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Teachers' attitudes towards the utility of computers in education in Kenya

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ABSTRACT

The Kenya government is funding an ambitious project that seeks to provide one laptop per elementary school child in order to increase the use of digital technologies in classrooms. The role of teachers' attitudes towards the utility of computers will have an impact on the implementation of this program. This study explores the differences in attitudes on the utility of computers between female and male teachers in Vihiga County of western Kenya. A convenience sample of 100 teachers responded to the Teachers Attitudes Towards Computers survey instrument developed by Christensen and Knezek (2009). The teachers' responses suggested that there were no substantial differences in attitudes towards the utility of computers between the genders. This study may assist education planners in the local community in planning the training of teachers in the county.

Keywords: Gender differences, technology integration, utility of computers, teacher attitudes.

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INTRODUCTION

Some studies have suggested that there are differences in attitudes towards computers between the genders (Schumacher and Morahan-Martin, 2001; Young, 2000; Colley and Comber, 2010). These studies suggest that males have more positive attitudes towards technology and computers compared to females. For educational planners in Kenya, a country in the process of integrating technology into its educational system, differences in attitudes need to be taken into consideration when planning for the training of pre-service teachers. Data from the Kenya National Bureau of Statistics (KNBS, 2017) show that number of trained female primary (elementary) school teachers in Kenya steadily increased from 105,512 in 2015 to 107,224 in 2016. This was slightly less than the number of male teachers who were 105,479 in 2015 and 107,495 in 2016. In Vihiga County of western Kenya, where most of the participants for this study were sourced, there were 1,970 female teachers in public primary schools in 2014 compared to 1,948 male teachers in the same year (KNBS, 2015). Considering that the genders are almost equally represented in the teaching force, this present study seeks to explore whether gender plays any significant role in the attitudes of teachers in Vihiga County, Kenya towards the utility of computers in classrooms. Does the teacher's gender play any substantial role in his or her attitude on whether computers are useful for successful classroom instruction? Do the genders have differing attitudes towards the utility of computers in education?

A study of 350 elementary school children in Greece by Vekiri and Chronaki (2008) suggested that although almost all students used computers outside school, there were significant gender differences in frequency and type of computer use. In that study, boys reported greater perceived support from their parents and peers in their use of computers and more positive computer self-efficacy and value beliefs than girls. Studies by Schumacher and Morahan-Martin (2001) on incoming undergraduate college students in the US, have also suggested that females have less overall experience with computers and are more likely than males to have negative attitudes towards computers. They found that males were more experienced with computers and were more likely to have taken high school courses requiring computer use. In a study of 375 Iranian undergraduate students, Shashaani and Khalili (2001) found significant

gender differences in confidence on computer use between men and women. They found that women expressed lower confidence in their ability to work with computers.

Males also demonstrated higher skill levels in applications such as programming, games and graphics than females in some studies. Whitley (1997), in a meta-analysis of studies of gender differences in computer-related attitudes and behavior of US and Canadian participants, suggested that men and boys exhibited greater gender stereotyping of computer expertise. Whitley's study suggested that men and boys had a more positive affect about computers than did women and girls. However, a study of 147 college students by Busch (1995) suggested that there were no gender differences in attitudes towards computers between the genders, especially regarding the completion of simple computer tasks. This was despite male students reporting more experience in computer programming and computer games.

Like other developing countries, Kenya has invested heavily in Information, Communication and Technology (ICT) technologies and infrastructure. Over the last two years, the Kenya government has allocated almost US$ 134 million to equip elementary schools with learning technologies, including the supply of student laptops (Rotich, 2017). Although a small number of computers were introduced to Kenyan students in the 1970s, the last few years have seen an intensive effort to integrate ICT in schools.

According to the ICT Authority of the Ministry of Information, Communication and Technology of Kenya (ICT Authority Kenya, 2017) the government initiated the implementation of an e-learning project aimed at equipping public elementary schools with technology. This project also sought to integrate digital technologies in elementary schools. Known as the Digital Literacy Program, the project is aimed at preparing primary school children to function in a digital world. The government is currently implementing the second phase of the project in which:

a) 150 primary schools will be equipped with technology,
b) an initial group of teachers will be trained,
c) content for the program developed, and
d) the program will be integrated in Kenya's elementary school curriculum.

The program expects to distribute 1.2 million digital devices to some 23,951 public elementary schools in Kenya (ICT Authority Kenya, 2017).

However, even as the government implements the project, there are questions on whether the teachers are well-equipped to integrate it into classrooms. Teachers' attitudes towards computer technologies play a role on how they perceive new technologies. Christensen (2002) has shown that teachers' confidence in the use of technology greatly influences how technology is integrated in the classroom. She found that increased computer use by teachers boosts their confidence and reduces technological anxiety. Christensen also suggested that successful implementation of e-learning programs in schools takes into consideration teachers' attitudes towards this technology. She stated that it was critical for teachers to have a positive attitude towards technology if these technologies were to be successfully integrated in classrooms.

It is, therefore, useful to measure and analyze teachers' attitudes towards computers as these determine the extent of the integration of digital learning in traditional classrooms. Bailey and Pearson (1983) have shown that the measuring and analyzing of computer-user satisfaction assists managers and decision makers improve the productivity of information systems. They also note that the valuing of the utility of technological systems also contributes to users' sense of satisfaction with these systems. Antonides (1990) has defined utility as the subjective value of something, related to preference and behavior. This present study examines the attitude of some teachers in western Kenya on the utility of computers in their classrooms. Do female teachers have differing attitudes towards technology compared to their male counterparts? This study may assist planners and administrators in the training of teachers and the integration of learning technologies in classrooms.

This study is partially viewed through a liberal feminist theoretical framework. According to Rosser (2005), in a liberal feminist view, women do not seek any special privileges at work but simply demand that everyone receive equal consideration without discrimination based on sex. Rosser has also suggested that when it comes to information technology jobs, women are historically confined to menial tasks and their ability to interact with technology is considered inferior to their male counterparts. The confinement of women to menial tasks occurs despite the technology workforce representing a vertically and horizontally gender-stratified labor market. The liberal feminist framework directs this research to encourage decision makers in Kenyan educational training to allow women equal access to technology training. This may lead to better opportunities for women. Furthermore, if women are involved in the different aspects of technology integration in Kenyan primary schools, they may have a positive impact on how these technologies are implemented. This includes encouraging technological designs that are gender inclusive and which avoid technological language that is exclusively patriarchal. Additionally, women's participation in technology may lead to technological designs that are free of bias or subjugation and instead promote designs that are responsive to gender differences.

Acker (1987) has pointed out that the main aim of liberal feminism is securing equal opportunities for the sexes. She points out that the intent of liberal feminists in education is to remove barriers which prevent girls from

reaching their full potential. Female teachers should be offered equal training opportunities to successfully integrate technology in schools even though they may have received unequal prior technology socialization as girls in schools. This includes technology training and opportunities for personal development and progress.

Although liberal feminist theory has been linked to white, western, middle class women (Beddoes and Borrego, 2011), the use of instructional technology in public schools in Kenya is a new phenomenon. This new phenomenon comes pre-loaded with gender biases that are not necessarily acceptable to the people who interact with this technology. To understand this phenomenon, it is useful to also view these technologies through cultural frameworks that are best suited to interrogate them.

Research question

This study surveyed teachers for any substantial differences in the attitudes on the utility of computers in classrooms between male and female teachers in Vihiga County of western Kenya. Although previous research has suggested that males are predisposed to a more positive attitude towards the utility of computers, were there differences in attitudes towards computers between male and female teachers in Vihiga County of western Kenya?

Hypothesis

In view of the overwhelming literature that supports the notion that males are more positively pre-disposed towards computers than females, this present study has the following hypotheses:

H_1: The alternative hypothesis is that male teachers in elementary schools in Kenya are more likely to have a more positive attitude towards the utility of computers in their classrooms than their female counterparts.

H_2: The null hypothesis is that male and female teachers in elementary schools in Kenya do not differ in their attitudes towards the utility of computers in classrooms.

MATERIALS AND METHODS

Subjects and procedures

The Teachers' Attitudes Towards Computers survey instrument (Christensen and Knezek, 2009) was administered to selected teachers in Vihiga County of western Kenya. 100 teachers responded to the questionnaire which is composed of 9 validated attitudinal surveys. The *utility* scale of the instrument has 10 items with an alpha reliability score of 0.93. The respondents were primary school teachers who teach in schools where digital educational technology is in its introductory phase. Of the 100 questionnaires distributed, 91 were completed and returned. Of these, there were 88 teachers who had successfully responded to subscale 6 of the questionnaire, which measures the utility of computers in schools. This study only considered scores from this subscale which the authors have noted can be administered by itself (Christensen and Knezek, 2009).

Permission to administer the questionnaire was sought and obtained from the Kenya government through the Kenya National Commission of Science and Technology and from the individual participants.

Instrument

According to Christensen and Knezek (2009), the Teachers' Attitudes Toward Computers (TAC) questionnaire is a 95-199 item Likert/Semantic Differential instrument for measuring teachers' attitudes toward computers on 7-20 subscales. The instrument used to collect data in this present study was the TAC version 5.11 which has 95 items on 9 factors: interest, comfort, accommodation, interaction (e-mail), concern, utility, perception, absorption, and significance. The instrument's reliability was tested based on data from 550 K-12 teachers in a large metropolitan school district in Texas in 2000. Although the teachers responded to all the factors, this study examines only the 6^{th} subscale, that is, the teachers' attitudes towards the *utility* of computers.

The *utility* subscale of the questionnaire consists of 10 questions. Respondents are required to indicate their level of agreement with statements that gauge their attitudes on the utility of computers. The responses range from 'strongly disagree' to 'strongly agree'. Positive responses indicate positive attitudes towards the utility of computers.

Data analysis

Data from the 88 respondents were analyzed using SPSS – independent sample *t*-test. The independent sample *t*-test was appropriate for this study as it tested whether there is a statistically significant difference between the means of two categorical groups. The analysis used a two-tailed *t*-test to explore the relationship between gender and the attitudes towards computers. This allowed for testing for the possibility of a relationship for either the male or female teachers on their attitudes towards the utility of computers. The responses were coded such that on attitudes towards the utility of computers, the analysis considered that on this subscale of the questionnaire, a positive attitude towards

computers resulted in a positive number. Therefore, if a respondent completed 'strongly agree' on all the scales, the data pointed to a strong likelihood that the respondent had positive attitudes towards the utility aspect of computers in classrooms. All ten questions on the scale were positively worded and none was inverted.

Of the 100 questionnaires distributed, 91 were returned, but only 88 teachers responded appropriately to the utility of computers subscale. One teacher declined to indicate his/her gender and two teachers had incorrectly completed this part of the questionnaire. Scores were assigned to each of the questions with 'strongly disagree' scoring 1, 'disagree' - 2, 'undecided' - 3, 'agree' - 4 and 'strongly agree'- 5. Therefore, if a respondent scored a mean of 5 on the whole section, it was assumed that they had highly positive attitudes towards the utility of computers in classrooms. Thus, the lower the mean score, the more negative an attitude towards the utility of computers in classrooms that the respondent had.

RESULTS

Analysis of the data found that for the female teachers (*n* = 53) the mean score was 4.2 with a standard deviation of .52, while for the male teachers (*n* = 34) the mean score was 4.1 with a standard deviation of .40. Levene's Test for Equality of Variances (Table 1), showed a significance value of .06, suggesting that there is no significant difference between male and female teachers' attitudes towards the utility of computers in classrooms. Therefore, the independent *t*-test conducted to determine whether a difference exists between the mean of utility of computer test scores for male and female teachers suggested that there was no statistically significant difference between the scores for males (n = 34, M = 4.1, SD = 0.41) and females (n = 53, M = 4.2, SD = 0.52). The 95% confidence interval was -.28 to 0.13. The present study failed to reject the null hypothesis.

Calculating for Effect Size using Cohen's *d*, Gates' *delta* and Hedges' *g* (Table 2), showed small values, further confirming that the difference between male and female teachers' attitudes towards the utility of computers in classrooms is not significant. Although this study cannot be generalized to the larger population of Kenyan teachers because of the limited sample size, it provides an understanding on the degree of some teachers' attitudes towards computers.

Table 1. SPSS independent samples *t*-test on gender and computer utility.

	Gender	N	Mean	Std. deviation	Std. mean Error
	Male	34	4.1608	.40398	.06928
Avg. score on utility of computers	Female	53	4.2377	.52155	.07164

Independent samples test										
		Levine's test for equality of variances		t-test for equality of means						
		F	Sig.	t	df	Sig. *(2-tailed)	Mean difference	Std. error difference	95% confidence interval of the difference	
									Lower	Upper
Avg. score on utility of computers	Equal variances assumed	3.417	.068	-.731	85	.467	-.07695	.10532	-.28636	.13246
	Equal variances not assumed			-.772	81.886	.442	-.07695	.09966	-.27521	.12131

Table 2. Calculating effect size.

Cohen's *d* = (44.1)/0.463897 = 0.215565
Gates' *delta* = (44.1)/0.4 = 0.25.
Hedges' *g* = (44.1)/0.47701 = 0.209639.

DISCUSSION

This study did not find any substantial differences in the attitudes of male and female teachers on the utility of computers in classrooms in Vihiga County. With a mean score of 4.1 for male teachers and 4.2 for female teachers out of a possible high of 5.0, this showed a mostly positive attitude. Both genders have a mean of about 4.0, and this may be an encouragement to educational planners and administrators, that gender differences may not constitute any major problem in technology training design. If the findings of this study were to generalize, it would also be encouraging that, considering Kenya's female teaching force is almost the same size as the male teaching force, trainers would not have to engage the genders separately. Therefore, the perception by both genders that computers offer great

utility in classrooms will encourage implementers to continue to integrate this technology into classrooms.

This result differed from the larger results suggest by the literature review which showed males have more positive attitudes towards computers than females (Schumacher and Morahan-Martin, 2001; Teo, 2006; Shashaani, 1993). Further research could be conducted to determine if these results are an anomaly or they are indicative of Kenyan teachers' attitudes towards the utility of computers. Additional research could show whether female or male teachers' attitudes towards the utility of computers have changed over time.

Such research would be advised to follow Chilisa and Ntseane's (2010) exhortation that investigation into gender issues should involve assertive questions, attention to the power of dominant values and the vigilant monitoring of how questions are asked so that the researchers are keenly aware of indigenous approaches and knowledge of the respondents. This includes understanding non-Western women's resistance to patriarchal systems, showing a need for alternative research methodologies that respect indigenous world views, and employing indigenous knowledge and experiences from non-Western women's standpoints. Future research into the Kenyan teachers' computer training that employs the feminist framework, therefore, is encouraged to take into consideration the differences between Western and indigenous views and emphasize the local communities' views.

Conclusion

The study suggested that there were no significant differences between male and female teachers' attitudes towards the utility of computers in the classrooms. For administrators and planners of Kenya's digital learning program, this could encourage them to organize training without having to segregate the genders as they all appear to have similar pre-dispositions towards the utility of computers. Considering that there are no substantial differences in attitudes between male and female teachers towards the utility of computers in classrooms, additional studies may seek to emphasize joint training for the teachers.

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