

# Effects of Gender on The Teaching and Learning of Information and Communication Technology (ICT) at Grade 7, at Selected Primary Schools in Chiredzi District, Zimbabwe

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## Abstract

This study is about the effects of gender on the teaching and learning of information and communication technology (ICT) at grade 7 level at a selected primary school in Chiredzi District of Masvingo province in Zimbabwe. A mixed methodology approach will be adopted for the study. The qualitative aspect of this study is concerned with developing explanations of social phenomena. The quantitative methodology aims at dealing with numbers and anything that is measurable in a systematic way of investigation of phenomena and their relationships. It was a case study of grade 7 learners. A non-probability sampling technique of purposive sampling was used to select a sample of 120 learners (3 grade 7 classes each with 40 learners) and 3 teachers who took part in the study. The researcher used questionnaires, interviews, observations, documents and records as well as focus group discussion as methods for collecting data. The main findings were that girls tended to be less interested in computers and had less positive views about the value of computing, and they reported more computer anxiety and less confidence in their computer abilities. Boys tend to agree with stereotypes and their stereotypical views correlate positively with their interest and with their beliefs about the value of ICT. Computers were perceived by girls as belonging to the male domain of mathematics, science, electronics, and machinery. Teachers were also of the view that boys enjoy working alone and discovering things on their own while girls prefer working in groups and sharing what they learn with others. That is, boys tend to be task-focused and to ignore group processes while for girls it is equally important to discuss and negotiate what to do and to resolve interpersonal conflicts. It is therefore recommended that there is need for ICT workshops with girls and female teachers such that having acquired ICT knowledge and skills, they are more likely to believe in girls' capacity to manage ICT. Their ICT-related gender stereotyping will significantly decreased after the workshop, paving a path for them to take continuous participation in ICT and other related subjects. Furthermore, the provision of ICT facilities in schools should be one that should be given all the energy it requires as society is already late in implementing ICT learning within the schools. A further study could be conducted covering all primary schools in the province

**Keywords:** Gender, computers, stereotypes

## Introduction

The relationship between gender and ICT appears to be in a state of flux. ICT and technology have been thought of as a male issue (Clegg, 2016), but this male association has emphasized the technical aspect of ICT, even though nowadays a user of computer technology is more likely to be a surfer in the net than a technically orientated programmer, or a user of the new communication tools in the Internet (Gansmo, 2018). However, there are still several differences between boys and girls regarding ICT.

The culture of ICT among boys seems to involve features of an adaptive expert culture (Alexander, 2004; Facer, Sutherland, Furlong, & Furlong, 2019; Mieg, 2020): Boys take up challenges in learning how to use

ICT and they learn computer technology at home, with friends or by themselves, while girls learn their computer skills primarily at school. Boys network with other enthusiasts and perform various tasks that are difficult for them. Their know-how is multidimensional (Hakkarainen, 2013; Ilomäki and Rantanen, 2016). The technology-oriented “student experts” are male (Ilomäki and Rantanen, 2016). During leisure time boys are more computer-orientated than girls (Keskinen 2018; Melkas, 2014), and the use of computer technology is a way of maintaining and developing friendly relations with other boys (Furlong, and Sutherland, 2013).

It has been proved that there is a gender-based gap also among adults in ICT: women use all kinds of applications significantly less than men (Hacker, 2013). New technology has not removed gender-based differences in work, and the gender-based selection of ICT professionals favours men (Perrons, 2018). Volman (2015) say the computer attitude of girls seems to be less positive than that of boys, boys and girls take on different tasks when working together on the computer and they tackle ICT tasks differently.

A statistical study on the Finnish population (Sirkiä, Muttilainen, Kangassalo and Nurmela, 2015), based on data from 2014, showed that the Internet use was strongly dependent on age, but that there was almost no difference between the genders, except in the oldest group, in which men used it more than women. The intensiveness of the use was strongly age-dependent: the younger the user, the more frequent the use. The versatility of the Internet use was strongly both gender- and age-dependent; young men had most the activities and old women the least.

Contrary views and results have also been put forward. According to Shade (2018), the gap in the ICT usage between the genders is narrowing, and this is especially related to the use of web services. Shade (2018) postulates that women are adopting the network for their own needs, in a similar way as in the beginning of the last century, when women became the primary user group of the telephone. In a study on the ICT usage of American students (Shaw and Giacquinta, 2016) no differences were found between male and female students in the amount of time they used computers for studying, in their satisfaction with their computer skills, or in their attitudes towards the significance of computers in studying. Dania (2014) is of the view that student’s performance in ICT is not determined by gender in terms of the interaction of gender and treatment on student’s academic achievement. In these researches it was inferred that girls perform better than boys at their tender ages but as they grow it is boys who have an upper hand on their learning of ICT.

Teaching, learning and using ICT in schools is not often thought of in terms of gender. The governments, developers and researchers have mainly been interested in how ICT could be used to develop education, in learning or teaching, although the goal of increasing equality between men and women is also proposed in national strategies, for example in Norway and Germany (Gansmo, 2018). In schools, there are gender-related differences in the usage of ICT. Teachers use it differently: more male teachers use ICT than female teachers, and male teachers use it more often than female teachers (Ilomäki, 2011).

In a study among students in Helsinki, girls and boys wished for more computer usage in teaching. However, boys had a considerably more positive view on being able to use ICT in their class and they found the use of ICT more motivating. Even though girls at all school levels used ICT as much as boys, they found it less motivating than boys. Boys considered that they had been able to use computer technology as a support for their learning, girls thought this more seldom (Ching, 2017). Apparently different things motivate girls and boys in learning with ICT. In a French study, boys participated more actively in collaborative virtual discussions, and the researchers proposed that the project in question emphasized technology, which interested especially boys (Lonka and Lehtinen, 2018). The same virtual environment was also used in a Canadian project, where girls actively participated, which the authors saw as reflecting the more pedagogical emphasis of the project (Hakkarainen and Palonen, 2019).

The use of ICT in teaching can at least partly increase or reduce differences in attitudes towards ICT

between the genders. According to Stepulevage (2017), ICT competence is related to the development of gender identity. In simplified form, girls do not have to be technically-minded for the sake of their gender identity, but for boys it is a part of their gender identity (Fraser, 2013). Probably lower secondary level boys' tendency to overestimate their skills is related to the same phenomenon (Muukkonen, 2019). Stepulevage (2016) also claims that teachers support this gender-based digital divide, often without noticing. On the other hand, the fact that schools provide students with an opportunity to use ICT in learning situations can increase equality (Krapp and Lewlter, 2015). Sølberg (2013) found that girls benefited more from ICT teaching at school, because their beliefs in their own skills and know-how developed to the level of boys' beliefs. According to Sølberg (2013) girls have the same attitudes towards computers as boys when they have the same amount of similar experiences. A case study of Ilomäki and Rantanen (2017) about students' intensive use of lap tops revealed that both genders achieved good competence in their usage, although some of the boys were more interested in the technical possibilities of ICT. It is within this background that a research of this nature is being proposed.

### **Statement of the problem**

It is agreed that men, women, boys and girls tend to benefit from ICTs. Despite the benefits, there are problems that arise in the teaching and learning of ICT in schools. Research has shown that boys and girls learn concepts differently. Research to date has produced inconclusive results of the effects of gender on the teaching and learning of particular concepts. ICT is a relatively introduced new teaching area in primary schools. The study therefore, seeks to examine the effects of gender on the teaching and learning of ICT at grade 7 level at a certain primary school in Triangle in Chiredzi district in Masvingo province.

### **Purpose of the study**

The purpose of the study was to examine the effects of gender on the teaching and learning of information and communication technology (ICT) at grade 7 level at a selected primary school in Chiredzi district, Masvingo province.

### **Research questions**

These are the research questions of the study:

- What are the effects of socialisation to the genders on the teaching and learning of ICT at grade 7 level?
- How do the genders differ in their skills in and usage of ICT and access to ICT during teaching and learning at grade 7 level?
- What role does the school play in equalising opportunities between the genders during the teaching and learning of ICT at grade 7 level?

### **Literature review**

#### **Theoretical framework**

The study is premised on the feminist standpoint theory as espoused by Debra Donalds (1988). Standpoint theories view the world from the position, point of view or insights of an individual. According to this approach, a person's standpoint influences how people construct their world socially, and is influenced by the social groups a person is a member. Standpoints are therefore different between different social groups. Feminist standpoint theory's starting point of enquiry is women's experiences and its based on the assumption that women's lives and roles in society are different to that of men's; because of their sociological position in society women see things differently. It has been used by (Kvasny 2006) as a lens

for unpacking African-American women's use of ICTs and by Clegg as a way of looking at gendered meanings in the relationship between education and computing (Clegg 2001). It is useful for this research in that it illuminates boys and girls' interests and needs, their experiences and their situated knowledge at grade 7 in ICT during teaching and learning.

### **Empirical review**

A large number of international studies has overwhelmingly revealed significant gender differences in young people's attitudes and self-efficacy beliefs about ICT. Females tend to be less interested in computers, to have less positive views about the value of computing, and to report more computer anxiety and less confidence in their computer abilities (Volman and van Eck, 2016). The gap in self-efficacy is fairly consistent from the elementary school to university and has been observed even in high-achieving female computer-majors enrolled at prestigious academic institutions (Scheckler and Darlington, 2019). Value and self-efficacy beliefs have a significant effect on the quality of student engagement, learning and performance and are important predictors of both males' and females' current and future academic choices (Dickhäuser and Stiensmeier-Pelster, 2019). High-efficacious and interested learners respond positively to challenge, expend effort, use cognitive and self-regulation strategies and, as a result, they are more successful academically and prepare themselves better for future academic and career pursuits (Eccles, 2014). Understanding some of the possible causes and the factors that are linked to gender differences in self-efficacy and interest in computers can help us consider effective educational interventions and clarify the questions that need to be addressed in future research.

Research shows that gender gaps exist all over the world, in all segments of society, but with cultural variations across the nations. The latest Global Gender Gap Report, published by the World Economic Forum, shows that no country in the world has yet reached equality between men and women (Hausmann, 2017). The Gender Gap Index assesses countries on how well they are dividing their resources and opportunities among their male and female populations, regardless of the overall levels of these resources and opportunities (UNESCO, 2018). The highest ranking country has closed a little over 80% of its gender gap while the lowest ranking country has closed a little over 45% of its gender gap. Sweden (1) Norway (2), Finland (3) and Iceland (4) top the rankings on the list. All countries in the top 20 made progress relative to their scores last year – some more so than others. The Report covers a total of 128 countries, representing over 90% of the world's population (Hausmann, 2017).

In the field of technology, there is also empirical evidence to suggest the continuance of male domination; men use computers and the Internet more than women, men have wider computer experience, spend more time online, report greater interests in and positive attitudes towards computer-related activities, and even appear to be more motivated to learn digital skills (Selwyn, 2016; Smihily, 2017). This gender gap concerning technology is also to be reflected among young people, both in an educational setting and elsewhere. Research on ICT, gender and education identifies gender differences in several fields, like learners' performances, attitudes towards computers and skills as well as the impact of teachers, parents and peers (OECD, 2018, 2008; Pedró, 2015).

These differences between the genders in terms of time consumption, frequency and patterns of use of ICT have often been interpreted as a possible explanations for why girls do not choose education in computing nor become ICT professionals (Alajaaski, 2016; Anderson, 2017; Beavis, 2137). As a consequence, much of the focus has been on what kind of efforts that have to be taken into action to help girls reach the same level as boys within the field of ICT. Furthermore, these assumptions might also be related to the discourse that appears to have been dominating the gender issue for a long period of time in many of the OECD countries and elsewhere, namely that the girls are falling behind the boys when it comes to skills, performance and attitudes towards ICT (Corneliussen 2013, Meelissen 2017). Moreover, there is no general consensus yet on how to disentangle this gender issue, and in which ways educational policymaking and practices might



succeed in bridging this gap.

There are several reasons for bridging the gap on gender and ICT in both its broadest sense in society, and within the field of education in particular. From an equity point of view, women need to fully participate in all aspects of society and economic activity (UNWomen, 2019). Second, from an efficiency point of view, women need to be part of economic activity at all levels, from decision-making to execution phases, and this is becoming increasingly urgent in the light of demographic pressures and aging populations in most OECD countries (UNICEF, 2020). Furthermore, there is a need to ensure a wide base of ICT skills to drive and enable ICT-related growth and productivity gains, contribute significantly to the design of new products and widen the user base.

ICT constitutes both a goal and a tool for increasing participation of women in society and in the workforce (Welsum, 2017). It is crucial to highlight the gender gap in the field of education for several reasons. First, gender segregation in regard to choice of education and career is still strong; in the Nordic countries girls are, on average, attaining higher marks than boys in all subjects, except physical education; in addition girls are approaching 60% of university student population (Hegna, 2016; Nordahl, 2019). Reports also indicate that boys experience more problems in school, drop out of school to a higher degree than girls, and this appears to be a problem in many countries (Nordahl, 2020; OECD, 2016).

A number of environmental and social factors, such as early exposure to computers, access to computers, frequency of computer use, parental and peer support for ICT learning, have been found to contribute to a positive image of oneself as technology user and to interest in developing expertise and have been used to explain differences in boys' and girls' attitudes and beliefs about ICT (Cassidy and Eachus, 2021). As research in educational psychology has documented self-efficacy is mainly affected by learner's interpretations of their past experiences, by external support from others and by access to successful role models. Success in past experiences builds confidence in competence, which in turn encourages children to take on new challenges (Vekiri and Chronaki, 2018). At the same time, experience helps children develop knowledge so that they respond successfully to new challenges. Young people are exposed to ICT at an early age and spend a lot of their time using ICT, often in the context of family and peer activities. Boys are likely to begin using computers earlier than girls and they more likely to have access to same-gender role models. They are also more likely than girls to have access to a computer at home, to use computers on a daily basis, to use computers in the context of peer activities, to attend computer clubs and courses outside school, and to receive more encouragement from their parents to improve their knowledge about ICT (Tømte, 2021; Vekiri and Chronaki, 2020)

In addition to examining differences in experience and social support, there have been some attempts to link gender differences in attitudes to cultural stereotypes about gender and ICT (Cooper and Ruble, 2015). Children get exposed to such stereotypes from their early years, while interacting with family members, peers, and the media. Research shows that many parents espouse stereotypes about the abilities of women in gender-typed domains (Jacobs and Eccles, 2019). These views are reflected in parents' behavior and children are able to perceive them (Shashaani, 2016). Not only video and computer games but also highly-rated educational software are characterized by an overrepresentation of male characters who exhibit "masculine" traits, and contain activities based on masculine stereotyped actions such as violence and competition (Sheldon, 2016). Exposure to cultural stereotypes, in turn, appears to affect children's own views about gender and technology: about gender appropriate behaviors and preferences, differences in females' and males' abilities, and attributions about what makes someone good or bad at computers. Many students are likely to believe that working with computers is more typical for men (Newman, 2015) and that certain behaviors, such as electronic game playing, is more appropriate for boys (Funk and Buchman, 2016). Students recognize software as masculine or feminine and show preference for those that they think are intended for their own gender group (Pinkard, 2015). Young people, typically more boys than girls, tend to

think that boys are generally better at computers (Vekiri and Chronaki, 2017). What is interesting here is that, while girls tend to disagree with stereotypes, boys perceive computers as a masculine domain. Further, in boys stronger stereotypes were found to correlate positively with higher interest in ICT and with more positive beliefs about the value of ICT (Vekiri and Chronaki, 2017). As Facer (2018) observed, for boys developing computer expertise appears to contribute to the construction of their gendered identities.

There is empirical evidence to show that young people's use of computers at home has a positive impact on their educational outcomes (Beltran, 2018; Espinosa, 2016). Moreover, PISA 2016 and other studies, as Eurostat, show a gender difference in the use of and time spent with computers; where the boys appear to dominate (OECD, 2017; Smihily, 2021). The results highlight some challenges schools are facing in order to avoid a new digital divide between the genders. Furthermore, boys use computers and the Internet more than girls, have wider computer experience, spend more time online, report greater interest in and perceive more positive attitudes to computer-related activities. Boys are also more motivated to learn digital skills (Arnseth, 2007; OECD and PISA, 2005). On the contrary, girls appear to be dominating in the communicative field of ICT, like word processing, text messaging on cell phone, as well as e-mail and blogging (Lenhart, 2017; OECD, 2017). Moreover, in most western countries the proportion of women in computer science and in ICT related professions is static or declining, even in cases of sustained inclusion efforts (Falkner, 2019).

The differences between the genders in terms of male dominance in time consumption, frequency and patterns of use of ICT have often been interpreted as a possible explanation for why girls do not choose education in computing nor become ICT professionals (Alajaaski, 2015). As a consequence, much of the focus has been on what kind of efforts that have to be taken into action to help girls reach the same level as boys within the field of ICT. Behind this lies an understanding that the girls are falling behind, in terms of not performing in the same way, nor show the same enthusiasm towards ICT as the boys. Meelissen and Drent (2020) make an interesting point when they highlight the fact that this discourse is only valid if one considers the boys' use as the norm and as a representative of the actual goals to reach (Meelissen, 2017). Some researchers also highlight and even challenge this claim, that the girls are falling behind the boys, for instance (Gansmo, 2017). However, most research has actually been based on this point of departure, which supports the view that the girls are falling behind the boys, when it comes to ICT; in terms of self-attainment, attitudes, patterns of use and so on. And there have been numerous studies, both quantitative and qualitative that support this claim.

Whether students' perceptions of gender differences in computer performance are accurate or not is not the only issue that should draw attention. Students' interpretations of these differences have equal or even higher importance. Girls tend to attribute their successful accomplishment of computer tasks to hard work or luck and failure to lack of ability (Voyles and Williams, 2014). Boys, on the other hand, are more likely than girls to attribute their success to their ability and failure to lack of effort or bad luck, a pattern also identified in studies of student beliefs in other gender-typed academic domains (Stipek and Galinski, 2015). Students' interpretations of successful computer performance are consistent with prevailing stereotypical images of computing and the geek mythology: computing requires "masculine" qualities such as rationality and the ability for abstract and mathematical thinking and is associated with characteristics that are typically perceived as incongruent with the female nature, such as asocial behavior and a narrow focus on programming to the neglect of everything else (Scheckler and Darlington, 2017). According to these stereotypical views, being good at computers comes naturally to boys as the result of innate abilities and characteristics, however, females have to work hard to succeed. According to psychological research on student attributions, such perceptions will have negative consequences for females' self-efficacy and future engagement with ICT (Stipek and Galinski, 2015). When failure is attributed to lack of ability, repeated unsuccessful experiences will hurt girl's confidence and reduce the possibility to take on future challenges that could help them become more competent. In their study Nelson and Cooper (2019) found that girls

expressed less positive views about their computer abilities after unsuccessful computer experiences while boys' confidence was not affected.

### **The role school play in equalising opportunities between the genders during the teaching and learning of ICT.**

While there is plenty of evidence to suggest that “progressive” pedagogical approaches can enhance self-efficacy and interest, certain elements of these approaches may not work the same for boys and girls. One such element is student collaboration. When it comes to ICT learning, research shows that boys and girls have different preferences, and adopt different collaboration approaches. Boys enjoy working alone and prefer to discover things on their own, while girls prefer to collaborate and to share what they learn with others (Barbieri and Light, 2015). Observations of students during ICT collaborative activities indicate that boys tend to be task-focused and to ignore group processes while for girls it is equally important to discuss what they do and to resolve interpersonal conflicts (Kafai and Marshall, 2016).

Teachers need to be aware of practices that may encourage or permit a gendered labor division and limit girls' cognitive and physical access to learning resources in the classroom (Scheckler and Darlington, 2017). They also need to be aware of gender differences in prior experience, preferences, interests, and learning approaches and to differentiate instruction in order to respond to the needs of various groups of students. There is a need for more studies to examine which specific changes in the learning environment (content, materials, instructional techniques) can contribute to positive attitudes and achievement for girls. Empirical findings so far indicate that many aspects of school learning, including subject-matter content, materials, teaching approaches, and practices are oriented towards boys' interests and needs (Voyles and Williams, 2014).

Textbooks, children's books, and educational television programs contain more male than female characters as successful role models with which students can identify (Volman & van Eck, 2001). Girls prefer software that involve female characters, adventure, creative scenarios and problem solving, without elements of competition and violence but most of the available educational software contain male characters in stereotypical roles and elements of competition or violence (Sheldon, 2014). Girls are more interested in the applications of ICT to the solution of problems rather than on the technical aspects of computing, which is often the focus in introductory information science courses. And teachers tend to interact more with boys than with girls and to allow boys more participation in classroom discussions (Warren and Walsh, 2018).

There are examples in the literature showing that gender differences in computer performance can decrease or disappear when the design of the learning environment takes into account individual differences in student interests and learning approaches. Teachers have their own views about how ICT should be integrated in teaching and learning, boys' and girls' ICT-related abilities, the qualities that characterize students who get on well with computers, and the factors that cause the gender gap in computers. There is little empirical research on elementary and secondary teachers' beliefs about gender and technology as well as on the way teachers interact with boys and girls in the context of ICT learning activities. Studies in the field of mathematics, however, show that teachers tend to have higher expectations for boys and to think that boys are more capable in mathematics (Li, 2019). This study therefore seeks to examine the effects of gender on the teaching and learning of information and communication technology (ICT) at grade 7 level at a selected primary school in Chiredzi district, Masvingo province.

### **Research Methodology**

A mixed methodology approach was adopted for the study. According to Merriam (2013) mixed methodology refers to ‘research’ in which the investigator collects, analyses, mixes, and draws inferences from both numeric and non-numeric data in a single study or a program of inquiry’.

The researchers used a case study of grade 7 learners at a primary school in Triangle in Chiredzi district, Masvingo province in Zimbabwe. According to Bromley (2021) a case study is a systematic inquiry into an event or a set of related phenomenon of interest.

The population for the study was made up of six grade 7 classes with 40 learners each and the teachers. Purposive sampling was used to select the participants in the study. Purposive sampling according to Tong (2007) is the deliberate choice of an informant due to the qualities the informant possesses. A sample of 120 learners (3 grade 7 classes each with 40 learners) and 3 teachers took part in this study.

Questionnaires, interviews, observations, and documents were used as methods for collecting data. Questionnaires were used because they secure standardised results that can be tabulated and treated statistically. Furthermore, questionnaires reduce burden to the respondents as they are easy to tackle and are researcher oriented. Rowley (2014) supports this as he noted that, questionnaires are easier to get large quantities of data from many people over a relatively short period of time.

he researcher used records such as the test record books, learners' exercise books, mark schedules and individual record books of participants. These helped the researcher to make statistical analysis of learners' performance according to gender in ICT. The use of documents and records can be efficient and inexpensive because one will be predominantly using research that has already been completed.

Interviews were used to seek clarity and consolidate data from the questionnaires. Interview will be used as a supplement to the questionnaire in data collection. Interviews allow verbatim recording of responses. Data generated from interviews can be immediately cross-checked for authenticity

### **Validity and Reliability**

Polit and Hungler (2013) refer to validity as the trustworthiness with which a research tool measures the characteristics it is intended to measure while reliability entails the dependability of a research tool. In this study to ensure reliability and validity several steps were taken.

A pilot study was conducted. The objective of the pilot study was to ensure that respondents understand the instructions, the questions being asked, the terminologies used, no misleading questions, that clarity was observed and that the instruments used were reliable to the subject being studied. To this end, the returned questionnaires were scrutinised for more corrective inputs. All input in the forms of comments, suggestions, ideas, proposals, corrections and views were taken into consideration to improve and upgrade the level of reliability of the instrument.

### **Triangulation**

Triangulation was also used as a way to enhance reliability and validity. The use of interviews, questionnaires and document analysis is meant to achieve data triangulation. In this study data triangulation entail the comparison of qualitative data received from in-depth interviews and quantitative data from the questionnaires administered. The use of a combination of methods increases one's understanding of a given phenomenon since social phenomena is complex.

Another strategy to enhance validity and reliability is through member checks. With member checking, the validity process changes from the one carrying out the research to those being studied in the research. It



consists of taking data and interpretations back to the participants in the study so that they can confirm the credibility of the information and narrative account. With the lens focused on participants, the researchers systematically checked the data and the narrative account.

Ethical issues that the researchers observed included voluntary participation, anonymity, confidentiality and informed consent among others. Written permission to conduct the research study was obtained from the authorities. The participants' consent was obtained before they completed the questionnaires and engage in interviews.

### **Data analysis procedures**

All questions from the questionnaire were individually analyzed, taking into considerations all the available factors. The thematic principle is applied in respect of qualitative data from interviews. The collected information was sieved, sorted, grouped and assembled in accordance with the question numbers that acted as the coding system in order to solicit the emerging issues/points and to establish certain patterns in all the answers. (Merriam, 2013). In the process of the actual report writing and for the purpose to increase the credibility of qualitative data, member checking will be done vigorously with the interviewees, both to clarify and verify their statements and to validate whatever that they had said. Respondents' validation is important to improve accuracy.

## **Data Presentation Analysis and Discussion**

### **The effects of socialisation to the genders on the teaching and learning of ICT at grade 7 level**

Data was collected on the effects of socialisation to the genders on the teaching and learning of ICT at grade 7 level. The teachers reported that girls tended to be less interested in computers, to have less positive views about the value of computing, and they reported more computer anxiety and less confidence in their computer abilities. It was also pointed out that boys tend to agree with stereotypes and their stereotypical views correlate positively with their interest and with their beliefs about the value of ICT.

It was generally argued that girls had a less positive attitude towards computers than boys. Computers were perceived by girls as belonging to the male domain of mathematics, science, electronics, and machinery.

Teachers were also of the view that boys enjoy working alone and discovering things on their own while girls prefer working in groups and sharing what they learn with others. That is, boys tend to be task-focused and to ignore group processes while for girls it is equally important to discuss and negotiate what to do and to resolve interpersonal conflicts.

It was found that teachers tended to attribute boys' successes and failures to ability and girls' successes and failures to effort. Teachers seemed to associate ICT ability with certain traits which were more typical for boys, and this was reflected in their descriptions of their best boy students as "*more competitive, more logical, more adventurous, and more independent in mathematics*" compared to their best girl students.

It was also reported that boys were likely to begin using computers earlier than girls and they more likely to have access to same-gender role models. Teachers pointed out that boys were also more likely than girls to have access to a computer at home, to use computers on a daily basis, to use computers in the context of peer activities, to attend computer clubs and courses outside school, and to receive more encouragement from their parents to improve their knowledge about ICT.

There is little question, therefore, that a stereotype exists that links the use of computers to gender. In fact, participants noted that the design, development, and repair of technical equipment, have been stereotyped as

masculine.

It appears, from the views of participants, that one key element in students' and teachers' gender schemata is the belief that computer ability is a fixed entity, a characteristic determined by genes, which no action on girl's part can change dramatically.

According to advocates of socialization theory, men and women confront computers in different ways and with different perceptions, based on social expectations from others, including parents and peer groups (Shashaani and Khalili, 2016). To illustrate, the results of the Vekiri and Chronali (2019) study in Greek elementary schools confirm the effect of different socialization experiences and gendered social expectations by family and peers on computer attitudes among students. They found, for instance, that parents' expectations and support in learning about computers emerged as one of the most important determinants of boys' and girls' beliefs about their computer self-efficacy and values. Educational psychologists (Pintrich and Schunk, 2016) recommend that teachers should foster in students the belief that competence or ability is changeable and controllable and that expertise in any domain develops with experience, effort, persistence, and use of good learning strategies. This can be accomplished when teacher practices focus on the process rather than on the product of learning and problem solving, for example when teachers explain and model good learning strategies and when they invite class discussions where students' approaches to a particular problem or assignment are thoroughly analyzed and evaluated. Stereotypes can cause high levels of anxiety even in high-achieving confident female students, when they think that other people are going to judge their performance according to dominant gender stereotypes (Spencer, 2014). Stereotypes may cause anxiety and pressure that can undermine performance, even in individuals who do not espouse stereotypes and do not have doubts about their abilities.

### **How the genders differ in their skills in and usage of ICT and access to ICT during teaching and learning**

It was reported that girls were interested more in using ICT(s) to create useful things and less in the technical aspects of ICT. That is, girls like software with female characters, adventure, problem solving and creative scenarios and boys like software with male characters, competition and violence. Not only video and computer games but also highly-rated educational software are characterized by an overrepresentation of male characters who exhibit "masculine" traits, and contain activities based on masculine stereotyped actions such as violence and competition.

It was found that exposure to cultural stereotypes, in turn, appears to affect children's own views about gender and technology: about gender appropriate behaviors and preferences, differences in females' and males' abilities, and attributions about what makes someone good or bad at computers. Teachers reported that many students were likely to believe that working with computers is more typical for men and that certain behaviors, such as electronic game playing, is more appropriate for boys. Teachers further noted that learners recognize software as masculine or feminine and show preference for those that they think are intended for their own gender group. The teachers were of the view that young people, typically more boys than girls, tend to think that boys are generally better at computers.

It was pointed out that girls enjoy explaining to others something that they can do well on the computer more than boys. The participants were of the view that boys find it more enjoyable to be able to beat someone at a computer game, while for girls it was more important to be able to create something pretty with the computer.

These findings are line with studies that have noted that teachers need to be aware of practices that may encourage or permit a gendered labor division and limit girls' cognitive and physical access to learning resources in the classroom (Warren and Walsh, 2017). They also need to be aware of gender differences in

prior experience, preferences, interests, and learning approaches and to differentiate instruction in order to respond to the needs of various groups of students. There is a need for more studies to examine which specific changes in the learning environment (content, materials, instructional techniques) can contribute to positive attitudes and achievement for girls. Empirical findings so far indicate that many aspects of school learning, including subject-matter content, materials, teaching approaches, and practices are oriented towards boys' interests and needs (Sheldon, 2019). Textbooks, children's books, and educational television programs contain more male than female characters as successful role models with which students can identify (Volman & van Eck, 2014). Girls prefer software that involve female characters, adventure, creative scenarios and problem solving, without elements of competition and violence (Volman and van Eck, 2014) but most of the available educational software contain male characters in stereotypical roles and elements of competition or violence (Chappell, 1996). Girls are more interested in the applications of ICT to the solution of problems rather than on the technical aspects of computing, which is often the focus in introductory information science courses. And teachers tend to interact more with boys than with girls and to allow boys more participation in classroom discussions (Aukrust, 2018).

The differences between male and female students' computer attitudes could be a sign that they differ in their motivations and interests in considering the utility of computers, as well as the role computers play in their lives (Volman, 2015). Selwyn (2017) argued that the utility and perceived usefulness of the different aspects of technology lay at the heart of much of the gendered nature of the data: what is useful for men and what is useful for women were often seen as very different. Also Ferrer (2018) argue that boys and girls in public schools in the region of Aragón (Spain) make different uses of ICT and also apply different value to the relationship between ICT knowledge and their subsequent incorporation into the labor market, according to careers of varying technological levels. Based on the results of this studies, it could be suggested that females take a more pragmatic stance toward computer use, meaning that they are likely to develop positive attitudes toward forms of computer use – attitudes towards computers in education in this case – that they deem to be useful. Abbiss (2008) described females as “task-oriented users” who focus on utilitarian functions of computers and on the end product. In contrast, males are described as “power users” who are machine oriented and for whom the computer is a toy to be manipulated for its own sake.

### **The role school play in equalising opportunities between the genders during the teaching and learning of ICT**

The fact that many pupils have acquired a lot of ICT skills out of school (often more than teachers themselves) leads some participants to surmise that the school has no specific role to play. The participants however noted that the use of computers is beneficial for learning.

Participants pointed out that computer use helps students develop higher-order thinking and problem-solving skills. Other benefits noted by participants were that ICT fosters collaborative learning and flexible learning opportunities, independent from time and place. In fact, it was pointed out that as technology has become an integral part of instruction, ICT attitudes play an influential role in determining the extent to which students accept the computer as a learning tool.

Participants confirmed that computer attitudes also influence the acceptance of computers in the context of teaching and learning. Having more negative attitudes towards computers may lead girls to avoid experiences that could help them develop computer competence, and this, in turn, might influence negatively their academic choices and limit their future career opportunities in ICT.

The teacher participants were of the view that as ICTs become more and more integrated into society and more people – both boys and girls – have access to and use computers, the so-called ICT gender gap, if it did exist, would narrow.

It can further be noted that in educational settings, such as schools, computer applications or ICTs are more and more present, it is important to make sure no one gets excluded because of less favorable computer attitudes resulting in evasion of computer use. This study shows that girls, although they have in general less positive attitudes towards computers than boys have, are not likely to be disadvantaged in educational settings, since their attitude towards computer use for educational purposes does not differ from boys. There are many ways in which technology can be used in the classroom to engage students and facilitate exciting, engaging and interesting lessons.

## Summary of Findings

Girls tended to be less interested in computers and had less positive views about the value of computing, and they reported more computer anxiety and less confidence in their computer abilities. Boys tend to agree with stereotypes and their stereotypical views correlate positively with their interest and with their beliefs about the value of ICT. Computers were perceived by girls as belonging to the male domain of mathematics, science, electronics, and machinery.

Teachers seemed to associate ICT ability with certain traits which were more typical for boys. Boys had begun using computers earlier than girls and they more likely to have access to same-gender role models. Boys were also more likely than girls to have access to a computer at home, to use computers on a daily basis, to use computers in the context of peer activities, to attend computer clubs and courses outside school, and to receive more encouragement from their parents to improve their knowledge about ICT.

Girls were interested more in using ICT(s) to create useful things and less in the technical aspects of ICT. That is, girls like software with female characters, adventure, problem solving and creative scenarios and boys like software with male characters, competition and violence.

Learners recognize software as masculine or feminine and show preference for those that they think are intended for their own gender group. The teachers were of the view that young people, typically more boys than girls, tend to think that boys are generally better at computers. Girls enjoy explaining to others something that they can do well on the computer more than boys. Boys found it more enjoyable to be able to beat someone at a computer game, while for girls it was more important to be able to create something pretty with the computer.

Computer attitudes also influence the acceptance of computers in the context of teaching and learning. Having more negative attitudes towards computers may lead girls to avoid experiences that could help them develop computer competence, and this, in turn, might influence negatively their academic choices and limit their future career opportunities in ICT. **Conclusion**

Socialisation is a theme which occurred frequently in this study on gender and ICT. The influence of peers, parents, teachers and the media is noted as being a major factor – perhaps the major factor – affecting girls' confidence, self-efficacy and attitudes towards ICT. One can conclude that the existence of stereotyping in relation to gender and ICT, which can, become selfreinforcing – girls learn that computers are 'boys' toys', which increases their anxiety around ICT, leading to negative attitudes and poor performance. This poor performance is taken as evidence that the stereotype is correct. Much of the stereotyping may be unconscious as many teachers express a commitment to equality but those who believe that girls dislike ICT have been found to direct more attention towards boys when using ICT in the classroom.

It can be concluded that the use of ICT in education improves the motivation and attainment of both girls and boys, though the increases are more marked for boys than girls. Girls have lower levels of access at home compared with boys, and generally use ICT less. Girls use ICT more for school work, whereas boys



use it more for leisure purposes. A large proportion of this difference can be accounted for by boys' greater use of computer games.

Although there is little evidence that girls are less skilled than boys in the use of ICT, girls generally feel less confident in their ability to use technology. There is no evidence to suggest that ICT intrinsically suits boys better than girls; there is, however, compelling evidence that the competitive, skill-based, non-collaborative nature of many computer games (even educational ones) is de-motivating for girls.

It can therefore be concluded that gender stereotypes in relation to at least some aspects of technology can have a significant impact on girls' attitudes towards ICT. These stereotypes begin at an early age with parents and are reinforced by peers, the media and, in some instances, teachers as girls get older.

The idea that ICT is the domain of boys is particularly strong in relation to games and programming. The context in which girls use ICT in school is crucial to realising the benefits of technology: girls do less well when working together with boys, possibly as a result of both their own and boys' stereotypical views of technology.

In short, the fact that the dominant cultural understanding of technology is as a masculine activity, means that girls have often chosen not to engage with it – not because they are excluded but because it does not fit with their self-image of what it is to be a girl. Traditionally, anything that is difficult to perform is considered a preserve of the male (boys) species. Therefore girl children would psychologically have a barrier to taking up ICT education.

## Recommendations

In light of the above findings and conclusions, these are the recommendations:

- There is need for ICT workshops with girls and female teachers such that having acquired ICT knowledge and skills, they are more likely to believe in girls' capacity to manage ICT. Their ICT-related gender stereotyping will significantly decreased after the workshop, paving a path for them to take continuous participation in ICT and other related subjects.
- ICT should be integrated into the curriculum mostly in terms of methodologies for instruction as it will easily aid the inquiry method where learners have to find knowledge for themselves and the teacher being just a guide.
- The provision of ICT facilities in our schools should be one that should be given all the energy it requires as we are already late in implementing ICT learning within the schools. The teachers should be up and doing in adapting to ICT based learning as indication showed that the student/teacher disparity in ICT compliance can be a hinderance to the girl child interest to ICT and its numerous benefits to learning

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