

# Gender differences in Field Dependent and Field Independent Cognitive Learning styles toward Reading Comprehension among Secondary School Students in Kiambu County, Kenya

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## ABSTRACT

The study examined gender differences in FD and FI cognitive learning styles toward reading comprehension among secondary school students in Kiambu County, Kenya. The researcher adopted correlational research design. Purposive sampling was used to pick 20 public day secondary schools in Kiambu County while simple random sampling was used to sample 860 students who took part in the study. The study collected data from the sampled schools and participants using questionnaires. Data analysis was done through coding into SPSS version 23. Descriptive data was presented in frequency distribution tables, percentages, means and standard deviations. Hypotheses testing was done using independent samples t-test. The results showed that the mean score difference between male and female respondents with FI cognitive learning style was not statistically significant ( $t(450) = .88, p > .05$ ). The results also showed that there was no statistically significant difference in the FD cognitive learning styles between male and female respondents ( $t(402) = -1.57, p > .05$ ). Based on the results, male and female students use similar cognitive learning styles. Therefore teachers need to put the same effort when teaching boys and girls to enhance their academic performance in reading comprehension.

**Keywords:** FD-FI Cognitive Learning Styles; Gender; Reading Comprehension Performance

## BACKGROUND TO THE STUDY

Language is used in the majority of civilizations as a means of problem-solving and communication both within and outside the classroom. The two main forms of language are spoken language and written language which is mostly in print form. Reading comprehension is essential for understanding, use, and communication in written or printed language. Reading comprehension is essential for improved learning and strategic information processing in academic accomplishment (Lianne et al., 2010). Learners must read and comprehend the teaching and learning materials in order to effectively respond to academic needs. The students' capacity to grasp what they read has a significant impact on how much they learn. Reading comprehension is crucial for students to achieve high grades in learning assessments. In Kenya, there are limited studies on gender differences in FD and FI cognitive learning styles toward reading comprehension performance among secondary school students in Kiambu County, Kenya. Therefore, there was need to conduct this study to fill the gap. Studies have shown that there are gender differences cognitive learning styles. Oginga (2020) revealed that cognitive styles differ with the gender of the students. Female student's cognitive learning styles differ with male students cognitive learning styles. Female students seemed to possess FI while male students were confirmed to have FD cognitive style.

In Indonesia, Muhammad and Werner (2022) revealed that there are significant gender differences where

more of male students possesses FD cognitive style while more of female students possess FI cognitive learning styles. On the same note, Prayinto et al. (2020) revealed the existence of gender differences in FD and FI among students in Turkey. Furthermore, Widodo and Nugroho (2020) indicated that male students had FD cognitive style while female students possessed FI cognitive styles. Similarly, Kamid et al. (2020) confirmed the existence of gender differences among student indicating that male were found to possess a high FD cognitive learning style while female students were found to possess a high FI.

A study done in Nigeria by Nornu and Orluwene (2019) confirmed that there are gender differences among students with FD and FI cognitive styles. Similarly, Akanni and Olamideji (2021) concluded that there were gender differences in FD and FI cognitive styles. They revealed that male students with FD and FI cognitive learning styles were found to have outperformed their female counterparts. In Ghana, Hamed (2020) also revealed that there exists gender differences in Cognitive learning styles. The researcher revealed that male students displayed high FD and FI as compared to female students. This helped them outperform the female students. Olankule (2019) on a similar note, confirmed that gender differences exist among students. He revealed that male students were purported to have high FI as compared to female students who had high FD cognitive styles.

Onyekuru (2015) established that male students possessed FI cognitive style while female students had FD in Nigerian secondary schools. Rezai and Noori (2013) also established gender differences in FD-FI cognitive styles. They revealed that male students were found to be possessing FD cognitive style while female students possessed FI. The researches reviewed have reported contradictory and mixed reports on gender differences in FD-FI cognitive styles. Some report that male students possess FD and others indicated that female students possess FI cognitive learning style. The mixed and contradictory results therefore call for continued research in this area on gender differences in FD-FI among secondary school students. The current study therefore aimed to fill this gap by examining gender differences in FD-FI cognitive styles towards reading comprehension among secondary school students in Kiambu County, Kenya.

## **STATEMENT OF THE PROBLEM**

The research problem this study addressed was below-average performance in reading comprehension performance among male and female students. This was evidenced by below-average performance in English in Kiambu County. Most of the time between 2016 and 2018, secondary school students received grades of D+ or worse. This issue can be related to the conventional teaching approach, in which the teacher typically provides learning instructions. Without taking into account the students' distinct cognitive learning styles, FD and FI, this method often involves multiple professors teaching the class at once. Locally, the FD and FI constructs in educational settings have not been studied. This study looked at gender differences in FD-FI cognitive learning styles among Form Two students in order to address this issue and fill a gap in the literature.

## **REVIEW OF RELATED LITERATURE**

A study by Boccia et al. (2017) conducted in Italy investigated the effects of cognitive styles on learning outcomes. Group Embedded Figure Test (GEFT) was used for data collection from a sample of 54 respondents to identify their cognitive techniques and PTSOT (Perspective Taking/Spatial Orientation Test) to determine their orientation skills. After data analysis, it was found that cognitive styles interacted with gender on rote learning and map drawing. Females classified as field dependent performed poorly than their male counterparts. This showed that cognitive style affected learning and retrieval of the content. The study concluded that cognitive techniques are vital while forming a mental map of the environment, and field-independent individuals showed more remarkable ability than field-dependent individuals. The findings are

significant, but it is unclear if the trend is the same concerning reading comprehension performance, a gap the current research aimed to address.

Another study was conducted by Hung and Wang (2021) to determine the impact of FD and FI cognitive styles and gender on how to identify and correct bugs while developing applications. The study involved forty learners studying C++ programming language. GEFT was used to classify the learners as either FD or FI. It was established that the FI and FD students identified and corrected errors differently. It was also found that male students took longer to identify and fix bugs than their female counterparts. This is a clear indication that there are gender differences based on their cognitive styles and how they solve problems. This study involved students studying programming languages, and therefore, there was a need for the present study to provide details on students dealing with reading comprehension in secondary schools in Kenya. Furthermore, the study was conducted in Taiwan, a country with a different socio-cultural and economic background to that of Kenya, and the present study filled this gap from a Kenyan context.

In another related research conducted in Iran. Niroomand and Rostampour (2014) investigated the impact of FD cognitive styles and gender differences on learning English. EFL (English as Foreign Language) students were subjected to VST (Vocabulary Size Test) and GEFT. The study reported that the cognitive styles of FD students affected their performance in English as a foreign language; other interactions, such as gender differences, also influenced vocabulary knowledge. The researchers concluded that understanding students' cognitive style of learning and gender enables the instructor to come up with appropriate materials to assist learners in enhancing their competence.

Arisi (2011) conducted a study in Nigeria to investigate the effect of learners' cognitive style and gender on their academic performance. The research aimed at investigating the impact of cognitive techniques on educational outcomes on one hand and gender differences on cognitive styles on the other hand. The study involved 192 (87 males and 105 females) students selected from 4 secondary schools. The data collected were analyzed using percentages, and the hypothesis was tested using ANCOVA. The study findings were as follows; there was no significant association between cognitive styles and academic achievement, and there was no significant association between cognitive techniques and students' gender. It was also reported that FD learners performed better than FI learners.

In another research, Idika (2017) examined the impact of FD and FI cognitive styles and gender on performance in Chemistry subjects. The study involved 208 students chosen from public secondary schools in Ibadan. The study employed a survey research design. The data were collected using questionnaires issued to the selected students. The data collected were then analyzed using SPSS to obtain descriptive and inferential statistics. It was established that there existed significant differences between FD and FI students on performance in chemistry, where students with FI cognitive style recorded higher performance than those with FD cognitive style. However, no significant gender differences were obtained based on these scores. The study recommended adopting a teaching style that suits all the available students in class. This study focused on performance in chemistry subjects. Therefore, there was need for the current research to provide empirical evidence for gender differences in FD and FI cognitive styles toward reading comprehension.

Niroomand and Rostampour (2014) conducted another study to determine whether gender impacted vocabulary knowledge among English First learners in Iran based on the FD and FI cognitive styles. The study involved 82 undergraduate students, both male and female students. The researchers utilized vocabulary size test to test understanding of the vocabulary, while the student's cognitive style was tested using GEFT. To determine the effect of gender based on their cognitive styles on vocabulary knowledge, the researchers used ANOVA. It was established that gender did not influence vocabulary knowledge based on students' cognitive style category. This study was conducted at a university in Iran, a country with a different socioeconomic background than Kenya. Furthermore, the findings were from university students and may not be generalized to secondary schools. The present study filled these gaps by providing literature

on a Kenyan setting involving secondary school students.

In Kenya, Oginga (2020) carried out a study to determine gender differences in cognitive styles. The study was carried out in public secondary schools. The study employed descriptive research design, and quantitative data were collected from form three students selected using stratified sampling techniques. The form three class was chosen using random and purposive sampling techniques. The cognitive styles were identified using GEFT. The student's performance was obtained from their previous exams. The data were analyzed using SPSS to get descriptive and inferential statistics that helped answer the research questions. The study established that gender did not significantly impact on the students' cognitive styles. This study did not provide information on gender differences in FD and FI cognitive styles toward reading comprehension, a gap this study aimed to fill.

Relatedly, Musya (2015) examined the association between cognitive styles and academic outcomes among high school learners in Kenya. The research aimed to find the association between students' cognitive style and academic achievement in Chemistry. Using simple random sampling, 200 form three students were selected from different schools. The respondents were issued with a questionnaire that collected personal information. End of term performance in Chemistry and GEFT was used to identify their cognitive styles. Data were analyzed using SPSS involving computation of mean scores and standard deviations in Chemistry. Pearson Moment Correlation Coefficients were used to find out the correlation coefficients. The findings revealed that FD and FI cognitive styles influenced chemistry performance, where FI students performed better than their counterparts. The study findings also showed that most male learners were FI while most female students were FD. Since the study focused on chemistry and was conducted in Kitui County, there was need to conduct similar research in Kiambu County to concentrate on reading comprehension performance to compare the results and contribute to literature to bridge the gap

## METHODOLOGY

### Research Design

In this study, correlational research design was employed. According to Kothari and Garg (2014), correlational research design is a quantitative method of inquiry in which two or more variables from the same subjects are examined to ascertain whether there is covariance or association. This approach was appropriate for this study because FD and FI cognitive learning styles cannot be altered due to ethical issues on isolating students based on their cognitive learning styles and the researcher's limited experience to conduct successful experiment. The characteristics that affect academic performance among secondary schools in Kiambu County have been successfully studied using a correlational research design. Mwangi (2015) employed this design to investigate the link between resilience and academic success, and the outcomes were in line with the majority of past studies. Ngunu (2019) employed the same design in a different study to examine particular correlates of academic achievement, and the results of that study were confirmed.

### Locale of the Study

This study was conducted in Kiambu County. According to Mwangi (2015), the majority of the county's public sub county day secondary schools are facing the challenge of declining academic achievement. The county was appropriate for this study because according to Nganga (2018) academic performance in majority of the public sub county day secondary schools was below average. The County was ranked 36 and 38 in KCSE in the years 2017 and 2018, respectively (KNEC statistics, 2018). In addition, Kiambu County had the majority of the last 200 public day secondary schools in the KCSE for the academic years 2016, 2017, and 2018. According to a study by Chege (2012), reading comprehension and academic achievement were significantly correlated. This study was necessary to address this issue since poor reading

comprehension may be contributing to poor academic performance in Kiambu County's public day secondary schools. No attempt was made to determine gender issues in FI-FD cognitive learning styles and reading comprehension performance.

### Sampling Techniques

Purposive sampling was used to select public day secondary schools. A total of 20 public day secondary schools were chosen using simple random sampling from a target population of 176. The study assistants were told to write the numbers on small sheets of paper after giving the schools codes ranging from 1 to 174. After folding, they were placed in a bowl and shuffled. Twenty papers were drawn at random from the bowl to choose the 20 schools. Simple random sampling was used to choose 860 students from the sampled schools. Boys and girls were given equal opportunity to participate in the study by utilizing proportionate stratified sampling technique. This technique was used to select students from the different schools sampled.

### Data Collection

For easy questionnaire identification during data coding, the sampled schools were listed down and given codes. The researcher administered the data collection tools with the help of research assistants. After receiving approval from the school administrator, the students were chosen using simple random sampling technique. The researcher asked the class teachers for help in data collection. The filled study instruments were collected the same day.

## DATA ANALYSIS

Out of the 860 questionnaires that were distributed, all of them were examined for completeness, and five of them were excluded from data analysis because they had more than four items unfilled. The remaining questionnaires were entered into the SPSS computer program Version 23 for analysis. Preliminary handling of the data involved checking for any missing data and outliers. Before data analysis was done, missing values were filled in and outliers were replaced using imputation method. Frequency distributions, percentages, means, and standard deviations were used to examine the descriptive data. The results were presented using tables. Inferential statistics; independent samples t-test was used to test research hypothesis.

## FINDINGS

### Demographic Data of the Respondents

The demographic data of the respondents collected was based on gender. Table 1 shows the gender of the respondents.

**Table 1: Gender of the Respondents**

Gender	Frequency	Percent
Male	419	48.9
Female	437	51.1
Total	856	100

Table 1 reveals that 419 respondents representing 48.9% of the total were male and 437 respondents representing 51.1% were female. The findings show that there were more girls than boys involved in the study.

To understand the distribution of the respondents’ cognitive learning style on the basis of gender, the data were subjected to cross tabulation and the results are presented in Table 2.

**Table 2: Respondents’ Gender and Cognitive Learning Style Cross Tabulation**

		FI and FD				Total	
		FI	%	FD	%	F	%
Gender	Male	214	25	205	23.9	419	48.9
	Female	238	27.9	199	23.2	437	51.1
<b>Total</b>		<b>452</b>	<b>52.9</b>	<b>404</b>	<b>47.1</b>	<b>856</b>	<b>100</b>

Note. FI – Field Independent; FD – Field Dependent; F- Frequency; % -Percentage

Table 2 demonstrates that 452 respondents (52.9%) had field independent cognitive learning style while 404 respondents (47.1%) had field dependent cognitive learn. Regarding cognitive learning style and gender, 214 boys (25%) had field independent learning orientation while 205 boys (23.9%) had field dependent learning orientation. For the girls, 238 (27.9%) of them had field independent cognitive learning style while 199 (23.2%) girls had field dependent cognitive learn.

### Hypothesis Testing

The researcher sought to test the following hypothesis:

$H_0$  There are no significant gender differences in FD and FI cognitive styles toward reading among Form Two students in Kiambu County.

Table 3 below presents male and female respondents’ FD and FI mean scores.

**Table 3 : FD and FI Mean Scores by Gender**

	Gender	N	Mean	SD	SE Mean
FD Total score	Male	205	20.82	2.82	0.19
	Female	199	21.27	2.88	0.2
FI Total score	Male	214	20.05	2.98	0.2
	Female	238	19.8	2.98	0.19

The findings show that male students performed better on the FI, with a mean score of 20.05( $SD=2.98$ ), than female students who achieved a mean score of 19.80( $SD=2.98$ ). In contrast, female respondents scored a mean of 21.27 ( $SD = 2.88$ ) on the FD cognitive style, which is somewhat higher than their male counterparts’ mean of 20.82 ( $SD = 2.82$ ).

To establish if the mean difference was statistically significant, the researcher conducted a t-test, and the results are presented in Table 4 below.

**Table 4 : Independent Samples T-Test**

		t-test for Equality of Means		
		T	Df	Sig. (2-tailed)
<b>FD Total score</b>	Equal variances assumed	-1.57	402	0.11
	Equal variances not assumed	-1.57	401.03	0.11

<b>FI Total score</b>	Equal variances assumed	0.88	450	0.37
	Equal variances not assumed	0.88	444.84	0.37

Table 4 indicates, the mean FI score difference between male and female respondents was not statistically significant ( $t(450) = .88, p > .05$ ). The results also showed that there was no statistically significant difference in the mean FD scores between male and female respondents ( $t(402) = -1.57, p > .05$ ). The null hypothesis was therefore retained.

### Discussion of the Results

The results of the study showed that the mean difference between male and female respondents' scores for field-dependent (FD) and field-independent (FI) cognitive learning styles was not statistically significant. In contrast to the female pupils, the male student who did well in reading comprehension displayed a higher FI. The outcomes of past studies were supported by the findings. According to Umah (2020), whereas female respondents scored higher in the FD cognitive learning type, male respondents performed better in the FI. Female respondents outperformed males in the field-independent cognitive learning style (Olagbaju's, 2020). The research was conducted among high school students in Nigeria and the boys outperformed girls in the field-dependent cognitive learning style.

According to Verawati et al. (2020), students with FI cognitive learning styles frequently outperformed those with FD. According to their findings, male students did better than female students with lower FI scores. Another study carried out by Hung and Wang (2021) to determine the impact of FD and FI cognitive styles and gender on how to identify and correct bugs while developing applications reported that male students took a long time to identify and fix bugs than their female counterparts. This indicated gender differences based on their cognitive learning styles and how they solve problems. The results did not agree with those of the present study.

In Nigeria, Idika (2017) carried out a study to determine the impact of FI and FD cognitive styles and gender on the performance in Chemistry. The study reported no significant gender differences based on the scores of FD and FI students. Arisi (2011) conducted a similar study in the same country and found no significant association between cognitive styles and students' gender. These results agree with the findings of the present study. Another study by Niroomand and Rostampour (2014) established that gender did not influence vocabulary knowledge based on students' cognitive style category.

In Kenya, a study by Musya (2015) examined the association between cognitive styles and academic outcomes among high school learners. The researcher established that FD and FI cognitive styles influenced Chemistry performance where FI students performed better than their counterparts. It was also reported that majority of the male learners were FI. In contrast, most of the female students were FD, indicating that gender could have played some role in influencing Chemistry performance. These findings were inconsistent with those of the present study.

### CONCLUSION

The study sought to ascertain whether secondary school students in Kiambu County differed by gender on their cognitive learning styles (FD and FI) towards reading comprehension. According to the study's findings, there were no significant gender disparities in FD and FI cognitive learning styles. However, female respondents had a higher mean score in FD cognitive learning style than male respondents. The mean score of male respondents on FI cognitive learning style was higher than of female respondents. The findings of independent samples t-test showed that there was no statistically significant difference in the

mean scores for FD and FI cognitive learning styles between male and female students.

## RECOMMENDATIONS

Based on the results, male and female students use similar cognitive learning styles. Therefore teachers need to put the same effort when teaching boys and girls to enhance their academic performance in reading comprehension.

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