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## Low Attendance and Transition Rates of Women at the Tertiary Level: Impact of Internet Innovation in Ghana

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### Abstract

Ghanaian education industry, especially at the tertiary level has witnessed progressive growth over the years. As a result of this, technology is required to sustain this progress since technology has become a powerful tool for women to further their education without experiencing any role conflict. However, of great concern are the challenges such as gender imbalance, the high cost of tertiary education, women's inability to secure ICT equipment. Based on this, the study examined the relationship between Internet Technology (IT) accessibility and women's tertiary education in Tamale. The quantitative case study was adopted as research design and using purposive sampling procedure also supported by simple random sampling for data collection. A chi-square test was employed to examine the causal relationship between internet technology availability and women's education accessibility. It was discovered that there is a strong positive relationship between internet availability and women's accessibility to tertiary education. The study also disclosed satisfactory ICT infrastructure, the growth of internet usage for learners pursuing tertiary education. Gender imbalance, the high cost of tertiary education, women's inability to secure ICT equipment and the role conflict between domestic and tertiary education were also discovered. Based on these findings, the study recommends the construction of a strong and resilient Fiber Optic System (FOS) should be treated as a top priority by the National Communication Authority (NCA). To achieve this objective, there should be Public Private Participation (PPP) so as to ensure cost-sharing between the government and the private sector and also prevent the overburdening of either the public or the private sector. Universities should consider incorporating e-learning systems as part of the medium of instruction so as to address the role conflict which normally occurs between women's domestic chores and their urge for advanced and further educational pursuit.

**Key Words:** Tertiary Education, Women, Internet, Innovation Technology, Accessibility, Enrollment.

### INTRODUCTION

On the premise of the famous quotes of Dr. James E. K. Aggrey (1928), "if you educate a man you simply educate an individual, but if you educate a woman, you educate a family." This and many others emphasized the

significance of women education. African higher education, at the beginning of the new millennium, faces unprecedented challenges. Not only is the demand for access unstoppable, especially in the context of Africa's traditionally low postsecondary attendance levels, but higher education is recognized as a key force for modernization and development (Damtew T. & Philip G. Altbach, 2004). Surprisingly, enrolment at the basic level in Ghana went up from about 500,000 students in 2004-2005 to more than 800,000 in 2005-2006, an increase of 67 percent (Ministry of Education, 2010). During the same period, the basic net enrolment rate increased from 59.1 percent to 68.8 percent, while net enrolment at the junior secondary level increased from 31.6 percent to 41.6 percent.

Though government's initiatives have helped to increase enrolment at the basic level, the expected outcome targeted at 50-50 male-female ratio at the tertiary education level has not been achieved. From data of Education Sector Performance Report (ESPR) of 2016, reveals further that, at the kindergarten level, Ghana has reached gender parity. The situation is similar at the primary and junior high school level. On the contrary, at the senior high school and tertiary level, gender parity is yet to be attained (UNDP, 2018). A similar situation pertains at the tertiary level where only one-third of tertiary students are female by Institute for Statistical Social and Economic Research (ISSER, 2012; Ministry of Education (MOE), 2017; National Council for Tertiary Education (NCTE), 2018). Moreover, females and males do not fare similarly in terms of completion and transition rates at the second cycle (tertiary) education in Africa which Ghana is part (Elmahdy 2003).

Although women constitute more than half of Ghana's population, they are at a disadvantage in accessing tertiary education. Ghana's Population and Housing Census (GPHC, 2018 est.) put women at 52% of the population and at the same time handle 60-90% of food production, processing, and marketing in the developing world, yet women record low tertiary attendance rate, have lower levels of education and therefore receives low literacy. Moreover, many studies (e.g., UN Reports, 2015; Eliasu and Felicia, 2015) and various approaches by government and development partners had pointed to the need for gender parity in education but failed to specifically outline clear measures that can improve women attendance and transition rate at the tertiary level of education.

This paper emphasizes that Internet Technology Innovation can play a greater role since it improves local knowledge and skills around tertiary education thereby ensuring adequate access to tertiary education through e-learning (Gender Working Group, 2010). This undoubtedly will enable women irrespective of their domestic role as housewives to tertiary education of traditional practices (Eliasu and Felicia, 2015). Learning will be improved using internet innovation and technology tools in presenting assignments electronically, participating in-group chats involving near-simultaneous written dialogue, and giving feedback electronically. In this process, female learners are able to organize their learning independently which make them take over some of the roles of the instructor (Annand, 2011).

That notwithstanding, due to population growth in Ghana, there is a need for more access to tertiary education for the growing number of college-aged students, who already compete for a limited number of universities in the country (National tertiary education (NTE), 2014). Amid growing population rates and an expanding women base, Ghana and other countries in West Sub-Saharan Africa is racked with the socioeconomic crisis.

In view of that, the study, therefore, seeks to assess the causes of the widened gap for women at the tertiary education in Ghana. The study also attempted to contribute to knowledge by exploring the influence of ITI through e-learning in dealing with the mismatch between the technology tools and female learners pursuing tertiary education at their respective campuses in Tamale in the northern region of Ghana.

## **LOW ATTENDANCE AND TRANSITION AT THE TERTIARY LEVEL**

Although literacy has been high on the development agenda over the past decades, that about 750 million adults; two-thirds of whom are women, still lack basic reading and writing skills, according to the latest available data for 2016 (UNESCO Institute for Statistics (UIS), July 2017). In similar data, the majority of countries missed the

Education for All (EFA) goal of reducing adult illiteracy rates by 50% between 2000 and 2015. At the global level, the adult and youth literacy rates are estimated to have grown by only 4% each over this period.

Apart from the low enrollment numbers, Ghana's tertiary education sector faces additional problems. As in the whole education sector, there are huge inequalities according to gender. In addition to socioeconomic, cultural, political challenges and strict policies for university entry are also limiting factors in accessing tertiary education in Ghana. According to statistics of the National Council for Tertiary Education (NCTE), in 2017 two thirds of all applicants to universities were denied. The strict selection is caused by a lack of university places, costing Ghana a lot of potential talent. Deliberate government policy which denies people access to tertiary education most of whom are women.

Ghana's population is characterized by people aged 24-35. This category of people receives 7 years of schooling. Females, on the one hand, receive a lesser score of 5.9 years of schooling. Their male counterparts, enjoy 8.1 years of school (UNDP, 2014b). Similar figures reflect in UNDP reports for 2018. These data show a disparity in education accessibility between the male and the female's citizens of the country.

Attainment of tertiary education starts with primary and secondary school education; however, in Ghana availability becomes a factor in accessing tertiary education (UNESCO, 2012). Out of 375,000 Ghanaian students take the Basic Education Certificate Examination (BECE) at the end of ninth grade to qualify for senior secondary/high school, and only 150,000 can be admitted to the 500 public and 200 private national secondary schools (GES, 2016). This represents significant percentage non-transition to the senior secondary level. However, this brings a significant drop of students to continue by reducing their chances at the tertiary level of education.

That notwithstanding, prior to the completion of senior secondary school, students must take the (WASSCE) West African Senior Secondary Certificate Examination. Based on exam results, only 53% of grades are credited passes, which qualify applicants for postsecondary school (GES, 2017). Ghana's 140 accredited tertiary institutions enrolled 300,000 undergraduates, graduate, certificate and diploma programs. Among this figure, Affortey (2015) revealed that women are always a disadvantage.

## **INTERNET INNOVATION TECHNOLOGY IN GHANA**

Most towns and cities in Ghana have improved mobile phone usage and Internet accessibility (UNDP, 2012). In Amenyedzi et al. (2011) improved connectivity, infrastructure improvements, and the promise of prospect innovations in wireless technology present an opportunity for a bright future in ICT accessibility in Ghana. In the interim, high utilization of cellular wireless signals purchased as bundles is resulting in increased usage of social media platforms and improved communication. Students in most tertiary level program access internet with bundles.

Furthermore, in acknowledging increased ICT usage, Ghana and other numerous countries have successfully integrated ICT courses into the secondary school curriculum. For example, Ghana introduced ICT into the senior high school curriculum in 2008 (Amenyedzi, Lartey, & Dzomeku, 2011). Trends indicate that there are changes which result in access. Increase in education and industry are finding a new market in Africa. But the major barriers to ICT in Ghana include skills, energy, and internet connectivity (A. T. Kearney's index, 2007-2010).

The linking of internet points of presence to all district capitals under the ICT backbone development is being undertaken by the government with support from Huawei Technologies (Ministry of communications, 2015). Move that will provide availability and expand access to internet usage in the country. But with the current Ghana telecom enjoying a monopoly, access to the SAT-3 submarine cable kept both local and international bandwidth prices relatively high, and internet connectivity is not always reliable with further downloading speeds remain slow.

According to Ghana ministry of communications (2010), the government is carrying out a second phase of the National Communication Backbone Network to continue to cover more districts that were not covered by further allowing four new international cables that will land stations in Ghana: Glo One, Main One, WACS, and ACE. Soon the country will have more international bandwidth approaching 20% of current prices (A. J. Whiteman, 2010). However, these efforts make internet visibility in the country further closer to the people and for the benefit of many sectors including education most especially at the tertiary. Though advancement in access is obvious in Ghana since 17.11% of the population has access to the Internet infrastructure, an increase from 9.5% in 2013 (UNDP, 2013, p. 188; 2014b, p. 211).

### **THEORETICAL FRAMEWORK**

The theoretical framework for this study is based on the three philosophical orientation namely connectivist pedagogy, cognitive-behaviorist pedagogy as well as the constructivist pedagogy. In expatiating on the theory under consideration, Anderson and Dron (2011) referred to the first orientation which is the connectivist pedagogy as a perspective that deals with how people from different background and orientations through various efforts and initiatives acquire knowledge for their own individual advancement or social status. This is termed as epistemological assumptions in the philosophical orientation and as one of the three generations of education pedagogy. The second philosophical orientation according to Anderson and Dron (2011) is the cognitive-behaviorist pedagogy. This as Anderson and Dron (2011) comprises two major theories of learning, and its focus on changes in behavior or knowledge. In this perspective, learning is considered as individual development and teaching as transmitting content to learners.

Constructivist pedagogy builds on a number of learning theories that recognize the social nature of knowledge and its establishment in the minds of individual learners (Anderson & Dron, 2011). The perspective also supports the teaching role of guiding learners to actively incorporate prior knowledge leading to the construction of new facts and information. The connectivist pedagogy thus reflects on emergent theories of knowledge, which is devoid of explicit correlation between pedagogy and learning theory that is evident in cognitive-behaviorist and constructivist pedagogy. Connectivism is mostly connected with work by Stephen Downes and George Siemens. According to Downes (2012), connectivism is the thesis which indicates that; facts of data are dispersed across a network of connections. This implies that, learning consists of the ability to construct and pass through those networks for the benefits in the knowledge industry. Networks that comes in the form of systems theory shows the properties of diversity, autonomy, openness, and connectivity, the connectivist pedagogy “seeks to describe the practices that lead to such networks, both in the individual and in society” Downes (2012) through learners’ practice and reflection, supported by teachers’ demonstration and modeling.

Siemens (2005), portrayed networked learning as a division of connectivism, related to connectives' key principle of network formation, with less focus on "presenting information and more lying is emphasis aimed at improving on the learner's ability to analyze the information obtained. Siemens, in particular, proposes that blogs, wikis, and other collaborative tools with which learners create, connect, and share knowledge replace the chronological presentation of content and activities typical of earlier generations of pedagogy.

According to Siemens, in connectivist pedagogy, teachers generate a healthy knowledge environment in which different social networks can thrive, enabling learners to develop links among themselves for the purpose of improved learning outcomes. McLoughlin and Lee's (2008) emphasized the fact that, pedagogy represents the methodology for learning- that focuses more on learning process than on learning outcomes. The key elements of the pedagogy paradigm are personalization, participation, and productivity. Within these, there exist principles that are related to the self-paced learning with connectivist pedagogy. Digital technologies for interaction and communication undoubtedly serve to simply repeat activities that are already present in conventional group-based learning (Dehoney & Laurillard, 2007). However, social media may have the potential to transform the self-paced study (Anderson, 2009; Anderson et al., 2010). Connectivist pedagogy may enable learners in self-paced courses to meet others within and outside their course, form communities, and support each other in their varied learning activities without relinquishing the freedom to study at their own pace. In view of the literature, the study intends to propose an interactive model of women education with the aid of innovative technology to contribute to improving the situation at hand.

## **INTERACTIVE MODEL OF WOMEN EDUCATION WITH THE AID OF INNOVATIVE TECHNOLOGY**

The interactive model involves the interplay of practical building blocks of knowledge acquisition at the tertiary level. This constitutes the individual level, the pedagogical approach used by the school (pedagogical level) and the instructional body (organizational level).

At the individual level, there is Learner-learner interaction (LLI) which is regularly characterized by collaboration at various study groups as well as learning centers. This ensures effective learning since the interactions are capable of reducing learners' sense of isolation and fostering feelings of being part of a learning community. However, Thurmond and Wambach (2004) put forward the argument that, encouraging learners to take part in collaborative activities can also reduce students' perceived levels of satisfaction with the course. For distance education institutions, efforts to increase learner-learner interaction may be constrained by increased costs per student enrolment. While learner-learner interaction is usually regarded as a positive feature for an online course determined by the electronic media, in many instances this type of interaction requires that learners sacrifice some of their freedom to choose, control, and take responsibility for aspects of their learning.

Self-determined learning is a permanent feature at the individual learner level. In self-determined courses, individual learners decide on the rate at which they work through their course, as well as when they will complete learning activities and assignments. Knowles' (1984) model of pedagogy suggests that adults' need to know and their reliance on background experience are powerful incentives and enablers for self-paced learning. Self-determined learning makes it possible for students to work more rapidly through familiar topics or slow down to focus on new material (Paranto & Neumann, 2006). These advantages of self-determined study are frequently affected by certain challenges, including difficulty incorporating learner-learner interaction on the first appearance.

At the organizational level which normally is referred to as the educational institutions in the learning circles set out course structure. It is possible for the Universities to offer multiple start dates per year (e.g., monthly or continuous intake). By accommodating students' availability and individual schedules, the schools now designs its curriculum through which intends determines the pedagogical approach in the delivery of lecture and other forms of instruction. This, therefore, determines learner achievement in self-determined environments. Conversely, Ostiguy and Haffer (2001) found no significant differences in learner achievement in course whether students learned in a traditional classroom, through synchronous television broadcasts, or at their own pace online. This implies that Ostiguy and Haffer (2001) do not see any for improved technology at the tertiary level of women's education.

## **METHODOLOGY**

The metropolis has a population of 371,351, accounting for 14.98% of the total population of the Northern Region of Ghana (Ghana Statistical Service, 2018). In terms of sex distribution/ratio, there were 185,995 males and 185,356 females in the metropolis; the sex ratio of male to female was 1.01:0.10 and annual growth rate of 4% in 2010 (Ghana Statistical Service, 2018).

The total figure of two hundred (200) respondents was considered as the target population for the study. Of which, one hundred and twenty (120) out of the initial figure was arrived at using Yamane (1967) statistical formula to determine the sample size for the data collection. Questionnaires were used to source data from female students, tutors and male respondents as well. Inferring from the above, the study adopted both probability sampling such as simple random sampling (to increase external validity) and non-probability sampling namely purposive sampling techniques (to increase transferability) procedures.

Probability and non-probability sampling techniques were used, the probability sampling techniques involved simple random sampling (SRS) which was adopted to select both female and male respondents, the majority of which were females at the tertiary institutions. Non-probability techniques, on the other hand, included

purposive sampling techniques were employed to select tutors, heads of schools and administrators of tertiary institutions. Female students, male, tutors, heads of schools and administrators were the target population and data were sourced from these categories of respondents through the use of semi-structured interview guides and questionnaires. This was due to the fact that, players in the educational sectors are experts capable of establishing a relationship between improved internet technology and female education at the comfort of their homes.

## DISCUSSION OF RESULTS

This section basically deals with the relationship between Internet Technology (IT) Access and Women tertiary education in the metropolis, challenges women to face in their attempt to further education at the tertiary level and the appropriate strategies that could facilitate the effectiveness of e-learning or is termed as learning by the internet.

### The relationship between internet technology (IT) availability and women access to tertiary education.

The study in this section sought to examine the extent to which Internet Technology (IT) availability relates directly to women's tertiary educational accessibility in the Tamale Metropolis.

Table 1.0: Responses of Relationship between Internet Technology (IT) Access and Women Tertiary Education in Tamale

| <u>Identified variables</u>  | <u>Responses from the field</u> |                  | <u>Total</u> |
|--|---------------------------------|------------------|--------------|
|  | <u>Related</u>                  | <u>Unrelated</u> |              |
| ICT infrastructure accessibility in Tamale is satisfactory                       | 10                              | 5                | <b>15</b>    |
| There is the growth of internet usage for educational purposes                   | 15                              | 5                | <b>20</b>    |
| Online submission of assignment has enabled female students to to meet deadlines | 8                               | 2                | <b>10</b>    |
| Lectures notes and reading handouts are obtained through students' e-mail        | 13                              | 7                | <b>20</b>    |
| The social media connects other learning centers across the metropolis.          | 10                              | 10               | <b>20</b>    |
| Women are able to learn and work at the same due to technology.                  | 10                              | 5                | <b>15</b>    |
| <b>Total</b>   | <b>66</b>                       | <b>34</b>        | <b>100</b>   |

Source: Field survey, August 2018.

The study in this section sought to examine the extent to which Internet Technology (IT) availability relates directly to women's tertiary educational accessibility in Tamale. As indicated in table 1, revealed the causal relationship between internet technology availability and women education accessibility. It studies discovered that there is a strong positive relationship between internet availability and women accessibility to tertiary education. The study also disclosed satisfactory ICT infrastructure, the growth of internet usage for learners pursuing tertiary education. Online submission of assignment meet deadlines dates, and lectures note and reading handouts obtained through students' e-mail, social media connecting learning centers across the metropolis and women are able to learn and work at the same due to IT were also discovered significant. This represents 66 percent of the entire responses using the identified measurements. This, however, goes to support the alternate hypothesis of the study. Which is stated as there is a significant relationship between internet access

and women tertiary education. This further supported by Mushin (2008) which clearly states that the use of Internet technologies to deliver a broad array of solutions that enhance knowledge and performance of women education at the tertiary level, further support the stand. On the hand, only 34 percent of the responses revealed a weak relationship between the two variables- internet technology access and women tertiary education.

### Hypothesis

Ho: there is no significant relationship between internet access and women tertiary education.

H<sub>1</sub>: there is a significant relationship between internet access and women tertiary education.

**Determining critical value:** -Critical value was determined using the degree of freedom= (Rows-1) (Column-1) = (6 – 1) (2 – 1) = (5) (1) = 5, obtained from Table 1.0 above. Given the alpha level ( $\alpha=0.05$ ), and readings from the four-figure table, the researcher, arrived at **11.07** as the critical value (chi-square critical).

- Compute the test statistic using the formula

$$X^2 = \sum \frac{(fo-fe)^2}{fe}, \quad \text{where } fe = \frac{(\text{Row total})(\text{column total})}{\text{grand total}}$$

*fe* is therefore calculated as follows:

$$\text{CELL A} = \frac{15 \times 66}{100 \times 100} = \frac{990}{100} = 9.9/10$$

$$\text{CELL B} = \frac{20 \times 66}{100 \times 100} = \frac{1320}{100} = 13.2$$

$$\text{CELL C} = \frac{10 \times 66}{100 \times 100} = \frac{660}{100} = 6.5$$

$$\text{CELL D} = \frac{20 \times 66}{100 \times 100} = \frac{1320}{100} = 13.2$$

$$\text{CELL E} = \frac{20 \times 66}{100 \times 100} = \frac{1320}{100} = 13.2$$

$$\text{CELL F} = \frac{15 \times 66}{100 \times 100} = \frac{990}{100} = 9.9/10$$

$$\text{CELL G} = \frac{15 \times 34}{100 \times 100} = \frac{510}{100} = 5.1$$

$$\text{CELL H} = \frac{20 \times 34}{100 \times 100} = \frac{680}{100} = 6.8$$

$$\text{CELL I} = \frac{10 \times 33}{100 \times 100} = \frac{330}{100} = 3.3$$

$$\text{CELL J} = \frac{20 \times 34}{100 \times 100} = \frac{680}{100} = 6.8$$

$$\text{CELL K} = \frac{20 \times 34}{100 \times 100} = \frac{680}{100} = 6.8$$

$$\text{CELL L} = \frac{15 \times 34}{100 \times 100} = \frac{510}{100} = 5.1$$

Table 2.0: Computation of the Test Statistic

| CELLS | Fo | Fe | (fo- fe) | ( fo- fe) <sup>2</sup> | $\frac{(fo-fe)^2}{fe}$ |
|-------|----|----|----------|------------------------|------------------------|
| A     | 10 | 12 | -2       | 4                      | 0.33                   |
| B     | 15 | 13 | 2        | 4                      | 0.30                   |
| C     | 08 | 7  | 1        | 1                      | 0.15                   |
| D     | 13 | 14 | -1       | 1                      | 0.07                   |
| E     | 10 | 12 | -2       | 4                      | 0.33                   |
| F     | 10 | 11 | 1        | 1                      | 0.09                   |
| G     | 05 | 4  | 1        | 1                      | 0.25                   |
| H     | 05 | 7  | -2       | 4                      | 0.57                   |
| I     | 02 | 3  | -1       | 1                      | 0.33                   |
| J     | 02 | 5  | -3       | 9                      | 1.8                    |
| K     | 10 | 8  | 2        | 4                      | 0.5                    |

|          |    |   |   |   |      |
|----------|----|---|---|---|------|
| <b>L</b> | 05 | 4 | 1 | 1 | 0.25 |
|----------|----|---|---|---|------|

Source: Researcher's construct

$$X^2 = \sum \frac{(fo-fe)^2}{Fe} = 4.97$$

### Decision Making

Computed chi-square which is 4.97 or 5 when compared with the critical chi-square (11.07), it is quite obvious that the computed chi-square is less than the critical chi square; therefore, the researcher upheld the null hypothesis that there are no significant relationship between Internet Technology (IT) access and women tertiary education in Tamale. It implies that failing to reject the null hypothesis does not prove that the null hypothesis is true; it means that we have failed to disprove the null hypothesis. The explanation further showed that to prove without any doubt that the null hypothesis is true; the population parameter would have to be known. To actually determine it researchers, have to count every single item of the population, and this is not feasible. The alternative is to take a sample from the population (Douglas et al., 2000).

### Challenges Women Faced in their Attempt to Further Education at the Tertiary level in Ghana

The identified challenges are presented and analyzed in Table 3.0 below.

Table 3.0: Challenges faced in Women's Education

| Reasons   | Strongly Agree | Agreed | Uncertain | Strongly Disagree | Disagree                  |
|---|----------------|--------|-----------|-------------------|---------------------------|
| Gender imbalance has create disparity in education between male and female. | 35             | 30     | 0         | 20                | 15                        |
| High cost of tertiary education.  | 40             | 35     | 0         | 15                | 10                        |
| Women inability to secure the ICT Equipment for tertiary education          | 50             | 28     | 0         | 14                | 18                        |
| Role conflict between domestic chores to tertiary education.                | 60             | 22     | 0         | 10                | 08                        |
| <b>Chi-square</b>   |                |        |           |                   | <b>11.000<sup>c</sup></b> |
| <b>Mean</b>   |                |        |           |                   | <b>2.1500</b>             |
| <b>Std. Deviation</b>   |                |        |           |                   | <b>1.06719</b>            |

Source: Field Work, 2018.

Several challenges which negatively affect women's education are clearly indicated in Table 3.0 above. These challenges include gender imbalance, discouraging women education, women's inability to access ICT equipment as well as unfair and inequitable educational opportunity have undoubtedly affected women's access to tertiary education. In the same vein, the critical chi-square (11.07) is said to be more than the computed of 4.97 [obtained from computations given by degree of freedom (c-1) (r-1) calculated as (6 - 1) (2 - 1) = (5) (1) = 5]. Based on the above, the study failed to accept the challenges in table 3.0 above which most people regarded as factors hampering women's access to tertiary education.

### Appropriate Strategies That Could Facilitate the Effective internet-based learning

Table 4.0: Strategies Aimed at Facilitating the Effective E-Learning Systems

| Strategies  | Frequency  | Percentage  |
|---|------------|-------------|
| Educational campaign by National Community Authority (NCA).                           | 35         | 29.17%      |
| Introducing Computer Science at the senior secondary level as a core subject.         | 25         | 20.83%      |
| The construction of a strong and resilient Fiber Optic System (FOS).                  | 25         | 20.83%      |
| Universities should consider e-learning Systems as part of the medium of instruction. | 35         | 29.17%      |
| <b>Total</b>  | <b>120</b> | <b>100%</b> |

Source: Field Data, 2018.

Relative to the strategies aimed to facilitate effective internet-based learning or E-Learning systems are presented, analyzed and discussed. As observed in table 4.0, 29% of the respondents held the view that, an educational campaign organized by the National Community Authority (NCA) could influence women towards the acceptance of e-learning systems in Tamale. On the issue of introducing Computer Science at the Senior High Secondary level as a core subject, 21% of the respondents thought this could serve a good purpose among other strategies that could go a long way to promote e-learning among women at the tertiary level.

Furthermore, 21% of the respondents considered the construction of a strong and resilient Fiber Optic System (FOS) as one of the strategies aimed at enhancing internet base learning since the FOS could make the internet more reliable and accessible in not only the Tamale Metropolis but in all other parts of Ghana. Universities' consideration of e-learning systems as part of the medium of instruction according to 29% of the respondents can also be a good strategy towards making internet learning more attractive, especially to the women folk.

### CONCLUSION

Technology plays a significant role in all aspect of human endeavor including tertiary education; this indeed has improved the telecommunication industry and education in general. This is, however, to the detriment of women's education at the tertiary level due to challenges such as gender imbalance, the high cost of tertiary education, women's inability to secure ICT equipment and the role conflict between domestic and tertiary education. In spite of the challenges, internet technology has proven over the years to have tremendous benefits to the overall performance of organizations including educational institutions.

The importance of internet technology to education is highlighted in the study and included the growth of internet usage for learners pursuing tertiary education. It also includes online and offline submission of assignments to meet deadlines dates, and lectures note and reading handouts obtained through students' e-mail, social media connecting learning centers across the metropolis and women are able to learn and work at the same due to IT were also discovered significant. As a matter of fact, the acceptance and application of innovative technology by public institutions including those in the educational sector, especially internet connectivity are of grave importance. It is, therefore, critical that suitable steps are taken so as to ensure the effective implementation of technological facilities in public institutions.

### RECOMMENDATION

In order to strengthen the effectiveness of technology aimed at the tertiary educational level, the recommendations indicated below when considered could go a long way to ensure improved performance of women in terms of

enrolment and transition at the tertiary level. However, to further encourage the use of internet technology at the University level, the authorities of the University should take advantage of the country further expanding internet access to cover all districts in the country, by liaising with telecommunication companies to established robust and reliable internet facilities at the various institutes of distance learning to further strengthen the availability and accessibility of tertiary education for women.

Again, though most of the respondents had Diploma in education, they should be encouraged and assisted by way of scholarship provision, and study leave with pay to enable women, in particular, to further their education in order to improve on their low educational qualification.

Admissions into the tertiary educational institutions should be skewed in favor of women as well as making it as a top priority so as to bridge the gender imbalance in the educational sector at the tertiary level.

The Research and Development (R&D) unit of the Universities should probe further into more details through research to determine the real state of affairs concerning the role of technology on women education. In view of the fact that, there is adequate ICT infrastructure leading to growth of internet usage, online submission of assignment as well as lectures notes using e-mail, the above modalities should be consolidated into the general overall strategies of the Universities in order to further boost the use of the internet for educational purposes by women.

#### **Conflicts of Interest**

The authors declare that they have no conflicts of interest.

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#### **Data Availability Statement**

Secondary data for this study can be accessed from the websites of Ghana Ministry of education, an annual report from 2010 to 2018.

World Bank report on SDG goal 4, target 4.3 which ensures by 2030 equal access for all women and men to affordable quality tertiary education, 2018.

Primary data of this study can be accessed by contacting the authors of this study.

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