



ISSN 2278 – 0211 (Online)

## Students' Readiness for the Study of Multimedia: The Case of UEW's Department of Graphic Design

**Teye, V. Q. N.**

Senior Lecturer, Department of Graphic Design,  
University of Education, Winneba, Ghana

**Esseku, J. F.**

Senior Lecturer, Department of Graphic Design,  
University of Education, Winneba, Ghana

### **Abstract:**

*The purpose of this study, which is based on a mixed-method design and descriptive analysis, is to examine the readiness of twenty-five students in multimedia, which is a key pathway in the study of Graphic Design at the University of Education in Winneba's Department of Graphic Design. The research will be conducted at the University of Education in Winneba's Department of Graphic Design. Students do not have access to the fundamental instruction or the resources that are necessary to complete their schoolwork or projects. As a result, the goal of this study was to investigate the effects of students' unprepared attitudes toward their inability to obtain tools for their studies in Multimedia as part of the Bachelor of Art in Graphic Design Programme at the University of Education, Winneba. This programme is offered at the University of Education, Winneba. To investigate how the current circumstances impact the teaching and learning of Multimedia as a primary area of study within the department, the researchers concentrated their efforts on two unique level groups. To collect data for this study through unstructured interviews and observations, a total of twenty-five students and five senior members of the organization were purposefully recruited. An analysis utilizing descriptive and narrative methods was performed on the primary data that was obtained. Students at the Department of Graphic Design who were majoring in Multimedia were unable to purchase the essential instruments, which meant that they were unable to properly acquire the knowledge and abilities necessary for their field of study. It was discovered that the percentage of pupils who lacked access to resources that may help them with their academics rose with each successive year group. This was the case for both public and private schools. The researchers have proposed, as a potential solution that the Department of Graphic Design at the University of Education, Winneba, in collaboration with a private business, sell high-end tools on credit, with a payment plan to be spread out throughout their studies through the use of a signed contract. This would be done to make the purchase more affordable for the students.*

**Keywords:** Advertising, graphic design, laptop, multimedia, project

### **1. Introduction**

Learning graphic design not only involves creativity, but it is also dependent on the right tools and materials the artist possesses and the lack of the right tools and materials affects the outcomes. When inability of the student to acquire the tools and materials for his/her study affects the attitudes of learners' form towards learning (Anthony & Walshaw, 2007; Grootenboer et al., 2008; Kele & Sharma, 2014). According to Han & Carpenter (2014) and Mensah et al. (2013), attitudes tie with cognitive, affective and behavioural reactions that one would display towards a situation based on their feelings or interest. Maio & Haddock (2009) and Sanchal & Sharma (2007) ascribed that the cognitive component is what the individual thinks. Thus, an effective component is that which drives students' attitudes towards his/her studies or interest.

The Department of Graphic Design at the University of Education, Winneba (UEW) in Ghana offers a bachelor-level design education in the field of advertising, graphic design and multimedia (interactive digital). The Department of Graphic Design puts user needs first and implements its teaching to solutions to real-world problems. The Department of Graphic Design at the University of Education, Winneba, provides students the opportunity to improve their skills as designers. As designing is an interactive process, it ties itself with current state-of-the-art equipment in the field of design and appropriate technology that facilitates the processes of design and production (DGD: UEW, 2018). For national governments to diversify their economies, there is a need to train human capital that would help carry out and support this transformation the world over today (AAU, 2015).

The policy of providing free senior high school education was introduced by the Ghanaian government today during the 7<sup>th</sup> parliament of the 4<sup>th</sup> Republic. Ghanaians often refer to this initiative as "Free SHS," which stands for "free

senior high school. "Young people and families that are unable to pay to educate their children up to the level of senior high school are the intended recipients of this policy's primary benefit, which is to instil a sense of optimism in them (Tamanja & Pajibo, 2019; Nurudeen et al., 2018). As a direct consequence of the effort known as "Free Senior High School," public educational institutions anticipate enrolling a substantial number of new students beginning with the academic year 2020–2021. According to Von Glasersfeld (1995) and Singh & Rana, educational changes in a nation's populous may be reflected in a mirror to disclose changes in that nation's educational system. This is something that can be done by holding the mirror up to the population of the nation (2004). The argument that the country needed to invest in the education of its children because those children would soon be in charge of the country caused the Ghanaian government to spend enormous amounts of money on education, which changed the educational narrative of the country. This change was brought about as a result of the argument that the country needed to invest in the education of its children because those children would soon be in charge of the country. This point of view was presented by the Deputy Minister of Finance (GhanaWeb, 2019).

The government of Ghana as well has continued to visibly enhance TVET1 through COVET2 to produce a globally competitive workforce through quality-oriented and demand-driven learning for national development (The World Bank et al., 2014). The government has further introduced and emphasised the CBT3 in the recent TVET education, all to produce technical manpower to advance the industrialisation of the nation as it exists in advanced nations (Ansah & Kissi, 2013). According to Joy Online (2020), the government of Ghana of the 7th Parliament of the 4th Republic has also built two first-ever creative arts schools to horn the need to vary the focus of education in Ghana today. The COVID-19 pandemic exposed nations that were behind in information and technology as it forced the world to stay and work from home.

Additionally, the Ghanaian government has maintained its efforts to demonstrably enhance TVET1 through COVET2 to produce a labour force that is competitive globally through learning that is quality-focused and demand-driven to support national development (The World Bank et al., 2014). By stressing the CBT3 and introducing it more recently in TVET education to imitate the educational systems of more industrialized nations, the government has made additional efforts to produce the technical manpower required to accelerate the industrialization of the country (Ansah & Kissi, 2013). Joy Online (2020) reports that the government of Ghana's 7th Parliament of the 4th Republic has also established two pioneering creative arts institutions in response to the requirement to diversify the emphasis of education in Ghana at the moment. This is in response to the requirement to change the current emphasis on education in Ghana. People throughout the world were forced to stay indoors and work from home as a result of the COVID-19 outbreak. It was made clear which nations fell behind in terms of information and technology.

According to Stanojevi et al. (2018), computers are becoming increasingly important for the active acquisition of information and creativity since teaching aids are evolving to fit the ongoing educational process. Since computers were first used in classrooms in 1970, they are now a must for education (Fouts, 2000). The Department of Graphic Design is underfunded and under-resourced, similar to other departments at state institutions in Africa. This is likely to have an impact on the quality of higher education (Twene, 2014; Goode, 2017; Daniel, 2012). At the University of Education, Winneba, the Department of Graphic Design and the Department of Art Education share a multimedia studio, placing pressure on students to use the studio. Students do not have the option of staying behind during lectures during the week to finish their projects and assignments due to the high number of students who utilize the multimedia studio weekly; instead, they must finish their assignments and projects outside of class. During the 2019 - 2020 academic year, the researcher looked at 17 pupils, including six level 300 students and eleven level 200 students. Additionally, two senior members of the Department of graphic design were contacted for primary data.

Through theory and practice, the Department of Graphic Design offers three prestigious degree options for the Bachelor of Arts in Graphic Design, including advertising, graphic design, and multimedia. Each of the three programme tracks offers several courses in computer-generated graphic design. Modern graphic design methods and manufacturing facilities require the proper technologies. Due to its ease, the personal computer - and, for that matter, the laptop - becomes an essential part of any design student's toolkit. The lack of a laptop in the life of a graphic design student is a difficulty for the instructor and the student, and this has an impact on teaching and learning, just as the lack of scribbling tools cannot be ineluctable in any school-going student. Fortunately, lecturers in the Department of Graphic Design can give up to five design tasks every week, and at times like these, having a laptop is essential. Students without laptops felt the pressure as instructors insisted on project submission deadlines. Without a strategy in place to get one before these groups of students end their studies, the attitude of graphic design students without laptops is spreading, and this attitude affects students' learning outcomes and instruction (Sanchal & Sharma, 2017; Esseku (2021), personal communication, September 15, 2020).

When one considers the upward trend of students at the Department of Graphic Design who do not own personal laptops, as well as the high number of students the department anticipates receiving as a result of the "Free SHS" policy that is currently in effect in Ghana, the unreadiness of students majoring in Graphic Design to own personal laptops would be a significant obstacle that would affect teaching and learning for an extended period. Today's institutions of higher learning almost universally require students to have access to both desktop and portable computing devices (Weaver & Wilson, 2005). In today's educational system, college students must have access to a laptop computer. According to the findings of certain research, three distinct aspects constitute an attitude. The cognitive component, the emotive component, and the behavioural component are the three that make up this aspect (Eagly & Chaiken, 1993). The behavioural component manifests itself in the replies to the attitude object, and students who do not possess laptops are more likely to choose to skip lectures than to attend them without actively participating. Jones and Eicer (2014) demonstrated that the development of an attitude is an experimental process. According to Mensah et al. (2013), life

experiences are the primary factor in the formation of attitudes in individuals. Students at level three hundred have been working through their curriculum without laptops; thus, students in level two hundred who do not have laptops have prepared themselves to continue working through the issue until they graduate. Students who do not own computers must rely only on the multimedia studio that is housed inside the Department of Graphic Design as well as a few classmates who have agreed to let them use their laptops to successfully finish their projects and assignments. Students who do not have access to computers consistently turn in their projects late, which is seen by their teachers. This mindset has a variety of unintended repercussions, one of which is tardiness in submitting projects and assignments. When students are required to remain up late nights at coursemate hostels while using their computers, the result is that they wind up asleep during lectures. This widespread problem hinders education. According to the findings of the OECD (2015), students who have access to and make greater use of computers differ in several ways, both observable and not observable, from students who have less limited access to computers or make less use of them. More and more attention has been displayed by education professionals to problems that have an impact on the teaching and learning process (Anghelache, 2013).

Due to the fact that their parents or guardians cannot afford to buy a laptop in addition to their facility usage fees and other expenses, some Graphic Design students do not bother themselves with the acquisition of personal computers. This is the sole explanation. It is typical for students to skip lectures because they understand that failing earlier quizzes and turning in papers late due to missing due dates will make it impossible for them to follow along in their classes. Since of this attitude, students performed poorly when their practical examination projects were also disapproved because they failed to meet the dates for submission. These students cannot comprehend the practical lesson; thus, the lecturers do not bother to help them during the practical sessions. Instead, they just sit about and do nothing. It presented a challenge for the lecturers when students who had missed the previous week's class because they could not borrow a laptop to finish their assignments were able to attend the session the following week because it brought the class back on track during the introduction of a new computer programme tool and the demonstration of how it should be used.

This attitude on the part of the students regularly kept the lecturers on their toes to meet the discussion of results deadlines at both the departmental and faculty levels. Instructors were once again faced with a challenge as a result of the student's attitude, as they had to look into the reasons why the lecturer did not have the students' practical projects to determine the whereabouts of the students when their projects were not turned in during the assessment period. The circumstance makes the lecturers' jobs more challenging and, at times, even embarrassing. Not to mention the subpar grades that these students frequently receive, for which the lecturers are asked questions during meetings of academic committees that are held by departments to discuss the results.

## 2. Methodology

The mixed methodology used in this work allowed the researcher to legitimately apply several ways to address the publication's requirements. One interpretation of the data that impacted the decision to choose nineteen people from the Department of Graphic Design as samples for the study was based on the qualitative and quantitative methods, the descriptive analysis, and the concomitant integration of the purposive sampling methodology. Eleven men made up the samples, accounting for 63.16 percent of the total, while eight women made up 36.84 percent of the nineteen people that were included in the sample. Six pupils, or 31.58 percent of the sampled population, were in the third-hundredth grade. Eleven subjects were sampled, accounting for 57.89 percent of the total; these included seven male students, accounting for 63.64 percent of the total, and four female students, accounting for 36.36 percent; and two senior members, accounting for 10.53 percent of the total, comprised of equal gender. Of the six subjects sampled from level 300, four subjects represented 66.67 percent of the total, and two female subjects accounted for 33.33 percent.

Initial research for this study suggested a variety of but largely consistent reasons why these students do not have computers and how this attitude has cost them, which led to the use of the purposive selection approach. The two senior members identified the identical difficulties that had an impact on their job. During the discussion with the subjects, two difficulties came up. In general, the student's attitude about not having computers for their studies has an impact on teaching and learning. Levels 100 and 400 students were left out of the study because the final year students would be away from campus for a semester of internship as part of their studies, and level 100 students were left out for practical reasons because they were taking the majority of foundation courses that did not heavily involve computer use and their guardians were soon to send in their laptops.

The researchers interacted with the senior members to find out if they had taken any steps to encourage these groups of students to own laptops, how the students' attitudes affected instruction in and outside of class when they turned in assignments, and generally how this group of students' attitudes affected their performance. Both graphic design and multimedia classes were taught by one senior member, while solely multimedia courses were taught by the other senior member. More than two courses were delivered to these groups of students each week by these two senior members. One of the senior members had over 10 years of expertise in instructing multimedia courses, while the other senior member had three years of experience. As they assisted in choosing the students for the primary data, these two senior members were purposefully chosen to help collect data for this research by utilising unstructured interviews and observational approaches.

## 3. Results and Discussions

Students were taken aback when they learned that the study of Multimedia at the university level was significantly more expensive than the Visual Art disciplines they had been exposed to during their final year of high school. Students were unaware that they needed computers for their curriculum since, during their senior year of high school,

nearly none of them made any financial investments in graphic design equipment and supplies. According to the questions that were asked of the children that were used as a sample, eleven of them, which represents 64.71 percent, lived with only one parent. The school fees for this group of pupils were difficult to pay in full at the beginning of each new academic year. 35.29 percent of the whole population, or six of the total sample, lived with both of their parents. This category of students had additional siblings who were enrolled in different higher institutions, and their parents' financial resources were insufficient to help them get a laptop for their academic pursuits. Eight of the students in the sample, or 47.06 percent of the total, had either a guardian, a sibling, or external contacts that helped support them financially. Two of the total sampled students, representing 11.76 percent of the student body and being male, fully funded their education and even had to contribute monetarily to the upkeep of their homes. These students were unable to request that their parents, guardians, or older siblings buy a personal laptop for them because of the situations in which they found themselves.

As a result of the investigations with the students, it became clear that due to the financial requirements of the Graphic Design programme, twelve students, representing 70.59 percent of the total students sampled, wished they could change their programme to Art Education, which did not necessarily demand a personal laptop due to the nature of the courses offered by the Department of Art Education in comparison to the courses offered by the Department of Graphic Design. This was evident in the findings. Only three of the twelve students that were sampled were female, which corresponds to a representational percentage of 25 percent; the other nine students, which corresponds to a representational percentage of 75 percent, were male. It was also discovered that a lack of financial resources was the primary obstacle that prevented them from purchasing a personal laptop. The pupils lacked access to any other means of acquiring a laptop, and they were reliant on the generosity of their classmates to provide them with the use of their laptops. Students who borrowed computers to carry out their coursework and project tasks were required to wait until the owner finished their work on the laptop before they could continue using it.

It was also discovered that students were not permitted to take the computers that they had borrowed from their roommates back to their hostels, but rather that they were required to use the laptop when the owner was present in his or her hostel. This was another issue that surfaced. As a result of this circumstance, the students arrived quite late at their dormitories feeling exhausted and unable to eat anything. As a result of not having enough time to do their homework and project work in time to meet deadlines, several of the other students in the class were obliged to let down their friends and co-workers who had previously made plans to borrow their computers. Five of the students who were polled, which is equivalent to 29.41 percent of the total, discussed how they were disciplined when they were unable to turn in either their assignments or their project works on time and how this circumstance impacted their final scores for the semester. Eight students from the sample, representing 47.06 percent of the total, missed lectures when they could not hand in their papers or projects on time because they were frequently reprimanded for having such an attitude and felt humiliated. Since they were unable to borrow a laptop in time for the end-of-semester examinations, three of the sampled students, representing 17.65 percent of the student body, did not hand in their projects for the end-of-semester examinations. However, these students did take supplementary examinations to finish their academic work for the semesters. The student's lacklustre performance on their tests was mostly attributable to the mentality they displayed. Thirteen students were polled, and 76.47 percent of them reported that their lecturers had called them during the holidays to demand their end-of-semester examination projects. The lecturers had given the students a deadline by which they needed to turn in their examination piece, or else they risked failing the examination.

Ten out of the seventeen students sampled, or 58.82 percent, were professional teachers who indicated they read the wrong programme. Instead, they would have read the Art Education curriculum, which contained an education component when they studied Graphic Design. Because they did not have enough money to pay for an internship in the industry, they decided to get some teaching practice instead because they were already familiar with that kind of practice. This fact had a role in the decision they made. These students were on study leave, and it was evident that they would return to the classroom to teach following the conclusion of the school year rather than start their enterprises. These students did not become aware that there was a distinction between the Graphic Design Programme and the Graphic Design speciality within the Art Education Programme until they arrived on campus and began attending lectures. As a result of their dissatisfaction, they lacked the motivation to apply for a loan to purchase a laptop for their academic pursuits. They believed that if they had completed an Art Education degree, they would have a better chance of finding a job in the teaching profession. However, for them to be qualified to enter the teaching profession, they needed to complete a post-graduate Education programme. Due to this dissatisfaction, four students, or 23.53 percent of the class, concluded that their mood had a direct detrimental influence on their performance throughout each semester. These students wanted to alter their programme, but they knew that if their peers found out that they did so, it would be embarrassing for them. They could not bear the thought of their peers finding out they had changed their programme due to their poor performance.

Interacting with the two senior members of the Department of Graphic Design sampled, emerged those students without personal laptops negatively affected teaching. Students skip lectures and when the students are forced to attend lectures, the result is that it drags the lecture for that day back since they had missed previous lessons. These students asked questions that were dealt with in the previous lesson session, which the student skipped. It was difficult for the lecturers to complete their lessons on schedule for which students who had skipped previous lectures attended. "Students who did not have their laptop could not answer the question(s) put before them or could not demonstrate an action in class for clarification during a practical lesson" (Senior Member B posted). Students in this category suffered in examinations and scored low grades. Students without laptops did not have the opportunity to practice over and over the lessons they took for the perfection of the skills taught. It was confirmed that students skipped lectures when their works were critiqued in class or they brought in their project works for supervision.

It was evident again from the interactions with the senior members that "students without personal laptops did not turn in their assignments and projects on time and often disrupt their schedule and release of examination results" (Senior member B observed). It was confirmed that senior members had to call students on their cell phones because they did not submit examination practical pieces before leaving for home on the school holidays. When students are not able to meet the opportunity to submit the examination project piece after the scheduled date, the students failed in their examination. It was evident that students did not prepare enough with the requisite tools and materials for their studies as students gave financial reasons for their inability to print and submit projects in some instances, a senior member lamented.

It again emerged that "students without personal laptops did not make an effort to obtain one and that forced such students to be truant in class" (Senior Member A lamented). This attitude by students forced lecturers not to have a pleasant relationship with these students. Lecturers often found themselves in an embarrassing situation to remark on why a student had a missing grade during a departmental board meeting, especially when the lecturer had made efforts to reach the said student without success. The number of students on the three-course paths in each year group is rising and overwhelms the lecturer to make enough time for each student coupled with their extra curriculum activities bestowed on the senior member. Students refused to meet with their academic counsellors to share their academic challenges for support. Some students confided in one of the senior members that they sometimes skipped lectures to take up part-time jobs to support their upkeep. "The divided attention was a serious setback to learning," the senior member observed. There has been substantial evidence that using technology as an instructional tool enhances students learning and educational outcomes (Gulek & Demirtas, 2005).

#### 4. Conclusion and Recommendations

Students are required to have their computers to take part in the multimedia programs that are offered by the vast majority of international educational institutions nowadays. Students in today's society who do not have access to laptops will be unable to follow the lessons in the graphic design studies course they are enrolled in. In the Multimedia programme within the Department of Graphic Design, out of the total of forty-seven courses that are taken for this study, twenty-seven Computer-Aided Design (CAD) courses are offered across all four semesters of the second and third years of the programme. This represents 78.72 percent of students who began their studies in graphic design at the Department of Graphic Design and enrolled in CAD classes within the first two years of their program. Without a laptop, with all of the complications that come along with it and that have been found, this will have a huge influence on the teaching of graphic design and the learning of graphic design. If a student attends a class at the Department of Graphic Design without bringing a laptop computer with them, their educational experience will be considerably different from that of their classmates who do bring laptops to class. The use of computers is mandated in several classrooms and laboratories, and the capacity of students to learn while they are in class is contingent on their having prompt and constant access to computers during their time there.

The difficulty of students acquiring laptops necessary for their studies has a detrimental impact not just on the student's academic performance but also on the work that lecturers do, including evaluation. In the same way that students are not permitted to remain in class without scribbling equipment and materials, a graphic designer cannot properly learn Graphic Design without the fundamental tool (laptop) in today's world. It is becoming the norm in today's society for a student majoring in graphic design to complete their whole four years of schooling without owning a laptop and to make no attempt to acquire one. Having observed the recent upward trend in admission trends into universities in Ghana, if the current mentality of graphic design students who are enrolling in Graphic Design programmes without a laptop is not checked, then it is obvious that there will not be enough good and professional graphic designers produced to satisfy the demand in the job market. Students who are studying graphic design but do not have access to a laptop are unable to engage in freelance work to support themselves during breaks in their studies, after they have completed their coursework, or while they search for employment. With the advancement of technology in today's world, there will be a surge in the demand for talented designers, which will open the door to vast expansion opportunities. In today's world of tertiary education, the benefits of owning a laptop exceed the costs associated with purchasing one.

The results and restrictions of the current study point in various directions for potential future research, which might be summed up as the question 'Why.' Why would students in the Graphic Design department want to study without a laptop? As soon as researchers and teachers have a better understanding of the significance of the laptop in learning graphic design today, more strategic sensitisation can be developed and inculcated in the visual art students at the senior high school level before they go on to study at the tertiary level. Second, in the future, research should start looking into the best way to help students who come from less privileged homes get laptops for their schoolwork from a third party by going through the University of Education, with the cost being broken up and paid off throughout the students' academic careers. The potential applicants for the Graphic Design Department might be required to have a laptop computer and a subscription to design software as a part of the qualifying admissions requirements.

In the future, studies could also benefit from the discovery of methods that directly track laptop usage among students studying graphic design. This would eliminate the difficulties that students who do not have computers have outside of the classroom. This kind of information would surely provide a more accurate picture of the reasons why a student of graphic design could not learn Graphic Design on anything other than a laptop. As an essential component in the process of developing the students' perspectives on the topic, they need to cultivate a favourable attitude toward the program. The outcomes of students who have laptops against students who do not have laptops might be compared in further study in the future.

In the end, however, these findings make it abundantly evident that the utilization of a laptop in the course of the study of graphic design is quite beneficial and that doing so without the usage of a laptop leads to significant drawbacks. Based on these findings, it appears that the negative effect acts in two different ways:

- First, it inhibits the student's ability to learn by preventing them from participating completely in class and
- Second, it causes students to miss lectures

The impact of the student's attitudes on the lecturer's ability to teach is the other side of the coin that emerges from examining the outcomes. Even though a number of other researchers have reached the opposite conclusion, namely that laptops should not be used in classrooms in which they are not an integral part of the curriculum (Barak et al., 2006; Gay, Stefan, Grace-Martin, & Hembrooke, 2001; as cited by Fried, 2006), this is not the consensus of the research community. In my opinion, the narrative is still relevant today.

## 5. References

- i. Association of African Universities. (2015). *Towards innovative models for funding higher education in Africa*. Association of African Universities.
- ii. Fouts, J. T. (2000). Research on computers and education: Past, present and future. Retrieved from <http://docshare01.docshare.tips/files/31705/317050658.pdf>.
- iii. Fried, C. B. (2008). In-class laptop use and its effects on student learning. *Computers & Education*, 50(3), 906–914. <https://doi.org/10.1016/j.compedu.2006.09.006>.
- iv. Gay, G., Stefanone, M., Grace-Martin, M., & Hembrooke, H. (2001). The Effects of Wireless Computing in Collaborative Learning Environments. *International Journal of Human-Computer Interaction*, 13(2), 257–276. [https://doi.org/10.1207/s15327590ijhc1302\\_10](https://doi.org/10.1207/s15327590ijhc1302_10)
- v. GhanaWeb. (2019). Government justifies expenditure on Free SHS. Retrieved from <https://www.ghanaweb.com/GhanaHomePage/NewsArchive/Government-justifies-expenditure-on-Free-SHS-769389>.
- vi. Goode, F. (2017). Approaches to Ghana's higher education challenges drawn from the U.S. community college model. Walden University: Columbia, MD. Accessed at: <https://scholarworks.waldenu.edu/cgi/viewcontent.cgi?article=5907&context=dissertations>.
- vii. Grootenboer, P., Lomas, G., & Ingram, N. (2008). The affective domain and mathematics education. In H. Forgasz, A. Barkatsas, A. Bishop, B. Clarke, S. Keast, W. T. Seah, P. Sullivan (Eds.), *Research in mathematics education in Australasia 2004–2007* (pp. 255–269). Sense.
- viii. Jones, C. R., & Eiser, J. R. (2014). Attitude Formation Through Exploration. *SAGE Open*, 4(3), 215824401455192. <https://doi.org/10.1177/2158244014551927>.
- ix. Joy Online. (2020). 9 new model schools to be completed by the end of 2020 – Education Minister. *Myjoyonline*. Retrieved from <https://www.myjoyonline.com/news/national/9-new-model-schools-to-be-completed-by-end-of-2020-education-minister/>.
- x. Kele, A., & Sharma, S. (2014). Students' beliefs about learning mathematics: Some findings from the Solomon Islands. *Teachers and Curriculum*, 14, 33–44.
- xi. Maio, G. & Haddock, G. G. (2009). *Psychology of attitudes and attitude change*. Sage.
- xii. Abdul-Rahaman, N., Abdul Rahaman, A. B., Ming, W., Ahmed, A.-R., & Salma S. (2018). The free senior high policy: An appropriate replacement to the progressive free senior high policy. *International Journal of Education and Literacy Studies*, 6(2), 26–33. <https://doi.org/10.7575/aiac.ijels.v.6n.2p.26>.
- xiii. Mensah, J. K., Okyere, M., & Kuranchie, A. (2013). Student attitude towards mathematics and performance: Does the teacher's attitude matter? *Journal of Education and Practice*, 4(3rd ed.).
- xiv. OECD. (2015). "How computers are related to students' performance," in *Students, Computers and Learning: Making the Connection*. OECD Publishing.
- xv. Sanchal, A., & Sharma, S. (2017). Students' attitudes towards learning mathematics: Impact of teaching in a sporting context. *Teachers and Curriculum*, 17(1), 89–99. <https://doi.org/10.15663/tandc.v17i1.151>.
- xvi. Singh, R. P., & Rana, G. (2004). *Teaching Strategies*. APH Publishing Corp.
- xvii. Stanojević, D., Cenić, D., & Cenić, S. (2018). Application of computers in modernisation of teaching science. *International Journal of Cognitive Research in Science Engineering and Education*, 6(2), 89–104. <https://doi.org/10.5937/ijcrsee1802089s>.
- xviii. Tamanja, E. & Pajibo, E. (2019). Ghana's free senior high school policy: Evidence and insight from data. *EDULEARN19 Proceedings*, 7837–7846. <https://doi.org/10.21125/edulearn.2019.1906>.
- xix. The World Bank, Ministry of Foreign Affairs of Denmark (DANIDA), & COTVET. (2014, April). *Ghana Skills and technology development project (GSTDP)* (No. P118112). Council for Technical and Vocational Education and Training (COTVET). Retrieved from <http://sdfghana.org/cp/images/reports/Final%20DRaft%20GSTDP%20MRT%20Report.pdf>.
- xx. Twene, P. (2014, April). Sources of funding for higher education in Ghana. *Department of Education, Faculty of Education Science*. Universitetet i Oslo. Retrieved from <https://www.duo.uio.no/bitstream/handle/10852/41689/Twene-Pius-Thesis.pdf%3Fsequence%3D1>.
- xxi. UEW. (2018). News. Retrieved from *University of Education, Winneba*: <https://www.uew.edu.gh/news/acting-head-department-graphic-design-attends-fitc-design-conference-amsterdam>.

- xxii. Gulek, J. C. & Demirtas, H. (2005). Learning with technology: The impact of laptop use on student achievement. *Journal of Technology, Learning, and Assessment*, 3(2). Retrieved from: <https://ejournals.bc.edu/index.php/jtla/article/view/1655>.
- xxiii. Anghelache, V. (2013). Determinant factors of students' attitudes toward learning. *Procedia - Social and Behavioral Sciences*, 93, 478–482. <https://doi.org/10.1016/j.sbspro.2013.09.223>.
- xxiv. Han, S. Y., & Carpenter, D. (2014). Construct validation of student attitude toward science, technology, engineering and mathematics project-based learning: The case of Korean middle-grade students. *Middle Grades Research Journal*, 9(3), 27–41.
- xxv. Ansah, S. K., & Kissi, E. (2013). Technical and vocational education and training in Ghana: A tool for skill acquisition and industrial development. *Journal of Education and Practice*, 4(16), 172–180. Retrieved from [https://www.researchgate.net/publication/305475999\\_Technical\\_and\\_Vocational\\_Education\\_and\\_Training\\_in\\_Ghana\\_A\\_Tool\\_for\\_Skill\\_Acquisition\\_and\\_Industrial\\_Development](https://www.researchgate.net/publication/305475999_Technical_and_Vocational_Education_and_Training_in_Ghana_A_Tool_for_Skill_Acquisition_and_Industrial_Development).
- xxvi. Anthony, G., & Walshaw, M. (2007). Effective pedagogy in mathematics/pangarau: Best evidence synthesis iteration (BES). *Ministry of Education*.
- xxvii. Barak, M., Lipson, A., & Lerman, S. (2006). Wireless laptops as means for promoting active learning in large lecture halls. *Journal of Research on Technology in Education*, 38(3), 245–263. <https://doi.org/10.1080/15391523.2006.10782459>.
- xxviii. Daniel, J. (2012). The future of open education. Paper presented at *UNESCO Bangkok Thailand, Special Summer Seminar 2012*.
- xxix. Eagly, A. H. & Chaiken, S. (1993). *The psychology of attitudes*. Harcourt Brace Jovanovich College Publishers.
- xxx. Esseku, J. F. (2021). Students' Preparedness towards the Study of Graphic Design: The Case of UEW. *International Journal of Humanities Social Sciences and Education (IJHSSE) Vol. 8(2)*. <https://doi.org/10.20431/2349-0381.0802004>