

Gender Differences in Academic Self-Concept among Standard Seven Pupils Using Learning Strategies in the Use of Information Communication Technology in Bungoma County, Kenya

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Received: June 8, 2021 Accepted: December 23, 2021 Online Published: December 31, 2021

doi:10.5539/nct.v6n2p22

URL: <https://doi.org/10.5539/nct.v6n2p22>

Abstract

Despite introduction of Information Communication Technology in schools by Government of Kenya, minimal research has been done on influence of learning strategies in information communication technology use on academic self-concept of pupils. Academic self-concept has a reciprocal relationship with academic achievement. Poor trends in academic achievement are associated with pupils' low academic self-concept as an outcome of continued use of traditional learning strategies. This may be alleviated by use of information communication technology in the learning process. The purpose of the present study was therefore to investigate gender differences in academic self-concept among pupils using learning strategies in the use of information communication technology. Multimedia Learning Theory, Collaborative Learning Theory and the Self Theory of Personality Development formed the theoretical framework of the study. A causal comparative *ex post facto* research design was used. The study employed mixed methods research by integrating qualitative and quantitative research. The study was done in Bungoma County. The target population was Standard Seven pupils in public primary schools in Bungoma County. A sample of 375 pupils was involved. Purposive sampling was used to select schools with computer program as treatment group and simple random sampling for schools using traditional learning strategies as comparison group. Independent and dependent variables were learning strategies and academic self-concept (measured in 3 dimensions) respectively. Data was collected through an adapted questionnaire with Academic Self-concept Scale and Learning Strategy Rating Scale for learning strategies. Oral interviews and non-participant overt observations were used to collect qualitative data from pupils and teachers who handled learners in the laptop computer programs. The reliability and validity of the instruments was established through a pilot study in 2 sampled schools which were not included in the main study. Data management and analysis was done using both inferential and descriptive statistics using Statistical Package for Social Sciences program. Pearson product moment correlation and t-test were used for inferential statistics. Results showed that there were no significant gender differences in academic self-concept among pupils using traditional learning strategies and those using learning strategies in the use of ICT ($t=1.151$, $t=1.03$, -1.494 $df=168.191$, 182.979 and 165.341 , $p> 0.05$ and $(t= 1.422$, -0.178 and 0.386 , $df=178.3$ $94,180.903$ and 175.616 , $p> 0.05)$ for treatment and comparison groups respectively. Recommendations for adoption of learning strategies in information communication technology use in classroom teaching and learning, policy development in education and curriculum development were made. Further research using pre-test and post-test experimental design with control group using samples at other levels of education and on individual subject academic self-concept was recommended.

Keywords: gender, academic self-concept, learning strategies, information communication technology

1.1 Introduction

Academic self-concept is defined as student's self-perception of academic ability formed through individual experiences and interactions with the environment (O'Mara et al., 2006; Valentine et al., 2004). It relates to how well one learns or how well one does at school. Understanding ASC is vital in the learning process because it is a predictor of academic achievement and academic behaviour (Mohan & Abebech, 2009). Nyagah (2016) found that

ASC is a good predictor of academic achievement. Improving academic performance is the main goal of educational institutions globally. ASC can be influenced by learning strategies among other factors. Learning strategies (LS) are steps taken by learners to enhance their learning. A learning strategy is an individual's approach (organization and skills) to complete a task. All that learners do to accomplish learning tasks are LS. Utilisation of Information Communication Technology (ICT) in the learning process like use of computers has specific learning strategies that involve manipulation of the digital devices like laptops. Hong Shi (2017) found that the more learning strategies a learner uses, the more the learner feels confident, motivated and self-efficacious. The three variables are part of or related to academic self-concept (ASC). It can be detected that learning strategies can influence or be associated with changes in ASC which can be measured through academic confidence, perception of achievement and capability. Theoretically, positive ASC is a good recipe for increased academic achievement which is the ultimate goal of any learner in a learning institution. This means that learners who have positive views of their academic abilities are more likely to engage in activities that promote academic achievement. Such achievement related activities include; early preparation for tests, completing homework and actively participating in class during lessons (Valentine et al., 2004).

According to Kwena (2007), learners should be equipped with skills to enable them feel good about themselves cognitively, socially, physically and emotionally. It was observed in the same research that self-confidence and positive self-image (self-concept) helps learners make proper judgments when faced with social and academic challenges. Research on self-concept or the perceived competence also shows that among the students of the same capability, those with low-academic self-concepts are not persistent enough (Fredrick et al., 2012).

From the definition, academic self-concept is determined by individual experiences and interactions with the environment. Learning environment is a factor influencing learning and learning outcomes. Use of Information Communication Technology (ICT) like use of laptop computers or other digital devices is one of the factors in the environment that are responsible for ASC, especially for learners who hardly access computers for academic use. Use of ICT is a motivating factor to such learners, which increases academic self-efficacy. Academic self-efficacy, a component of ASC, refers to individuals' convictions that they can tackle a task or assignment successfully to some predetermined levels (Bong&Einar, 2003). In the current times, use of ICT has found a place in education, especially the use of computers in the learning process. Computer programs for classroom instruction and simulations are now available for learning institutions in various subjects in schools. Laptops and other digital learning devices are being used as learning tools.

Similarly, research suggests that enriching learning environment with ICT devices especially laptops and other digital learning devices like tablets, has positive effects (National Research Council, 2002). These positive effects will include academic achievement and academic self-concept. Such research results propelled the USA Federal Government to inject six billion dollars in educational technology to obtain high academic achievement in the years 2003 and 2004 (Johnson, 2004). This government recognized the potential of educational technology to enhance learning outcomes. A technologically-rich learning environment influence academic self-concept of learners. Continued research on how learners use the mobile technology like use of laptops and their effect on learning outcomes like academic self-concept is necessary.

Learners use computers like laptops in various ways. Some gain confidence or are motivated when working alone on the computer (individual-child learning strategy), others are motivated when they work with fellow learners (child-to-child learning strategy), while others gain confidence when working with a teacher around them (child-teacher learning strategy). These are learning strategies used by learners with ICT tools. The present study considered the influence of learning strategies in ICT use on academic self-concept among pupils in primary schools. Their academic self-concept was studied comparatively with those using traditional learning strategies where there no laptops or ICT in class.

Bick (2005) found that learners who made use of ICT tools like laptops as learning devices were found to think at higher levels, work together more and become much more involved in the learning process. This depicts increased academic confidence which is a component of academic self-concept. Working together in class means collaboration during the learning process, which is a child-to-child (CTC) learning strategy. Involvement in the learning process includes engagement with tutors and individual learning which is a description of child-teacher learning strategies and individual learner learning strategies. While this research was done in the USA, similar research could be done in other areas like Kenya, where the present study considered as the locale, to test the same influence of learning strategies in ICT use on academic self-concept of pupils.

One Laptop Per Child program was launched to support children in learning around the world especially those from developing countries. This program developed cheaper laptops that has enabled thousands of learners especially those from developing countries to access technology for learning. The program has greatly promoted the learning process (Warschauer, Shelia, & Cotton, 2012). Based on this approach, the present study considered the influence of use of such laptops as an ICT tool on pupil's academic self-concept.

The child-teacher, child-to-child and individual-child learning strategies are exposed in constructivist approach. This approach basically involves teachers inviting learners' questions and ideas, welcoming and motivating them to take initiative. In this constructivist approach, students are encouraged to take leadership, seek information and present ideas. Teachers in this approach, align their teaching pedagogies with students' background, aspirations and needs. This depicts a child-teacher learning strategy which the present study has considered.

Other principles of constructivism include; instructors using printed information and subject experts, encouraging learners to and inviting student questions and answers. This depicts the child-teacher learning strategy which was considered in the present study. Learning outcomes such as ASC as manifestation of learning are studied in the process.

Similarly, the relationship of such kind of approach to learning with academic self-concept of learners can be considered for further investigation in different populations. OLPC principles of connectivity and saturation are in line with constructivism and OLPC interest of technologically driven change. If all children have these tools in their hands and they can communicate with one another, ICT organizations project a massive shift in skills, competencies, creativity and innovations among population in a short while. When learners are given time to interact with ICT devices, child-to-child, child-teacher or individual learning strategies are involved, that calls for further inquiry.

Kenya and Rwanda have partly adopted computer programs in schools. Rwanda has deployed over 110,000 laptops to over 400 primary schools. OLPC Kenya includes a number of small deployment communities including Asilong in West Pokot, Kibwezi, Mombasa-North, Nairobi, Bungoma and East-Coast project near Lamu (OLPC Rwanda, 2012).

Areepattamanni and Freeman (2008) posit that academic self-concept has the greatest potential of being directly influenced by the regular class room teacher and should therefore be of main concern. The interaction between the teacher and the learner is a factor that influences ASC and it is also a learning strategy used by learners in the learning process. The present study investigated influence of learning strategies in the use of ICT on pupils' on ASC.

One of the learning strategies considered in the present study is child-teacher learning whose influence on ASC was investigated. A high academic self-concept influences academic behaviours and choices, educational ambitions and the consequent academic achievement (Marsh, 2002). Parents and teachers are therefore charged with the responsibility of building the learners self-concept irrespective of their academic abilities by acknowledging each learner's positive aspects. Identification and development of talent in whichever area the child is strong in, builds a positive self-image for academically weak learners. The classroom teacher therefore, has a greater role to play in ensuring that each individual learner's confidence is elevated by raising his/her academic self-concept. This child-teacher interaction and its influence on ASC were considered in this study.

The use of computers or ICT tools provides a rich environment for learning. Researchers like Trautwein, Lüdtke, Kastens, & Koller (2006) found that learners with higher ASC were likely to choose more sophisticated learning or educational environments and show greater effort in dealing with learning tasks which may lead to students' overall satisfaction. These learning outcomes are due to academic confidence which is a component of academic self-concept. Direct relationship between the learning strategies and academic self-concept can be investigated in a different locale just like is the case in the present study.

Ilomaki (2008) in a study on effects of ICT on school; teachers' and students' perspectives found that learning projects became student-centered and many of the ICT-based innovations involved multidisciplinary and collaborative projects. The teacher's role changed from that of primary source of information to one who creates structure and provides advice for students, monitors their progress, assesses their accomplishments, and works as a coach. This has a lot of influence on learning outcomes like ASC. That is child-teacher learning strategy in the use computer or ICT that was investigated in the present study. In the same study, students' role changed, they were engaged in general and/or online inquiry, and in productive learning which developed their sense of capability and

collective cognitive responsibility (Lakkala et al., 2007). The nature of the teacher's role has impact on the student's role and students learning outcomes which includes academic self-concept.

McInerney, Rebecca, Magdalena and Amy (2012) found that academic self-concept, learning strategies, and academic achievement have reciprocal relationships with each other among high school students. The study did not include the use of ICT tools like laptops. The current study focused on the influence of learning strategies on academic self-concept in the use of laptops as ICT tools.

In Kenya, Computer For Schools Kenya (CFSK) sourced over 120,000 personal computers that have been deployed in over 8,500 Public Secondary and Primary Schools, Technical Training Institutes, Teacher Training Colleges, Medical Training Centres and several Universities (CFSK, 2014). Little research has been done on the influence of the use of these computers through learning strategies used by learners on the academic self-concept.

Odera (2011) found that in suburban schools in Kenyan secondary schools, the use of computers have really increased students desire to learn. They are very motivated and this enables them to learn and understand difficult science topics. Motivated learners show a positive effect of use of ICT on ASC of learners. While this study was done among secondary school students, the current study focused on primary school pupils in Standard Seven, specifically in Bungoma West Sub-county. The study by Odera (2011) did not also focus on specific influence of learning strategies in the use of the computers on academic self-concept, which is the main focus of the present research.

In Bungoma County, some public primary schools in Bungoma West sub-county, pupils in Standard Five, Six, and Seven have been using laptops as a learning tool since the year 2011. The schools in conjunction with One Laptop Per Child (OLPC) Foundation had laptop program for school. Laptops were available in schools, Teachers were trained to teach and help learners to access and use the digital devices. Pupils access and use laptops to supplement and complement the available teaching and learning aids to enhance learning. Formal curriculum activities from Kenya Institute of Curriculum Development in the various subjects were installed on the laptops for access and use by the pupils. The current research considered influence of learning strategies in the use of these laptops on Standard seven pupils' academic self-concept. Rural primary schools in Bungoma County are a representative of such schools in other counties in Kenya. Most primary schools in rural areas in Kenya have not infused ICT in the learning process sticking on traditional learning strategies. Majority of these schools perform dismally as is the case in Bungoma West Sub-county. For comparability, it is good to note that, all pupils or students in a particular level of education in Kenya go through the same curriculum and teachers who are the main curriculum implementers have undergone a similar training. With the laptop program in the schools, research on learning strategies in the use of laptops or ICT tool and their influence on pupils' ASC may be beneficial to stakeholders in Education.

Bungoma West Sub-county has witnessed dismal academic performance in Kenya Certificate of Primary Education (KCPE) for many years despite efforts made by stake holders to alleviate the situation. This dismal performance is associated with low ASC among other factors. KCPE mean scores for the Sub-county for previous five years when the study was done are: 230.28 in 2010, 230.78 in 2011, 238.18 in 2012, 239 in 2013 and 233 in 2014 out of a total of 500 marks (DEO, Bungoma West Sub-county Office). This is an average of 234.248 which is way below average. Knowledge on ASC and learning strategies as considered by the present study may contribute to necessary adjustments in the learning process for better academic performance.

1.2 Statement of the Problem

Low Academic self-concept of pupils in Bungoma West Sub-county is associated with poor performance of primary schools in Kenya Certificate of Primary Examination (KCPE) in Bungoma West Sub-County witnessed over time. Other indicators of low academic self-concept in the Sub-County apart from academic performance are: absenteeism, high dropout rates, repetitions, poor retention, poor transition and low completion rates (Bungoma West Sub-county Education Office). This low academic self-concept of for both boys and girls is also associated with continued use of traditional learning strategies (where there is lack of or minimal use of ICT) by learners. According to Nyaga (2016) academic self-concept is a predictor of academic achievement among boys and girls in school. Similarly, Guay, Ratelle, Roy and Litalien (2010) reported that students perceiving themselves as academically competent obtained higher grades because their academic self-concept led them to be automatically motivated in school. Based on this studies, improving academic self-concept will have commensurate improvement in academic performance. Use of ICT digital devices is motivating factor that can influence ASC.

As the world advances technologically, some areas like Bungoma West Sub-County lag behind in the use of ICT in the learning process. The Sub-county rural public primary schools are a representative of majority of such schools in the rest of Bungoma County and Kenya as a whole. The schools hardly access ICT devices like laptops for use in the learning process. The continued use of traditional learning strategies in the Sub-County is associated with pupils' low academic self-concept among primary school pupils which is reflected in low academic performance among other indicators. Pupils with low academic self-concept lack the motivation to work hard and excel in academic work. This will mean most pupils will not do well in examinations and secure chances in good secondary schools or miss out completely.

Pupils also experience psychological disturbance and low self-esteem due to the poor results they get every year. It was hypothesized that use of ICT like laptops in the learning process will lift the low academic self-concept among pupils in the Sub-county. This will help them strive to excel in class.

More research is required to focus on the influence of use of ICT in the learning process on the academic self-concept of the learners. Therefore this study intends to find out the influence of learning strategies in ICT use on academic self-concept among Standard Seven primary school pupils in Bungoma West Sub-county. Knowledge from the study may help stakeholders in Education to make necessary adjustments in content delivery in the Sub-county for better results in academic performance and finally improved competitiveness in national examinations.

The purpose of the study was find out gender differences in academic self-concept among Standard Seven pupils using learning strategies in the use of ICT in Bungoma County. The study therefore sought to find out if there were gender differences in ASC after use of learning strategies in ICT.

Objective of the study were to test if there are any gender differences in academic self-concept among pupils using traditional learning strategies (comparison group) and those using learning strategies in the use of ICT (treatment group).

1.3 Theoretical and Conceptual Framework

Three theories guided the study. Cognitive Theory of Multimedia Learning by Richard Mayer. It is based on a principle known as the "multimedia principle" which states that people learn more deeply from words and pictures than from words alone (Mayer, 2001). Collaborative Learning which explains situations where two or more individuals attempt to learn or learn together. The third theory was Self Theory by Carl Rogers (1959) and other humanistic theorists. According to this Self Theory, a person's concept of self comprises of four inter-related self-perceptions: the perceived self, the ideal self, one's self esteem and a set of social identities. Each of the elements plays a critical role in energizing, directing, and sustaining an individual's organizational behaviour.

Conceptual Framework

The conceptual framework showing the relationship between variables can be visualized diagrammatically as shown in Figure 1 below.

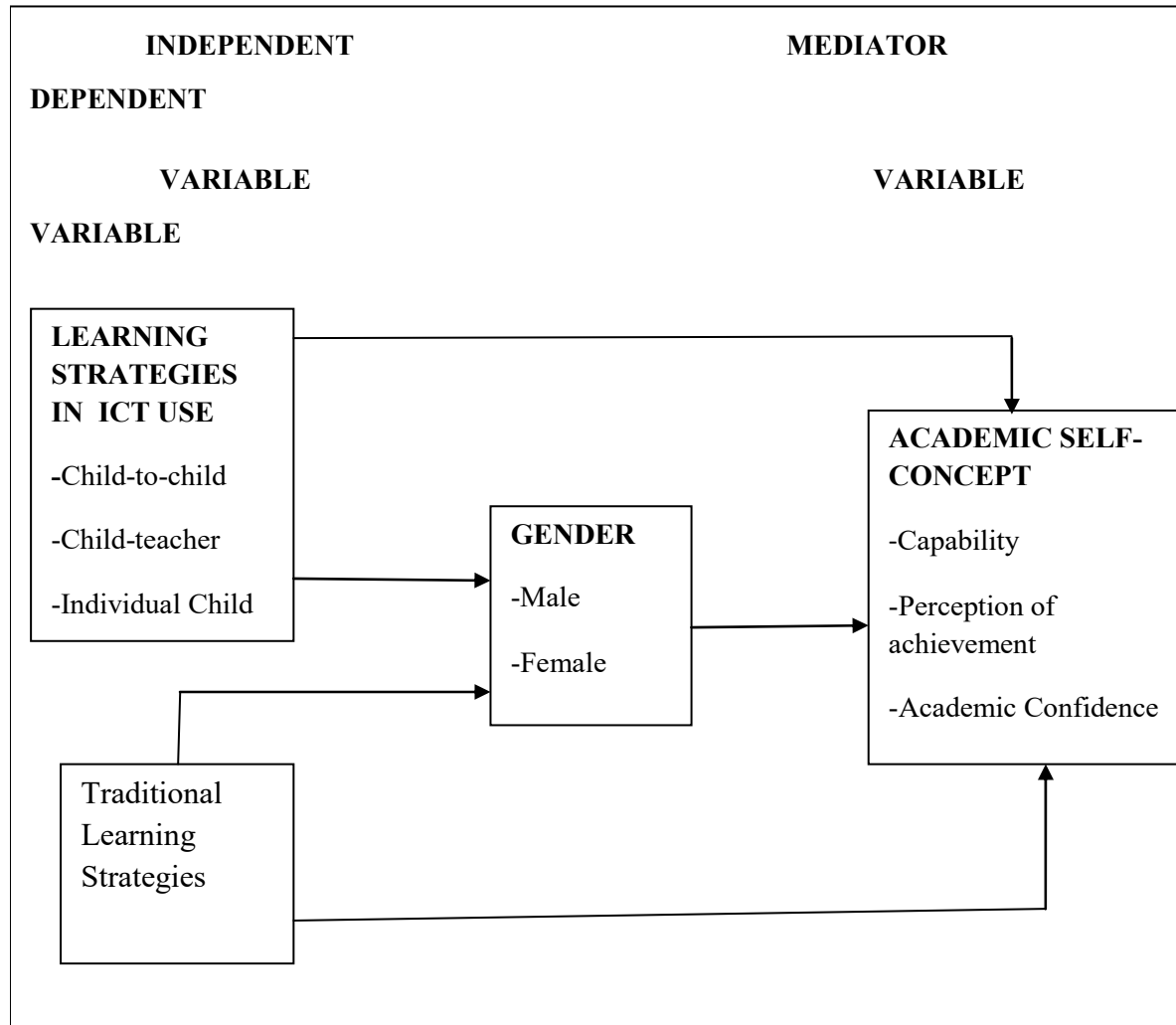


Figure 1. Relationship model of learning strategies and academic self-concept

Figure 1 presents study variables and the anticipated relationships. Learning strategies in the use of ICT (child-to-child, child-teacher and individual-child) and traditional learning strategies used by learners have been identified as independent variables. Academic self-concept is the outcome or dependent variable. Gender may also cause influence on the academic self-concept and is a mediator variable between learning strategies and the academic self-concept. Girls and boys may differ significantly in the use of ICT and therefore have different levels of influence on their academic self-concept.

1.4 Review of Related Literature

Gender differences in ASC among comparison and treatment groups

Lippa (2005) posited that gender differences do not take place in a vacuum but they happen in a social context. Different social and educational contexts may presuppose different gender relations and roles. Considering that most studies on gender differences have been conducted in industrialized countries, one cannot assume the validity of their findings in culturally diverse communities. An investigation of gender differences in ASC in a specific culture can bring out more understanding of the concept like in the present study. Students' academic behaviour and achievement are known to be associated with their motivation and self-concept (Craven, Marsh & Burnett, 2003; Marsh & Craven 2006; McInerney & Ali, 2006).

A study by Jansen, Schroeders and Ludtke (2014) investigated how ASC was linked to academic achievement and gender differences. Data was analyzed from self-concept measures, grades and standardized achievement tests using structural equation modeling. The sample comprised of 6,036 German 10th graders offering three science subjects- biology, chemistry and physics. Among others the results indicated that; (a) the associations between the

self-concept and achievement are substantial and subject specific and (b) female students possess an inferior academic self-concept in chemistry and physics. In current investigation, the researcher sought to test the gender differences in ASC in the context of ICT and traditional learning strategies in a culture specific environment, in one grade level (Standard Seven).

Le Grant (2016) investigated gender differences in academic self-concept and achievement in Maths and Reading among elementary school-aged students. The researcher examined within group and between group differences in ASC among boys and girls. The study used archival data of 104 students in the third through the sixth grades, enrolled in a rural elementary school in Arizona. Approximately half of participants were male and half were female.

Data were collected via file reviews for gender, demographic, and Terra Nova reading and math achievement scores. Survey research procedures were also utilized via questionnaires to collect self-concept data, using math and reading composite self-concept variables from the Self-Description Questionnaire, developed by Marsh (1990). Bivariate and multivariate statistical procedures were used within a correlational design, with *t* test, repeated-measures ANOVA (RM-ANOVA), and hierarchical multiple regression analysis (MRA) procedures.

Results of dependent-samples *t* tests demonstrated no significant differences in math and reading self-concepts or achievement scores for boys. Among girls, the only significant mean-level difference was found in higher reported reading self-concept scores, than math self-concept scores. Girls did not, however, exhibit significantly higher reading than math achievement scores. Results of RM-ANOVA procedures revealed no significant differences between boys and girls in the domains of reading and math achievement. Similarly, no significant differences were obtained between boys and girls in either domain (math or reading) of self-concept. This study is a suitable review for the current study since ASC is the research variable as well as gender differences being examined. The two variables were investigated in the current study. Data analysis methods used in this study like *t*-test and ANOVA were also used in the current study as well as data collection instruments and methods i.e use of self-description questionnaires and interviews.

A study by Yeung (2011) posited that students' self-concept and effort in school work had a significant influence on essential academic outcomes, though self-concept and effort may decline as students grow up. His research examined the potential differences between boys and girls in primary and secondary schools using a multi-cultural Australian sample of 3rd to 11th graders in Sydney. Participants from 16 schools (N=2,200) rated themselves on academic self-concept and effort in school work.

Confirmatory factor analysis and repeated-measures of ANOVA found that: a) for all 42 variables, scores were lower for higher graders; b) boys were lower in effort; c) for effort, gender differences favouring girls in primary became negligible in higher secondary education and d) differences between primary and secondary tended to be greater for girls. This being a longitudinal study involving comparison between primary and secondary school students in a developed country, there was need to conduct a one day study using only class 8 pupils in non-formal primary schools.

In Africa, Musa and Bakari (2013) studied the relationship between academic self-concept and academic achievement in which gender differences in ASC were investigated among Junior High School students in Ghana, both in rural and urban schools. The sample comprised of 756 male and 714 female Junior High School students, randomly sampled from 24 schools using stratified sampling. Two research instruments were used namely, achievement tests and academic self-concept questionnaire consisting five-point Likert scale with a Cronbach Alpha reliability coefficient of 0.80. Pearson product moment correlation coefficient and *t*-test were used in data analysis.

Results showed that there were no statistically significant differences in ASC between male and female students. There were also no statistically significant differences in ASC between students from rural and urban schools. The study adopted a correlational ex post facto research design. The current study adopted a similar study but with a criterion group resulting into causal comparative design. Data analysis methods used this review; *t*-test and Pearson product moment correlation coefficient were also suitable for the current study. There were no laptops or computers used in the learning process, it is therefore assumed that that learners used traditional learning strategies only. Sample size was a little larger than for the current study. While the study was done in Junior elementary High schools, the current study was done in senior primary schools in a rural area setting.

In Kenya, Were, Indoshi and Yalo (2010) investigated gender differences in self-concept and academic achievement among the visually impaired pupils in Maseno in Western Kenya. The study variable measured included general, ASC and subject specific self-concept. Stratified random sampling technique was used to draw a

sample of 262 respondents (152 males and 110 females). It included 152 in special schools, 82 in integrated programmes and 28 in inclusive programmes. Analysis of Variance (ANOVA) was used to analyze data at ≤ 0.05 level of significance. The t-test was used to establish gender differences. The study found out that there were gender differences in self-concept and academic achievement among visually impaired pupils in Kenya. Females performed better in self-concept as compared to males with a mean of 56.40 (SD=4.64) while the males score was 54.43 (SD=4.51). The study did not consider academic self concept which this study focused on.

In academic achievement the females still performed better than the males. The mean achievement for the females was 60.86% while the male was 57.85%. The study also confirms that there is a positive direct relationship. Since boys exhibited lower self-concepts, the study therefore recommends an early intervention through counseling with the view of helping them to accept their disability. Since this was done without application of ICT, traditional learning strategies were used in the learning process. The same variables could be tested when ICT is introduced in the context.

2. Methodology

A causal comparative research design was employed. It is a form of *ex post facto* design apart from correlation type to investigate cause-effect relationship where manipulation of variables is not permitted (Shadish&Cambell, 2002). Standard Seven pupils from primary schools that were using learning strategies in the use of ICT in Bungoma West Sub-county constituted the treatment group and the comparison group was pupils from primary schools in the same locality who didn't have the laptop program. Learning strategy was the independent variable (IV) while learner's academic self-concept was considered as the dependent variable (DV). The study was carried out in Bungoma West Sub-County in Bungoma County, Kenya. The target population in the study was Standard Seven pupils in public primary schools in Bungoma County. Therefore the population was approximately 5600 pupils. Purposive sampling to select Sub-county and simple random sampling for selecting respondents techniques were used. A sample size of 375 pupils were selected through the process of simple random sampling. 189 pupils came from four schools taking part in the OLPC project and 186 pupils from four schools not covered by the project from the same Sub-county, one school from each group had been involved in the pilot study (Table 1).

Table 1. Sample Size

Population type	Target pop.	Sample	Boys	Girls
Treatment Group (4 schools)	2812	189	93	96
Comparison Group (4 schools)	2750	186	93	93
Total (8 schools)	5562	375	186	189

Source: Bungoma West Sub-County Education Office

The main research instrument used in the study was a questionnaire with Academic Self-Concept Scale (ASCS) which was adapted to suit the study. Learning strategies were measured by Learning Strategy Rating Scale (LSRS). Structured interview and observation guides were used to collect qualitative data from teachers and students in the treatment group. Before the main study, the researcher did a pilot study. Two schools were involved; one from the control and another from treatment group. 30 pupils from each school were selected randomly to take part in the pilot study. Content and construct validities of the instrument were established through discussion of the contents and by seeking expert judgment from Department of Educational Psychology, Kenyatta University. Reliability of the instrument was established through the test-retest method during the pilot study and the correlation coefficient established adjustments on the instruments were done accordingly. Results of the pilot study were analysed and tabulated as shown in Table 2 below

Table 2. Results of the reliability coefficient pilot study in treatment and comparison groups

Variable	No. of respondents		Pearson
	Control group	Treatment group	
Learning strategy (IV)			
LSRS for pupils with laptops	-	40	.78
LSRS for pupils without laptops	40	-	.80
ASC Questionnaire (DV)			
Perception of achievement	40	40	.72
Capability	40	40	.75
Academic confidence	40	40	.84

2.1 ActualData Collection

Data collection was done through questionnaires, interviews and overt observation in classrooms. Questionnaires were administered to the respondents who filled them. A total of 18 teachers were interviewed. All interviews were audio-taped and transcribed. Each laptop classroom was observed on four different occasions. The control group classes were observed twice.

2.2 Data Analysis

Data analysis followed a series of steps for easy reading and complete discussion as recommended by Creswell (2009) in research tips. Items from the questionnaire were arranged and grouped according to particular research questions and objectives. The data was coded, entered into computer and gleaned for analysis through Statistical Package for Social Sciences (SPSS), a computer program for testing major inferential research hypotheses of the study. The researcher established distinct relationships among variables using Compare Means, Pearson product moment correlation coefficient and t-tests. Data from classroom observations and teacher interviews were first transcribed and analysed thematically according to the objective.

The study was guided by null hypothesis; H_0 : There is no significant gender difference in academic self-concept in both learning strategies in the use of ICT and traditional learning strategies. T-test of independent samples statistic was use for analysis. Logistical andethical considerations and steps were made by obtaining a letter of approval from Kenyatta University Graduate School through the Department of Educational Psychology and Permission sought from National Commission for Science, Technology and Innovation (NACOSTI). The respondents did not meet any cost.No respondent was coerced to give answers. A written consent from the participants was obtained before commencement of data collection. Confidentiality was observed.

3. Results, Interpretation and Discussion

3.1 General Information

A high return rate of questionnaires of 98.4% was reported because the researcher collected the questionnaires immediately after administration. A sample of 375 student questionnaires was expected but 369 were actually used in the analysis because six questionnaires did not have a consistent trend of data.

Table 3. Return Rate according to experimental groups

	Frequency Percent	
Treatment group (TG)	186	50.4
Control group (CG)	183	49.6
Total	369	100.0

From Table 3, there were slightly more than half (50.4%) of the respondents in treatment group, sampled from schools with laptop program. Respondents in the comparison group were slightly less than half of the sample (49.6%), sampled from schools without laptop program (who used traditional learning strategies) in the same sub-county

Return rate according to gender was also made as shown in Table 4.

Table 4. Return rate according to gender

	Frequency	Percent
Female	189	51.2
Male	180	48.8
Total	369	100.0

In general, Table 4 shows that more than half of the respondents were female (51.2%) and their male counterparts constituted slightly less than half (48.8%).

3.2 Results of the Study

The results of study were presented in line with objective of study

Gender differences in ASC among treatment and comparison groups

a) Descriptive statistics of gender differences in academic self-concept

Academic self-concept questionnaire had three sections or sub-scales namely capability, perception of achievement and academic confidence items. Pupils rated themselves depending on the degree of agreement as *strongly agree*, a score of 5, *agree* a score of 4, *not sure* a score of 3, *disagree* a score of 2, *strongly disagree* a score of 1. The scores were analysed according to gender and the ASC sub-scales or dimensions.

Results of descriptive statistics of ASC by gender are summarized in Tables 5, 6, 7, 8, 9 and 10 below according to treatment groups and the three dimensions or sub-scales of ASC.

Table 5. Gender differences in capability dimension of ASC of pupils using learning strategies in ICT

Gender	N	Min	Max	Range	Mean	SD	SE	Skewness	Kurtosis
Female	96	2.45	4.55	2.10	3.4859	.45200	.04613	.365	-.079
Male	90	2.35	4.95	2.60	3.5539	.50848	.05360	.622	.785
Total	186	2.35	4.95	2.60	3.5188	.48006	.03520	.531	.499

Note. N- Number of respondents per given gender, Min-Minimum, Max-Maximum, SD- Standard Deviation, SE- Standard Error.

From the results in Table 4.27, the mean score for capability dimension of ASC for boys is 3.5539 (SD=0.5085) and that of the girls stands at 3.4859 (SD=0.45200). Therefore boys using ICT have higher mean score of capability than girls who use learning strategies in use of ICT though the latter's scores are more homogeneous having range of scores as 2.10 and 2.60 for girls and boys respectively. The results indicate that boys have a higher sense of capability than the girls. The negative kurtosis observed among girls' scores indicate that their scores were highly dispersed around the mean unlike boys who had positive kurtosis which indicates that their scores were close to a normal distribution. The positive skewness for both boys and girls show that majority of the scores for both gender were below the mean though closer to normal distribution.

Table 6. Gender differences in capability dimension of pupils using traditional learning strategies (comparison group)

Gender	N	Min	Max	Range	Mean	SD	SE	Skewness	Kurtosis
Female	93	2.05	4.60	2.55	3.3720	.47938	.04971	.087	.368
Male	90	2.15	5.00	2.85	3.2783	.41068	.04329	.561	3.158
Total	183	2.05	5.00	2.95	3.3260	.44816	.03313	.310	1.257

Note. N- Number of respondents per given gender, Min-Minimum, Max-Maximum, SD- Standard Deviation, SE- Standard Error.

As observed in Table 6, girls using traditional learning strategies had a higher mean score of 3.3720 (SD= 0.4793) on capability rating than their boys counterparts who have a mean score of 3.2783 (SD= 0.41068). The range of the boys' scores was higher than that of the girls. Skewness and kurtosis of the data are positive meaning the scores are clustered around the mean and very close to normal distribution.

Table 7. Gender differences in academic confidence of pupils using learning strategies in the use of ICT

Gender	N	Min	Max	Range	Mean	SD	Skewness	Kurtosis
Female	96	2.20	5.00	2.80	4.0667	.63223	-.573	-.048
Male	90	2.00	5.00	3.00	4.1744	.61252	-.819	1.157
Total	186	2.00	5.00	3.00	4.1188	.62343	-.681	.416

Note. N- Number of respondents per given gender, Min-Minimum, Max-Maximum, SD- Standard Deviation, SE- Standard Error.

Table 7 shows that mean scores of academic confidence among pupils using ICT strategies is quite high though boys have a slightly higher mean score than girls i.e 4.0667 and 4.1744 for girls and boys respectively. Homogeneity of academic confidence scores of both gender is almost equal for both gender with boys having a slightly higher range of scores (2.80 and 3.0 for girls and boys respectively). A negatively skewed distribution of scores observed shows that majority of scores are above the mean. This implies that both boys and girls had high academic confidence associated with the use of laptops in school. Academic confidence of the girls' scores were more dispersed from the mean than boys since they had a negative skewness making the distribution of girls' scores more platykurtic.

Table 8. Gender differences in academic confidence of pupils using traditional learning strategies (comparison group)

Gender	N	Min	Max	Range	Mean	SD	SE	Skewness	Kurtosis
Female	93	2.00	5.00	3.00	3.8032	.62909	.06523	-.608	-.005
Male	90	1.60	5.00	3.40	3.7644	.72613	.07654	-1.092	1.513
Total	183	1.60	5.00	3.40	3.7842	.67695	.05004	-.908	1.022

Note. N- Number of respondents per given gender, Min-Minimum, Max-Maximum, SD- Standard Deviation, SE- Standard Error.

As observed in Table 8, results indicate that girls had a higher mean score of 3.8032 (SD=0.62909) of academic confidence than boys whose mean score stands at 3.7644 (SD=0.72) for pupils without laptops. In addition, girls scores were more homogeneous than boys with a range of 3.0 and 3.40 for girls and boys respectively. The distribution of scores for both male and female pupils had negative skewness meaning majority of the academic confidence ratings were above the mean. This means that majority of pupils rated themselves highly on academic confidence scale. Boys had a positive kurtosis implying that their scores were leptokurtic, clustering around the mean. Girls' score had negative kurtosis meaning that the distribution was more platykurtic i.e spread further from the mean.

Table 9. Gender differences in perception of achievement dimension of ASC among pupils using ICT

Gender	N	Min	Max	Range	Mean	SD	SE	Skewness	Kurtosis
Female	96	2.00	5.00	3.00	3.9229	.65172	.06652	-.296	-.350
Male	90	2.00	5.00	3.00	3.8256	.65815	.06937	-.847	.533
Total	186	2.00	5.00	3.00	3.8758	.65488	.04802	-.560	.134

Note. N- Number of respondents per given gender, Min-Minimum, Max-Maximum, SD- Standard Deviation, SE- Standard Error.

Table 10 shows that girls had a higher mean score of perception of achievement than boys among pupils using laptops or ICT. The mean scores are 3.9239 (SD=0.65172) and 3.8758 (SD=0.65815) for girls and boys respectively. Both boys and girls have the same range of 3.00 and almost equal standard deviations. This implies that the level of spread of scores is almost equal for both boys and girls. The negative skewness observed in the results indicates that majority of the score were above the mean away from a normal distribution.

The distribution of girls' scores has negative kurtosis while that of boys has positive kurtosis. That means the former is platykurtic, that is, scores are stretched further from the mean while the latter is leptokurtic with scores concentrated around the mean due to extreme scores.

Table 10. Perception of achievement dimension of ASC of pupils using traditional learning strategies (comparison group)

Gender	N	Min	Max	Range	Mean	SD	Skewness	Kurtosis
Female	93	2.00	4.80	2.80	3.6022	.68175	-.422	-.709
Male	90	1.40	5.00	3.60	3.6200	.67511	-.741	.862
Total	183	1.40	5.00	3.60	3.6109	.67668	-.572	.006

Note. N- Number of respondents per given gender, Min-Minimum, Max-Maximum, SD- Standard Deviation, SE- Standard Error.

Results in Table 10 show that boys have a higher range of scores of 3.60 compared to girls with 2.80. It means boys' scores have higher variation or amount of spread than girls showing that the former has a more homogeneous distribution of scores. It is also observed that there is very little difference in mean scores between boys and girls, that is, 3.6022 for girls and 3.6200 for boys. This implies that boys and girls have almost equal levels of perception of achievement among pupils using traditional learning strategies. Scores for both boys and girls have negative skewness. It shows less normality for both distributions and majority of the scores lie above the mean score. Negative kurtosis of scores of girls in Table 4.31 shows that the distribution was more platykurtic, i.e. spread away from the mean while the positive skewness of boys' score indicate that the distribution is leptokurtic, meaning majority of scores are concentrated near the mean.

b) Testing of null hypothesis

H_0 There is no significant gender differences in pupils' academic self-concept among those using traditional learning strategies and those using learning strategies in ICT use.

To test this hypothesis, two supplementary hypotheses were developed;

$H_{01.1}$ There is no statistically significant gender differences in academic self-concept among pupils using learning strategies in ICT.

$H_{01.2}$ There is no statistically significant gender differences in academic self-concept among pupils using traditional learning strategies

In order to test for any significant gender differences among pupils using ICT, data collected from respondents was subjected to t-test of independent samples for analysis. Results are as recorded in Table 11 below.

Table 11. Results of t-test of independent samples of gender differences in ASC among pupils using learning strategies in the use of ICT

ASC Variable	t	df	Sig. (2-t)	95% C.I	
				Lower	Upper
C	-1.151	168.191	.251	-.28024	.07378
PA	1.013	182.979	.312	-.09227	.28699
AC	-1.494	165.341	.137	-.37917	.05250

Note. C- Capability, PA- Perception of Achievement, AC- Academic confidence, df-degrees of freedom, C.I – Confidence interval, ASC- academic self-concept.

Results in Table 11 show that there is no significant gender difference in ASC between boys and girls in all the sub-scales among learners using learning strategies in the use of laptops or ICT at 0.05 significance level: $t=1.151$, $t=-1.03$, -1.494 $df=168.191$, 182.979 and 165.341 , $p> 0.05$, for capability, perception of achievement and academic confidence respectively. These results indicate that ASC mean score for boys and girls is similar. Therefore the null hypothesis is accepted at 0.05 significance level. The implication is that boys and girls have the same level of ASC in ICT use.

To find out if there were any significant gender differences in ASC among pupils using traditional learning strategies in the comparison group as was hypothesized, data collected from respondents was subjected to t-test of independent samples for analysis. Table 13 shows the results.

Table 12. Results of t-test of independent samples on gender differences in ASC among learners using traditional learning strategies

ASC level	t	df	Sig. (2-tailed)
C	1.422	178.394	.157
PA	-.178	180.903	.859
AC	.386	175.616	.700

Note. C- Capability, P- Perception of Achievement, AC- Academic Confidence, df- degrees of freedom, t- t-statistic, Sig.- significance level.

Based on the results in Table 12, there is no significant gender difference in ASC levels among pupils using traditional learning strategies ($t= 1.422$, -0.178 and 0.386 , $df=178.3$ $94,180.903$ and 175.616 , $p> 0.05$) for capability, perception of achievement and academic confidence respectively. This observation implies that ASC mean scores of boys and girls are statistically the same. Therefore the null hypothesis is accepted or is tenable at 0.05 significance level.

3.3 Discussion of the Results

Results from the current study indicate that there were no significant gender differences in academic self-concept among pupils using learning strategies in the use of ICT and those using traditional learning strategies. These results agree with findings by Le Grant (2016) who found that there are no significant gender differences in Mathematics and Reading academic self-concepts among elementary school-aged learners in Sidney, Australia.

An investigation by Musa and Bakari (2013) also agree with the results from the current study. The latter study investigated gender differences in ASC among other variables like academic achievement among Junior High School students in Ghana. In the studies cited, gender does not effectively mediate the learning strategies and ASC. The results of these studies are also linked to the Self Theory of Personality development which posits that, any child whether boy or girl who feels valued based on various social identities, develops a positive self-concept.

The results are similar in both rural and urban schools and even for secondary and primary school levels. This consistency was witnessed in the current study that was done in a rural setting. It is an indication that girls and boys have similar ratings of academic confidence, perception of achievement and capability with or without the use of ICT as long as they are given equal learning opportunities and treatment. It means that both male and female students in Bungoma County do not differ in their views they hold about their academic competence and capabilities. This finding may be attributed to the nature of education system and curriculum in Kenya that provides for equal opportunities for both male and female students.

It shows that both boys and girls are given equal access to school, equal provision of learning materials like ICT equipments and psychological support from parents, teachers and government. This has made both sexes to be competitive, venturesome and open-minded in the pursuit of their educational goals. The support received from teachers and fellow learners is rooted in Collaborative Learning Theory whose model explains that knowledge is created among population when there is collaboration. Population in this case includes both male and female. The traditional, child-teacher and Child-to-child learning strategies include collaboration which affects both boys and girls. The strategies have a strong relationship with ASC in both treatment and comparison groups.

In line with same argument, the present study contradicts results in an earlier study by Nyagah (2016) who found

that there existed gender differences in ASC among non-formal schools in Ruaraka in Kenya in favour of boys. Since the study did not involve computers or any signs of ICT, the learning strategies were mainly traditional just like the control group in the present study.

The present study having been done in a formal setting may have been the source of gender differences in ASC with the study done in non-formal schools in earlier studies. Non-formal schools may not provide equal opportunities for both girls and boys. Boys seem to be favoured in a non-formal environment especially where traditional learning strategies are used. Gender differences in ASC may also arise due to domain specific measures of ASC for example Maths self-concept (Suvillan, 2009). This can be attributed to stereotyping of subjects like Maths for boys and Verbal ability or languages for girls.

Brunner et al. (2009) in a cross-cultural study, evaluated gender differences in terms of point biserial correlations and found contrary results to the present research findings. The results of their study showed a positive correlation indicating that boys had a higher academic self-concept than girls. In a country specific analysis, the results of their study showed that gender differences in academic self-concept varied considerably across countries. The present study was done in one country Kenya and specifically Bungoma County to control for such cultural differences. Similarly, Brunner, et al. (2009) found that boys had a higher mathematics self-concept and girls had higher verbal self-concept. These observed gender differences in domain-specific academic self-concept according to Skaalvik and Skaalvik (2004) are congruent with the gender stereotype explanation proposing mathematics to be a male domain and females to have higher verbal ability.

Results of the current study also contradict findings in an earlier study by Were, Indiosh and Yalo (2010) who investigated gender differences in academic self-concept and academic achievement among the visually impaired pupils in Maseno in Western Kenya. They found that female students had a higher general academic self-concept than male students. The gender differences can be attributed to self-acceptance of the visual impairment of the students.

4. Conclusion and Recommendations

4.1 Conclusion

Results show that there are no significant gender differences in ASC between boys and girls in treatment and comparison groups as hypothesized. Although this finding is contrary to many studies done before, it implies that both boys and girls can improve their ASC provided both are exposed to similar set of learning experiences.

Therefore when stakeholders in education sector endeavor to provide equal opportunities for learning especially use of ICT, girls and boys will tend to have similar levels of academic self-concept. From previous studies, girls only significantly differ with boys in ASC due to variance in cultural experiences, gender stereotyping in specific subjects, non-formal schooling, cultural beliefs on gender which favour boys in provision of formal education among other factors. But where equal opportunities are provided for both gender, girls have similar levels of ASC as boys as witnessed in the present study.

4.2 Recommendations

Based on the findings of this study the following recommendations for policy and further research were made.

4.2.1 Policy Recommendations

From the results, there is a significant difference in academic self-concept between learners who use learning strategies in the use of laptops and those who use traditional learning strategies in favour of those with laptops. Therefore it is important that parents, teachers, school managers especially those from rural areas provide digital learning devices like laptops to help enhance academic self-concept of pupils(both boys and girls) in primary and even in secondary schools. Academic self-concept has a positive reciprocal relationship with academic achievement of learners. Positive academic self-concept is a good recipe for academic achievement for any learner.

Teachers and other curriculum implementers and developers should consider retraining with a view of equipping themselves with ICT skills that are anchored on classroom learning strategies of learners and change of teaching-learning approaches and pedagogies. Institutions that are entrusted with the task of curriculum design should emphasize the use of child-to-child and child-teacher learning strategies for pupils to help them boost their academic self-concept which eventually can translate to academic achievement.

The National and local Governments should come up with comprehensive policies to guide implementation of digital learning that should include learning strategies in ICT use. The Government through MOEST should consider developing a policy on helping learners in rural areas to improve their academic self-concept as a basis of improving their academic achievement through incorporating ICT across classes in primary schools.

4.2.2 Recommendations for Further Research

The following suggestions were made for consideration for further research.

Results of this study showed no significant gender differences in academic self-concept between treatment group in schools where laptops are used and comparison group in schools where learners use traditional learning strategies. This involved public schools in a rural area only. Variables of type of school were not considered. Therefore further studies are required to involve private schools and public urban schools.

Further studies should be done to involve other class levels in primary and secondary schools since the present study involved only Standard Seven pupils. Levels like Class five, six, eight and Form 1-4 should be compared.

Similarly, more studies can be done involving pre-test and post tests using experimental research design using one sample to compare academic self-concept before and after treatment or use of ICT. Same variables can be studied using control group with post and pre-test. Studies can also be done comparing child-to-child, Child-teacher, and individual-child learning strategies in the use of ICT with their respective traditional learning strategies.

The present study considered general academic self-concept as the dependent variable. Further studies can be done considering self-concept of specific subject areas like English, Mathematics, science, social sciences and technical subjects. To verify if the results are consistent among learners and cross-checking for overrating of students due to self-rating on the questionnaire, further studies can be done using focus group discussions and student interviews.

The results of this study may be generalized to the Kenyan primary school pupils' population with caution because it covered a small sample drawn from only one County. In order to control cultural and geographical effects, the study should be replicated in other counties.

It was found from this study that there were no significant gender differences in academic self-concept among pupils who used learning strategies in the use of ICT and pupils using traditional learning strategies. This findings contradicted results from many researchers from developed countries. Therefore further research on gender differences in varied geographical and cultural areas is necessary to make it more conclusive.

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