

# **THE USE OF COMPUTERS IN LEARNING: A CASE STUDY OF SELECTED BOTSWANA JUNIOR SECONDARY SCHOOL STUDENTS' GENDER ATTITUDES.**

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*This article reports the findings of the study that analyzed students' gender attitudes in learning to use computers in Botswana junior secondary schools in the year 2005. Attitudinal variables considered were usefulness and enjoyment of using computers in learning, and anxiety in learning when using computers. Data were collected using structured interviews with closed and open-ended questions, and analyzed by qualitative and quantitative techniques. School and classroom observations were done using structured schedules. The findings of the study showed that gender differences existed in the three variables, i.e. usefulness, enjoyment and anxiety. It was concluded that the nature of computer studies curricula and teaching methodologies used had some contribution to gender differences.*

## **INTRODUCTION**

The introduction of Information and Communication Technology (ICT) into the school curricula raised some hopes that it could be one of the means of communication in classroom instruction where gender differences could be minimized. Earlier, when ICT was introduced in schools, it was perceived as a male domain and boys were considered people with technological know-how, where girls were "guests" and boys "hosts" (Elkjaer, 1992 in Jones and Smart, 1993). The interactive nature of ICT materials was believed to provide the opportunity for students to analyze the process, assimilate and work independently. Such an opportunity was also believed to be useful to especially girls where some classroom practices were found to create an undesirable learning environment for girls (Kaino and Mazibuko, 2001). Calculators and computers are instruments where students could interact independently in classroom instruction. Compared to traditional classroom learning, it was assumed, calculators, computers and other forms of ICTs could offer neutral environments for both sexes during learning.

Earlier studies on the use of ICT in instruction did not consider a computer to be a neutral value and attitudes towards information technology were expected to be even more extreme than those towards other educational media (Anderson, 1985). If gender-related differences in attitudes toward the computer had to follow similar patterns to those established for science or math, as girls tended to associate computers with math and technology (Levine, 2006), then there would be little hope for improved attitudes toward learning among girls when computers are integrated in instruction. Some studies had already indicated that boys' attitudes towards computers were generally more positive than those of girls (Clariana & Schultz, 1993; Levine & Gordon, 1989; Sutton 1991). Also other studies had indicated that boys and girls differed in their perception of the role of computers in learning, and in their preference for different types of computer-based activities (Hall & Cooper, 1991; Sanders

1984). The above findings however, were obtained between fifteen and about twenty years ago, and school learning environments, instruction, practices and others might have changed gender attitudes.

## **CONCEPTUAL FRAMEWORK**

The study considered only three variables, i.e. usefulness, enjoyment and anxiety in learning using computers in classroom to be among determinants of students' gender attitudes towards learning. One approach of learning involving the cognitive constructivist theory of learning was considered. Cognitive constructivism as developed by Piaget (1953 & 1955) asserted that learners created their own knowledge through personal experiences. It was argued that personal experiences enabled learners to create mental images in their minds. Piaget argued that thought arose out of actions the learner performed with objects and not from the objects themselves. This argument put up the premise that thought arises after appreciation of the significance of operations done by the learner himself/herself with materials and not from the performance of the materials themselves. Piaget maintained that action was the basis of thought and that the type of concept that developed depended essentially on the level of abstraction or dissociation of which the learner was capable, depending on the quality of the sequences of action in the mind the learner could elaborate. Some studies have also indicated that learning was constructed through mental and physical activities (Adeyinka & Mayor, 2005; Epstein 2002) whereby the learner got direct sense impressions like touching, seeing and/or smelling. In such a process, learners were able to discover knowledge themselves.

Piaget's constructivist approach has attracted a number of debates among educators with interest. The approach to involve active construction of knowledge by the learner and not passively received from the teacher, was received by many educators and researchers as a pragmatic strategy in learning. This approach has promoted a shift from the teacher-centeredness approach of teaching to learner-centeredness approach, which is regarded as a new concept of teaching. The concept of learner-centeredness has evolved as a contemporary counter to the traditional teacher-centered approach that has been considered authoritative in nature (Pulist, 2005). The learner-centered approach is said to empower learners to take control of their learning as also they controlled their destiny (Muller, 1997). Furthermore, learners were provided with greater autonomy and control over the choice of subject matter, learning methods and pace of study (Gibbs, 1992). Such an approach is against the notion of giving or transmitting a predetermined body of knowledge to the learner who was believed treated as an object in a traditional approach. Learner-centeredness encouraged individual discovery where learners evolved their own truths or understanding (Walker and Daets, 2000). In this learning process, the learner was given the opportunity to process information, solve problems and make decisions at his/her own (Blumenfeld et al, 1991). Through learner-centeredness, learners were believed to build confidence, create an anxiety-free atmosphere for learning (Pulist, 2005).

This study was thus embedded in Piaget's constructivist theory of learning where learners were believed to acquire knowledge independently and create their own knowledge when they learnt using computers. The interactive nature of using computers was believed to

provide the opportunity for learners to work independently. In particular, the opportunity for female learners to work independently was thought to be useful in coeducation schools where the classroom environment had been described to contain undesirable climate for females to learners conductively (Kaino, 1997; Anstey 1997; Jungwirth 1997). The premise put forward by this study was whether the use of computers in instruction could minimize the gender gap in learning. This premise was made with knowledge of the existence of classroom gender practices among students of both sexes as well as from teachers during instruction as reported in various studies elsewhere (Kaino and Mazibuko, 2001; Kaino, 1997; Cheng, 1993; Fraser, 1986; and others).

The study was guided by the following research questions (by gender): (i) What were the students' views on the usefulness of computers in learning? (ii) How was students' enjoyment of using computers in learning? (iii) How was the students' anxiety in learning when using computers?

## **METHODOLOGY**

The study employed both qualitative and quantitative techniques. Structured interviews with closed and open-ended questions were used to get information from students and teachers. Classroom observations were done using structured schedules. Form two students were selected to represent the sample at junior level. The sample comprised 72 students from junior schools (36 girls and 36 boys) selected at random from each class stream. Pre-test and validation were done before main data collection. The quantitative data involving closed-ended questions was analyzed using the Statistical Package for Social Sciences (SPSS). Responses were analyzed using a 4-point Likert scale, frequencies and pie charts. The Likert scale had the following weightings: Very useful (4), Useful (3), Averagely useful (2) and Not useful (1); Strongly agree (4), Agree (3), Disagree (2) and Strongly disagree (1). Total score of responses were computed and average scores determined. The average values indicated levels of usefulness and agreement; and significances were tested at 0.01 and 0.05 levels. From the qualitative data, involving open-ended responses, individual responses were recorded and similar views grouped together. The number of similar views were noted and presented in frequencies and then transformed into percentages. The t-test method was used to determine any differences that existed between boys' and girls' responses at junior level. The t-test analysis was also done on a combined sample between two sexes to detect any differences.

## **FINDINGS AND ANALYSIS**

Students were asked to state on the usefulness of using computers in learning by indicating the four levels of usefulness. More girls (about 61%) than boys (about 52%) said computers were very useful. About 42% of boys and 39% of girls said computers were useful. Only about 6% of the boys said using computers were averagely useful (Table 1). Likert scale averages (boys-3.46 and girls-3.6) also indicated that students of both sexes considered computers to be useful in learning though girls' average was higher than those of boys. While

more girls than boys indicated that computers were useful, the differences were not significant at 0.05.

*Do you find learning using computers in class to be useful to you?*

		Boys No.	Girls No.
	Very useful	17 (51.5%)	22 (61.1%)
	Useful	14 (42.4%)	14 (38.9%)
	Average useful	2 (6.1%)	0 (0%)
	Not useful	0 (0%)	0 (0%)
	Total	33	36
Missin g		3	0
Total		36	36

**Table 1: Students' views on computer usefulness by gender**

Averages on Likert scale: Boys-3.46, Girls-3.61, and Boys & Girls-3.54

T-test: not significant at 0.05 (0.650>0.05)

### **Students' reasons why computers were useful**

Students who indicated that using computers in learning was useful were asked to state their reasons why they agreed. The views, which were open-ended, were analyzed and categorized into six types for boys and into seven for girls as shown in Table 2 below.

Many boys (about 36%) said computers were useful in searching for jobs while about 31% of girls said were useful for internet access. About 28% of girls also said computers were useful in searching for jobs. The t-test on similar views did not show any significance difference between boys and girls at 0.05 (0.50<0.59). Dominant views from both girls and boys indicated that computers were useful in search for jobs, Internet, access to information and knowledge.

#### **Boys**

	Number	Percent	Valid Percent	Cumulative Percent

	Helpful in job search	11	30.6	35.5	35.5
	Provide accurate information	6	16.7	19.4	54.9
	Fast in communication	5	13.9	16.1	71.0
	Helpful in doing assignments and research	3	8.3	9.7	80.7
	Using computers is added knowledge	3	8.3	9.7	90.4
	Provide access to Internet	3	8.3	9.7	100
	Total	31	86.1	100	
Missing		5	13.9		
Total		36	100.0		

#### Girls

		Number	Percent	Valid Percent	Cumulative Percent
	Provide access to Internet	10	27.8	31.3	31.3
	Helpful in job search	9	25.0	28.1	59.4
	Using computers is added knowledge	6	16.7	18.8	78.2
	Provide accurate information	2	5.6	6.3	84.5
	Fast in communication	2	5.6	6.3	90.8
	Useful for typing and printing pictures	2	5.6	6.3	97.3
	Provide accurate answers	1	2.8	3.1	100
	Total	32	88.9	100	
Missing		4	11.1		
Total		36	100.0		

**Table 2: Students' reasons why computers were useful**

### **Students' enjoyment of using computers in learning**

Students were asked to indicate the level of enjoyment in learning when using computers. The 4-point Likert scale was used and responses were recorded in frequencies and then computed into percentages. Most students indicated that they enjoyed using computers in learning (Table 3).

About 42% of girls and 38% of boys indicated highly their enjoyment of using computers. On the average, many students of both sexes enjoyed computers and girls had a higher average score on the Likert scale than boys. Though many girls than boys enjoyed using computers, about 11% of the girls (compared to 0% of boys) did not enjoy at all using

computers. The analysis showed no significant differences of enjoyment among sexes at 0.05 levels.

*Do you enjoy using a computer in class?*

		Boys Number	Girls Number
	Very Much	13 (38.2%)	15 (41.7%)
	Much	16 (47.1%)	15 (41.7%)
	Average	5 (14.7%)	2 (5.6%)
	Not at all	0 (0%)	4 (11.1%)
	Total	34	36
Missin g		2	
Total		36	

**Table 3: Students’ enjoyment of using computers in class**

Average on Likert scale: Boys-2.94, Girls-3.12

T-test: not significant at 0.05 (0.77>0.05)

Some reasons were sought from girls who said they did not at all enjoy learning using computers. The reasons were given as “ I hate computer classes (2), “I do not know much about computers (1), and “The teacher is the one who does almost everything (1).

### **Students’ comfort in using computers**

While many boys and girls in junior schools were comfortable with the use of computers, many boys (about 76%) than girls (50%) were more comfortable, Table 4. Three girls who said were “much” uncomfortable gave the reasons as “Because I haven’t learnt much about computers” (1), “Sometimes I don’t know what to press” (1) and “The teacher is fast “ (1).

*Do you feel uncomfortable in learning when you use a computer?*

		Boys Number	Girls Number
	Very much	0(0%)	0 (0%)
	Much	0 (0%)	3 (8.3%)
	Someho w	8 (24.2%)	15 (41.7%)
	Not at all	25 (75.8%)	18 (50%)
	Total	33 (100%)	36 (100%)
Missin g		3	
Total		36	

**Table 4: Students' comfort when using computers in learning**

### **Students' confusion in learning using computers**

More boys (about 61%) than girls (about 33%) were not worried when using computers in learning (Table 5). Girls' worries were seen in their ratings that constituted about 67%. A sample of girls of who indicated much worries said, "learning with computers was difficult (3)", "there were many buttons and instructions to follow (1)" and "I am dealing with something am not sure of (1)". The reasons for boys who also indicated much worries were "little knowledge in computers (5)", "many instructions (1)" and "feeling that am not doing something right (1)".

*Do you feel confused when you use a computer in learning?*

	Boys Number	Girls Number
Very Much	3 (8.3%)	2 (5.6%)
Much	4 (11.1%)	3 (8.3%)
Somehow	7 (19.4%)	19 (52.8%)
Not at all	22 (61.1%)	12 (33.3%)
Total	36 (100%)	36 (100%)

t-test: 1.00 (>0.05)

**Table 5: Students' feelings when using computers**

### **Discussion**

The general view by many students that they found learning using computers to be useful was a positive sign towards the use of technology in instruction. However, more girls than boys found computers to be more useful. Gender differences on usefulness of computers in learning were noted among students where many boys found computers to be useful in searching for jobs, whereas many girls found them useful in internet access. Students of both sexes did not indicate the usefulness in particular contents of the study and few of them stated usefulness in accuracy of answers and information.

In form two, at the time of conducting the study, students were expected to have covered knowledge in basic computer skills that involved keyboard skills, creating new documents and editing. This syllabus was general in nature and could reflect the responses of students who could not specify the usefulness in particular content areas. Students' views that computers were useful could be considered as an appreciation to the use of technology in

instruction. An earlier study in a number of schools in Botswana showed that students did not consider the use of calculators to be useful in learning (Kaino and Salani, 2004). Such a finding would be regarded as a setback at the time when traditional ways of instruction were to be innovated and improved to cope with current developments in technology.

Students' perceptions on usefulness have been linked to participation in the subject studied. For example in mathematics, students' perceptions on usefulness were associated with activities and tasks performed in class (Meyer and Koehler, 1990). And an earlier study by Fennema and Sherman (1977 & 1978) showed the existence of gender differences in perceptions on the usefulness of mathematics.

The study by The World Bank (2006) in Ghana, Mauritania, Senegal, and Uganda found that when girls had access to computers, they would use them more often for academic research and communication with friends and family, increasing their reasoning and communication skills. They also used Internet access to obtain information on issues such as reproduction and sexuality, information not available from their families or communities. Boys tended to use the computers for sports and music and received little academic benefit. It was also reported that when girls did have equal access to computers, their self-confidence improved. The finding by this study in Botswana that usefulness of computers differed by gender tends to exhibit a gender pattern found in other studies.

Alternatively, it could be argued that enjoyment depended on the nature of the syllabi used by students at the time of conducting research. Enjoyment in learning has been associated with the value students attributed to the subject studied. The study by Kulm (1990) indicated that students enjoyed subjects they valued. Value was associated with the subject that students performed well (Wigfield and Meece, 1998). It was beyond the scope of this study to establish whether value attributed to computer studies contributed to gender differences in enjoyment.

Also the finding that girls had more anxiety in learning than boys concurred with some other researchers elsewhere. An earlier study in Botswana secondary schools that girls had more anxiety than boys in using calculators (Kaino & Salani, 2004) is one of such cases. Studies have established a correlation that students who had more anxiety in learning had less enjoyment of the subject studied (Muthelo, 2003). Anxiety in learning has been described to affect confidence among learners (Wigfield and Meece, 1988; Richardson and Suinn, 1972). Confidence was described as one of important affective factors in learning (Reyes, 1984). The result of this study that girls had more anxiety than boys was an indication that could lead to less enjoyment, less confidence and less interest in learning using computers.

## **Conclusion**

The finding that views on usefulness of computers differed by gender was consistent with other studies elsewhere on gender disparities. However, the nature of the computer curriculum used at this level of schooling, seemed to have an influence on the usefulness of computers in learning. Boys' more enjoyment in learning using computers with less or no anxiety than girls was also consistent with findings by other researchers. Anxiety found by

this study among girls was related to less enjoyment (than boys) that could lead to less confidence and interest in learning using computers.

Though gender differences existed in usefulness, enjoyment and anxiety, there were indications that students had the opportunity to work independently, discover and create knowledge. It was also realized from the findings that provision of equal facility to both sexes in the same classroom environment could not necessarily mean equal access opportunities to learning.

While the findings of this study could not be generalized to reflect gender attitudes in all schools, it was felt that attention should be drawn to the following for further study: (i) the nature of computer studies curriculum that targeted particular content areas where learners could identify as useful, (ii) exploration of areas (in computer studies content) that could motivate students (especially girls) to enjoy learning using computers, (iii) teaching using computers that involved particular activities and exercises (from identified content areas) that could motivate girls to feel comfortable in learning and enjoy computer lessons without anxiety and (iv) exploration of girls' learning styles, attitudes, and behaviors in class.

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