THE NEEDS ASSESSMENT OF ELECTRONIC MEDIA FOR TEACHING AND LEARNING IN THE 21ST CENTURY: A CASE STUDY OF THE COLLEGES OF EDUCATION IN GHANA

FRANK OFORI[1]*, METEE PIGULTONG[2]

[1]DEPARTMENT OF EDUCATIONAL TECHNOLOGY AND COMMUNICATIONS, RAJAMANGALA
UNIVERSITY OF TECHNOLOGY THANYABURI PATHUM-THANI, THAILAND.
(FRANK_O@MAIL.RMUTT.AC.TH)
(HTTPS://ORCID.ORG/0000-0002-2062-4086)
[2]DEPARTMENT OF EDUCATIONAL TECHNOLOGY AND COMMUNICATIONS, RAJAMANGALA
UNIVERSITY OF TECHNOLOGY THANYABURI PATHUM-THANI, THAILAND.
(METEE_P@RMUTT.AC.TH)

ABSTRACT

The objectives of this research were, 1) to find out suitable types of electronic media used for teaching and learning in the colleges of education in Ghana. 2) to develop a suitable electronic media prototype to be used in the colleges of education in Ghana, 3) to find out the quality of the electronic media developed for teaching and learning in the colleges of education in Ghana.

17 experts used for the research included 10 tutors and 7 administrators from ten colleges of education in Ghana, which were obtained through purposive sampling. The Delphi method was employed by the researcher to obtain the data for this research.

The results of the study showed that it is important to use electronic media for teaching and learning in the 21st century. Also, the data indicated that learners will prefer electronic content that can be accessed through mobile phones to any other electronic device. The findings also indicated that E-book is one of the best forms of electronic media that can be used for teaching and learning in the colleges of education in Ghana. Finally, the study found out that, tutors will highly recommend the use of electronic media in the colleges of education in Ghana.

Keywords: Educational Media, electronic media, Teaching and Learning, the 21st Century education, Delphi technique.

I. INTRODUCTION

Teaching is an art and science that has knowledge, presentation, dissemination of data using every aspect of all elements of communication. Teaching demands broader knowledge of the subject matter, a complete curriculum with standards, a position and caring attitude with energy, and desire for teaching and learning of classroom management, and a desire to make difference in the lives of learners.

Educational media'' is the general term used to describe the resources instructors use to deliver lessons. Educational media can significantly increase learners' achievement by supporting learning. For example, an educational video may provide a learner within-depthness and an attractive worksheet may provide the learner with the chance to rehearse a new skill acquired in class. Ideally, the educational media will be fitted to the content in which they are being used by the teacher, to the students in whose class they are being used. Educational media in the past consisted of many shapes and sizes, but in recent times it consists of both print and electronic media. According to (Smith, R. 2014), There are many types or categories of media that teachers can use to support the teaching and learning process. Some media are more traditional such as textbooks, newspapers,

others are more innovative such as television, social media, radio, computers, and laptops.

According to (Thomas 1998), there are two major approaches to using media and technology in schools. Firstly, students can learn from educational media and technology, and secondly, learners can learn with educational media and technology. Learners learning from educational media and technology are often referred to as instructional television integrated learning systems. Learning with educational media and technology is referred to in terms such as constructivist learning tools and cognitive environments. The role of educational media in teaching and learning cannot be underestimated. In the 21st century, online materials have now become one of the main sources of knowledge for students, especially in academic settings (Close, R. 2004). Close opined that, with the spread of digital educational spaces such as blogs, Online Discussion Forums (ODF), Wikis, and Learning Management Systems (LMS), there is a rising demand for materials that can be read in digital formats. To situate in this context, it is the educator's role to equip students with suitable educational media and help students to explore various aspects so that they can make use of most media (Bell, J. 1999), and also to enhance learner autonomy. If learners are not properly resourced, they will face difficulties in learning, using the various media because, the materials change and distract readers with multimodal features especially when the resources are online (Cho & Afflerbach, 2017). Hence, teaching students how to effectively use educational media, is crucial as library materials have been digitized to create e-books and online articles.

In the center of teaching and learning is the teacher who needs in-depth knowledge on how to use the various educational media to achieve results in the classroom.

The Colleges of Education in Ghana primarily aim at producing competent and highly qualified teachers employable in Ghana and abroad. In the light of this, valuable and appropriate information for evaluating the results of the education and training given to teachers are required. This, therefore, demands the study of how effective educational media are introduced to the student teachers in the various Colleges of Education in Ghana. This is to find out how effective educational media are in the various

colleges. For instance, it was noticed with sage concern that, one of the major contributing factors to pitiable academic performance by basic school pupils in Ghana is a didactic problem of ineffective use of educational media by basic schools (Agyemang 2016).

Educational media are instructional resources that teachers use in the classroom to support and achieve a specific learning objective. As provided by the new National Teachers' Standards for Ghana under the professional practices, teachers are to produce teaching and learning resources that enhance learning, including online material. Such resources are to be made from the local materials where possible and in sufficient numbers for all learners to handle. In the Ghanaian teacher training institutions, teacher trainees are supposed to be taught how to prepare and use educational media in every lesson they have with their pupils. In the Colleges of Education, lesson delivery opportunities are to be given to teacher trainees to practice the use of various educational media during on-campus teaching and off-campus teaching practices with some of them busily looking for materials within and outside the teaching practicing school environment. Some are also seen resorting to drawing those materials that are not readily available in their environment with some others downloading pictures, videos, and audios from the internet and also making use of video documentaries when necessary. All of these draw on how teacher trainees value the importance of educational media in lesson delivery. Following the trainees from the various Colleges of Education, it has however been observed that teachers at the basic school levels ceased to use educational media in their lesson delivery even though they were aware of their importance in lesson delivery. It is for this reason that research needs to be conducted into how effective these educational media are used in the various colleges and their impact on these teacher trainees.

1.2 Statement of the problem

Electronic media possess some inherent advantages that make them unique in the teaching and learning process. For starters, they give teachers with engaging and compelling platforms for communicating knowledge by

motivating students to want to learn more. Additionally, by giving chances for individual study and reference, the learner's curiosity and interest are piqued. Furthermore, the instructor is supported in overcoming physical challenges that may have hampered his ability to effectively convey a specific topic. The microphone technology in most electronic media, for example, enables teachers with low voices. They make teaching and learning more enjoyable and less stressful in general. Despite the inherent benefits of these media for teaching and learning, the extent to which poor nations have profited from them in terms of teaching and learning efficacy is debatable. Many researches in advanced nations have reported on the influence of electronic media in the efficacy of teaching and learning (Hepburn, 1998). However, not many such studies have documented the experiences of less-developed countries of Africa, especially Ghana. The scarcity of experimentally grounded observations necessitates a large number of further investigations in this field.

For instance, we are not fully informed on whether or not teachers in various levels of schools and colleges in Ghana effectively use these media as instructional materials, and with what effects.

Agyemang (2016), for instance, stated that in most of the Basic schools in Ghana, the majority of pupils perform poorly in external examinations as a result of teachers' inability to use teaching and learning resources in the delivery of the concept to the learner. As such, this research wants to do the need assessment of electronic media for teaching and learning in the 21st century and a case study of the colleges of education in Ghana. The reason is that these colleges of education produce the majority of the teachers who teach in the basic schools in Ghana, as such to investigate the inability of teachers to use educational media to effectively deliver lessons in the Basic school, an assessment should be done in the colleges.

1.3 Research Questions

The research aims to address the following questions.

1. What are the suitable types of electronic media used for teaching and learning in the Colleges of Education in Ghana?

2. How quality is the electronic media developed by the researcher for teaching and learning in the colleges of education in Ghana?
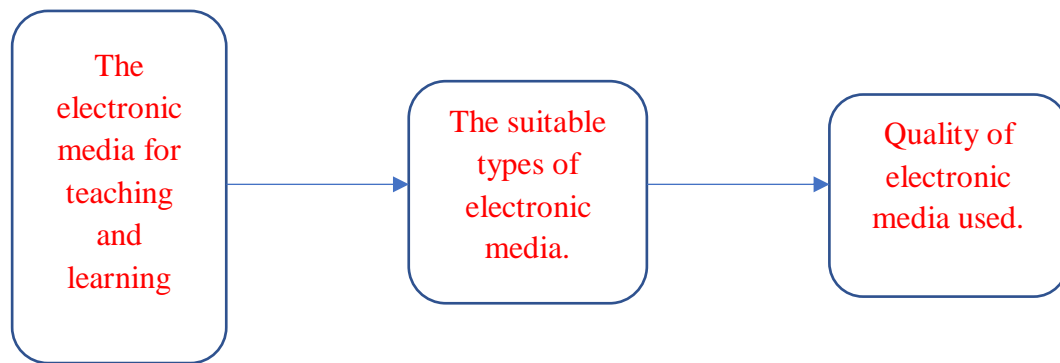
1.4 Objectives of the Study

1. To find out suitable types of electronic media used for teaching and learning in the colleges of education in Ghana.

2. To develop a suitable electronic media prototype for use in the colleges of education in Ghana.

3. To find out how quality the electronic media developed is for teaching and learning in the colleges of education in Ghana.

1.5 Conceptual Framework

In many areas, people get educated through the media where they get to learn many things from media about the politics, outside environment, etc. Media like television is a good source for people to get updated through electronic media. Electronic media makes people aware of worldwide things. It is also believed that if electronic media is used for teaching and learning, instructors will be able to reach a lot of learners at the same time and also be able to communicate with a large number of learners.

The conceptual framework (figure 1.1) shows the use of electronic media on

the colleges of education in Ghana. The conceptualized variables that are likely to influence the effectiveness of electronic media in the colleges of education in Ghana include the availability of the electronic media and appropriate use of the said media. Electronic media that are available to the colleges of education in Ghana, utilization of the electronic media, and their effects on the colleges of education in Ghana will transform the basic schools in Ghana. When these factors are considered, the possible outcomes include improved performance in the colleges of education in Ghana, learners' independence during instruction, and thus developing of a positive attitude towards teaching and learning.

```
┌─────────────┐        ┌─────────────┐        ┌─────────────┐
│     The     │        │ The suitable│        │  Quality of │
│  electronic │        │   types of  │        │  electronic │
│  media for  │───────▶│  electronic │───────▶│ media used. │
│   teaching  │        │    media.   │        │             │
│     and     │        │             │        │             │
│   learning  │        │             │        │             │
└─────────────┘        └─────────────┘        └─────────────┘
```

(Figure 1.1): The conceptual framework of the research.

1.6 Electronic Media Used for teaching and learning

From our conceptual clarification, electronic media used for teaching and learning would include all instructional materials that are electronically generated. They can be networked or non-networked depending on whether a number of equipment or materials are interconnected or inter-related in lubricating information flow (Koert, 2000). Radio, television, projectors, tape recorders, video sets, computers, internet capabilities, and communications facilities are all examples of electronic media.

1.7 Teaching and learning

The teacher's job is to assist the students in learning. It means that the teacher's first priority should be that, the students should learn well what they need to know. Teaching sessions or classes must be properly organized, taking into account the students' learning styles, language, and backgrounds. In short, the teaching must be student-centered, not teacher-centered. Teaching and learning are therefore a process that includes many variables. These variables communicate as learners work toward their goals and absorb new knowledge, behaviors, and skills that add to a wide range of their learning experiences (Avand, A.-Q. 2009).

1.8 Teaching and Learning in the 21st Century

Ambogo, M.M. (2012) defines twenty-first-century learning as "recasting" old concepts of learning, such as "core knowledge in subject areas," for today's environment, where a global perspective and collaborative skills are important. According to Ambogo, it's no longer sufficient to have an idea about things. It's more important to remain curious about finding out what is not known. The Internet, which has aided efficient global interaction and access to information, simultaneously, holds the key to creating a new educational system in which students use the knowledge at their fingertips and collaborate in teams to accomplish more than one person can alone, reflecting the 21st-century job. Lynne Munson (2010) explained that Twenty-first-century learning will ultimately be "learner-driven." Our old stories of education that are, factory-model, top-down, compliance-driven are breaking down or broken, and this is because the internet is releasing dormant intellectual energy that stems from our basic aspirations to have a voice, create, and contribute. The knowledge-based outcomes look a lot like democratic governments. Not tightly restrained and extremely self-directed, these teaching and learning activities go beyond the authority or influence of formal educational institutions.

1.8 Delphi technique

The capacity to make successful judgments in circumstances when there is conflicting or insufficient information has resulted in a rise in the usage of consensus approaches such as brainstorming and nominal group technique and Delphi is a surveying technique. This approach was called after the legendary oracle at Delphi and was created by the Rand Corporation for technology forecasting. The method has been widely used in medical, nursing, and health

services research (Williams & Webb 1994, Kirk, 2002, Gibson 1991), and there are now many different variations. These include the `muddied Delphi' (McKenna 1994), the `policy Delphi' (Crisp et al. 1997), and the `real-time Delphi' (Beretta 1996). The literature is filled with research documenting its usage because of the technique's exibility, although modified variations of the Delphi have been critiqued for a lack of methodological rigor since the mid-1970s (Sackman 1975). Regardless of the format used, the effective application of this strategy necessitates a high level of methodological precision and study rigor (Peiro Moreno & Argelaguet 1993).

The Delphi method is a pragmatic technique based on philosopher and educator John Dewey's philosophical principles that social science research should directly connect to and influence real-world practice and decision making (Kirk & Reid, 2002). The Delphi approach stresses organized anonymous dialogue among persons with knowledge on a particular issue to reach a consensus in policy, practice, or organizational decision-making. (Birdsall, 2004).

2. METHODOLOGY

2.1 Research Design

For this study, the Delphi technique approach was used. The approach was chosen because it allows communication between and among a panel of experts, allowing the process to be more productive and the group as a whole to deal with a complicated topic that is critical in this research.

This strategy, once again, increases important idea production through systematic information gathering and processing of collective input from a panel of geographically dispersed specialists. Delphi method was chosen for the following reasons: (1) Participants in this study were dispersed across multiple regions of the country due to the vacation of Ghana's colleges of education, making in-person interviews impractical; (2) the participants in the study were busy professionals who needed flexibility in when they participated, which open questionnaires allowed; (3) all participants were experienced tutors and administrators who can often be distrustful and non-participatory in

academic research, (4) Finally, the Delphi approach presented a practical mechanism for learning as much as possible from highly experienced organizing practitioners in as little time as possible.

2.2 Target population

The target population is defined by Nachmias and Nachmias (2009) as the total collection of relevant units of analysis or data. According to Krishnaswami, O. R. (2001) the criteria for the inclusion of a unit in a survey are based on the characteristics of respondents who are eligible for participation in the survey. For that matter, the target population of this study comprised all the tutors and administrators of the 46 colleges of education in Ghana.

2.3 Sampling techniques and sample size

Because expert opinion is sought, a purposive sample was utilized, and individuals were chosen not to represent the broader population, but rather to demonstrate their expert capacity to answer the study questions (Fink & Kosecoff 1985). To determine the initial set of experts, the supervisor's guidance was solicited, but the "snowball" sampling approach was utilized to create future participants. 17 individuals were carefully chosen from ten (10) Ghanaian educational institutes. This indicates that these are specialists who have been thinking about how to utilize media for teaching and learning for over a decade.

2.4 Instrument for Data Collection

In this study, the primary data gathering instrument was a questionnaire. The Delphi surveys were distributed by e-mail. Round one of Delphi Questionnaires was created - Care and attention were paid to developing the initial wide question that focused on the study since respondents were required to grasp the issue to offer acceptable replies or they would be disappointed (Delbecq, 1975). The initial round of questionnaires was used to generate ideas.

Release and Analyze Round One Questionnaire - Questionnaires were delivered to participants, who completed them and returned them to the researcher. The Round One data were then analyzed using the research paradigm (qualitative coding). Reality maps were also created and sent to Delphi participants.

Round Two Questionnaire - Questionnaires were guided by the study aims. The Round Two Questionnaire was distributed to study participants and returned for analysis once completed. A media was created by the researcher upon which the round two questionnaires were based on. The questionnaire sought experts' recommendations about the media. However, participants were first given the chance to confirm that the Round One response accurately reflected their thoughts and to amend or broaden their Round One response. Continuous verification is required throughout the Delphi process to increase the dependability of the outputs (Adler & Ziglio, 1996; Delbeq et al., 1975; Linstone & Turloff, 1975) As a result, it was integrated into the research design. Round three Questionnaire - The round two replies were used to improve on the electronic media for teaching and learning in the colleges of education in Ghana, the media was then sent back to the panel of experts, and feedback was brought back to the researcher, using grade points. This helped the researcher to understand where these results may be extended.

2.5 Validity and reliability

Content validity was established through the administration of the instruments before they were administered. Views from other researchers (peer review) also established content validity. This enabled the researchers to identify items that needed to be included and those that needed adjustment or replacement. Hence, accurate and adequate information on the variables, methods, and objectives under this study was collected.

Also, several efforts were taken to ensure the study's dependability. The Delphi questionnaires were distributed to tutors from all disciplines and institutes of education in Ghana. To be more definite about the diverse replies offered by the experts, the Delphi questionnaires were published on the same problem three times in a row. The data obtained as well as the techniques utilized to acquire the data were compared and contrasted.

2.6 Data analysis techniques

After the third round, responses from the team of experts were compared and the instruments were reviewed for completeness and errors, and the questionnaires were then organized, coded, and fed into the computer for analysis using the

Statistical Package for Social Science (SPSS). Descriptive statistics were used to analyze quantitative data by filling in frequencies and percentages depicted in tables, charts, and graphs.

The level of unanimity to be used was also taken into account. Delphi does not have a widely agreed-upon proportion since the level employed is determined by the sample size, the purpose of the study, and the available resources. McKenna (2004), building on the work of Loughlin and Moore (1979), says that consensus should be defined as 51 percent agreement among respondents, Sumsion (1998) supports 70 percent, while Green et al. (1999) chose 80 percent. For that matter, percentages were utilized to assess the consistency of respondents' replies. In the initial round of answers, McKenna (2004), building on the work of Loughlin and Moore (1979), 51 percent agreement among respondents or higher was deemed desirable. As advised by Green et al., replies with an accuracy of 80% or above were considered in the second round of responses as consensus. The replies from round three, on the other hand, were represented by mean and standard deviation.

2.7 Ethical Considerations

There was no harm to any of the participants in this study. The administrators and college tutors who took part in the Delphi questions completed online consent forms and agreed that their responses would be properly analyzed and utilized in this research. The researcher, on the other hand, went into great detail about the study. Throughout the study, the names of the administrators and college tutors were kept private. Furthermore, no component of the questionnaire allowed respondents to disclose their names or any other information that might review their identification.

3. DATA ANALYSIS

3.1 Results from the First Round of The Delphi Data

Contained in this section is the biodata for the research and the initial opinions of a panel of experts about the use of electronic media for teaching and learning in the 21st century.

Research question one: What are the suitable types of electronic media used for teaching and learning in the Colleges of Education in Ghana?

Table 4.1 Number of colleges used for the data collection

Name of college	Number of representations
Ola college of education	4
Accra College of education	2
St. Ambrose college of education	1
St. Francis college of education	2
Gbewaa college of education	1
Methodist college of education	2
SDA college of education	1
St. Monica college of education	2
Jasikan college of education	1
Berekum college of education	1
Total	**17**

Table 4.1, shows the number of colleges the experts used for this research were taken from. This indicated that the number of Tutors and administrators used in this research were obtained from 10 colleges of education in Ghana. It is through these experts that all the data for all three rounds of the research were derived.

Figure 4.1: Representation of Tutors and administrators in Colleges of Education Ghana
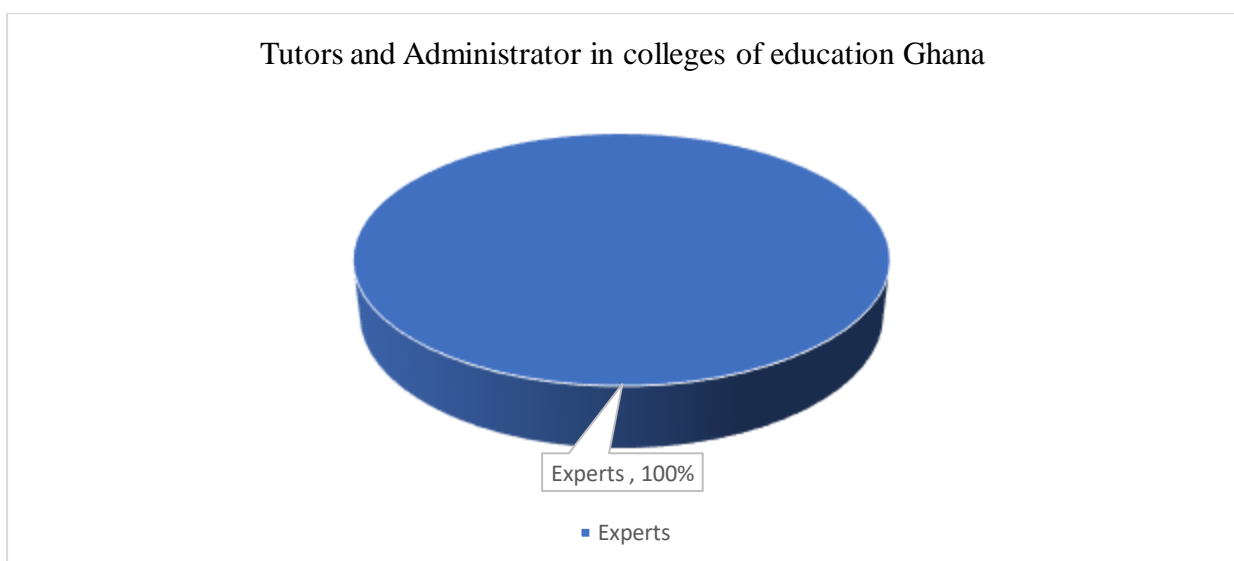

Tutors and Administrator in colleges of education Ghana

Experts , 100%

■ Experts

Figure **4.1** indicates that all the panel of experts were from the public colleges of education in Ghana. This research focused on using the colleges of education in Ghana, and all panelists chosen for this research were all tutors and administrators from the public colleges of education in Ghana.
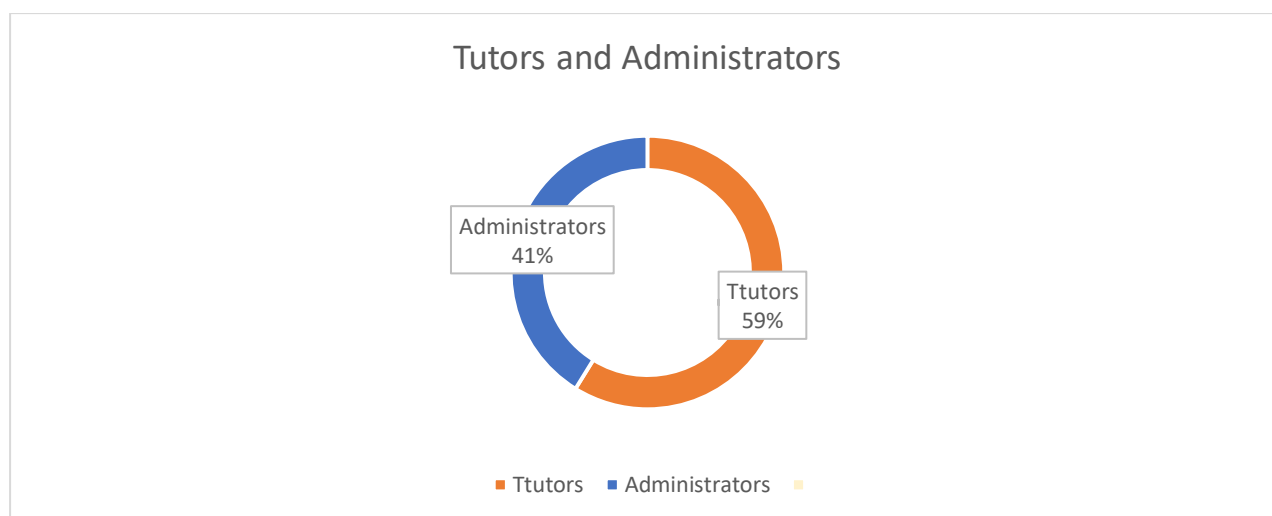
Figure 4.2: Status of Respondents

Figure 4.2 shows that 10 of the experts representing 59% used for the research were tutors from the colleges of education in Ghana while 7 of them representing 41% were administrators from the colleges of education in Ghana.

Table 4.2: The meaning of electronic media

Number of respondents	Response	Percentage (%)
3	Assessing information through electronic means	17.6%
5	It's a tool and means of communication through airwaves	29.5%
9	It is a vehicle through which information is shared or received	52.9 (%)
Total = 17		**100%**

Table 4.2 explains the general idea about respondents' idea of what electronic media means. 3 of the participants representing 17.6% defined electronic media as Assessing information through electronic means. 5 experts representing 29.5% defined electronic media, as a tool and means of communication through airwaves. And 9 experts representing 52.9% defined electronic media, as a vehicle through which information is shared or received. According to McKenna (2004), building on the work of Loughlin and Moore (1979) says that consensus should be defined as 51 percent agreement among respondents. For the benefit of this research electronic media was defined as, "A vehicle through which information is shared or received" as recommended by the panel of experts.

Figure 4.3: The use of electronic media in the teaching and learning process in the college of education in Ghana.

Relevance of electronic media.

Experts , 100%
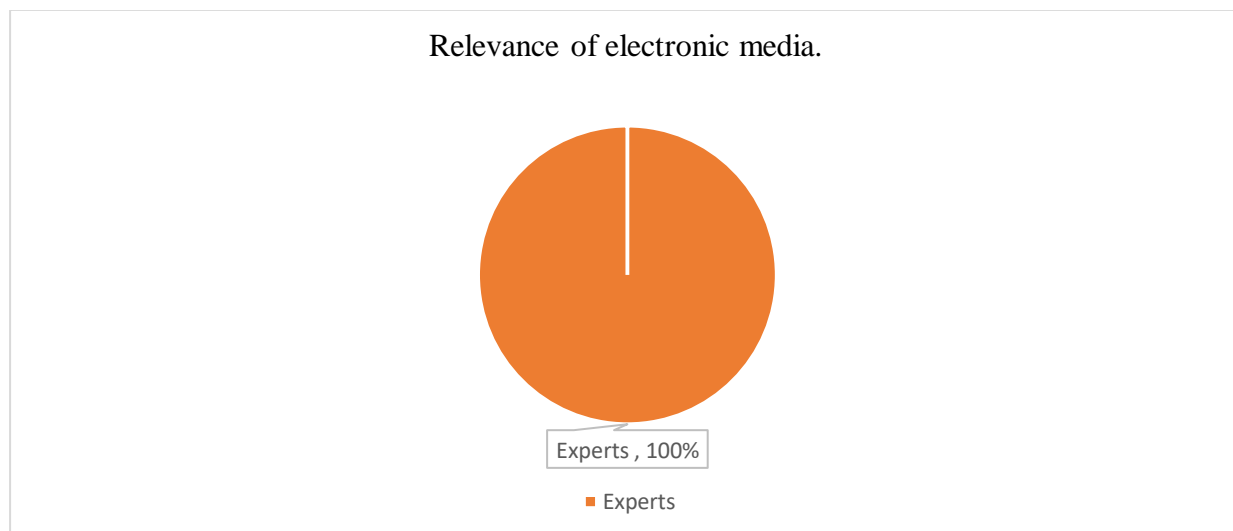
■ Experts

According to **Figure 4.3**, all 17 experts agreed that the use of electronic media for teaching and learning in the twenty-first century is highly significant and should be employed in Ghanaian educational institutions. According to Kitaboo (2018), electronic media raises people's awareness of global issues. Greater chances are acquired by having all of your media in one location; this is a benefit of media. All experts agreed that electronic media may significantly increase academic achievement.

Table 4.3: The importance of the use of electronic media in the teaching and learning process in the colleges of education in Ghana.

Number of experts	Responses	Percentages (%)
6	Because it supplements the face-to-face teaching and learning	35.3%
8	It helps students to grasp teaching and learning easier.	47.1%
3	It makes research by teachers easy for delivery of lessons.	17.6%
Total=17		**100%**

Table 4.3 indicates that all the experts agreed that, the use of electronic media is very important for teaching and learning in the colleges of education in Ghana, however, they justified how important it is to them from different perspectives. It must be reiterated that all experts indicated that, it is very important to use electronic media in the colleges of education in Ghana given 100% consensus by experts.

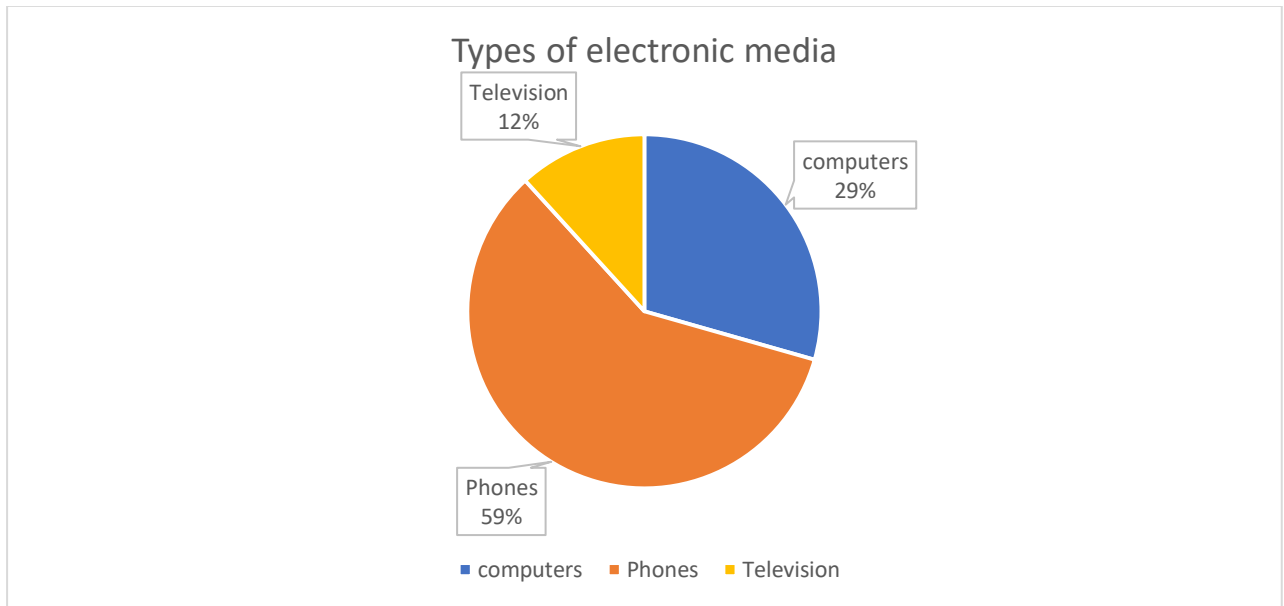**Figure: 4.3: Type(s) of electronic media do experts find it user friendly for teaching and learning**

Figure **4.3** explains that 5experts representing 29% find the usage of computers for teaching and learning more friendly. 2 experts representing 12% stated that they find the usage of television for teaching and learning more user-friendly. And 10 experts representing 59% indicated that the use of mobile phones for teaching and learning is more friendly than any other electronic device. Going by McKenna (2004), building on the work of Loughlin and Moore (1979), who says, consensus should be defined as 51 percent agreement among respondents, it is therefore imperative to state that, respondents find the use of mobile phones for accessing electronic contents for the educational purpose better than any other electronic device.

Figure 4.4 Type of electronic media recommended by experts to be used for teaching and learning in the colleges of education in Ghana.
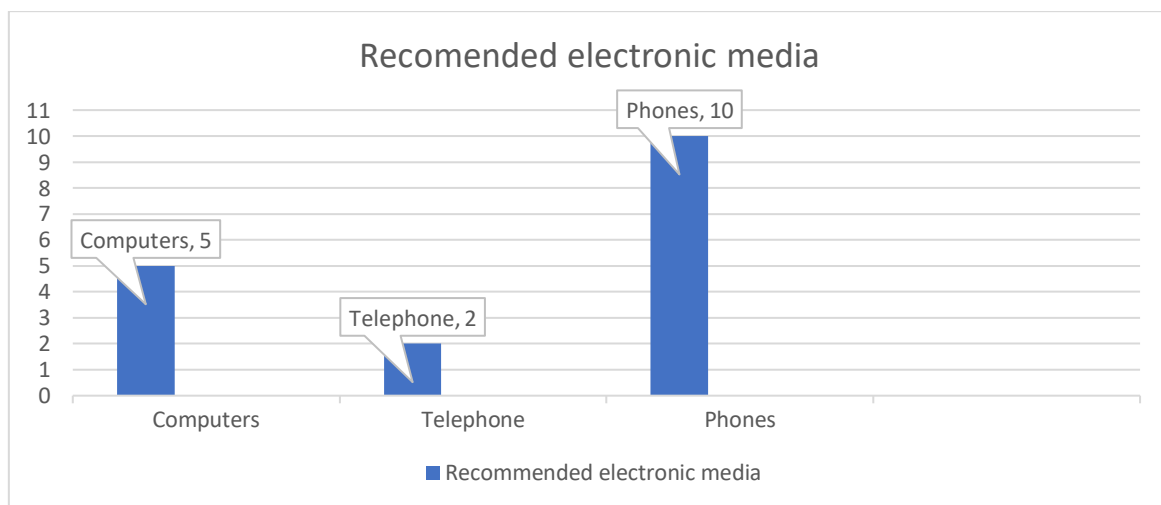

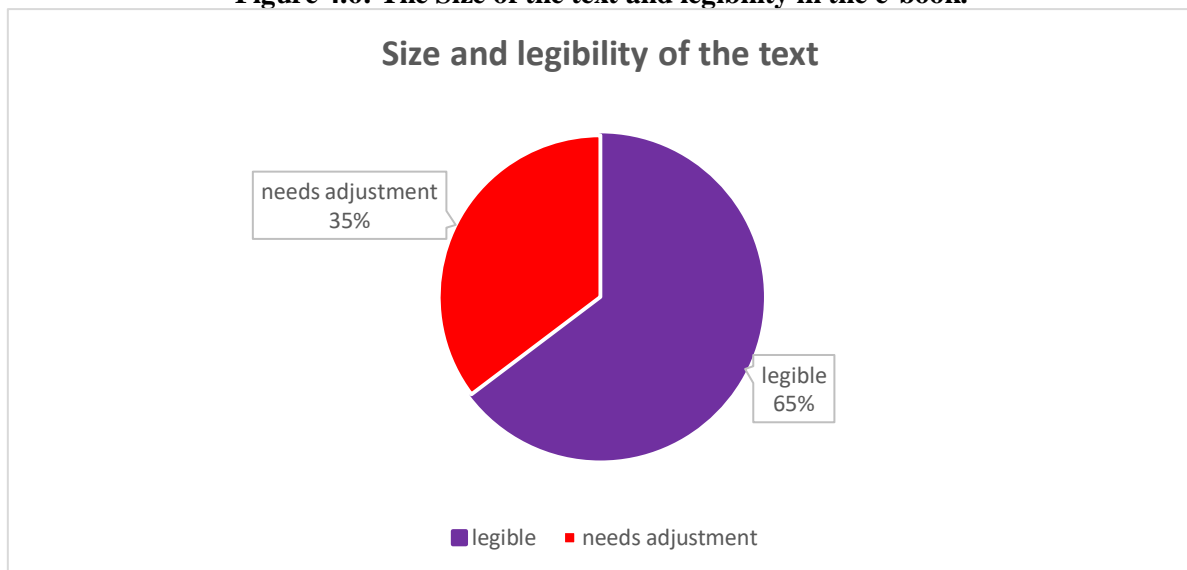**Figure 4.5** shows that 5 experts recommended the usage of computers to access electronic content for teaching and learning, again, 2 experts recommended the usage of television for

teaching and learning while 10 experts recommended the use of mobile phones for electronic content. This indicates that 58.8% of experts recommended that, content that can easily be accessed on the mobile phone should be used for teaching and learning in the colleges of education in Ghana. This recommendation by the experts is in line with (Hashemi and M, Azizinezhad, 2011), who indicated that mobile phones and their networks are easy to be used and less expensive and as such, it is prudent to use mobile phones for teaching and learning.

3.2 Results from the Second Round of the Delphi Data

This section contains the data analysis of round two of the Delphi research. This includes the recommendation made by a panel of experts for the researcher to adjust the electronic media created for teaching and learning in the colleges of education in Ghana.

Figure 4.6: The Size of the text and legibility in the e-book.

Figure 4.6 shows, that 11 experts representing 65% stated that the text in the e-book was legible enough to be read, meaning, the font size and the type of font selected were perfect. On the other hand, 6 experts representing 35% recommended that some of the text sizes should be adjusted to get uniformity in the texts. Even though 65% of the experts indicated the text legibility and size were perfect, adjustments were made to meet the recommendations of the 35% of the experts to be able to get an e-book of high quality for educational purposes.

Figure 4.7: The appropriateness of Sizes and quality of the pictures included in the e-book.
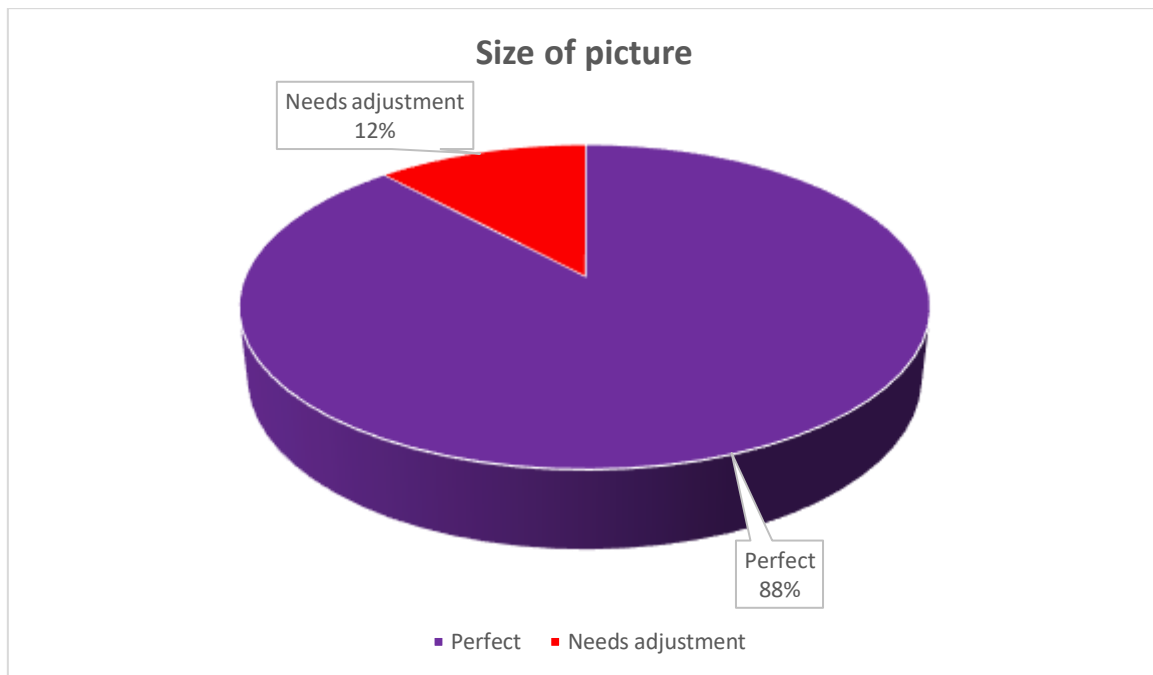
Size of picture

Needs adjustment
12%

Perfect
88%

■ Perfect   ■ Needs adjustment

Figure **4.7** indicates that 88% of the experts stated that the picture sizes included in the e-book were clearer and bigger enough to be seen by learners and instructors for educational purposes. Again, the same percentage of experts indicated that the arrangements of the pictures in the e-book were good enough for educational purposes. However, 2 of the experts representing 12% raised no concerns about the picture quality, but their concern was about the picture arrangement in the e-book. Even though according to Green et al., replies with an accuracy of 80% or above were considered in the second round of responses as consensus, the suggestions made by the 12% of the experts were taken into consideration, and adjustments were made for the betterment of the e-book for teaching and learning in the 21st century.

Figure 4.8: The use of E-book with students in the colleges of education in Ghana.

The usage of the E-book with students
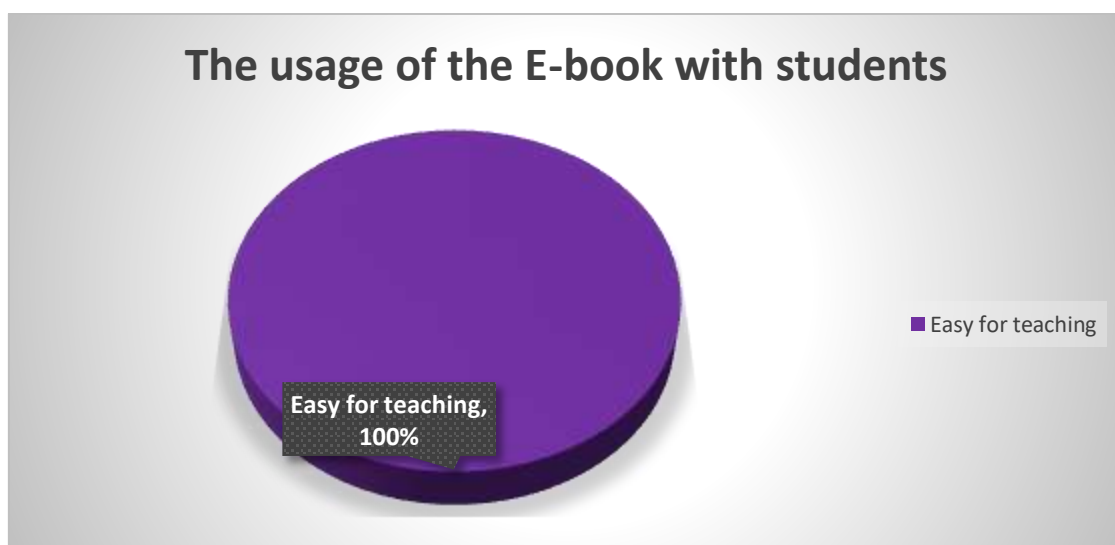
Easy for teaching,
100%

■ Easy for teaching

Figure 4.9 shows that all experts agreed that the e-book is very convenient to use for teaching and learning in Ghanaian educational institutes. The goal of an E-book, according to Kitaboo (2018), is to simplify and improve the whole learning experience. Digital books enhance the learning experience by making it more interactive and interesting. Students may now actively engage in the learning process rather than passively listening to one individual who is always talking. All experts agreed with Kitaboo's assessment (2018). The e-book was also suggested for usage by tutors at Ghanaian educational establishments for teaching and learning reasons.
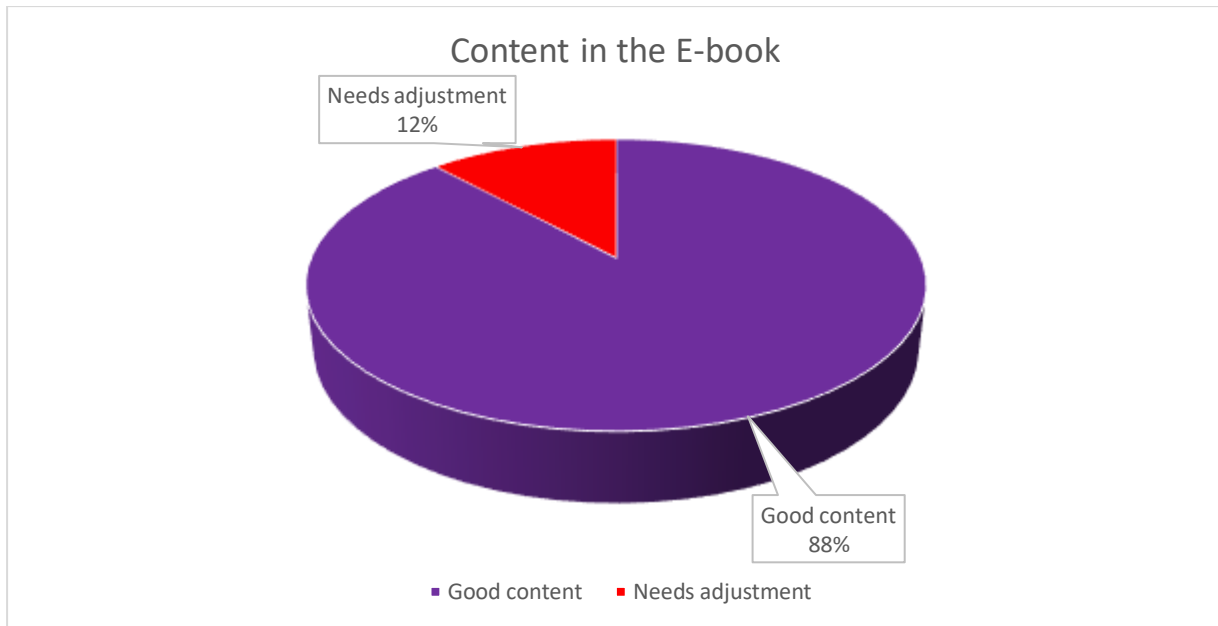
Figure 4.10 The content created in the E-book.

Figure **4.11** shows, that 88% of the experts suggested that the content created was inline and good for educational purposes. However, 12% of the experts even agreed that, the content in the e-book is good for educational purposes, they stated however that, it needs to be adjusted and expanded to give details for the tutors to be able to create their content for online teaching and learning. Even though according to Green et al., replies with an accuracy of 80% or above were considered in the second round of responses as consensus in this research, it was however explained to experts that the main objective of the content created was on how to create online media and that was exactly what the e-book contained.

Figure 4.12 Other recommendations by experts
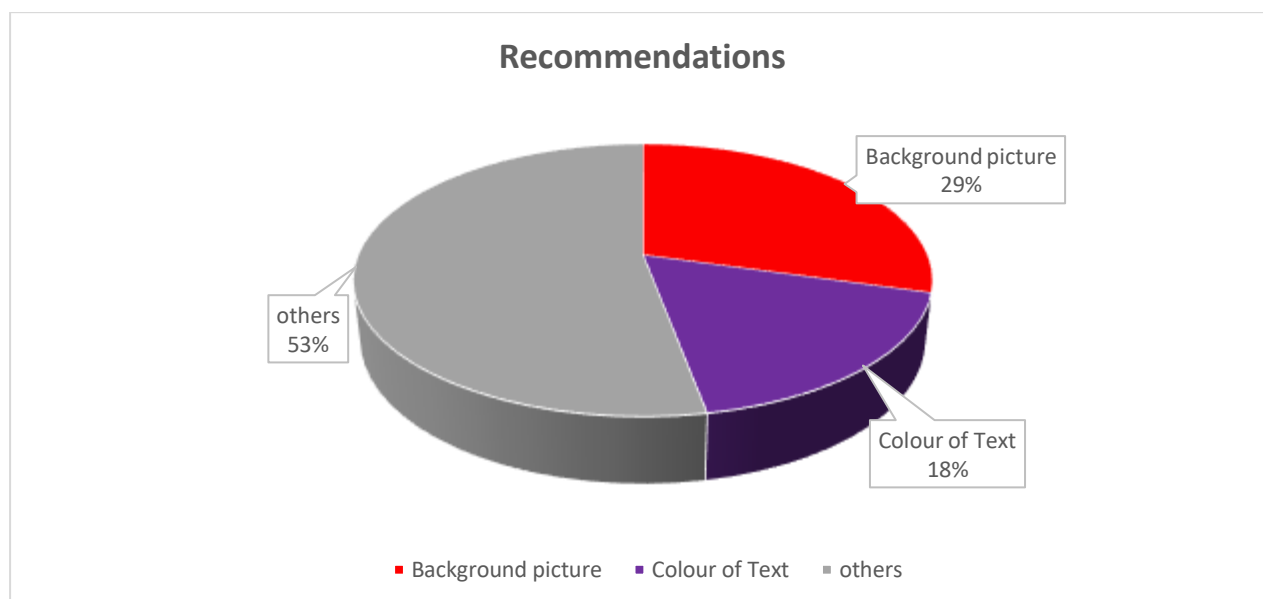
Figure 4.12 shows, that 29% of the experts recommended that the background image should be changed for another. Even though it was admitted by experts that every text on the background could be seen well, experts, however, indicated that background colors do not blend well with most of the text on some of the pages. 18% of experts also recommended that the choice of text color chosen for the e-book should be considered on each of the pages. 53% of the experts indicated that they had no problem with the background image in the e-book as from their expertise perspective, everything was good for educational purposes. Notwithstanding, the researcher considered the type of background chosen and made changes also in the color of text chosen for each page, to be able to get the idealized e-book as recommended by all the experts.

3.3 The results from the final round of the Delphi Research

3.3.1 Research question two: How quality is the electronic media developed by the researcher for teaching and learning in the colleges of education in Ghana?

How satisfaction with the use of E-book

On the satisfaction with the use of e-books on the scale of 5, experts indicated being very satisfied with the used e-book for educational purposes with (mean=1.411765 and SD=0.618347)

The size of the text in the e-book

Concerning the sizes of the text in the e-book and how legible the texts were, on a scale of 4, experts indicated that the texts were very legible on the e-book with (mean=1.647059 and SD=0.701888)

How the color of the text blended with the background

With how the color of the text blended with the background, on the Scale of 4, experts indicated that the color of the text blended well with the background and pictures in the e-book with the (mean=1.470588 and SD=0.624264).

The picture quality on the e-book

On the quality of the pictures in the e-book for teaching and learning, on a scale of 4, experts indicated that the pictures were of quality enough to be seen and used for educational purposes with the (mean=1.647059 and SD=0.606339)

The size of pictures in the e-book

When experts were asked the sizes of the pictures on the e-book on how bigger they were for educational purposes on a scale of 4, experts agreed that the sizes of the pictures on the e-book were bigger enough to be used for teaching and learning (mean=1.764706 and SD=0.437237).

The background image quality of the e-book

On the rating of the background image of the e-book on a scale of 1-5, experts rated the background very high for educational purposes with the (mean=3.705882 and SD=0.469668)

Ease of navigation

On the rating of the attribute of the navigation of the e-book on average, experts rated the navigability of the e-book on above-average as any other sites or electronic media with the (mean=1.470588 and SD=0.514496) on the scale over 4.

Accuracy of information

On the rating of the accuracy of the information in the e-book by experts on the average, experts rated the accuracy of the information in the e-book on average as credible information for education with (mean=1.529412 and SD=0.514496) on a scale over 4.

Quality of content

Experts also rated the quality of the content in the e-book on an average scale, experts indicated that, the content an average as good content as credible content for teaching and learning purposes with the (mean=1.705882 and SD=0.469668) on a scale over 4.

Layout/design

When experts were asked on rating the layout and the design of the e-book on an average scale, experts indicated that the design and layout of the e-book created by the researcher were on average any design on every site or electronic media they have come across with the (mean=1.588235 and SD=0.5073) on the scale over 4.

Meeting needs of students

On the issue of e-books meeting the needs of students, experts were questioned whether or not they met the needs of students for teaching and learning purposes on an average rating scale, experts rated the e-book on meeting the needs of average students for teaching and learning purposes with (mean=1.529412 and SD=0.71743) on the scale over 4.

The likelihood of using e-books for teaching and learning in the future

On the likeliness of recommending the use of e-books for teaching and learning in the future, experts indicated that it is very likely for them to recommend the use of electronic media for teaching and learning in the future due to its ability to blend both video, picture and texts at the same time with the (mean=1.294118 and SD=0.469668) over the scale of 5.

Relevancy of the content in the e-book to tutors or administrators in the college of education

On the relevancy of the content on the e-book to the college tutor or administrator, experts rated the content on the e-book as relevant to the tutors and college administrators for teaching and learning using the electronic media, with the (mean=1.705882 and SD=0.685994) over the scale of 5.

The likelihood to use the e-book created by the researcher as a primary source of information to create an electronic media

On how likely experts were going to rely on the information in the e-book created by the researcher as the primary documents for the creation of the online media for teaching and learning in the colleges of education in Ghana, with (mean=1.941176 and SD=0.966345) over the scale of 5, experts indicated that it is likely for them to use the information on the e-book to create their online media for teaching and learning in the colleges of education in Ghana.

How likely experts will recommend to colleague tutors the content in the e-book

On how likely experts will recommend the content in the e-book to their colleagues, experts indicated that is very likely for them to recommend the content in e-book for teaching and learning in the colleges of education in Ghana, with the (mean=1.647059 and SD=0.492592) over the scale of 5.

How likely e-book will be recommended to colleague tutors in future

Experts indicated that they will recommend the use of e-books to their colleague tutors for teaching and learning purposes in the future in the colleges of education in Ghana, by stating that, it is very likely to be recommended with (mean=1.647059 and SD=0.492592) over the scale of 5.

How likely are experts recommend e-books to their students for teaching and learning purposes

Experts indicated that they will highly recommend the use of e-books to their students for teaching and learning purposes in their various classrooms in the future. Rating on how likely it will be for experts to recommend, experts indicated it's very likely for them to recommend it to their students with (mean=1.411765 and SD=0.618347) over the scale of 5.

How comfortable the experts were in using the e-book created by the researcher for educational purposes

On how comfortable experts were with the use of the e-book for teaching and learning, experts indicated, they were comfortable with the use of e-books for teaching and learning purposes in the colleges of education in Ghana with the (mean=2.058824 and SD= 0.658653) over the scale of 5.

Comparing the e-book created by the researcher to other electronic media for teaching and learning

Comparing the e-book created by the researcher to other electronic media used for teaching and learning, experts rated the e-book as an above-average of any electronic media used for teaching and learning purposes with (mean=3.705882 and SD=0.771744) over the scale of 5.

Recommending the use of e-books for teaching and learning in the colleges of education in Ghana.

On the issue of recommending the use of e-books for teaching and learning in the colleges of education in Ghana in the future, experts agreed with the researcher that, the e-book should be the most suitable electronic media used for teaching and learning purposes in the colleges of education in Ghana with (mean=4.294118 and SD=0.587868) over the scale of 5.

4. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

4.1 Summary of the research process

The analysis discovered several important concerns. These were found with regards to the use of electronic media for teaching and learning in the 21st-century case in the colleges of education in Ghana.

4.2 Summary of the Research Findings

The study found out with regards to what types of electronic media are appropriate to be used for teaching and learning in the colleges of education in Ghana.

The study concerned itself with three rounds of questions. The first round sought to find out the general overview of the experts on electronic media and its usage for teaching and learning in the 21st century. After analyzing the responses of the first round, an electronic media was created by the researcher and was sent to the team of experts for observation and to offer recommendations in round two questions for the betterment of the media for teaching and learning.

Experts made various recommendations and suggestions about the media created. Various aspects such as the text, background, accessibility, and relevancy of the content to teaching and learning were the areas experts made recommendations. The media was improved upon after the data from round two was analyzed. The electronic media was finally sent to the experts and quality assessment questionnaires were sent to them afterward to assess the media for teaching and learning in the colleges of education in Ghana.

Seventeen experts from 10 colleges of education in Ghana were used for the research. The experts consisted of 7 administrators and 10 tutors from public colleges of education in Ghana. All 17 experts took part in all three rounds of the data collection.

The results from the data collected from the experts indicated that there is a need for the use of electronic media for teaching and learning in the 21st century. Again, the data indicated that the use of online media for teaching and learning is much needed for teaching and learning purposes in the colleges of education in Ghana in the 21st century. This is in line with Kitaboo (2018), who stated, that electronic media makes people aware of worldwide things. Greater opportunities gained through this media sitting in one place is an advantage media. All experts

admitted that electronic media can improve academic performance tremendously.

The data also indicated that all the experts have various electronic devices to access electronic content. The data, however, showed that experts feel more comfortable with the use of a mobile phone to access electronic content. This recommendation by the experts is in line with (Hashemi and M, Azizinezhad, 2011), who indicated that mobile phones and their networks are easy to be used and less expensive and as such it will be more prudent to use mobile phones for teaching and learning.

The data indicated that the media was quality enough for teaching and learning in the 21st century. All the experts indicated that the content will go a long way to help the tutors to be able to create their online media for teaching and learning in the colleges of education in Ghana.

Again, the data indicated that the media created by the researcher will highly be recommended to other tutors and their students for teaching and learning purposes. This according to the experts will help in teaching and learning in Ghana in the 21st century.

Finally, the data showed that, on the issue of recommending the use of e-books for teaching and learning in the colleges of education in Ghana in the future, experts agreed with the researcher that, the e-book should be the most suitable electronic media used for teaching and learning purposes in the Colleges of educations in Ghana with (mean=4.294118 and SD=0.587868) over the scale of 5.

4.3 Conclusion

Based on the research findings it can be concluded that:

1.   The use of electronic media for teaching and learning is very important in the 21st century and all levels of the educational ladder should be encouraged to use it.

2.   Tutors in the colleges of education are not familiar with how to create electronic contents that mobile phones can be used to access to enable all students to have access.

3.   E-book is a very convenient electronic media for teaching and learning in the colleges of education in Ghana since it allows to blend of

pictures, video, and text at the same time, therefore tutors should be encouraged to use them for teaching and learning.

4.4 Recommendation

Based on the findings of the study, the following recommendations have been made for policy and practice:

1.   In-service training should be organized for the tutors and administrators in the colleges of education in Ghana on how to create and use electronic media for teaching and learning.

2.   A course should be mounted in the colleges of education in Ghana, to teach teacher trainees how to use the various electronic media for teaching and learning at the basic level since the world is moving from analog to digital.

3.   The ministry of education and NGOs should sponsor the use of electronic media for teaching and learning in the colleges of education in Ghana since it is capital intensive and leaving it for the colleges to bear the cost will make the usage unproductive.

5.6   Areas for further research

The researcher suggests that;

i.   The study was conducted in colleges of education in Ghana, a similar study should be done in other countries to establish the need to use electronic media for educational purposes.
ii.   A study can be conducted on methods of improvising electronic media and models in schools
iii.   A study on the integration of ICT and e-learning to complement human resources in Ghana.

REFERENCES

[1]   Adler, M. & Ziglio. E. (1996). Gazing into the oracle: The Delphi Method and its application to social policy and public health. London: Jessica Kingsley Publishers.

[2]   Agyemang, E. O. (2016-08), Investigating into the causes and effects of students' unrest in Ghanaian schools: a case study of Adu Gyamfi Senior High School in the Sekyere South districts, Ashanti Region.

[3]   Ambogo, M.M. (2012). Relationship between availability of Teaching and Learning Resources and performance in Eldoret district. Moi University. Scholarlink research institute journals. (SRIJ)

[4]   Ashton, R. (1986). Combining the judgments of experts: How many and which ones? Organizational Behavior and Human Decision Processes, 38(3), 405 - 415.

[5]   Avand, A.-Q. (2009). Using Translation and Reading Comprehension of ESP learners. The Asian ESP Journal, 5(1), 44–60.

[6]   Bell, J. (1999). Doing your research project: A guide for first-time researchers in education and social science (3rd ed.). Buckingham: Open University Press.

[7]   Birdsall, I. A. (2004). It seemed like a good idea at the time: The forces affecting implementation of strategies for an information technology project in the Department of Defense. Digital Abstracts International, 65 (07), 2756. (UMI No. 314222.

[8]   Cho, B.-Y., & Afflerbach, P. (2017). An evolving perspective of constructively responsive reading comprehension strategies in multilayered digital text environments. In S. E. Israel (Ed.), Handbook of research on reading comprehension (pp. 109–134). The Guilford Press.

[9]   Delbecq, A.L Van de Ven A.H., Gustafson D.H., (1975). Group techniques for program planning: A guide to nominal group and Delphi processes, Scott, Foresman and Company, Glenview, Illinois.

[10] Dr. Close, R. (2004). Television and Language Development in the Early Years. National Literacy Trust. Retrieved on May 2, 2021 from http://www.literacytrust.org.uk/assets/0000/0429/TV_early_years_2004.pdf

[11] Fink, A. & Kosecoff, J. (1985). How to conduct surveys: A step-by-step guide. London, UK, Sage Publications.

[12] Gibson, R., G. Wright, F. Bolger, (1991). Delphi: A re-evaluation of research and theory, Technological Forecasting and Social Change 39, pp. 235-251

[13] Green S, Vaughn DW, Kalayanarooj S, et al. (1999). Early immune activation in acute dengue illness is related to the development of plasma leakage and disease severity, J Infect Dis, vol. 179 (pg. 755-62

[14] Hashemi, M., & Azizinezhad, M. (2011). Teaching English To Children: A Unique, Challenging Experience For Teachers, Effective Teaching Ideas. *Procedia - Social and Behavioral Sciences, 30*, 2083-2087.

[15] Hasson, Felicity & Keeney, Sinead & Mckenna, Hugh. (2000). Research guidelines for the Delphi Survey Technique. Journal of advanced nursing.

[16] Hepburn, H.R. and Radloff, S.E., (1998) Honeybees of Africa. Springer Science & Business Media Berlin.

[17] Jossey-Bass, (2016) Generation Z Goes to College: San Francisco, CA.

[18] J Crisp · (1997) The Delphi method? Nurs Res.**7**;46(2):116-8.   doi: 10.1097/00006199-199703000-00010

[19] https://kitaboo.com/top-10-advantages-of-ebooks-over-printed-books/:retreived,19th December,2021;11:00 GMT.

[20] Kirk, S. A., & Reid, W. J. (2002). Science and social work. New York, NY: Columbia University Press.

[21] Krishnaswami, O. R. (2001). Methodology of research in social science, Himalaya Mumbai, Himalaya publishing House.

[22] Linstone, H.A & Turoff, M. (1975). The Delphi Method: Techniques and Applications, Addison Wesley Publishing Company, London.

[23] Loughlin KG, Moore LF. (1979) Using Delphi to achieve congruent objectives and activities in a pediatrics department. J Med Educ.

[24] McKenna H, Keeney S, Bradley M (2004). Nurse leadership within primary care: The perceptions of community nurses, GPs, policy makers and members of the public. J Nurs Manag, 12:69-76.

[25] Munson, L. (2012, March 15). Panel discussion at The Common Core's Truant

from School: History, Science and Art, Washington, DC. Retrieved from www.americansforthearts.org/networks/arts_education/arts_education_015.asp [Google Scholar]

[26] Murray Thomas R. (1998), conducting educational research, A comparative view; London library.

[27] Nachmias, F. C & Nachmias, D (2009), Research methods in the social sciences. London. St. Martin's press, Inc.

[28] Peiro Moreno S. & Argelaguet P.E. (1993) Consensus doesn't always mean agreement. Gac Sanit 7(39), 292-300.

[29] Sackman H. (1975) Delphi Critique. Lexington Books, Lexington, Massachusetts

[30] Smith, R. (2014). Letting Children use Ipads may harm language development. The Telegraph. Retrieved on 30th August,2021 from http://www.telegraph.co.uk/technology/news/10803324/Letting-children-use-iPads-may-harm-language-development.html

[31] Sumsion, T. (1998). The Delphi Technique: An Adaptive Research Tool: British Journal of Occupational Therapy. https://doi.org/10.1177/030802269806100403

[32] Van Koert, R. (2000). Providing content and facilitating social change: Electronic media in rural development based on case material from Peru. *First Monday*, *5*(2). https://doi.org/10.5210/fm.v5i2.728

[33] Williams PL, Webb C: The Delphi technique: a methodological discussion. J Adv Nurs 1994, 19:180-6.