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# Computer Health Risks Among Graphic Design Students in Ghanaian Tertiary Institutions: The Case of UEW

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**Abstract**
The study was set out to explore the computer health risks awareness among Graphic Design students in tertiary institutions of Ghana, using University of Education, Winneba as a case study. A descriptive survey design was adopted for the study. To accomplish the aim, two research questions were formulated to guide it. Review of related literature centred on computer health risks, particularly eye, vision and posture, while empirical studies on computer ergonomics were also reviewed. Stratified, purposive and simple random sampling techniques were adopted to select one hundred and fifteen (115) respondents for the study. The instruments used for data collection were questionnaire and observation, while the data collected was analysed and presented in simple percentages and frequencies. The analysis of data indicated that a majority of Graphic Design students were using the computer extensively and for prolonged hours. However, they were not aware of the associated health implications. Hence, they adopted a bad attitude by using the machine for prolonged hours without intermittent breaks, and assumed bad postures such as slouching. It was recommended that the Department of Graphic Design, University of Education, Winneba should make efforts to educate students about the dangers involved in using the computer as well as ensuring students adhere to best practices when it comes to computer usage.
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## 1. Introduction

Computer has become a powerful and indispensable tool, which has revolutionised the world of work. Graphic design, which hitherto depended solely on manpower, has seen a paradigm shift resulting in new and better ways of designing. It is common these days to generate three-dimensional graphic design work, which was difficult to visualise few years back. Today, graphic designers are able to produce high-quality works, meet clients' strict deadlines, and market their handiworks worldwide in the comfort of their homes. Thus, graphic designers no longer limit the advertisements of their handiworks to just the word-of-mouth, but are able to use appropriate technologies such as the Internet and other electronic media to publicise their work output for people to see what they can do. Indeed, with powerful graphic design software such as Photoshop, Flash and CorelDraw, among others emerging and upgraded almost on a regular basis, one will not be wrong to say graphic design profession has become a force to reckon with, in terms of solving the numerous unemployment challenges faced by many countries, especially among the youth.

Ghana, just like many other countries, has taken advantage of the numerous affordances offered by the current technologies to incorporate computer-based programmes into the work of graphic designers so that they could be more attractive and competitive in the global market. It is, therefore, not surprising that the National Accreditation Board (NAB), Ghana, has given accreditation to the Department of Graphic Design, University of Education, Winneba (UEW), to mount courses that will equip students with the basic entrepreneurial skills so that they can set-up their private businesses after their studies. The aim is to help ease the pressure on Government from absorbing such students into the formal sector after graduation. Courses such as 'Vector Based Systems', 'Page Design and Desktop Publishing', 'Web Designing and Development', 'Computer Animation', and Digital Matte Painting with Photoshop, among others, require the use of a computer to accomplish.

However, as students use the machine (computer) for prolonged hours, they are not spared the health risks associated with the use of the machine. In fact, several studies have found a correlation between prolonged use of the computer and health challenges such as visual, musculoskeletal disorders (MSDs), and stress (Blehm, Vishnu, Khattak, Mitra & Yee, 2005; Griffiths, Mackey & Adamson, 2007). According to Jackson, Barnett, Stevens, McClure, Patterson and MeRynolds (1997), people who expose themselves to the computer screen for prolonged hours are most likely to suffer from visual and general work-related symptoms twice as much as those who spend less time using the screen. It is said that over 70% of people who use computer suffer from the Computer-Vision Syndrome (CVS) worldwide (Blehm et al., 2005). A Ghanaian chiropractor has reported that people who maintain poor posture are likely to suffer disastrous consequences in future if good spinal care is not sought (Jhessim, 2017).

With students acquiring personal computers which offer them the flexibility to do research, communicate with peers, and work to meet strict assignment deadlines, among others, there is the tendency that they would use

 

the computer for prolonged hours. However, one begins to wonder whether they (students) are adequately briefed about the health risks they expose themselves to. Again, one is tempted to ask whether these students take adequate steps to minimise such health risks if they happen to be aware. Obviously, getting a fair idea and understanding the health risks emanating from prolonged use of computer can help users take precautionary measures to control if not eliminate them completely. These and many other questions need to be interrogated, hence, the research is to explore graphic design students' computer health risks awareness and the possible measures adopted to ameliorate them.

## 2. Literature Review

### *2.1 The Concept of Computer Health Risk*

The computer has brought about a significant transformation in every aspect of life, including the realm of work. Its introduction has ushered in increased work efficiency, rapid access to information, enhanced opportunities for leisure and entertainment, simplified social interactions, and access to social support (Thomée, Härenstam & Hagberg, 2012). Present-day employees have the freedom to shift unfinished office tasks to their homes and continue at their own convenience. Similarly, student halls of residence have essentially become an extension of their classrooms, enabling them to engage in academic pursuits regardless of time, place, or location. Consequently, the prevalence of computer usage has reached such alarming levels that students are able of working for prolonged periods without taking breaks.

Regrettably, the continuous use of the machine does not occur without its associated health risks. Computer health risk encompass a range of physical and psychological health concerns associated with prolonged and improper computer usage. It is the degree of likelihood the exposure to the machine affects the health of users. These risks are primarily attributed to the sedentary nature of computer work and the ergonomic challenges it poses. Several studies have acknowledged that there is a correlation between prolonged use of the computer and health risks (Blehm et al., 2005; Jackson et al., 1997; Griffiths, Mackey & Adamson, 2007). Among the risks are Musculoskeletal system, Carpal Tunnel Syndrome (CTS), stress, Visual Discomfort and Computer Vision Syndrome (CVS).

Musculoskeletal system is made up of muscles, tendons, ligaments, joints, bones, cartilage and discs in the spine, which an injury or illness to any of them is referred to as musculoskeletal disorder (MSD) (American Federation of State, County and Municipal Employees Healthy and Safety Handbook, 2006). The condition can occur when muscle tissues are damaged as a result of wear and tear. Symptoms include pains from falls, auto accidents, fractures, sprains, and dislocations. Other causes are postural strain, repetitive movements and extended immobilization. A comprehensive analysis of 56 epidemiological studies investigating the impact of computer usage revealed that regular use of computer keyboards can lead to musculoskeletal issues in the hands, wrists, neck, and shoulders (Punnett & Bergqvist, 1997). It further noted that more than 50% of users were experiencing symptoms related to hand or arm discomfort were in their first year of a new job. Another study, aimed at identifying the occurrence and risk factors associated with musculoskeletal symptoms (MSS) and disorders (MSD) in the neck or shoulder and hand or arm, reached the conclusion that problems in the hand or arm, as well as the neck or shoulder, were the most prevalent issues experienced by computer users (Gerr, Marcus, Ensor, Kleinbaum, Cohen, Edwards, Gentry, Ortiz & Monteilh, 2002). In fact, MSD is a disorder which can lead to carpal tunnel syndrome.

Carpal Tunnel Syndrome is a prevalent medical condition which stands as one of the most commonly reported forms of median nerve compression. It manifests as pain, numbness, and tingling in the hand and arm of the affected person. According to the Clinical Guidelines on CTS Diagnosis by the American Academy of Orthopaedic Surgeons (AAOS), (2007), CTS is described as a compression neuropathy of the median nerve at the wrist level. Symptoms include pain in the hand, uncomfortable tingling, as well as pain or numbness in the thumb, index, middle fingers, and the radial side of the ring finger (Solomon, Warwick & Nayagam, 2005). It is estimated that approximately 4% to 5% of the global population experiences CTS, with the highest susceptibility observed among individuals in the age range of 40 to 60 years. This condition can be classified into four distinct categories. These are (i) Extrinsic factors that expand the space within the tunnel, whether inside or outside the nerve. (ii) Intrinsic factors within the nerve itself that increase the occupied space inside the tunnel. (iii) Extrinsic factors that modify the shape or structure of the tunnel. (iv) Neuropathic factors. Extrinsic factors that can enlarge the space within the tunnel encompass conditions that disrupt the body's fluid balance. These include pregnancy, menopause, obesity, renal failure, hypothyroidism, the use of oral contraceptives, and congestive heart failure (MacDermid & Doherty, 2004). Intrinsic factors within the nerve that can increase the space within the tunnel include tumours and tumour-like growths. Extrinsic factors that may alter the contour of the tunnel could result from fractures of the distal radius, either directly or through posttraumatic arthritis (MacDermid & Doherty, 2004). Neuropathic factors, such as diabetes, alcoholism, vitamin toxicity or deficiency, and exposure to toxins, can play a role in eliciting CTS symptoms. This is because they affect the median nerve without necessarily increasing the interstitial pressure within the carpal tunnel (MacDermid & Doherty, 2004). Though

 

more than 80% of persons suffering from this condition have a positive response to conservative treatments, there is an 80% chance of the symptoms recurring within a year.

Another health issue emanating from the prolonged use of computer is stress. It occurs when a person feels tense, restless, nervous, or anxious or is unable to sleep at night because his/her mind is troubled all the time (Thomée, Härenstam & Hagberg, 2012). This is the state many students find themselves. They are mostly loaded with assignments and given limited time to submit. Attempts to beat strict deadlines are sometimes associated with sleepless nights working with the computer. Research has shown that when people experience sleepless nights while using the computer, they become susceptible to mental health (Thomée, Härenstam & Hagberg, 2012). Stress causes changes in the body functions (physiology) such as release of hormones, increased breathing, quickened pulse and the production of more stomach acid. According to Shu, Tu and Wang (2011) higher levels of computer dependency is associated with higher levels of stress known as "technostress". Technostress is a coined word, which describes a modern disease caused by one's inability to cope or deal with Information and Communications Technology (ICT) in a healthy manner (Ayyagari, Grover & Purvis, 2011; Tarafdar, Tu & Ragu-Nathan, 2011). Studies have shown that academic stress can affect students' self-esteem, self-confidence (Erturgut & Erturgut, 2010), and in some cases, lead to depression (Senecal, Koestner, &Vallerand, 1995).

The continuous of computer also causes visual discomfort. This is "pain experienced in or around the eyes, often associated with headache and/or nausea, and sometimes accompanied by signs such as red, itchy or watery eyes" (Boyce & Wilkins, 2018, 98). Other symptoms are blurred or double vision, burning and tearing eyes, and frequent changes in eyeglass prescription (World Health Organization, 1999; Emara, 2001; Lim & Carayon, 2001). The underlying factors can cause poor visibility, overstimulation and distraction. Given the above risk factors, Yan, Hu, Chen and Lu (2008), categorizes the health risks into three, namely eye, vision, and posture.

*2.2 Computer usage and eye related risks.*

It is said that good eyesight is a panacea for the wellbeing and quality of life (Kayode, Idowu & Gbenga, 2014). Unfortunately, many people experience eye-related discomfort and/or visual problems as a result of prolonged use of the computer. Studies have shown that eye-related symptoms such as eye fatigue, irritation, burning sensation, dry eyes, redness, blurred vision, and other eye discomfort which contribute to health problems among VDT users, the dry eyes seem to be the main influencing factor (Blehm et al., 2005). Dry eyes occurs when users of VDT stare at the screen for a prolonged period without rest. This affects the blinking rate, which sometimes result in inflammation of the eye. In other words, the oil-secreting glands that supply tears and moisture to the eye's surface are blocked, thereby triggering the discomfort of the eye in the process (Cashin-Garbutt, 2012). An experiment conducted by Tsubota and Nakamori (1993) on 104 office workers when they were relaxed and made to read a book, as against reading from an electronic screen found the average blinking rate to be 22 times per minute when the subjects were relaxed and made to read the book. However, the blinking rate changed significantly to between 7-10 times per minute when the subjects were made to read from a VDT. Another study by Schlote, Kadner and Freudenthaler (2004), also found the blinking rate between 15-16 times per minute on average when the subjects were relaxed and in conversational mood. The rate was reduced to between 5 to 6 times when the subjects were made to read from the computer screen.

The above findings are indicative that blinking rates are affected when people read from the computer screen or engage in activities that require starring at the screen for prolonged hours. This is the state many graphic design students find themselves. They are in most cases carried away by the work and stare at objects on the screen for longer periods and suffer the consequences. For example, drawing a human figure on the computer may require the user to stare at the screen as he/she gradually moves the cursor or pointer along. By so doing, the blinking rate is delayed resulting in dry eyes, irritation or inflammation in and around the eyes. In some cases, there is an increase in tear production which result in watery eyes. It is said that regular breaks relax the eye's accommodative system and decrease eye-fatigue or headache of computer-users (Fenety & Walker, 2002). Unfortunately, this is not the case as users sometimes ignore this wisdom, and work at their own peril, particularly when under pressure to meet strict assignment deadlines.

*2.3 Computer usage and vision related challenges*

One other potential health risk affecting computer users is the Computer-Vision Syndrome (CVS) otherwise known as the digital eye strain (Rosenfield, 2016). It is a conditional issue which occurs when rest periods and working conditions are abused. The American Optometric Association, describes it as a combination of eye and vision related condition which is associated with the computer usage (Rosenfield, 2011). Individuals who experience this condition are unable to have sufficient visual capabilities to perform computer related tasks comfortably. Symptoms are blurred or double vision, headache, ocular discomfort, burning and sensation of heaviness, among others. Eye strain is characterized by two groups of symptoms: external, which include burning, tearing, irritation, and dryness and internal symptoms such as strain, ache, and headache. According to

 

research, over 70% of people who use the computer face this disorder worldwide (Blehm et al., 2005). It is also said that about 90% of people who use the computer for two hours or more on a daily basis are likely to experience vision-related symptoms (Salibello & Nilsen, 1995). This is supported by Rossignol, Morse, Summers and Pagnotto (1987). They discovered that visual symptoms increased significantly in individuals who spent more than four hours daily working on video display terminals (VDTs). Logaraj et al., (2014) did a similar study to assess the prevalence of CVS among medical and engineering college students of a university in the suburban area of Chennai. They found the prevalence of CVS among engineering students to be 81.9%, while that of the medical students was 78.6%. It was noted that students who used the computer for 4-6 hours were at higher risk of developing the visual symptoms such as redness, burning sensation and dry eyes. Another research conducted in Malaysia among undergraduate students studying computing, medicine, and some secretarial staff found the prevalence of the visual symptoms as follows; 55% experienced burning sensation in the eyes, 61% had headache, 46% experienced redness of the eyes, while a majority constituting 87% had a problem with eye fatigue. In fact, these conditions were worsened when the period of usage was prolonged. It goes to affirm the statement that there is a significant correlation between prolonged use of the computer and visual symptoms (Sen and Richard, 2007). Given the substantial number of hours graphic design students spend on academic work, and the fact that they have access to personal computers, which enable them to work irrespective of the time and place, there is the greatest possibility that they might be suffering from the conditions enumerated above.

*2.4 Computer usage and posture related issues*

A good posture and healthy working habits protect the computer user's health and well-being. The reverse is also true if the user abuses this practice. It is often said that poor posture without interruption for a long time can cause postural backache, spinal and joint dysfunction. Hakala, Rimpelä, Saarni, and Salminen (2006) in a study declared that poor posture leads to muscle strain and pain in the neck, shoulders and lower back. Chiu, Ku, Lee, Sum, Wan, Wong and Yuen (2002), in another research also reported a significant association between head posture and neck pain during computer work. Regrettably, many computer users are found in postures that are injurious to their health. Users are mostly found slumping (sometimes called slouching) or leaning, which put pressure on the vertebrae and cause severe back pains if prolonged.

It is observed that the placement or position of computer and its accessories like printer, scanner and monitor can have a negative impact on the users' posture. Naturally, the human eyes are positioned to look straight ahead and slightly down. However, due to wrong positioning of the other accessories, users are compelled to do otherwise. In some cases, the eye muscles are forced to adjust and hold the new eyes position, which sometimes, contribute to headache, dry eyes, blurred vision, and eye-fatigue.

Besides, prolonged sitting without breaks increases load between intervertebral disc and weakens posterior lumbar structures. In other words, when the legs and knees are wrongly positioned, pressure is built up under the thighs and behind the knees and create uneasiness if the chair is not adjusted properly (Horton, Johnson & Skinner, 2010). According to Jhessim (2017), a person who maintains poor posture is likely to suffer disastrous consequences in future if good spinal care is not sought. It is observed that the spine and spinal cord are connected to the brain, and therefore, can make the body susceptible to ailments such as cardiovascular, stroke, poor digestion, chronic back pain, faulty veins, chronic headaches, and a weakened immune system if it is bad.

*2.5 Computer and ergonomics*

The term 'ergonomics' was originated from two Greek words 'ergon' (work) and 'nomoi' (natural laws), which is the study of how working conditions, machines and equipment are arranged to promote work efficiency. The International Ergonomics Association (IEA, 2010) refers to Ergonomics (or human factors) as the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theoretical principles, data and methods to design in order to optimize human well-being and overall system performance. With the correct type and configuration of chair, keyboard, and monitor, among others, users can work comfortably, efficiently and protect their health. They can also increase efficiency and minimise health risks if they adhere to ergonomic principles at the workplace (Sawyer, 2003). In fact, a fair knowledge of ergonomics can help avoid certain risks factors that are likely to contribute to musculoskeletal disorders.

Regrettably, many computer users are without the basic knowledge of computer ergonomics. A study among Swedish upper secondary school students established that over 50% of the respondents did not have any information about ergonomics and computer use at school. Another survey among some Irish secondary schools to ascertain teachers' ergonomic capabilities, noted that the teachers themselves did not have any sufficient knowledge in ergonomic practices, let alone discussing the importance with their students (Dockrell, Fallon, Kelly, & Galvin, 2009). A similar study within secondary schools in New Zealand also affirmed a general lack of ergonomic awareness guidelines as a major challenge faced by students, resulting in potential problems (Drummond, 2007). In conclusion, Mvungi, Mcharo, Mmbuji, Mgonja and Kitua (2008), asserted that many

 

computer-related problems are emerging because users do not have sufficient knowledge about safety titbits on computer usage.

## 3. Objectives

The research was guided by the following objectives:

1. To examine the extent Graphic Design students' use computers at UEW.
2. To assess graphic design students' awareness of the health risks associated with prolonged use of the computer.

## 4. Research Questions

1. To what extent do graphic design students use the computer at UEW?
2. How are graphic design students aware of the health implications of using the computer for prolonged hours?

## 5. Significance of the Study

The significance of the study is to make lecturers and other stakeholders realise the extent Graphic Design students use computer, and also create the awareness of the possible dangers associated with the prolonged use of the computer.

## 6. Delimitation

The study was delimited to Graphic Design students in UEW. Indeed, issues concerning computer and health risks are broad and varied for a single study to capture. However, the focus was on factors such as eye-related, vision-related and posture-related symptoms.

## 7. Method

The study adopted a descriptive survey design with a quantitative approach. A descriptive survey research design allows for the collection of quantifiable data from a sample to explain a particular phenomenon (Upadhya & Singh, 2008). To carry out the study, data was collected from a subset of the population in a way that the knowledge gained could be representative of the total population studied.

Students from the Departments of Graphic Design, University of Education, Winneba, were selected for the study. The Department has a total student population of 496, made up of 18 Diploma, 87 Level 100, 133 Level 200, 135 Level 300, and 124 Level 400. The study focused on the second, third, and fourth-year students because they had used the computer continuously for at least one academic year in the University, and could be in a better position to contribute meaningfully to the discussion. The research excluded the first year (Diploma and Degree) students because they might not have used the computer well enough, as far as university education is concerned, to share their experiences on the topic. Out of the number of cohorts totalling 392, a sample size of 118 was selected using the 'Rule of Thumb' method. The 'Rule of Thumb' method states that when the population is less than a 1000, 30% is required for the sample (Neuman, 2006).

Stratified, purposive and simple random sampling techniques were used to select the sample. Stratified sampling is used when researchers are trying to get a proportional representation of different sub-groups or strata. In this respect, 30% of each cohort was calculated, and arrived at 40, 41 and 37 respectively. Purposive sampling, otherwise known as judgemental sampling is also used when selecting people who in one's judgement, are better positioned to provide the needed information for a study; hence, the year groups selected. Finally, the subjects from each of the cohorts were randomly selected to give equal chances to take part in the exercise.

The instruments used for data collection were questionnaire and observation. The questionnaire was divided into three sections, namely A, B and C. Section A contained demographic information of the respondents, Section B contained information on the extent respondents use the computer, while Section C was devoted to respondents' awareness level of computer health risks. Both close and open-ended items were used to solicit information. Among the close ended items was a five-point Likert-scale ranging from: Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D), to Strongly Disagree (SD). The observation was composed of a checklist to record the sitting posture of respondents any time they used the computer.

To ensure reliability and validity of the research instrument in relation to the topic, colleagues' views were sought, after which the instruments were pre-tested using twenty (20) Graphic Design students from Takoradi Technical University, Takoradi - Ghana. The choice was based on the fact that these two institutions share similar characteristics. In other words, both institutions offer Graphic Design at the tertiary level in Ghana. This exercise helped to validate the instrument and ensured that the questions and instructions were clearly stated to illicit the needed information for the research.

As part of the ethical considerations, permission was sought from the Head of Graphic Design Department, School of Creative Arts, University of Education, Winneba, for the administration of questionnaire to the

 

students. Copies of the questionnaire were then distributed to respondents and the purpose explained, after which respondents were assured of confidentiality and anonymity. They were however given two days to complete the questionnaire. Besides, the sitting positions of the respondents were observed and recorded unknowingly, each time they used the computer. This continued on a daily basis for two consecutive weeks.

The data received was rechecked for consistency, and were organized in tables, according to the issues presented, using simple percentages.

## 8. Findings and Discussion

### *8.1. Demographics of Respondents*

Out of the 118 questionnaires distributed, 115 were responded to, representing 97.5%. This comprised 38 level 200, 40 level 300, and 37 level 400.

Table 1: Age, gender and level of respondents

| Level | Gender | Age | | | | Total (%) |
|---|---|---|---|---|---|---|
| | | 21 - 24 | 25-28 | 29-32 | ≥33 | |
| 200 | Male | 19(16.4) | 9(7.8) | 1(0.9) | 0 | 29(25.2) |
| | Female | 8(7.0) | 1(0.9) | 0 | 0 | 9(7.8) |
| 300 | Male | 13(11.3) | 13(11.3) | 3(2.6) | 1(0.9) | 30(26.1) |
| | Female | 8(7.0) | 2(1.7) | 0 | 0 | 10(8.7) |
| 400 | Male | 9(7.8) | 12(10.4) | 4(3.5) | 2(1.7) | 27(23.5) |
| | Female | 7(6.1) | 2(1.7) | 0 | 1(0.9) | 10(8.7) |

The female and male respondents were 29 (25.2%), and 86 (74.8%) respectively as shown in Table 1. Demographically, the disparity between male and female figures is a reflection of the general low female enrolment in the Department of Graphic Design, University of Education, Winneba. The age range (21 to 33 years and above) places the respondents within the digital and information age, making them information technology compliant. In addition, they fall within the working age of Ghana and have the potential to work and contribute their quota to building the economy. By extension, any health problems likely to affect them can have a dire consequence on the workforce of the country in the near future, hence, the need to be concerned about their welfare.

### *8.2. Analysis of Research Questions*

#### *8.2.1. Research question 1: To what extent do graphic design students use the computer at UEW?*

In order to ascertain the extent to which Graphic Design students use the computer at UEW, a number of sub-questions were asked. Notably amongst them was the number of years students had used the computer. The responses are presented in Table 2.

Table 2: Number of years respondents have used the computer.

| Years of using computer | Frequency (%) |
|---|---|
| 1-4 | 42(36.6) |
| 5-8 | 41(35.7) |
| 9-12 | 19(16.5) |
| 13+ | 13(11.3) |
| Total | 115(100) |

Data from Table 2 shows that 42 respondents representing 36.6% had used the computer for 1-4 years. Forty-one representing 35.7% had used it for 5-8 years, 19 (16.5%) had used it for 9-12 years, while 13(11.3%) had used it for either 13 years or more.

It can be concluded that a majority of the respondents had used the computer for quite a long time. The fact that about two-thirds (63.5%) of the respondents had used the machine for five years or more is an indication that they started using the device long before they enrolled on the Graphic Design programme at UEW. This goes to buttress the point that they are 21st Century students who have taken advantage of the technological age and are making use of the computer in their respective engagements.

Table 3: Type of computer owned and used frequently by respondents

| Item | Laptop | Desktop | Both | Total |
|---|---|---|---|---|
| Type owned | 89(77.4%) | 4(3.5%) | 22(19.1%) | 115(100%) |
| Type frequently used | 107(93.1%) | 8(7.0%) | 0 | 115(100%) |

To find out the kind of computers respondents owned and used frequently, the following responses emerged

 

as shown in Table 3. It was found that 89 respondents representing 77.4% owned laptop computers, 4(3.5%) owned desktop computer, while 22 (19.1%) possessed both laptop and desktop computers. On the type of computer respondents frequently used, the response showed an overwhelming majority (93.1%) indicating laptop while just a small fraction (7.0%) indicated desktop computer.

It must be emphasised that almost all the courses studied at the Department of Graphic Design, require the use of computer. Unfortunately, the Department does not have adequate computers to cater for the ever-growing number of students. Hence, students are compelled to acquire their personal computers to perform their respective academic exercises. This explains why all the respondents owned their personal computers as indicated. In fact, owning a personal computer, particularly laptop has created the flexibility for students to work irrespective of the time and location, which end up exposing them to health risks, especially, when under pressure to meet strict assignment deadlines.

Table 4: The number of hours respondents use the computer on a daily basis.

| Gender | 1-3 | 4-6 | 7-9 | 10-12 | 13+ | Total |
|---|---|---|---|---|---|---|
| Male | 9 | 25 | 17 | 18 | 17 | 86 |
| Female | 4 | 9 | 4 | 5 | 7 | 29 |
| Total | 13 | 34 | 21 | 23 | 24 | 115 |

Data from Table 4 indicates that an overwhelming majority (88.7%) on daily basis use the computer for four hours or more on average. Thus, while 30% indicated they use the machine for 4-6 hours, 18% were using it for 7-9, 20% used it for 10-12, and 24% using the machine for 13 hours. The fact that about two-thirds (68%) of the respondents were using laptops for seven hours or more presupposes that they were working for prolonged hours and might be suffering from computer health related problems. This is in line with the study by Ye, Abe, Kusano, Takamura, Eida, et al. (2007) which found a correlation between the duration of computer usage and upper extremity (UE) pain, back pain and eye strain.

Again, a cross tabulation on gender basis to further ascertain how respondents were using the computer showed that 24 out of the 29 females, were using the computer for four (4) hours or more. Besides, 77 out of the 86 male respondents were working four hours or more. This supports a study by Blatter and Bongers (2002), which discovered a relationship between musculoskeletal disorders of neck or upper limb in women who used the computer for four hours or more, and six hours or more in men respectively. Indeed, while females experience musculoskeletal disorders when they used the machine for four hours, their male counterparts however, had to use six hours or more because women are relatively different when it comes to computer usage. According to research, women are at a higher risk than men because of the differences in anthropometrics and physiological makeup (Korhonen, Ketola, Toivonen, Luukonnen, Hakkanen, & Viikari-Juntura, 2003). With a majority of respondents using the computer for seven (7) hours or more a day, one can conclude that many might be suffering from computer related health challenges if the assertion above is anything to go by.

Table 5: What respondents regularly use the computer for

| Item | Frequency | Percentage (%) | Total |
|---|---|---|---|
| Assignment | 109 | 94.8 | 115(100%) |
| Research | 108 | 93.9 | 115(100%) |
| Coursework | 106 | 92.2 | 115(100%) |
| Downloading tutorials | 104 | 90.4 | 115(100%) |
| Play music | 101 | 87.8 | 115(100%) |
| Watch film | 97 | 84.3 | 115(100%) |
| Access email | 55 | 47.8 | 115(100%) |

Table 5 shows by order of preference the type of engagement respondents regularly use the computer for. The Table demonstrates an overwhelming majority (94.8%) using it for assignments. This was followed by research work 108(93.9%), coursework 106(92.2%), downloading of tutorials 104(90.5%), and watching films 97(84.3%) respectively. This shows that the respondents are using the computer for a good course. After all, their core mandate is to study, hence, it comes as no surprise that assignment, research, and coursework constituted the three top engagements the respondents were using their computers.

*8.2.2. Research question 2: How are graphic design students aware of the health implications of using the computer for prolonged hours?*

To answer the research question 2, various sub-questions were asked to solicit views from respondents. A question asked to ascertain whether respondents had received any form of education on computer health risks showed that following responses. Indeed, less than half, constituting 53(46.1%) answered in the affirmative, while the majority of 62(53.9%) shared the contrary view. When those who answered in the affirmative were

 

further asked to indicate where they received their education, 29(25.2%) cited teachers, 11(9.6%) mentioned optometrists, five (4.3%) said the Internet, while three (2.6%) indicated friends. Again, two (1.7%) mentioned family members, while each of the remaining three respondents cited television, resource persons, and user manual respectively.

Table 6: Awareness of computer health risks

| Statement | SA F (%) | A F (%) | U F (%) | D F (%) | SD F (%) | Total |
|---|---|---|---|---|---|---|
| I am aware using computer regularly can affect my health. | 75(65.2) | 31(27.0) | 5(4.3) | 3(2.6) | 1(0.9) | 115(100) |
| Aware I will go blind if I don't observe 5 minutes break regularly | 17(14.8) | 28(24.3) | 34(29.6) | 21(18.3) | 15(13.0) | 115(100) |
| Aware prolonged use of computer causes reddish eye | 35(30.4) | 49(42.6) | 16(13.9) | 14(12.2) | 19(0.9) | 115(100) |
| Know prolonged use of computer causes eye itching | 40(34.8) | 42(36.5) | 22(19.1) | 9(7.8) | 2(1.7) | 115(100) |
| Prolong use of computer causes watery eye | 44(38.2) | 39(33.9) | 21(18.3) | 8(7.0) | 3(2.6) | 115(100) |
| I know I can get headache if I look on the computer screen for long | 37(32.2) | 33(28.7) | 29(25.2) | 14(12.2) | 2(1.7) | 115(100) |
| Aware prolonged use of computer causes eye cancer | 17(14.8) | 25(21.7) | 44(38.3) | 22(19.1) | 7(6.1) | 115(100) |
| Know keeping my eyes so close to the computer is the best way to use the monitor | 11(9.6) | 11(9.6) | 16(13.9) | 27(23.5) | 50(43.5) | 115(100) |
| I know sitting for long can cause stress | 55(47.8) | 41(35.7) | 9(7.8) | 7(6.1) | 3(2.6) | 115(100) |
| Aware I will go mad if I use the computer for long hours | 5(4.3) | 6(5.2) | 16(13.9) | 22(19.1) | 66(57.4) | 115(100) |
| Aware putting laptops on the lap is better than on a table | 9(7.8) | 8(7.0) | 15(13.0) | 25(21.7) | 58(50.4) | 115(100) |
| Desktop computers are better for my health than laptop | 12(10.4) | 20(17.4) | 32(27.8) | 32(27.8) | 19(16.5) | 115(100) |
| Changing my posture frequently is the best way to avoid health risk | 25(21.7) | 34(29.6) | 26(22.6) | 21(18.3) | 9(7.8) | 115(100) |
| Aware using computer at home and lecture hall will make me fall sick | 6(5.2) | 19(16.5) | 23(20.0) | 44(38.3) | 23(20.0) | 115(100) |
| Aware bending while using the computer will affect my spine | 61(53.0) | 41(35.7) | 8(7.0) | 3(2.6) | 2(1.7) | 115(100) |

Table 6 shows a vast majority (92.2%) of respondents agreeing to the claim that prolonged use of computer could affect their health. Even though, some of them were not certain about the statements, a majority agreed to the assertion that they could suffer computer health related problems such as reddish, itchy, and watery eyes if they use the computer for prolonged hours. They were also of the view that challenges such as stress and headache could occur if they regularly use the computer for prolonged hours. A majority agreed that bending the body forward while using the computer could affect their spine. They however, disagreed to the statements that using the computer for prolonged hours could make them go mad. They also disagreed to the statements that keeping their eyes very close to the computer monitor was a good practice; putting the laptop on their laps regularly was better than putting it on a table; and using the computer regularly at home and lecture halls could let them fall sick.

The analysis shows that all respondents use laptop computers which aid them to sit very close to the computer screen. Laptops are put on laps, compelling respondents to assume poor postures such as slouching or bending whenever they are using the machine. This is in line with Straker, Jones and Miller (1997) who posited that laptop users compromise their typing posture more compared to desktop. Apart from the pressure brought to bear on the spine, male users are susceptible to suffering from a reduction in sperm production as a result of the accumulated heat produced by laptop and WI-FI connectivity. This affirms a study by Aldad, Gan, Gao and Taylor (2012) which found that men who place laptops on their laps with WI-FI connectivity might have a greater risk of reduced sperm motility and more sperm DNA fragmentation, which could affect their chances of impregnating women. The study further indicated that when portable computers are placed on the laps, they expose the genitals to radio frequency electromagnetic waves (RF-EMW) as well as high temperatures which reduce sperm production in men.

Computer health risk education can lead to good health practices. To assess whether respondents had had any knowledge about computer ergonomic practices, an overwhelming majority (82.6.3%) said no, while just one-fifth (17.4%) answered in the affirmative. The implication is that an overwhelming majority was ignorant

 

about computer ergonomic practices, despite using the machine for quite a number of years. It is quite often said that 'ignorance of the law is not an excuse'. In other words, ignorance of computer ergonomic practices does not exonerate the users from suffering the associated health consequences. Respondents' ignorance corroborates an earlier study by Drummond (2007), which found a general lack of ergonomic awareness guidelines as potential problem students were facing in New Zealand. This is also in line with the observation made by Mvungi et al. (2008) that many computer-related problems occur because users do not have sufficient knowledge on safety tidbits. Per computer ergonomics, users of computer are required to take breaks and vary their work tasks when using the machine (Juul-Kristensen & Jensen, 2005). However, this was not the case, as a majority of the respondents did not observe any breaks even though, they had used the computer for a number of years. With the few respondents who proclaimed to have knowledge about ergonomic practices, their demeanour such as sitting posture, observation of intermittent breaks, and closeness to the monitor, during the observation session gave some doubts as to whether they really understood what they meant. It is therefore not surprising that majority of the respondents indicated they did not know anything about ergonomic practices.

## 9. Conclusion

The computer is now a major tool used by many academic institutions worldwide, which graphic design is not an exception. It has helped to increase work efficiency, rapid access to information, enhanced opportunities for leisure and entertainment, simplified social interactions, and access to social support. Based on the extensive findings and discussions presented, it is evident that graphic design students at the University of Education, Winneba, are heavily reliant on computers for their academic work. The majority of respondents have been using computers for an extended period, signifying their proficiency in utilizing technology. However, this prolonged computer usage comes with potential health risks that need to be addressed. The demographic data revealed a significant gender disparity, with a higher percentage of male respondents, reflecting the low female enrolment in the Department of Graphic Design. It is essential to recognize this gender gap and work towards creating a more inclusive learning environment in the department.

The analysis of research questions highlighted that most students use laptops and spend a substantial amount of time on computers daily. This prolonged usage exposes them to various computer-related health risks, including eye strain, musculoskeletal problems, and potential long-term issues. The findings emphasize the importance of raising awareness about computer ergonomics and promoting healthy computer usage habits among students.

Regarding awareness of computer health risks, the majority of respondents acknowledged the potential health implications of prolonged computer use. However, there is a lack of awareness about computer ergonomics and proper practices to mitigate these risks. This knowledge gap is a cause for concern, as it indicates that students may not be taking adequate measures to protect their health while using computers for extended periods.

In conclusion, this study underscores the critical need for educational institutions to prioritize computer health and ergonomics awareness among students, particularly in departments like Graphic Design, where computer usage is integral to academic success. Implementing programs and initiatives to educate students about the risks associated with prolonged computer use and promoting healthy habits can contribute to their overall well-being and productivity. It is essential to bridge the knowledge gap and empower students to make informed decisions about their computer usage, ultimately ensuring a healthier and more productive academic environment.

## 10. Recommendations

Based on the findings of the study, the following measures are recommended for efficient and effective use of computers by graphic design students.

Certainly, the use of the computer comes with its associated health challenges. Therefore, there should be conscious efforts by the Department of Graphic Design, UEW, to organise computer health risks awareness programmes for students, especially during orientation at the beginning of each academic year, to sensitise them on the dangers involved in using the machine. As part of the exercise, experts such as optometrists or medical doctors could be invited to talk to students. These experts can discuss computer ergonomic practices to help prevent students from becoming victims. Besides, students can have their eyes screened, and those found to be affected treated.

Moreover, the Department should acquire up-to-date computer laboratories, where lectures can be held for the various courses. This will help students get enough desktop computers to work with instead of using personal laptop, which in most cases compel them to sit very close to the screen, and slump instead of sitting straight with back support when working. With such laboratories, students can have adjustable chairs and tables suitable for their usage.

Finally, timetable for Graphic Design courses should be structured in such a way that lecturers as well as

 

students can have intermittent breaks to stretch or move round and rest their eyes whenever they engage in practical work which requires the use of the computer for prolonged hours. This will help prevent many of the risks associated with the prolonged use of the computer.

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