Gender-related differences in using computer assisted teaching strategy on student motivation in biology based in public secondary schools in Baringo county, Kenya

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Abstract

This study sought to determine how gender inequalities in using computer-assisted pedagogics in Baringo County influenced biology students' motivation. Solomon's four-quasi-experimental design was used. Purposive sampling was used to choose eight extra-county secondary faculties in Baringo to integrate laptop power-assisted Teaching into classroom teaching and learning. The investigator used stratified sampling to select the study's sample schools. A stratified sample of 324 biology students was drawn from different County secondary schools. Easy random sampling was accustomed to deciding the experimental and management groups. The experimental groups offered computer-assisted instruction, while traditional instruction was given to the control groups. Two research tools were used the Biology Achievement Test and the Biology Motivation Questionnaire. The data were examined descriptively with frequencies and percentages and inferentially with Analysis of Variance and the t-test. According to the study's findings, the strategy has a beneficial impact on biology student motivation. The data show that students were exposed to CATS, and there was statistical significance in student motivation. CATS has been found to boost biology student motivation. The study findings will assist curriculum makers at the Kenya Institute of Curriculum Development in developing guidelines and standards for integrating, developing, and using CATS in school curricula to promote learning. Student accomplishment and motivation, as a result, biology teachers should include computer-assisted education in their lectures to boost academic activity and overall biology enthusiasm.

Keywords: computer assisted teaching strategy, motivation, student

1. Introduction

The tendency of students to find academic work fascinating and attractive and to seek to gain the intended educational benefits from them is referred to as motivation to study [2, 5]. From childhood until adolescence, motivation is vital for academic learning and achievement [4]. It engages and sustains learners while steering them toward specific self-directed goals that drive students to actively study difficult scientific subjects. From the brain research perspective, [17] stated that motivation to learn stems from learning itself, which maintains and leads the learner toward learning activities that suit the learner's requirements. One aspect that influences student learning is motivation, and teachers may impact student motivation in a way that supports learning; hence, learners' motivation toward subjects differs among students in class. Motivation can be either internal or external.

Extrinsic motivation is influenced by one's surroundings; for instance, young learners are inspired by parental support in the form of praise and presents. Motivating factors within us are intrinsic. An individual who is intrinsically driven to learn does so because they are curious, eager to learn, and interested in improving themselves and their learning [14]. While studying biology, [16] looked into the intrinsic and extrinsic regulation of high school pupils and found that female students had greater levels of both than male students. Students are motivated to study science and outperform others who are less motivated [5, 14].

This is due to the fact that someone who is highly driven excels in their own performance and is more likely to participate in deeper, spontaneous learning [1]. Men are more naturally driven to learn science than women are, claims [10]. Women are most interested in science when it can teach them how to maintain good health via nutrition and exercise, as well as the causes and prevention of sickness. Additionally, students would like to be involved in important ethical and complicated scientific topics that affect them on a daily basis. Students typically consider physics-related science topics as being the most uninteresting in school, followed by chemistry and biology [12].

According to [9], a study examining the impact of extrinsic and intrinsic motivation on student skills revealed that males are more extrinsically driven than females and that girls are more intrinsically motivated in learning, particularly biology. According to Wellington, males prefer intellectual and competitive learning environments, whereas women choose creative and collaborative learning. On the other hand, [7] conducted a research in a small number of schools in Nakuru County, Kenya, utilizing an effective e-learning teaching strategy to increase students' creativity in biology classes.

Students exposed to the Cooperative E-Learning (CEL) teaching approach were more creative than those exposed to the standard teaching strategy. Furthermore, the study found that CEL is an effective tool for increasing creativity and inventiveness and, as such, should be included in school biology training. Furthermore, [15] proposed that creativity is essential to any effective learning process since it increases a

learner's capacity to comprehend scientific truths.

As a result, scientific educators must design techniques to increase classroom creativity, such as utilizing computers in Teaching and learning. As a result, gender motivation is influenced by instructional techniques. [8] Investigated the relationship between student's perceptions of the classroom learning environment and motivational achievement goal orientation toward Biology and Physics, as well as the influence of gender. According to the findings, females set substantially higher mastery and performance approach objectives in Biology.

In contrast, men have considerably higher objectives for physics and biology performance avoidance. Positive correlations between gender, the adoption of particular performance objectives, and the level of felt competition were discovered in the biology and physics classrooms. The study's results also showed a sizable gender gap favoring women across a number of motivational variables. The elements affecting Turkish primary school kids' interest in science were examined by [3].

The Students' Motivation in Science Learning Questionnaire was used to collect data. In terms of scientific motivation, the results showed statistically significant gender differences, with women outperforming men. In the Bureti District of Kenya, [15] looked at the impact of employing advance organizers on students' enthusiasm to learn biology. The Student Motivation Questionnaire was used to collect information. According to the research, pupils who were taught using sophisticated organizers were more motivated than those who were taught using conventional techniques. After the intervention, the statistics also indicated that.

In comparison to the females, were noticeably more driven to learn biology [13]. Biology classes were more common among females than boys, and girls viewed biology as more essential and less complicated than boys, according to research on students' interests and attitudes toward the subject. Lessons in science that are more applicable to students' everyday life are those they pick. Girls that are interested in biology do so because they want to understand more about the human body [6].

2. Materials and methods

2.1 Location of the study area

The investigation was carried out in Baringo County, one of Kenya's counties. Several schools do research. The KCSE scientific findings, particularly biology, which is a nationally representative sample, have continuously been unsatisfactory. The study was conducted at schools outside the school district with computers. The study was carried out in Baringo County, Kenya, at one of the country's schools. Extra-county, mixed schools, private schools, county schools, sub-county schools, and public schools are all types of schools. The country's scientific achievements were poor in KCSE, particularly in biology, a typical sample of the entire school county. Several county schools were chosen for the inquiry, which included a computer study.

2.2 Population of the study

Secondary school biology students in Baringo County are among the demographics under scrutiny. The accessible population was made up of form three biology students from 85 secondary schools, whereas the target population was made up of 7,650 biology students.

2.3 Sample size and sampling procedures

A specific sample was used to evaluate a public secondary school in Baringo County equipped with a computer to incorporate CATS into the classroom. The model school was separated into two sections. Only boys and girls are allowed. The stratified random selection approach was used to choose the sample schools. This approach was carried out by voting, which awarded the school a number. The numbers were written on a little piece of paper, folded, and then placed in different boxes to symbolize the layers. According to the sample grid in Table 1, researchers randomly chose eight schools with identical proportions of four males and four girls.

Table 1: Sampling Grid Table

School type	Number of school	Sample school	Total population	Student		
				Experiment group	Control group	Total
Boys only	38	4	145	64	80	144
Girls only	47	4	179	99	81	180
Total	85	8	324	163	161	324

Simple random samples were taken from three biology students at chosen schools with several streams and assigned to the test and control groups. We chose a specific stream for data analysis using simple random sampling. Three hundred twenty-four respondents from eight schools took part in the poll, split into four categories.

2.4 Research instrument

A biology performance test assessed students' knowledge and skills in subtopic cell division biology. The BAT test included aspects from the study's cell division subtopic. Mitosis and meiotic cell division are covered in the Test. The topic's brief replies and structured questions covered ten items. For 30 points, the Test tested knowledge, understanding, and application of what was covered. The pretest was reorganized and used as a follow-up exam. This pretest was given to the experimental (E1) and control (C1) groups before the start of the course, and the posttest was given to all groups after the course. The purpose of the pretesting was to assess student competency, and this knowledge was the focus of the study. The Test was piloted at a high school that resembled the sample schools in the Baringo region. This was used to assess

dependability. Items were scored using a systematic assessment scheme, and the results were recorded and analyzed.

2.5 Data collection

The investigator visited the model school, spoke with kids and faculty members, and requested permission. The investigator utilized the guidebook to educate the experimental group's teachers on how to classify CAT items. Plant and animal reproduction was taught as a sub-theme of cell division. Teachers followed a combined implementation plan in all of the sample schools. Before beginning the study, the experimental group (E1) and control group (C1) took pretests, followed by the CAT technique for two weeks. The experimental groups (E1) and (E2) were taught using automated procedures, whereas the control group was taught using traditional teaching methods. BAT tests and BMQs were administered to all four groups and scored and categorized for data collection and analysis.

2.6 Data analysis

The collected data was evaluated, coded, and ready for analysis. We evaluated the data and tested our research hypotheses using descriptive and inference statistics. ANOVA was used to compare the four means and determine whether the four groups differed significantly from one another. The difference in means between the control and experimental groups was evaluated using the Test. The T-test is also used to categorize groups and students by gender. In the ANOVA and the Test, the null hypothesis was either rejected or accepted at a significance level of = 0.05, assuming no or minimal differences between the groups. Survey data were evaluated using a version of the Package of Social Science.

3. Results

The goal of the research is to determine if students' motivation for learning biology in Baringo County differed by gender when it was taught using a computer-assisted teaching method. Students were asked to respond to questions in BMQ questionnaires in order to assess gender-based biological motivation.

The 30-item BMQ was graded on a five-point Likert scale, with Strongly Agree (S.A.) being equal to 5, Agree (A) equal to 4, Undecided (U) equal to 3, Disagree (D) equal to 2, and Strongly Disagree (S.D.) being equal to 1. Male and female students' BMQ mean scores were computed and compared to see if there were any appreciable differences. The mean rating score for each gender category was calculated using the average rating score across all replies. The data was looked at and the results are shown in Table. 2.

Table 2: Pretest Mean Score Obtained by Students in BMQ by Gender

Group	Gender	N	Mean	Std. Deviation
Experimental Pretest	Male	64	8.92	3.026
	Female	99	7.55	2.990

The mean BMQ score by gender for the experimental group was displayed in the results. Males in the experimental group had mean scores of 8.92 and 7.55 with standard deviations of 3.026 and 2.990, respectively. The researcher compared the pretest mean experimental score group with the posttest experimental and control groups in order to ascertain the effects of CATS on student motivation depending on gender. Table 3 presents the results of the examination of the gender-based BMQ posttest results.

Table 3: Posttest based on gender, the average score from the BMQ results

Group	Gender	N	Mean	Std. Deviation
Experimental Posttest	Male	64	5.81	1.93
	Female	99	9.00	2.99

According to Table 3, the average score for males who used CATS (Computer Assisted Teaching Strategy) was 5.81 with a standard deviation of 1.93, while the average score for girls was 9.00 with a standard deviation of 2.99. Therefore, it was clear that when exposed to CATS, females were significantly motivated in biology compared to their peers. However, the information was insufficient to draw the conclusion that students' motivation for Biology when taught using the computer-assisted teaching method in Baringo County is not statistically different based on gender. To decide whether or not a one-way ANOVA test is appropriate, the mean scores and standard deviation were utilized to establish the level of significance of the difference. The mean difference was tested for statistical significance using a one-way ANOVA test. Furthermore, the results are presented in Table 4.

Table 4: A one-way ANOVA of student motivation based on gender

	Some of Squares	Df	Mean Square	F	Sig.
Between Groups	2.624	1	3.426	0.786	.000
Within Groups	3457.246	162	28.985		
Total	3459.870	163			

The obtained F=0.786<2.00 and p<0.05 and significance 0.000. F critical value (1,162) = 3.060, which is greater than obtained value. Adopting a computer-assisted teaching technique revealed a statistically significant difference in student motivation in Biology based on gender (CATS). As a result, the null hypothesis H04, stating that there was no statistically significant difference in student motivation in biology depending on gender when taught utilizing a computer-assisted teaching technique, was rejected. As a result, applying the CATS depending on gender has no significant influence on biological motivation.

4. Discussion

The current study's findings are consistent with those of [11], who investigated the impact of computer-assisted teaching methodologies on student achievement by gender in agricultural education in Tharaka Nithi County, Kenya. The study discovered a substantial difference between pretest and

posttest mean scores in boys' and girls' enthusiasm to learn agriculture. The men had a higher mean motivation score before the exam than the women. This resulted in statistically significant variations in the excitement of boys and girls to learn agriculture between the two groups.

The results of this study agree with [7]. They looked at how secondary school students' interest in biology was impacted by the cooperative concept mapping (CCM) teaching strategy. Their research found that among secondary school pupils exposed to CCM, there was no statistically significant gender difference in the enthusiasm to learn biology.

The results of the present study are in contrast to those of [8], who looked at the connection between students' perceptions of the learning environment in the classroom and motivational achievement goal orientation toward Biology and Physics as well as the influence of gender.

The results showed a substantial gender difference favoring females across a variety of motivational factors. The results of the current study disagree with those of [3] about the elements affecting Turkish primary school pupils' interest in science. The Students' Motivation for Science Learning Questionnaire was used to collect data.

The study's findings showed statistically significant gender disparities in motivation for science. Male students lacked the motivation that female students did to study science, particularly biology. From an experimental perspective, [15] looked at the impact of employing advance organizers on students' motivation to learn biology in the Bureti District of Kenya.

The Student Motivation Questionnaire was used to collect information. According to the research, pupils who were taught using sophisticated organizers were more motivated than those who were taught using conventional techniques.

Additionally, the findings showed a large gender gap in the intervention-related motivation to learn biology, with male students being more motivated than female students. (CCM) teaching approach on secondary school students' biology motivation. Their results showed no statistically significant gender difference in their enthusiasm for learning biology.

The study's findings showed that among students who received computer-assisted instruction, there was a statistically significant gender difference in biology motivation. Girls were statistically much more motivated to study biology than males, as seen by a comparison of posttest mean scores. After the CATS intervention, there were no gender differences in the degree of motivation to study biology, which was further examined using one-way ANOVA.

5. Conclusion

The study's outcomes revealed no gender difference in motivation to learn biology when students were taught using CATS; this suggests that the teaching technique was equally successful in inspiring both boys and girls.

6. Recommendations

Biology professors should adopt the CAT technique to increase student interest in biology and enhance academic accomplishment.

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