EFFECT OF GENDER ON STUDENTS' ACADEMIC ACHIEVEMENT IN CHEMISTRY WHEN TAUGHT USING HARKNESS TEACHING METHOD IN SECONDARY SCHOOLS IN KAJIADO COUNTY, KENYA

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Abstract: This study determined the effect of gender on learners' academic achievement in chemistry when taught using Harkness teaching method in secondary schools in Kajiado county, Kenya. Quasi experimental design was utilized (Solomon's four group design) to determine and describe the relationship between variables. Four sub-county secondary schools from the County were involved in the study. The study targeted students undertaking chemistry subject in secondary schools within the county. The accessible population was drawn from form three class and involved 5,289 chemistry students in mixed secondary schools in the sub-county. The study employed purposive sampling technique to sample sub-county mixed secondary schools from a list of mixed secondary schools identified in the county. Simple random sampling was used to draw the participating sub-county mixed schools. Thereafter, participant schools were assigned to experimental and control groups using a simple random sampling technique. The study sample size was 124 learners from the four schools. Chemistry Pre-Test (CPT), and Chemistry Achievement Test (CAT) were used as data collection tools. Pilot study was performed to determine the reliability of the tools in a school from Tharaka Nithi County. The validity of the instrument was ensured through experts' input and opinion from Chuka University Department. The Reliability coefficient for chemistry achievement test was 0.759. Harkness teaching method was used to teach Experimental group (E1 and E2) while conventional teaching was used with control groups (C1 and C2). Data was analyzed using Statistical Package for Social Science (SPSS) version 25.0. Descriptive statistics used were (standard deviation, mean, and percentages) while inferential statistics (one-way ANOVA, Mann-Whitney U Test, Kruskal Wallis Test and Bonferroni adjusted alpha levels post hoc analysis, and t-test). The significance level for rejection was at $\alpha = 0.05$. Harkness teaching significantly enhanced the learners' academic achievement in the subject. However, the findings revealed no statistically significant difference in boys' and girls' achievement in Chemistry when taught using Harkness teaching method. The findings of the study may help curriculum planners and learning institutions (teacher training colleges) to incorporate innovative techniques in classroom teaching to improve learning of chemistry subject in Kenya. The findings also form a ground upon which likely further research could be built for innovative teaching techniques in secondary schools.

Keywords: Harkness teaching method, Gender, Academic achievement

1. Background Information

Gender simply refers to the socially/culturally created features and roles that males and females are ascribed in any given community (Nnamani & Oyibe, 2016). Gender and sex are not synonymous terms. In contrast to sexuality, which refers to the biological makeup of a man and a woman, gender refers to the roles and behaviors that have been socially and culturally assigned to males and females. Gender is the outcome of cultural learning and socialization that lasts a lifetime since socialization is overemphasized in childhood. Some features are assigned to males and others to females based on gender. Such categorisation is never inherited, but rather acquired through social interaction. the male gender is assigned characteristics such as boldness, aggressiveness, logical reasoning, intelligence, self-confidence, dominion/ assertiveness, tactfulness, economic use of words, and so on, whilst the

female gender is assigned characteristics such as fearfulness, submissiveness, tactlessness, and talkativeness, among others (Nnamani & Oyibe, 2016). According to Nzewi (2010), there is a gender discrepancy in the teaching and learning of science subjects such as chemistry. According to the KNEC (2001) report, girls took up Chemistry in the KCSE test at a rate of 43 percent of the total number of applicants who registered for Chemistry in 2000, compared to 58 percent who took biology and 29 percent who chose physics. The information gained from this report reinforces the assumption of male dominance in science learning and the belief that science jobs are dominated by men.

Gender studies on academic accomplishment have shown a lot of conflicting results; some find gender to be a relevant component in academic achievement, while others find no difference between the sexes in this field (Bunkure, 2007). In general, guys have shown a high level of interest in science courses and occupations. According to Ogunleye and Babaside (2011), science topics such as Chemistry are given a masculine perspective by many educators, implying that women and girls face numerous challenges. According to Fatokun and Odagboyi (2011), some subjects, such as science and mathematics, are branded male, while others, such as home science and secretarial studies, are branded feminine. Nwona and Akogun (2015) also identified a gender imbalance in science, technology, and mathematics. Because these disciplines are viewed as masculine, guys are always expected to outperform girls. The present push for science education reform is motivated by the reality that the conventional educational environment does not attract or maintain a sufficient proportion of women in science courses such as Chemistry (Nzekwe, 2018).

In terms of the gender gap in science achievement, national trends in the United States of America exhibited inconsistent outcomes. (Amelink, 2009) According to this study, females perform equally to male peers in coursework completed; however, in assessments geared to measuring mastery of contents, such as the National Assessment of Educational Progress, it was revealed that the differences between males and females in K-12 Education surfaced in elementary school and continued at the high school level. Differences in science achievement at the K-12 level, according to Dalton, Ingels, Downing, and Bozick (2007), are due in part to fewer females obtaining degrees in science, technology, engineering, and mathematics (STEM) disciplines. At the global level, female students have limited opportunities for participation in STEM disciplines, with less than 30% of female students enrolled in STEM disciplines worldwide and less than 25% in physical sciences internationally, according to the National Science Foundation (Mbirianjau, Chege, Oanda, 2016). Female participation in STEM disciplines is low in Africa, and the greatest gender disparity exists in Engineering, in which one in every four students was a woman as of August 2010.

To actively engage in economic development as full citizenship, women must be well-versed in field of science and technology concepts and methods of inquiry. Pertinently, equal access to creation of new knowledge and skills by women is first and foremost a humanitarian issue, in the sense that education is a fundamental human right under international law. Hill, Corbett, and Rose (2013) make the argument that STEM professions should prepare students to be critical thinkers, innovators, self-sufficient, logical thinkers, and technologically literate so that they can apply technologies effectively in their future careers and lives. In line with this argument, the United Nations Economic and Social Council Report on the Status of Women (UNESCO) (2010) asserts that STEM and innovation can be used to accelerate progress toward achieving vision 2030 as well as achieving internationally accepted policy objectives, including the Sustainable Development Goals. Gender inequality is identified as one of the most important developmental challenges facing Kenya, according to the Kenya Vision 2030. If the nation is to achieve all of its goals, it will have no choice but to make huge investments in the STEM fields, which are currently underfunded. Science and technology, and per the Forum for African Women Educationists (FAWE) (2014), should be given due acknowledgement and incorporated into the structure of the economy (Kenya National Bureau of Statistics) in order to accomplish the objectives articulated in Vision 2030. (KNBS, 2013).

According to Tomlinson (2001), differentiated instruction increases the standard for all learners in middle school classes in the United States (USA). Cousins (2007) conducted research on gender inclusion in secondary schools. In Australia's secondary schools, chemistry has an impact on both male and female participation. Thirty Year 12 Chemistry students were questioned about what encouraged them to enroll in secondary Chemistry using a case–study approach. According to the student's views, despite the quantitative shifts that show increased female success over the last few decades, chemistry is not completely gender inclusive. Cousin also noticed that secondary school Chemistry has not yet achieved total gender inclusion due to prevalent gender variations in student desire to

choose Chemistry and the influence that gender stereotypes continue to have on student subject choosing. On the other hand, a Japanese study found no difference in the attitudes of boys and girls toward science (Ogawa & Shimode 2004). These findings are intriguing because the effect of gender on attitudes toward science varies by country. According to Okeke (2007), male dominance in technical developments in Nigeria has resulted from female non-involvement in scientific studies.

According to Nwachukwu (2008), exposing female students to a small group cooperative interaction learning method leads to high cognitive accomplishment in Chemistry. The study used a quasi-experimental design. The study used a sample size of 283 Chemistry students taken from nine co-educational public schools in Anambra State's Onitsha Education Zone. Boys outperform girls when the educational style in sciences is competitive, whereas girls outperform boys in a cooperative academic atmosphere (Nwachukwu, 2008). Ezeudo and Ezinwanne (2013) evaluated the impact of simulation games on students' performance in Senior Secondary School Chemistry in Enugu State, Nigeria. The study was designed as a pre-test and post-test quasi-experimental design. The sample comprised of 159 students from Senior Secondary Schools 1 (SSS 1). (80 males and 79 females). The accomplishment test in simulation (ATIS) was used to obtain achievement data from students. In Chemistry concepts, there was no significant difference in achievement between male and female students.

Oludipe (2012) used a cooperative learning teaching style to study the influence of gender on Junior Secondary students' academic progress in basic science. The study included a total of 120 students drawn from the entire classes of three selected Junior Secondary Schools in three designated Local Government Areas of Ogun State, South-west Nigeria. The acquired data was examined statistically using descriptive and independent samples t-test methods. The study's findings revealed that there was no significant difference in academic achievement between male and female learners at the pretest, posttest, and delayed posttest levels. According to the findings of this study, in order to encourage more women to pursue pure sciences and science-related courses, interventions that focus not only on academic achievement of girls but also on how to make science-related occupations more appealing to young, high-achieving girls should be developed. Poripo (2008) studied the impacts of a simulation game on male and female students' chemistry achievement in Bayelsa State, Nigeria. Male and female students perform equally well, with no statistically significant difference in mean responses. Women prefer teamwork in science and technology, according to Seymour (2021), however science teachers don't give them a chance to complete work on an equal basis with the males. Students in scientific practical lessons should work together in small groups, with each member taking on a certain responsibility. Collaborative learning tactics include games, simulations, role-playing, group discussions, and career-oriented training. According to Okoli (2012), professors of STEM subjects should steer clear of jokes or actions that may have an adverse effect on male and female students' personalities or cultural roles.

Arop, Umanah, and Effiong (2015) investigated the impact of instructional materials on basic 'science teaching and learning in junior secondary schools' in Cross River State, Nigeria. The study made use of a quasi-experimental design. A sample of 240 pupils was drawn at random from four secondary schools in Cross River State's Biase Local Government Area using a simple ballot procedure. The results showed that there is a considerable difference in the mean achievement scores of students, with girls outperforming boys. As a result, teachers should seek out educational materials in order to offer effective lessons. According to Ssempala's (2009) study on gender differences in the performance of Chemistry practical skills among senior six females in selected mixed secondary schools in the Kampala district, boys outperform girls in Chemistry. Participants in the study were chosen from five different mixed secondary schools in the Kampala district. A total of 50 students took part, with half of them being girls and the other half being guys. A cross-sectional descriptive study design with quantitative and qualitative research methodologies was adopted.

Wachanga and Mwangi (2004) investigated how cooperative class experiment (CCE) teaching approaches improve students' Chemistry achievement in Kenya's Nakuru District. With 521 randomly selected students, the study used Solomon's four-group, non-equivalent control group design and discovered that the CCE approach facilitated students' Chemistry learning more than standard methods. Gender had no bearing on success. Musera (2011) conducted research in Kenya on the differences in secondary school chemistry and biology achievement. The research was carried out in 40 secondary schools across Western Province. Responses were received from 32 of the 40 schools chosen, resulting in an 80 percent response rate. The questionnaire was used to gather information. The study discovered that there are differences in achievement between different school categories and gender. During

the five years, boys' schools had higher mean results in Chemistry and biology than girls' and co-educational schools. Co-educational schools were found to be underperforming.

The study by Abungu, Okere, and Wachanga (2014) examined the impact of science process skills teaching strategies on boys' and girls' chemistry achievement. The research used a quasi-experimental design. To ensure that the number of boys and girls in each school was roughly equal, purposeful sampling was employed to acquire two district secondary schools. The participants were 90 Form Three pupils from two district secondary schools in Kenya's Nyando District. The findings demonstrated that the science process skills teaching technique had a substantial impact on both boys and girls' Chemistry achievement. According to the findings of a study conducted by Wambugu and Changeiywo (2008) with secondary school students in Kenya, the Mastery Learning teaching style resulted in higher accomplishment, although gender had no significant impact on students' achievement. Solomon Four Non-equivalent Control Group Design was employed in this quasi-experimental investigation. A total of 161 Form Two pupils were included in the study.

Chebii (2019) conducted research to see how the Cooperative E-learning Approach affected students' achievement and attitude toward Chemistry. The research was carried out in Kenya's Koibatek sub-county, where there has been a pattern of low accomplishment in the subject. The research focused on the mole idea, which is included in the Form Three Chemistry curriculum. The study used the Solomon Four Non-equivalent Control Group Design. From a total of 40 secondary schools in the sub-County, twelve were randomly assigned to Experimental Group one (E1), Experimental Group two (E2), Control Group one (C1), and Control Group two (C2) (C2). For this study, 489 Form three students were polled. When the Cooperative E-learning Approach was used in the classroom, the gender component had no effect on student development in Chemistry, according to the study. This method should be used by chemistry teachers in high school, especially when teaching the topic "The Mole." Women have not only proven but also been considered to be as gifted as males, and what is required now is for mechanisms to be put in place to encourage all of them to respect this and compete together.

Eze (2008) from his studies asserted that gender had significant effects on students' achievement in chemistry and showed that male students achieved higher than their female counterparts. Chebii (2019) asserted that students' achievement in chemistry had nothing to do with whether the student is male or female. Gender has been identified as one of the factors influencing student's achievement in sciences at senior secondary school level. Olson (2002) reported that females performed better than male students when taught mathematics using Cooperative learning. Barmao (2016) argued that there is no significant difference in the test scores in mathematics when comparing students enrolled in single-gender classes and those taught in co-educational environment. Students did gain in both single-gender and co-educational classes. Harker (2000) in their study of relative achievement of girls in the single-sex and co-educational schools were explored in details with careful controls for the student's population differences at the two types of schools. The apparent differences between the two types of schools showed non-significant in their achievement. Thus, further investigation was done to clarify the actual impact of gender on learners' academic achievement. In this regard, effect of gender on learners' academic achievement when taught using Harkness teaching method was examined in this study.

2. Methodology

Solomon four group design was used in this study as a quasi-experimental design. Four groups make up the Solomon four-group design (Ogunniyi, 1996). The key element of the Solomon four-group study is that participants are randomly randomized to either receive or not receive a pre-test, and then to either a treatment or comparison group. This design is preferred since it is based on groups of respondents rather than individuals. However, it is not advisable to break and reassemble secondary school classes for research reasons once they have been formed as entire groups. The method allows the researcher to control and measure the testing's key effects. It also allows the researcher to do research in natural and real-world environments. The Solomon four group allows researchers to undertake a more detailed assessment of the reason of changes in dependent variables, including determining if changes are due to interactions between the pretest and treatment. It permits the researchers to have complete control over the variable and ensure that the pre-test has no bearing on the final results (Shuttleworth, 2009).

The Solomon four-group design is represented in Figure 1.

Group	Pre-test	Treatment	Post-test
E1	O1	X	O2
C1	O3	-	O4
E2	-	X	O5
C2	-	-	O6

Figure 1: Solomon Four Group Design.

Shuttle Worth (2009)

Pre-testing (OI), treatment (X), and protesting (02) were all part of the experimental group EI. The control group (CI) got pre-testing (O3), no treatment, and a post-test (O4), The experimental group E2 did not get a pretest and instead got treatment (X) before being post tested (05). Only the post-test (06) was given to the control group (C2). C1 and C2 were taught in a conventional classroom setting. The interaction between testing and treatment was abolished with post-test (O5) and (O6). Students were given a pre-test to determine their entering behavior before the experiment began. The students were not aware of the experimentation because they were instructed by their teachers. To avoid subject interaction, the experimental and control groups were from different schools.

The target population was comprised of 41,287 learners taking Chemistry subject in secondary schools in Kajiado County, Kenya. There were 5,289 participants who formed accessible population. The study sample was collected from Form three students in Sub-County mixed secondary schools.

In this study, students in individual schools were used as sampling units. Out of Kenya's 47 counties, the researcher chose Kajiado as a representative sample. There are 165 secondary schools in the county of Kajiado. From a list of mixed secondary schools in Kajiado county, the researcher employed purposive sampling to select sub-county mixed secondary schools. Purposive sampling technique was used to choose schools from a list of schools in Kajiado county that had the desired feature. Sub-county mixed secondary schools with a class size of at least 30 students were the desired characteristics for the schools that qualified for the study. For experimental study, Frankel and Wallen (2000) recommend at least 30 instances per group. The number of sub-county mixed secondary schools offered a sufficient sample size for the investigation. The four schools that participated in the study were chosen using simple random sampling mixed sub-county secondary schools. To assign groups to experimental (E1 and E2) and control (C1 & C2) groups, a simple random selection procedure was used. If a school had more than one chemistry stream, all of the streams studied using the same teaching methods, but only one stream was chosen for analysis. A total of 124 students were used in this study. Before sampling, the researcher gathered a list of all sub-county secondary schools in the county to determine if they were appropriate for the study. The researcher selected four schools randomly as shown in then sampling grid Table 1.

Table 1: Sampling Grid for the Schools and Students

Population		Sample	
Schools	Students	Schools	Students
51	5289	4	124

Kajiado County has 51 subcounty mixed secondary schools with a population of 5289 chemistry student. Simple random sampling was used to sample four schools. The sample size was 124 chemistry students.

The Chemistry Pre-Test (CPT) instrument was developed for organic chemistry 1. The pre-test instrument's main purpose was to evaluate the students' chemistry entrance behaviour. There were 11 short structured questions from chemistry paper 1 for a total of 30 points on the test. To ensure content validity, all of the questions were taken from previous KCSE chemistry paper 1 examinations. The questions tested knowledge, understanding, application, and analysis skills. Students' achievement in chemistry was measured using the Chemistry Achievement Test. A post-test evaluation at the end of the treatment phase was used to evaluate the effect of the intervention on student chemistry achievement. Out of many subtopics of organic chemistry, the researcher created the instrument

Chemistry Achievement Test (CAT) (Alkanes & Alkenes). There was a total of 11 items, totaling 30 marks. The test items were drawn from KNEC past papers. The test items tested knowledge, comprehension, application and analysis levels. The reliability coefficient for CAT calculated by Kunder Richardson was 0.759. According to Lance (2006), a reliability co-efficient of greater than 0.7 is required for the study. As a result, the instruments were suitable for the research.

The data from the pre- and post - tests was scored, arranged, coded, and entered into a computer for analysis. Version 25.0 of the Statistical Package for Social Sciences (SPSS) was used. Inferential statistics (t-test, Mann-Whitney U Test, Kruskal Wallis Test, and Post Hoc Analysis) were used to perform descriptive statistics (mean, standard deviation, and percentages). The Kruskal Wallis Test was used to check if there were any significant differences between the four groups on the variable in question. To evaluate differences between the means, a t-test and a Mann-Whitney U test were utilized. To investigate the differences between the several groups while controlling the experiment wise error rate, researchers used a post hoc test with Bonferroni adjusted alpha levels. Due to its high power to detect differences, an independent t-test was utilized to analyze differences between means. α=0.05 was chosen as the significance index for rejecting the null hypothesis.

3. Results

This section presents the analysis of data and discussions of the results. The findings are presented in tables and figures.

3.1 Demographic Information of the Students

The gender distribution of the participants was examined in this study. Data on Table 2 shows the outcomes.

Table 2: Demographic Information of the Students

	Experimental			Control		
	N	%	N	%	N	%
Male	35	56.5	39	62.9	74	59.7
Female	27	43.5	23	37.1	50	40.3
Total	62	100	62	100	124	100

According to the results, the experimental group contained 56.5% male and 43.5% female, while the control group had 62.9% male and 37.1% female. 59.7 % of students are male, compared to 40.3% of female students. Fewer female studied chemistry in the sampled schools.

3.2 Effect of Harkness Teaching Method on Students' Academic Achievement Based on Gender

The third objective of the study was to find out if gender influenced learners' academic progress in chemistry when instructed using the Harkness method. The researcher utilized the chemistry achievement test to measure chemistry success based on Gender. The average score of learners' performances by gender was compared before and after experimentation. This objective sought to find out if there was a significant difference in student achievement in chemistry based on gender when the Harkness teaching approach was used. The findings from the analysis of pretest mean marks are presented in Table 3.

Table 3: CAT Experimental Mean Score and t-test Pretest Results of Students by Gender

Gender	N	Mean	Std. Deviation	T	Df	Sig.
Male	18	17.83	6.012	1.439	29	0.161
Female	13	14.77	5.615			
Total	31					

The pre-test average score and t-test outcomes of chemistry based on gender for experimental group 1 are shown in Table 3. The average score for males in the experimental group (E1) was 17.83 with a standard deviation of 6.012,

while the mean score for females was 14.77 with a standard deviation of 5.615. Information on Table 4 demonstrates that p is greater than 0.05 at the 0.05 alpha level, with t (29) = 1.439. This implies that learners of both genders had equivalent characteristics before the treatment, implying that learners had similar qualities.

The researcher also wanted to examine the post-test average score of experimental groups to find out how the Harkness teaching method affected student achievement based on gender. Table 4 summarizes the study findings.

Table 4: CAT Experimental Group Mean Scores and t-test Post-test Results of Students by Gender

Gender	N	Mean	Std. Deviation	T	df	Sig.
Male	35	58.23	6.890	1.673	60	0.099
Female	27	54.81	9.182			
Total	62					

The males had an average score of 58.23 %, which was greater than the females' 54.81 %, according to Table 4. Boys had a standard deviation of 6.890, whereas females had a standard deviation of 9.182. Table 4 shows that at the 0.05 alpha level, t (60) =1.673, p>0.05), indicating that there is no statistically significant difference in chemistry performance among girls and boys when instructed using the Harkness teaching method. As a result, the research null hypothesis (H0) was accepted, stating that when students learn utilizing the Harkness teaching method, there is no statistically significant gender difference in chemistry performance. Boys had a higher average score of 58.23%, while girls had a lower average score of 54.81 % as shown in Figure 2.

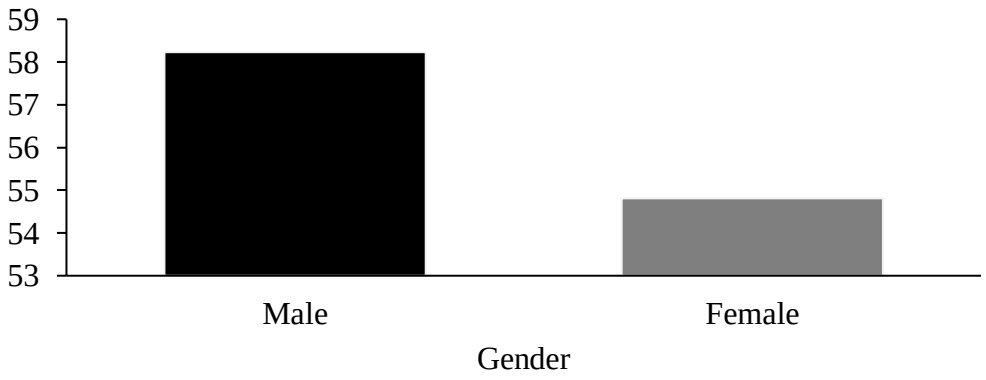

Figure 2: CAT Experimental Group Mean Scores of Students by Gender

Whenever girls and boys were instructed utilizing the Harkness teaching method, there was no significant difference in their performance. Gender has no impact on chemistry understanding, according to the results of this study.

4. Discussion

The research findings correspond with those of Backer (2016) and Kurtz (2015). They found that Harkness classes promote collaborative learning, with fairness, equity, transparency, and the reduction of egos (both teachers and students) as notable outcomes.

The findings of the study are also in line with a study in the Times Newspaper Vol. 163, No. 3 of January 19, 2004, which stated that females have not only proven but also been acknowledged as talented as males and that what is required now is to have a mechanism in place to make everyone applaud this and start competing around each other. The study findings contradict those of Dalton, Ingels, Dawning, and Bozick (2007), who discovered a gap between men and women in science achievement at the K-12 level in their study. The findings were ascribed in part to a lack of women pursuing degrees in STEM subjects (Science, Technology, Engineering, and Mathematics). The findings are consistent with those of a study conducted by Ssempala (2009) on gender disparities in chemistry

practical skill among senior six females in Kampala district mixed secondary schools, which found that boys did better than girls in chemistry.

The current study also contradicts the findings of Rizwan and Muhammad (2005). They reported that female students' science performance was higher than male students' achievement scores despite no significant difference in CAT average score. In the United States, public polls on the gender imbalance in science achievement provided conflicting results (Amelink, 2009). According to this study, women performed equally to male colleagues in classwork finished; nevertheless, in evaluations aimed to measure content knowledge, such as the nationwide study of department of education, differences between the sexes in education programs emerged in primary and proceeded through high school. The results of this study contradict those of Kolawole (2007), who looked into gender issues and educational achievement of senior high school pupils in arithmetic computing tasks to see if males or females did better. The study found that children in single-gender schools scored better in numerical computation than children in mixed-gender schools and those males in boy schools did not execute substantially better than females in girl schools.

Females outperform male in fairly low elementary grades, according to a study conducted by Kenyatta University in collaboration with the Rockefeller Foundation and the Education ministry, Science, and Technology in 2004. The research was a collaborative effort of Kenyatta University, the Rockefeller Foundation, and the Ministry of Education, Science, and Technology. The findings of the study contradict those of Nzewi (2010), who asserted that there is a gender difference in the learning of science courses such as chemistry with female students being disadvantaged.

The findings of study contradict those of Arop, Umanah, and Effiong (2015). They looked at the impact of teaching materials on the learning of science in junior high schools in Nigeria's Cross River State. The findings revealed a considerable disparity in learners' average achievement scores, with females scoring higher than men. The study's findings are in accordance with Tomlinson's (2001) results that special education raises the stakes for all students in intermediate school classrooms in the United States of America. Cousins (2007) studied gendered inclusion in secondary school education students' chemistry on male and female's involvement in secondary schools in Australia.

Notwithstanding the quantitative shifts that show growing female performance over the last few years, the students' comments suggested that chemistry is not completely gendered inclusive. The research outcomes contradict those of Herrick (2009). He found that many educators and researchers offer science topics like chemistry a gendered outlook, implying that girls and women face numerous challenges. Because the subjects are viewed as male, male students are always anticipated to outperform females.

5. Summary of Research Findings

The objective of this study intended to determine if there were gender differences in students' achievement in chemistry subject taught using Harkness method. The findings revealed that there were no statistically significant gender differences in achievement in chemistry subject taught using Harkness method. This could be taken to mean gender does not affect students' academic achievement when Harkness method is utilized. Thus, Harkness method is appropriate for teaching both girls and boys; it is gender sensitive and non-discriminative. Additionally, it affords all students an equal access to the curriculum while maintaining their high expectations.

Conclusion

The findings of the study revealed that gender does not have any effect on chemistry achievement when students are taught using Harkness teaching method. Hence Harkness teaching method is a versatile method for teaching both male and female learners. This means Harkness teaching method is ideal in teaching students regardless of gender.

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