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Readiness in using blended approach in college education

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ARTICLE INFO	ABSTRACT
Received: 11 May 2022 Accepted: 11 Aug. 2022	This study explores readiness in using blended approach in teaching and learning of mathematics in colleges of education in the Northern Region of Ghana. 15 participants were purposively selected made up of College Vice Principals, Quality Assurance Officers, Head of Mathematics Departments, and ICT heads from the three colleges of education. Structured interview was used to collect information regarding policy on the blended approach, supportive environment for effective implementation, availability of ICT equipment and internet connectivity among others. Data were analyzed using coding, theme, and content analysis. It revealed that, colleges of education integrate the blended approach in teaching and learning. There is availability of computer labs, internet connectivity, tutors were assisted in acquiring data, and there was provision of smart phones to trainees, as well as a well-structured timetable. Tutors have ideas about the blended approach but lack the necessary skills and knowledge to use it effectively. It is recommended that college management should collaborate with stakeholders to improve upon the computer laboratories, the Internet connectivity, and up-date the skills of mathematics tutors. **Keywords:** colleges of education, blended approach, teaching and learning, mathematics, tutor

INTRODUCTION

Research have shown that current educational trends still face a lot of challenges. These are predominantly in developing countries (Nwagwu et al., 2021). Every aspect of our modern lifestyle is being challenged due to the fact that ICT has influenced every aspect of our modern society (Malik, 2018).

Hinostroza (2018) revealed that both teachers and students do not have the prerequisite knowledge in terms of technological skills to make effective use of ICT tools within and outside the classroom. The world was already faced with numerous challenges, COVID-19 as a global pandemic have come to negatively affect the educational system and exposed the numerous challenges developing countries were facing in terms of infrastructure and ICT integration. COVID-19 was declared a global pandemic as it struck the world on March 11, 2020.

A released by WHO outlined a number of safety protocols to prevent the spread of the virus. One of these safety protocols was the adherence to the social distance. it was evidenced that school environment would be affected deeply, these safety protocols were to be followed throughout the country. it was therefore not surprising when President of the Republic of Ghana, Nana Addo Dankwah Akufo, ordered the closure of all Ghanaian schools on March 16, 2020, as the COVID-19 cases in the country increased, and directed the ministry of education to roll out distance learning programs to successfully end the academic year.

The beginning of the 2019/2020 second semester session saw the coronavirus pandemic in which institutions had to develop ways of reaching out to their student. This made College of Education to embark on online teaching modes. College of Education has established ICT centers to cater for the technological needs for both their tutors and students. Interestingly there is enough study to show that it is not easy blending ICT in ensuring effective instructional delivery (Bingimlas, 2009; Rasheed et al., 2020; Wu et al.,2013).

Colleges of education have over the years used the traditional face- to -face to teach trainees. With the blended approach, how are they prepared in terms of skills, knowledge, physical resources to undertake this? Hence, the problem that this paper seeks to address is the gap that exist in colleges of education in preparing to implement the blended approach in teaching mathematics so as to improve students learning outcomes.

Objective of the Study

1. To examine the readiness of colleges of education in implementing the blended approach in teaching and learning of mathematics.

2. To find out what is in place for mathematics tutors to effectively use the blended approach.

Research Questions

1. How ready are colleges of education in implementing the blended approach in teaching and learning of mathematics?
2. What is put in place by college management for mathematics tutors to effectively use the blended approach?

The Concept of Blended Learning Approach in Mathematics

Mundt et al. (2018) outlined the key ideas in blended learning concept in the field of higher mathematics education using a self-developed and designed e-learning environment dubbed "*e:t:p:M@Mat*." This acronym on which the project is named represents key concepts and series of activities providing description of the blended learning concepts.

As "e" stands for e-learning, Mundt et al. (2018) identified the series of tools and activities within this category as the core of the "*e:t:p:M@Mat*" project. In using creative learning models, they created an e-learning content made up of 11 recorded online lessons of which lessons were structured in thematic headlines in terms of outline and are between 20 to 30 minutes long. Key features of the lessons include the following:

1. speakers, information boards, images animations, and quotations;
2. a "responsive web-app", where students can access content, text, and exercises;
3. downloadable .pdf after students have added annotations for future referencing;
4. an "FAQ-area" for communication exchanges between lecturer and students; and
5. teacher can as well track students learning progress in the "FAQ-area" (Mundt et al., 2018, p. 12).

From the "*e:t:p:M@Mat*" project, "t" stands for "text" and the aspect of learning "theory." According to Mundt et al. (2018), this text is formatted uniformly alongside with the online lessons with deep content supported from the literature, which contains questions in files to be addressed during seminars. The "*e:t:p:M@Mat*" project was designed seeks to personalize learning content as well as integration within the classroom environment and so the letter "p" represents not only practice but also attendance (Mundt et al., 2018).

Higher institutions such as colleges of education need to provide support and care for beginning teachers because the individual teacher needs to be equipped with subject-specific competence (Mundt et al., 2018). Also, beginning teachers need to gain more insight and abilities on how to engage into extensive academic so as to be able to explore the demanding world of academics. In the "*e:t:p:M@Mat*" project, tutor of a college needs to identified and trained competent students in specific workshops. Once the mainstream classroom students are put into smaller groups, it is the duties of the trained mentors to monitor happenings within the groups during the semester. Tutors could do the mentoring too and hence the letter "M" in the project stands for mentoring.

Setyaningrum (2018) maintained that students who have the opportunity to learn mathematics using the blended learning approach have better conceptual understanding because they can have access to revisit materials, they deemed difficult at their own convenient time. But in enumerating constraints, he maintained that students faced some obstacles which relate to their desire to learn independently and also of the fact that they may be distracted by adverts when they learn online.

To engage students' participation in mathematics classroom, a switch from the traditional mathematics teaching to the blending learning of mathematics is required as teachers gets the opportunity to act as just facilitator of the learning process using ICT tools such as "PowerPoint with audio support, YouTube tutorial videos and online reading materials before and after classes" (Lopes & Soares, 2018). Halverson et al. (2013) maintained most higher institutions are using the models of blended learning approaches in the entire duration of three or four years of study in their campuses. However, it is a recent development in the Ghanaian context with the advent of COVID-19 pandemic. The combination of face- to-face instructional methods and online strategies is what most researchers describe as blended learning. (Christenson et al., 2013; Tayebinik & Puteh, 2012). The description of blended learning is provider below by Hartman and Moskal (2004), as follows:

> "Blended learning should be viewed as a pedagogical approach that combines the effectiveness and socialization opportunities of the classroom with the technologically enhanced active learning possibilities of the online environment, rather than a ratio of delivery modalities….Our research has shown that, while student success and high levels of student and instructor satisfaction can be produced consistently in the fully online environment, many faculty and students lament the loss of face-to-face contact. Blended learning retains the face-to-face element, making it–in the words of many faculties–the 'best of both worlds."

Technology in the mathematics classroom has lot of advantages since there is "multiple pathways" and "method of access" (Attard & Holmes, 2020). Attard and Holmes (2020) mentioned specifically that the use of blended classroom teaching strategies in the provision of "multiple pathways" means not only do individual learner have the opportunities to learn from the teacher but also "personalized learning approaches" can be adopted. And for "access to methods" they again discovered that teachers have the opportunities for multiple representing concepts in term of manipulations of concepts and using visual aids to enhance the visualizations of mathematics concept usually presented in abstract. An alternative is provided also to ensure student-teachers exchanges in regarding "feedback and communications" (Attard & Holmes, 2020). In investigating the teaching of pre-algebra in separate learning environment of face to face and the blended learning environment, Awodeyi et al. (2014) reveal students achieved higher score in the blended learning environment than their counterparts who do not used the blended approach. The authors again cited students in the blended learning environment had the opportunities of interacting with varieties of teaching

and learning materials such as audio and video media after tuitions and that the prompt feedbacks aid their understanding the more. He again suggested that emergent ICT tools should be used to teach mathematical concepts towards equipping learner with conceptual knowledge.

Research was carried out in the calculus/mathematics class that is the material limit and derivatives and in using an experimental study (Ulfa & Puspaningtyas, 2020). Ulfa and Puspaningtyas (2020) used blended learning approach to teach limits and derivative as fundamental concepts in studying calculus. Test was conducted after the experiments to examine students' conceptual understanding of limits and derivatives and a result majority of the students were able to:

1. classify objects according to certain properties according to the concept,
2. states concepts in various forms of mathematical representation,
3. use, utilize, and select certain procedures or operations, and
4. apply the concepts.

Blended learning is flexible in nature as it incorporates lots of strategies (Al-Samarraie & Saeed, 2018; Tulaboev, 2013; Wang et al., 2015). Blended learning in its flexible nature is described as, follows:

> "A rich mixture of face to face and /or e-learning, use of different media including text, audio or video podcast, alternative approaches to learning, e.g choice of reading materials, media, face to face, and online activities, alternative approaches to assessment for example written assignment, group, assignment, and multiple choice test and alternative approach to contacting and working with tutors including face to face session, e-mail, and message system, phone, online discussion groups" (Allan, 2007, p. 8).

Teacher's Competences in Using the Blended Approach

Tutors are denied the opportunities to socialize with their students as the roles of directors are limited due to the numerous e-learning platforms available (Arkorful & Abaidoo, 2015). Tutor are faced with challenges in the blended learning approach in relation to design instructional strategies and this because more emphasis is placed on implementation and leaving the design of content with little time and budget so sometime the program becomes unsuccessful due to little time and cost constraints in designing content (Kaur, 2013). Lack of developed content and strategies to deliver means, as follows:

1. tutor will be challenged on how to effectively teach,
2. tutor will have difficulties teaching to align with instructional goals and objectives,
3. tutor will also have challenges making lesson interactive as they may be just talking to students,
4. tutor will confront with issues on how to ignite and motivate students participate with abstract ideas, and
5. tutor will have challenges in employing all the active learning strategies to ensure that all the blend are well coordinated (Kaur, 2013).

METHOD AND PROCEDURES

This study used structured interview to collect data. 15 participants were purposively selected made up of College Principals/Vice Principals, Quality Assurance Officers, Head of Mathematics Departments, and ICT heads from the three colleges of education in the studied area. This was done because the participants were the right people to provide the primary information that with address the objectives of the student. They constitute key part of college management and administration. Information regarding policy relative to the blended approach, supportive environment for effective implementation, availability of ICT equipment and internet connectivity among others were collected. After several readings of the transcripts, initial themes that ran through data collected from respondents using structured interview were assigned codes. Data were coded and themes generated. Patterns for the most frequently occurring words and phrases, were noted. These processes of coding the structured interview data included a manual system of open coding as described by Creswell (1998) to categorize themes during which writers pull out meanings and then connect those meanings to arrive at explanations and interpretations.

For validity and truthiness, initial finding was presented to the principals for validation before the final write-up. During the coding and the identification of the theme and the final writing of the finding, the researcher bracketed himself and relied on information as presented during data collection.

RESULTS AND DISCUSSION

Data received from college management using structured interviews to ascertain the views concerning colleges of education readiness in implementing the blended approach in teaching and learning as well as measures put in place for college mathematic tutors in using the blended approach in teaching.

Research Question One: How Ready are Colleges of Education in Using Blended Approach?

The results show that on the issue of policy on the blended approach, the respondents were of the view that since mainstream university are using this approach, and that colleges of education are affiliated to them, by implication they are guided by the policy of the affiliate university and the guidelines provided by the Ghana Tertiary Education Commission (GTEC).

Management of colleges of education in the Northern Region maintained that they use the blended approach in teaching and learning, particularly in the area of mathematics, and indicated that it is done in a "shift system". What this means is that first and third year students will be on campus for a period of six week for face to-face session while the second-year students are at home and are taught using the online mode. Third years then write their quizzes and mid-semester examination at the close of week six and depart to their various homes to start their online session with their tutors, while the second years join the first years for their face-to-face session. One of the respondents' remarks that:

> "The "shift system" put in place in the colleges of education throughout the country shows that college Management are prepared in using the blended approach of reaching out to their students since it has come to stay and during such sessions power point presentations are done in both virtual and face-to-face" (Admin A, interview).

Colleges of education implementation of the shift system suggest that the blended approach is in operation. Various ICT tools are adopted to enable virtual and face to face sessions. This practice is now part of the college system and as a medium of instruction, it provided alternative platforms to reach out to students. This further gives an indication that management need to take absolute responsibilities of the process and the implementation of the blended approach within the context of their respective institution. The above assertion agrees with Acree et al. (2017) who maintained that not only should management help but liaise with other institutions who have the capacity to help. Meyer (2014) suggested that various institutions must be equipped with ICT tool to ensure the effective implementation of the blended learning approach. Mulyadi et al. (2020) study highlights institutions cannot effectively implement the blended learning approach when they have difficulties accessing the right ICT tools.

On the question of assessment of students learning using the blended approach, participants revealed that, it is based on the benchmark for assessments within the colleges of education, in consonant with the affiliated university's mode of assessment. But a participant was quick to add that "if instructions were delivered through online, the corresponding assessment was also done online, whiles face-to-face lectures also attracted face-to-face examination" (Student A6, interview). However, participants maintain that students return to campus after the online studies, for face- to- face session for a period and write the quizzes and examinations. What this suggests is that the mode of examination may vary depending on the affiliate university and that the assessment may not be same in all the colleges.

This implies that both tutors and students require adequate knowledge in using the online platform as they are already used to the face-to-face assessment. Meyer (2014) suggests that institutions are better prepared when they are fully equipped with skilled personnel who on a daily basis can execute commands needed to ensure that services are not truncated.

Supportive Environment to Facilitate the Blended Approach

On the question of an established quality assurance to support the blended approach, it came to light that colleges of education in the study area had computer laboratories with internet connectivity accessible to both tutors and students. The following excerpt provides evidence to this finding:

> "In partnership with T-TEL GTEC and PRINCOF, an attempt was made to give smart phones to both learners and tutors at discounted prices as a quality assurance measure for effective teaching and learning utilizing this approach. For those who live in locations without a network, materials were meant to be available at advantage points at Ghana Education Service district offices, where students could pick them up" (Administration C, interview).

Administrative policies in the blended learning approach should address both virtual and face and face needs. And once various ICT tools are made available for both tutors and students, services at the various district levels should be facilitators to ensure that both tutors and students have access to modules and teaching and materials. These ideas prevent the challenges of online learning in areas of network access and cost of data on the part of students.

The study finding is similar to Picciano et al.' (2013) study, which maintained that administrative policies geared at making ICT accessible and other teaching modules to both tutors and students is to enhance "blending to support information dissemination, blending to support open interaction, blending to support knowledge creation, and blending to support efficient management. Although it not possible to address all challenges of implementing the blended learning approach but policies geared towards assisting school individuals of having access to both online materials and face to face teaching modules will adequately support information dissemination, open interactions, knowledge creations and provision of feedback for efficient management.

In the area of time tabling to support the blended approach, it was revealed that colleges of education had two set of timetables for each semester: level 100 and 300, and that of level 100 and 200. The first one, catered for face-to-face session for level 100 and 300 while level 200 take online lectures at the comfort of their homes while the second one had level 100 and 200 on campus for face-to-face and level 300 at home for online lectures.

Research Question Two: What is Put in Place by College Management for Mathematics Tutors to Effectively Use the Blended Approach

The findings indicated that, A 4-day capacity building workshop session on online teaching and learning was organized by T-TEL in consultation with PRINCOF for tutors of colleges of education which mathematics tutors were part.

In the area of internet connectivity, it was revealed that tutors used the college's internet provided by college management and in some cases, college management do supported tutors to purchase data. In the views of one of the respondents, he noted that, "the ICT unit of the College is tasked to organized workshops for all tutors, there are regular briefing and de-briefing during the weekly professional development sessions among tutors." From the results, it was revealed that, for effective teaching, tutors were taken through how to make both virtual and face-to-face lessons interactive and participatory with "play" being part of it.

In the area of supervision and monitoring, respondents maintained that head of departments, quality assurance and vice principals are put on the online teaching platform, and during face to face they periodically go round to see what is going on in the classrooms. What this means is that colleges of education management have put in place some supportive measures in place to effectively facilitate the blended approach in the colleges and are mindful and ready to address the challenges as when they come in using this approach of teaching.

On the question of mathematics tutor using appropriate teaching methods, the respondents ascertain that they use the interactive approach, which allows students to do their own research and thereafter do presentations. The use of diverse methodologies and teaching resources are also encouraged, this is because there have been several calls for mathematics teachers to enhance the teaching of mathematics integrating technology.

On the issue of mathematics tutors mind set and sharing of ideas, the data revealed that during the weekly PD sessions and departmental meetings at the college level are organized help to build tutors capacity. At these sessions, new ideas received from the interactions among colleagues are enough motivational practices. What this means is that mathematics teachers are provided with the requisite platform where they can acquire the skills of the 21st century teacher who is actively involved in unlearn re-learn and learn by acquiring new experiences in collaborative support and pedagogical approaches that will enhance the teaching of mathematics.

On the question on support for mathematics teachers in using the blended approach, it came to light that, Tutors were taken through the learning management system (LMS) of affiliate universities and workshops organized for tutors. ICT tools such as projector, computer laptops, printer, and photocopier are made available for use by mathematics teachers.

From the above information, it is clear that colleges of education management have put certain measures in place to facilitate the smooth implementation of the blended approach to teaching and learning of mathematics at the colleges in the area of, building the capacity of teachers. These findings agree with Wang et al. (2015) who maintain that teachers, learner, institution, content, technology, and learning support are the six interconnected and intertwined components of blended learning system. Where the teacher's roles are; facilitators, moderators learning guide and advisor, and students serve as researchers, practitioners, and collaborators. The institution can provide strategies, policy supports, and necessary infrastructures to facilitate the blended approach.

It is clear from the findings, that colleges of education as institutions have put in measures in place to accommodate the blended approach of teaching and learning in the colleges. Key findings include the followings:

1. Colleges of education relied on their affiliated university, Ghana Tertiary Education Commission, Ministry of Education, and their own internal policies as a guide for the implementation of the blended approach in teaching and learning in the colleges.

2. There is a timetable for the blended approach which is captioned as the "shift system", which was explained as

   "first- and third-year students will be on campus for six week for face to-face session while the second years are at home and are taught using online. Third years then write their quizzes/mid-semester examination at the end of the sixth week and leave for their homes to start their online session with their tutors, while the second years joined the first years for their face-to-face session."

Provision of ICT equipment to help colleges to deliver using the blended approach, this is seen in the area of internet connectivity on campus, computer laboratories, overhead projectors, and re-training of tutors in the use of these equipment.

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of the study, the following conclusions and recommendations were made.

Conclusions

In terms of college of education readiness, there is enough evidence to the effect that there are some structures put in place for the implementation of blended approach.

1. Availability of computer labs, internet connectivity, support given to tutors in acquiring data, and provision of smart phones to trainees as well as a well-structured timetable for it.

2. Mathematics tutors at the colleges of education have read about the blended approach and are purported to be using the approach but lack the requisite skills and knowledge that will make them effective and efficient to deliver the online aspect of the blended approach, which is equally more important when trainees are at home.

Recommendations

In line with the conclusions drawn above, the following recommendations are worth nothing:

1. College management, Ministry of Education through Ghana Tertiary Education Commission should improve upon the structures put in place to meet the current demand of the blended approach. Online lecture laboratories' where tutors can have access to and have lectures online with their students should be created in the College.

2. College management should intensify the various PD sessions in the college to include avenues for sharing practices for other tutors to emulate. Orientation, seminars, and workshops on regular basis for teaching staff and other auxiliary staff on how to use online in teaching courses should be organized.

3. Mathematics tutors should make the online teaching as part of their instructional methods and do extensive research on it to be more effective and efficient in it since the approach has come to stay with us.

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