and 202 students and discovered that demographic characteristics such as gender, age, academic degree, and teaching experience were not associated with the creativity nurturing behaviours of teachers. When Walsh and Hardy (1999) compared academic programmes in relation to gender from Facione's California Critical Thinking Disposition Inventory, they found that females scored better

than males. A study on creative ability by Zetriuslita et al. (2016) found that there were gender differences as men possessed creative abilities than women. According to the study by Bagheri and Ghanizadah (2016), no differences were found between men and women in creative thinking. Asked to rate their creativity, family toughness, and emotional intelligence, Chan (2005) discovered that there were no differences between men and women in any of the measured creative constructs.

According to Soh (2015), it is well known that teachers have a major impact on the inventiveness of students. Teachers' responses to their students' ideas, perspectives, and proposals can be anticipated to influence the students' ensuing determination and propensity in generating fresh ideas, viewpoints, and suggestions. In essence, positive teacher responses will naturally motivate students to work hard, while premature and unfavourable teacher reactions will dampen students' creative discovery. Simply put, teachers can nurture creativity in their students if they demonstrate creative behavior frequently with students on a daily basis. It is also true that not all teachers have capacity-building behaviours. The effect of their behavior on their kids' creativity is possible but unknown. Therefore, they must know their impact on student creativity and be trained to show creativity-inducing behaviours in the learning situation.

## METHODOLOGY

### Research Design

The study employed a quantitatively based cross-sectional survey design. This design was appropriate because statistical inferences were made on the data collected from the respondents. In using this design, respondents were not manipulated, but data about their creativity were gathered. The choice of this design aligns with the views of Allen (2017) and Ihudiebube-Splendor and Chikeme (2020) that cross-sectional survey designs are employed to describe a population of interest at a specific point in time. Validly, cross-sectional survey designs are used when researchers want to record information without manipulating variables. Again, cross-sectional survey designs survey a large number of people at one moment in time to define characteristics of that population such as age, gender, and geographic location among other factors. These examinations may usually be completed in a short time and are reasonably affordable. However, cross-sectional survey designs cannot establish causal correlations among variables because measurement is performed in a snapshot (Allen, 2017; Ihudiebube-Splendor & Chikeme, 2020).

### Participants

The researcher surveyed 768 out of 1,321 in-service teachers pursuing post-diploma teaching programmes on satellite campuses (across the five belts of Ghana: southern, northern, eastern, central, and western) of the University of Cape Coast, Ghana. These satellite campuses are strategically placed to provide all in-service teachers with an opportunity to upgrade to the degree level as the minimum qualification for teaching in Ghana. In this sense, the respondents were drawn from all parts of Ghana and their number was appropriate and adequate to draw inferences about teachers and the creative nurturing behaviors of teachers in Ghana. The respondents were both male (n=375) and female (n=393). The respondents had teaching experience between 1 and 20 years.

**Instruments**

Data for the study were collected using an adapted version of the Sharma and Sharma (2018) creativity nurturing behavior scale (15-items;  $\alpha=.79$ ). Samples of statements on the scale are “I regularly give group assignments as part of the pedagogy” and “I do not react immediately to the suggestions of the students rather give them time”. The scale was scored based on agreement to disagreement (1-4). The scale was piloted among 40 randomly selected in-service teachers in the Cape Coast Metropolis, where preliminary analysis provided a solid internal consistency of 0.76. This internal consistency meets most criteria, especially Ritter (2010), that the reliability coefficient between 0.6 above for a measurement scale is deemed appropriate for data gathering.

**Data Analysis**

The data collected with the instruments were analyzed using descriptive statistics and inferential statistics. The descriptive statistics used were frequencies and percentages to quantify the respondents based on their levels of creative nurturing behaviors. The inferential statistics used were independent samples t-test and One-Way Analysis of Variance (ANOVA). The independent samples t-test was used because the research compared responses of males and females, while the one-way ANOVA was used because the researcher compared responses based on the experience of teachers on creative nurturing behaviors.

**RESULTS**

The data collected were cleaned and assumptions were tested to give way for the analysis. Fundamentally, assumptions such as normality and homogeneity tests were met. The study was about creative nurturing behaviors exhibited by in-service teachers in the process of executing their in-service mandate. These creativity-feeding behaviors of in-service teachers were measured using a 15-item scale with four (4) dimensions; abstraction, inquisitiveness, motivation, and critical thinking. In each dimension, the researcher examined the levels of creativity-fostering behaviors to ascertain which areas of creativity in learners were adequately honed by teachers and which areas the teachers lacked and needed to be guided through creative workshops.

**Table 1** shows the results on the levels of creativity-promoting behaviors among in-service teachers based on the scale dimensions and the total scale. Regarding abstraction as dimension one, the study revealed that the majority of the in-service teachers possess low levels. This implies that teachers may find it difficult to teach students using abstract strategies such as assignments, group work, and, as well, soliciting views from the students. Regarding inquisitiveness as dimension two, the study revealed that the majority of the in-service teachers possess moderate levels. This implies that in way one or the other teachers provide opportunities for students to share ideas and thoughts, students are understood by teachers, and as well, teachers try to track the progress of their students. Regarding motivation as dimension three, the study revealed that the majority of the in-service teachers possessed moderate levels. This implies that teachers try making efforts to inspire their students in terms of encouragement, emphasizing the importance of the information taught and as well making time to listen to students who may be distressed. Regarding critical thinking as dimension four, the study revealed that the majority

**Table 1.** Levels of teacher creativity nurturing behaviour (n=768)

Levels	Score range	Frequency	Percentage
<b>Creative abstraction (4-items)</b>			
Lowest level	4-12	380	49.5
Moderate level	13-20	183	23.8
The highest level	21-28	205	26.7
<b>Creative inquisitive (3-items)</b>			
Lowest level	3-9	122	15.9
Moderate level	10-15	395	51.4
The highest level	16-21	251	32.7
<b>Creative motivation (3 items)</b>			
Lowest level	3-9	264	34.4
Moderate level	10-15	403	52.4
The highest level	16-21	101	13.2
<b>Creative critical thinking (4-items)</b>			
Lowest level	4-12	415	54.0
Moderate level	13-20	353	46.0
The highest level	21-28	0	0
<b>Total creativity nurturing behaviours of teachers</b>			
Lowest level	15-45	302	39.3
Moderate level	46-75	267	34.7
The highest level	76-105	199	26.0

Source: Field data (2021)

**Table 2.** Gender difference in the creativity-supporting behaviors of teachers

Gender	Sample	Mean	SD	t	df	Sig.	F	LCI	UCI	p
Male	375	49.37	5.53	.874	766	0.448	.575	-.414	1.080	.382
Female	393	49.04	5.01							

Source: Field data (2021)

of the in-service teachers possessed low levels of critical thinking abilities as they make less effort in nurturing students in this respect. In this sense, teachers may find it impossible to apply the teaching in different contexts, be less motivated to teach students to transfer knowledge, might not solicit ideas from students, and as well evaluate or give judgments on contributions of students in class. In general, in-service teachers possessed low levels of creativity nurturing behaviours. These findings paint a gloomy picture of young people being taught by these teachers because areas that could propel them to explore academically are less catered for by their teachers. In one way, it might not be the fault of teachers not possessing adequate knowledge in creativity so that they could channel such abilities into their teaching, but because political infiltration has made teacher training institutions drift from objectivity to subjectivity.

The study considered gender differences between teachers in service regarding their creativity-inspiring behaviors. **Table 2** shows the results of the independent samples t-test concerning male and female in-service teachers’ differences in creativity nurturing behaviour. Based on the results, it is evident that equal variances were assumed as Levene’s test of equality of variance produced a sig. value of 0.448 greater than the threshold of .05. In search of differences, it was found that there were no significant differences between males (n=375, M=49.37, and SD=5.53) and females (n=393, M=49.04, SD=5.01,  $t(766)=.874$ , and  $p=.382$ ) in-service teachers with respect to their nurturing behavior of creativity. The effect size for the nonsignificant differences between male and female in-service teachers (MD=.333 and 95% CI=-.414 to 1.080) was moderate at 0.06 according to Cohen (1988). This implies that 6% of the variance in the creativity nurturing behaviours was represented by the gender of the in-service teachers.

The study considered differences in the teaching experience of in-service teachers as they reflect in creativity nurturing behaviours. The teaching experiences of the in-service teachers were in four categories against one continuous variable. Based on the nature of the variable combinations, One-Way ANOVA was appropriate for the analysis. In examining the results of One-Way ANOVA, it was found that homogeneity of variance was violated as Levene's test of equality of variance produced a sig. value of 0.034 less than the threshold of .05. This could have occurred as a result of the huge differences between the categories of teaching experiences of the in-service teachers. However, this was compensated for by the Welch results, which were greater than .05. Furthermore, examination of the ANOVA results revealed that there were no significant differences in the creativity nurturing behaviors of the teachers regarding their teaching experience, thus  $F(3, 33.49) = 2.59$  and  $\omega = .069$ . The results show that teachers in service who have taught for a period of 6-10 years ( $n=214$ ,  $M=49.51$ ,  $SD=4.95$ ; and 95%  $CI=48.02$  to  $49.56$ ) 11-15 years ( $n=24$ ,  $M=45.96$ ,  $SD=7.14$ ; and 95%  $CI=42.95$  to  $48.97$ ) were not different in the nurturing of creativity of students than those who have taught for 1-5 years ( $n=520$ ,  $M=49.51$ ,  $SD=4.95$ ; 95%  $CI=49.08$  to  $49.94$ ) and 16-20 years ( $n=10$ ,  $M=49.20$ ,  $SD=5.27$ ; 95%  $CI=48.83$  to  $49.58$ ). The magnitude of the difference was small with an effect size of .1 according to Cohen (1988). This implies that 1.0% of the variance in the creativity nurturing behaviours was represented by the teaching experience of the in-service teachers.

## DISCUSSION

The study aimed to examine the levels of creativity nurturing ability of in-service teachers and to find out if differences could be found based on in-service teachers' gender and teaching experience. The study revealed that most teachers had low levels of creativity nurturing behaviours. With this, in-service teachers might not be able to nurture students to become creative in their learning. The revelation portrays a blurry picture of the teachers as their show of inadequacy could hamper their progress in the ever-changing educational landscape. This inadequate creativity nurturing behaviours exhibited by in-service teachers defeat the propagation by OECD (2009) that teachers need to be creative as it is critical to prepare students for the unknown: for jobs that do not yet exist, for technologies that have not yet been conceived, and for issues that have not yet been foreseen. The revelation was inconsistent with the idea that teachers with adequate creative abilities inure teacher-student interaction (Sawyer, 2012). Furthermore, the revelation debunks the assertion that 21<sup>st</sup>-century teaching and learning requires teaching with creative abilities so that they could foster creativity and critical thinking in learners (Bloom & Doss, 2019).

Again, the study revealed that male and female in-service teachers had low levels of creativity nurturing behaviors, as their mean scores from the independent samples t-test were approximately the same. Without any doubt, the finding is not far-fetched because both sexes passed through the old way of training learners and were engaged for new ways of teaching using creative ideas and strategies. The finding of the current study is not in the harmony with a similar one that found significant differences between male and female teachers in their creative abilities, according to Zetriuslita et al. (2016). However, the current study's finding corroborates with Chan (2005) and Torrance (1983) study findings. In their studies, they found no significant differences between men and women in creative abilities.

Finally, the study did not reveal statistically significant differences in the creative nurturing behaviors of the in-service teachers based on their teaching experience. This seems unsurprising because these teachers were recruited from similar teacher training institutions in Ghana, where such institutions appear not to be training teachers with contents related creativity. More so, the less experienced teachers could be more equipped in creative teaching than more experienced teachers because most teacher training institutions in Ghana appear to be adjusting to the new paradigm of teaching that falls within the realms of new standard-based curriculum, where some of these teachers were trained since 2017. The study revelation in part supports and refutes some empirical studies. For instance, Dikici (2014) study found that teachers with less experience have a good attitude toward creative thinking and creative teaching than more experienced colleagues while Huang et al.'s (2019) and Taat and Suki's (2021) studies found that teachers with more experience showed high creativity and originality than teachers with less experience.

## CONCLUSIONS

The study investigated the in-service teachers' creativity nurturing behaviours and found that most of them measured low in this all-important natural ability. Comparing the low ability of the creativity nurturing ability of these teachers against their gender and experience, teachers' gender and experience had no role in their creativity nurturing behaviours.

### Implication for Policy Direction and Practice

It is imperative to note that these low levels of creative nurturing behaviors found could bring about less academic reasoning on the part of teachers and those they teach because creativity shares great features with reasoning or imagination. With this, in-service teachers might find it difficult to idealize their thoughts because they have fewer abilities in doing that, hence no innovations in their practice as professional teachers despite the availability of creative guides like a new standard-based curriculum. To this end, it is important that the Government of Ghana, through its educational stakeholders such as the Ministry of Education, the Ghana Education Service, and the National Council for Curriculum Assessment (NaCCA), make it a point to offer an intensive gradual curriculum retraining for all in-service teachers under their supervision for a period not less than an academic year. This can be done at the various circuit capitals of the educational categorization in Ghana. With this, resident trainers could be used as a way of decentralizing the training process. When this is considered, the benefits far outweigh any cost that would be incurred because no trainer would be moved from his or her comfort zone to any remote area that requires a lot of preparation and financial resources. It is imperative to note that the less adequacy of creative abilities among in-service teachers is unfathomable and unexpected. Under normal circumstances, the more experienced teachers should serve as mentors to the less experienced ones by seniority but that was not the case. To change the narrative, the Ghana Education Service should develop incentive packages to award teachers who exhibit acts of creativity in their professional practice so that they do not regress as they accumulate more years in the job. Doing this would reinforce teachers with the need to broaden their knowledge horizon and prepare them psychologically for any eminent curriculum change in the future.

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