Cognitive Styles of Undergraduate Students at Pwani University on the Field Independence–Field Dependence Dimension, Kilifi, Kenya.

Abstract

Choosing a university academic programme is an important task and a key defining moment in a learner's career life. Besides, placement in a programme that matches one's cognitive style is just as critical. Therefore, the purpose of this study was to examine the cognitive styles of undergraduate students at Pwani University, Kenya. A correlational study design was applied in the study. The tool for data collection was a cognitive style and programme satisfaction (CS&PS) students' questionnaire. The study's target population comprised of 1,926 first and 1,671 third year undergraduate students. The study made use Krejcie and Morgan Sampling table to obtain a sample size of 351. Proportionate sampling was used to sample the respondents to represent schools, departments and gender. Test-retest procedure was run to enhance reliability and validity of the tool. Cronbach's alpha coefficient was calculated to determine the reliability of the piloted questionnaires. The content validity of the study instruments was ensured through expert review and pilot study. Data was analyzed using chi-square, Pearson correlation and regression analysis using Statistical Package for Social Sciences (SPSS). The study found that 54.9% of respondents were Field Independent (FI) learners, while 44.8% were Field Dependent (FD). Further, more female students (69.5%) had FD cognitive style while more male students (74.8%) had FI cognitive style. The study concluded that that there was a various (22.7%) cognitive style of undergraduate students' at Pwani University. The study recommended that Pwani university management through academic mentorship programmes should encourage undergraduate students to identify their cognitive styles and the learning strategies to enhance their optimal performance. The study also recommends that lecturers should apply variety of teaching methodologies and resources in a bid to accommodate each individual learner's cognitive style preferences during learning.

Keywords: Academic programme, Cognitive style, Programme satisfaction, Cronbach's alpha coefficient, Field Dependent

1. INTRODUCTION

Undergraduate students often have ambitions and plan about their future career paths by the time they enroll for their studies. However, a considerable number of students are compelled into certain programmes either by families, peer pressure or due to university placement into programmes that they do not prefer. Although a recent increase in enrollment rates in Kenyan universities has been hailed as a positive step, many students admitted are frustrated academically by the placement into programmes they find themselves in (Douglas, 2003). Over the years, scholars have acknowledged approximately nineteen ways of explaining cognitive styles (Douglas, 2003). These ways have been enshrined in theories, constructs, and models as follows: The Converger–Diverger construct by Hudson (1967) explains that divergers are open-ended, creative, and exploratory individuals, while convergers are close-ended, focused individuals who prefer structured formal tasks that demand logical methods. However, Kagan,

Rosman, Day, Albert, and Phillips (1964) describe the reflectivity versus impulsivity theory. This theory posits that reflective individuals take a relatively long time to respond to a situation and hence have high accuracy and long response latency. Conversely, impulsive individuals are quick when reacting to a situation, have short response latency, and often make several errors (Hudson, 1967).Conversely, an innovator learner is dynamic, seeks to solve a problem differently, and provides an innovative change. Kirton's (1976) explanation bears similarities to that of Pask (1969) and Hudson (1967). For instance, in the 2019/2020 academic year, Kenya Universities and College Central Placement Services (KUCCPS) reported that a quarter of the 90,744 2018 KCSE candidates that qualified for placement to degree programmes, did not get any of their preferred choices for programmes to pursue. This was because student placement is usually done on a competitive basis. Consequently, some students lose interest in their studies; others procrastinate by deferring semesters while others drop out completely(Omwenga & Kayusi, 2024).

Based on the foregoing descriptions of cognitive style, most of them are anchored towards FI-FD, with Field Independent learners bearing similar characteristics as the innovators, divergers, and holists. This, therefore, indicates an overlap between cognitive style distinctions. This position was supported by Riding and Cheema (1997) and Lusweti et al. 2017 who stated that most cognitive style dimensions are but different conceptualizations of similar concepts and that resemblance exists among the various dimensions.

Field Independent learners, therefore, prefer working independently, they are intrinsically motivated, and hence they are less affected by criticism and social background (Omwenga & W, 2024). These learners have more logical-mathematical, visual-spatial and intrapersonal intelligence and therefore, can be successful as scientists, engineers, architects, computer programmers, mathematicians, accountants, artists and philosophers (Witkin, Moore, Oltman, Goodenough, Friedman, Owen & Raskin, 1977). Witkin et al. (1977) argue that Field Independent people are more likely to depend on internal frames of reference as opposed to Field Dependent individuals. Field-Independence is the extent to which a person perceptually detaches an object from the immediate field instead of considering it as rooted in the field (Mall-Amiri & Ahmadi, 2014). A Field-Independent person can easily distinguish objects from embedding frameworks, for example, by articulating figures as discrete from their backgrounds. Furthermore, Field Independent learners are not affected by the environment around them when thinking, perceiving, remembering, and processing information but also by family background (Omwenga & Kayusi, 2024). A case in point may involve learners who comfortably read and concentrate in a noisy classroom. Further, Field Independent learners are analytical and task-oriented and tend to be less social than Field Dependent learners

(Goodenough, 1976). Globally, the Africa-America Institute (2015) reported that only 56.2% of students complete their college programmes. In Britain, the USA, and Canada, the attrition rates are at 50% (Soilemetzidis& Dale, 2013). Studies from India and the Middle East report that the rates of attrition are between 20% and 35% (Barnes & Randall, 2012). In Africa, a study by Herman (2011) in South African universities reported an attrition rate of 50%. Njoroge, Wang'eri and Gichure (2016) in a similar study conducted in Kenya found a 37% attrition rate in private universities. Pwani University students experience similar problems. In the 2018/2019 academic year, 435 first-year undergraduate students of Pwani University applied for intra and inter-school transfer, but only 230 (53%) students were approved (Pwani University Admissions Office, 2020). Thus, 47% of students who applied for the transfers were placed in programmes they did not prefer. In the 2019/2020 academic year, 348 learners applied for intra and inter-school transfer, but only 160 (46%) students were approved. Evidently, these students who remain in the selected programmes do so but with little interest. In the same year 2020, 138 first year undergraduate learners deferred their studies. Also 10 out of 19 learners in the University that dropped out of their programmes of study were first year undergraduate students (Pwani University Admissions Office, 2020).Therefore, enrolling in a programme that a person does not appreciate and has no interest in has direct consequences for society and the individual. Some students dislike their studies and hence put little effort into them leading to poor performance, deferment, and emotional and psychological stress(Keari et al., 2024). Other students decide to go back to college and train in a programme of their interest later after graduating hence wasting time and resources. Besides, some students complete the degree but lack interest and ambition in their trained career, something which demotivates them. On the other hand, some may look for jobs in different fields, thus causing society to strain financially due to academic-market mismatch(Keari et al., 2024).This study focused on Field Dependence–Field Independence (FI-FD) cognitive style that describes a person's preferences and stable attitudes that influences their perception. The FI-FD cognitive style also influences people's knowledge acquisition and their differential reaction to stimuli, which affects their career perception and satisfaction (Ellah & Achor, 2015). At Pwani University, cases of attrition, deferment and approval of few intra and inter school transfers have been reported.

1.1 Objective of the Study

The study was carried out to determine and assess the cognitive styles of undergraduate students at Pwani University on the Field Independence–Field Dependence dimension.

1.2 Null Hypothesis

There is no significant difference in cognitive styles among undergraduate students at Pwani University on the Field Independence–Field Dependence dimension.

1.3 Aim of the Study

This study sought to examine the cognitive styles among undergraduate students at Pwani University on the Field Independence–Field Dependence dimension.

1.4 Significance of the Study

i. Based on the findings of this study, undergraduate students may be made more aware of how their specific cognitive styles can influence their learning and academic programme satisfaction to have a successful studentship.
ii. Students may also get insights into the drawbacks and benefits of their specific cognitive style. This might help them in decision-making concerning their programme choices.
iii. The students may tap into the understanding of their cognitive styles to adjust and harness their thinking, learning, and problem-solving behaviors to match programme demands.
iv. From the study findings, lecturers and tutors may be made aware of the differences in cognitive styles thus, use appropriate teaching approaches that cater to the range of cognitive style preferences of students.
v. The management of Pwani University may find it beneficial to train chairs of departments, deans, and university counselors on cognitive styles to help students to transfer to programmes that are more aligned to their cognitive style even after being placed by KUCCPS.
vi. This study's findings might also help parents become conscious of their children's cognitive style and, therefore, not compel them into programmes for their own sake but for the learner. Further curriculum designers and developers for teacher training may be guided to input cognitive styles into consideration as a content area to cover when training teachers.
vii. The Ministry of Education, KUCCPS and the Commission for University Education may use the study findings to create meaningful ways of improving students' programme welfare by coming up with ways to guide them appropriately before making programme choices back in high schools. Finally, the findings of this study will significantly contribute to the knowledge pool for academia on the already existing literature on programme satisfaction and cognitive styles.

1.5 Limitations of Study

Cognitive style is a psychological concept. Measuring it using a self-reporting tool may have posed a challenge since the participants could have exaggerated, underestimated, or misreported the traits in question. To mitigate this, the researcher took time to administer the tool to one learner at a time and rephrased and paraphrased questions where it was deemed necessary.

2. METHODOLOGY

Research Design: This study used correlational design to describe the degree to which the study variables were statistically related. The design was chosen as it lends itself to collecting quantitative data concerning the already existing cognitive styles. Correlation design further allowed for the prediction of programme satisfaction based on cognitive style indices.

Study area: This study was carried out at Pwani University. Pwani University is a public university situated in the Kenyan coastal region at the heart of Kilifi town. Pwani University borders the Indian Ocean, and the major economic activities of the neighboring community are fishing, tourism, and agriculture.

Target Population of the Study: The study targeted all first and third-year undergraduate students at Pwani University. The researcher was interested in determining if there were differences in the level of programme satisfaction and cognitive styles between junior and senior undergraduate students. When data was being collected at Pwani University, the first-year student population was 1,926, and the third-year population was 1,671 (Pwani University Admissions Office, 2020). The study involved male and female students from all seven schools in the university.**Sampling Technique:** This study applied multistage sampling to select respondents. Sampling began by stratifying students by their school. Students from the seven schools at Pwani University participated in the study. purposive sampling was used to obtain an equal number of female and male students to participate in the study.

Sample Size: At the time of sampling the first-year undergraduate students were 1,926, while third-year undergraduate students were 1,671 forming a total target population of 3,597 at Pwani University (Pwani University Admissions Office, 2020). The Krejcie and Morgan (1970) sample size calculation table was used to select an optimal sample size in line with the required precision level, as well as the estimate fraction of the sample in the population. A total sample of 351 students was selected. This sample was distributed across the seven schools at Pwani University to yield about 50 students per school and about 25 per department. Considering the student population, the sample was then proportionately divided between first and third year; the researcher thus picked 189 first-year and 162 third-year undergraduate students. The numbers were equally divided between male and female students.

Research instruments: The study employed a cognitive style and programme satisfaction (CS&PS) students' questionnaire and Field Dependence Cognitive Style Checklist developed by Wyss (2002). The checklist contained nine contrasting statements. **Pilot research:** Was conducted to assess the validity of the questionnaires, the participants' comprehension of the questions, and the time required to determine the correctness and suitability of research tools.The CS & PS questionnaire used in this study was exposed to a test-retest procedure where the instrument was administered and re-administered to thirty respondents within a time difference of two weeks to the reliability of the research tools. **Data Collection Procedure:** The researcher acquired a Certificate of Ethical Approval from the Pwani University Ethics Review Committee. The approval is endorsed by the National Commission for Science, Technology, and Innovation (NACOSTI). The researcher further met the Deans of the selected schools and chairs of departments to seek permission, familiarize, create rapport and explain the aim of the study.

Data Analysis: The data collected was analysed quantitatively using the Statistical Package for Social Sciences (SPSS). The data was coded and descriptive statistics, such as percentages, frequencies, pie charts, and frequency tables, were used to provide a profile of students' gender, student's course of study, cognitive style, and programme satisfaction.

3. RESULTS AND DISCUSSION

3.1 Response Rate

The researcher administered 351 questionnaires to undergraduate students from the seven schools at Pwani University. The return rate is summarized in ***Table 1.***

Table 1: *Questionnaire Return Rate*

	NumberofRespondents	QuestionnaireReturnRate
QuestionnairesReturned	286	81.5%
Questionnaires not Returned	65	18.5%
Total	351	100%

As shown in Table 1, 351 questionnaires were administered; however, 65 questionnaires were not returned. This resulted to a questionnaire return rate of 81.5%. According to Mugenda and Mugenda (2003), a questionnaire return rate above 50% is adequate for data analysis to be conducted in research. Therefore, a response of rate 81.5% was considered adequate for data analysis to be undertaken for the present study.

3.2 Demographic Information of the Respondents

The respondents' demographic information, which included sex, age, school, year of study, and departments is presented in this section.**3.2.1 Sex of the Respondents** The researcher was interested in establishing whether gender differences in cognitive styles exist among undergraduate students at Pwani University. This is because some earlier studies such as (Rostampour&Niroomand, 2014; Oginga, 2020) reported that the proportion of males who are field-independent was higher than that of female students. The results on sex of respondents are shown in ***Figure 1.***

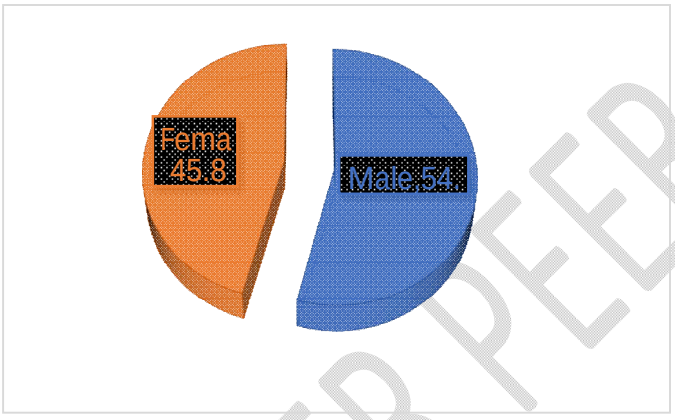
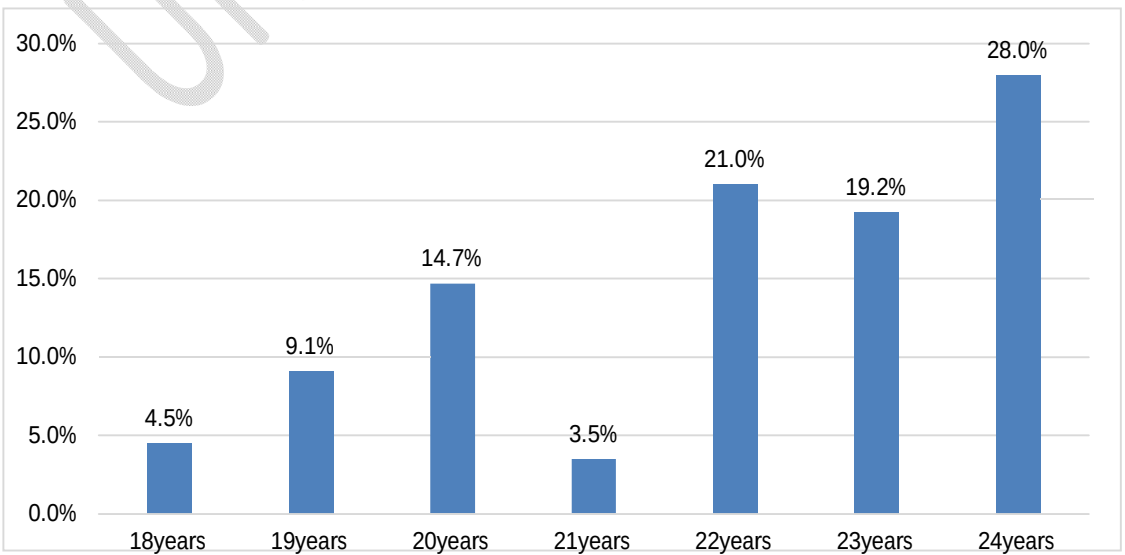


Figure 1: *Distribution of respondents according to Sex*

From the findings in Figure 1, there was an almost similar distribution between the two sexes; male (54.2%) and female (45.8%). The evidenced distribution was a result of the study



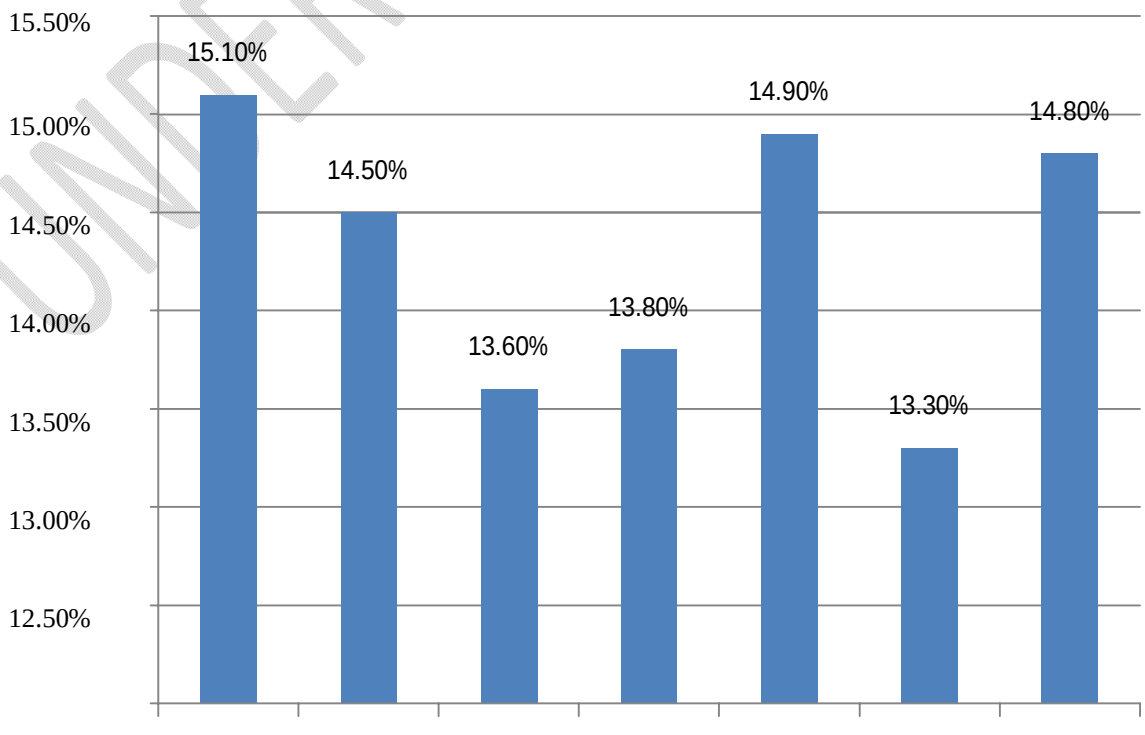
sampling frame that anticipated equal numbers of male and female respondents so that a comparison between them could be done.

3.2.2 Age of the Respondents

The results on age of respondents are shown in ***Figure 2***

Figure 2: *Distribution of respondents according to age*

In this study age was considered as an intervening variable. Age was controlled by selecting undergraduate students who were below 25 years. Age was an important consideration as previous studies have revealed that the cognitive style of a person may shift at the age of 25. This formed the basis of delimiting it and, therefore, necessitated data collection across the relevant ages only. From the findings, most of the respondents were 24 years (28%), followed by 22 years (21%), 23 years (19.2%), 20 years (14.7%), 19 years (9.1%), 18 years (4.5%) and 21 years (3.5%) was the least. **3.2.3 Respondent's school**The researcher was interested in collecting data from all the seven schools (faculties) at Pwani University to have all learners represented. The representation from the various schools is shown in ***Figure 3.***



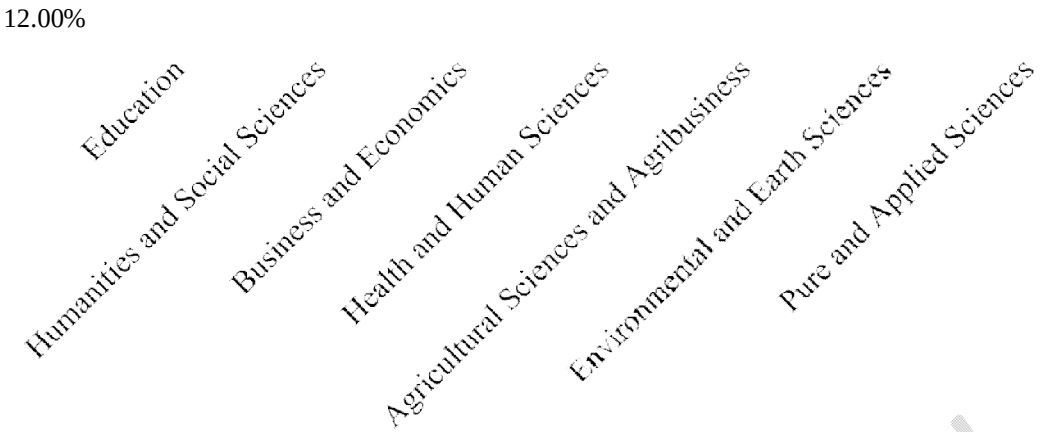


Figure 3 *Distribution of respondents according to school*

From the findings, the respondents belonged to various schools in the following proportions: School of Business and Economics (13.6%), School of Pure and Applied Sciences (14.8 %), School of Education (15.1%), School of Humanities and Social Sciences (14.5 %), School of Health and Human Sciences (13.8%), School of Agricultural Sciences and Agribusiness (14.9%) and School of Environmental and Earth Sciences (13.3%). The profile reflects the sampling frame, which sought to have an equal representation of undergraduate students from across all the schools so that findings could be generalized to the entire Pwani University student body.**3.2.4 Respondents' Year of Study**

The results of the respondents' year of study are shown in ***Figure 4.***

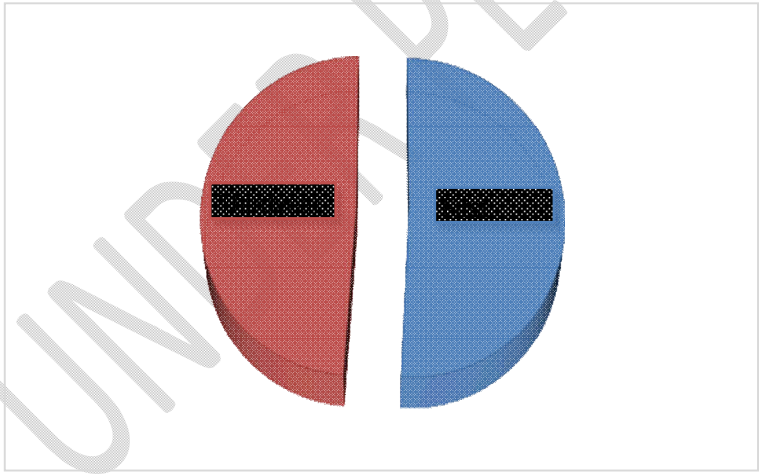


Figure 4: *Distribution of respondents according to year of study*

From the findings, 51% of the respondents were first-year students and 49% were thirdyear students. Sampling was proportionate owing to the number of learners in the respective years as described in section 3.5.2. Considering that there were more first-year students in the population, the sample reflected the above prevalence. This was done purposely to allow for

robustness in the generalization of programme satisfaction and cognitive styles to all undergraduate students at Pwani University.

3.3 Description of Cognitive Styles of Undergraduate Students The study's objective was to profile the cognitive styles of undergraduate students at Pwani University on the Field-Independence - Field Dependence (FI-FD) Dimension. The statements on the questionnaire were on a five-point Likert scale ranging from very much like me to very much unlike me. A leaner was expected to tick only once to show where they belong on the preference scale. Descriptive statistics for the FI-FD cognitive style indicators namely working environment, frame of reference and source of motivation are as shown in sections 3.3.1, 3.3.2 and 3.3.3.

3.3.1 Working Environment

Working environment is the preferred learning surrounding that helps a student learn best. Field independent learners prefer working alone while field dependent learners prefer working in groups. The statements that outlined a learner's working environment preference were analysed as follows:

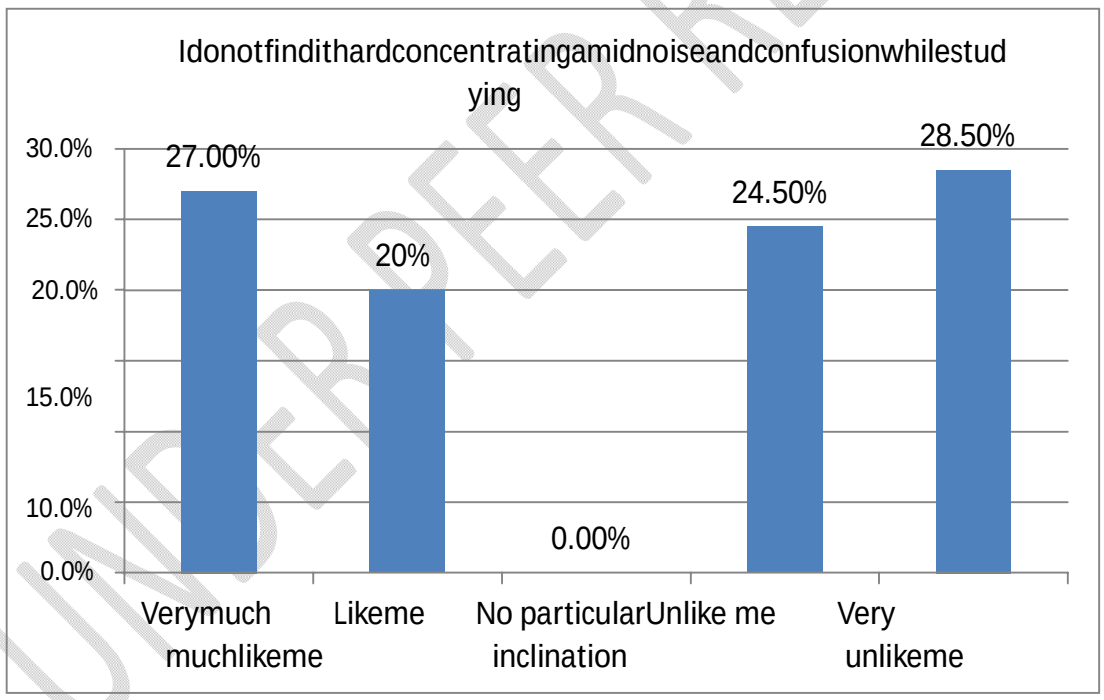


Figure 5: *Learners working environment preference*

Figure 5 shows that 47% of learners admitted that they do not find it hard concentrating amid noise and confusion while studying. This shows that their learning is not affected by the environment around them meaning that they were field independent. On the other hand, 53% of learners stated that they find it hard to concentrate in a noisy environment, implying that

they were field dependent. Learners were also asked about their preference on group or individual work. The results are as shown in *figure 6* below

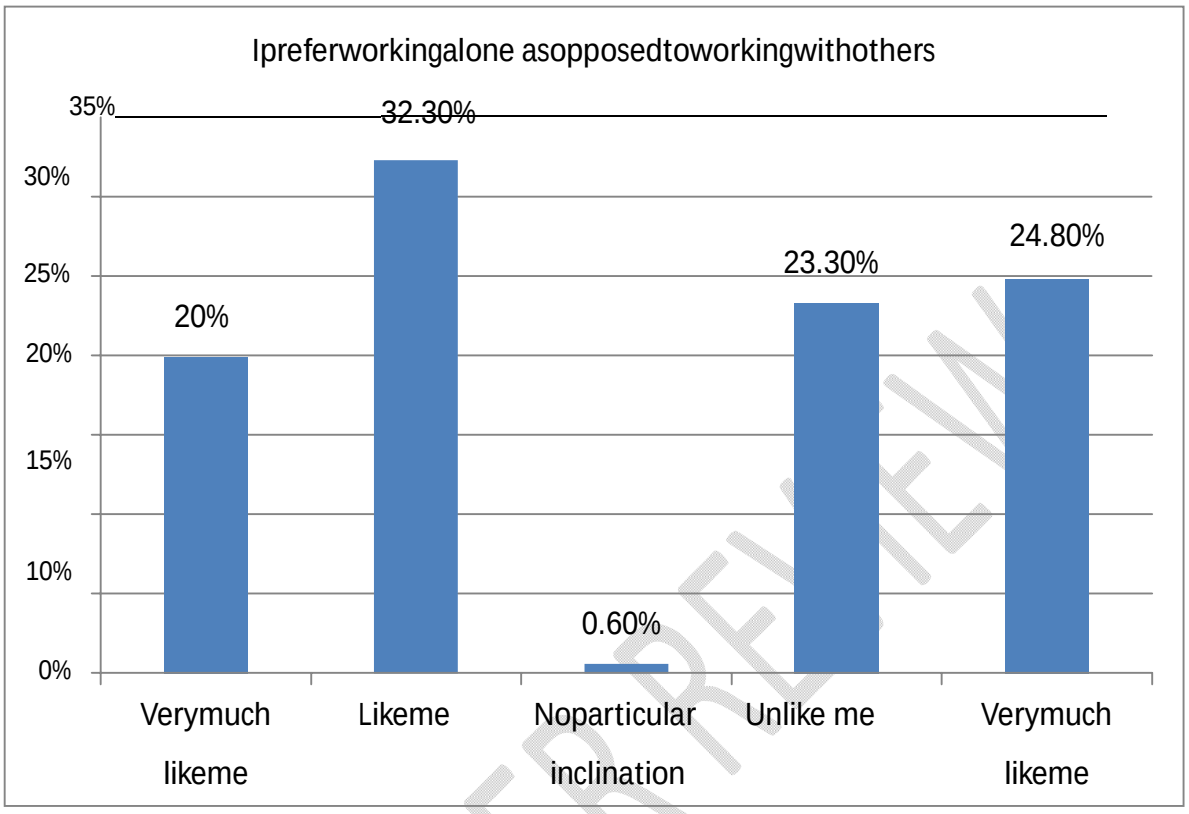


Figure 6: *Learners preference on group or individual work*

Figure 6 indicate that 52.3% of learners admitted that they preferred working alone as opposed to working with others. This finding implies that personal study is more meaningful to them as opposed to working in pairs or discussing in groups. Preference to work individually is a characteristic of field independent learners who grasp content better when they study on their own. A small percentage of 0.6% did not show inclination to either side. On the other hand, 48.1% of learners indicated that they prefer working with others i.e. they learn better in a social set up. This is a characteristic of field dependent learners. The balance in preference of group or individual work could be attributed to the fact that there are schools in Pwani University that offers predominantly science or art-oriented programmes. In a school like education clustered as a social science there are students taking Bachelor of Education Science and Bachelor of Agricultural Education programmes which are predominantly science. On the other hand, there are students taking Bachelor of Education Arts which is a predominantly art programme. There are schools that offer pure science programmes like School of Health and Human Sciences and those that offer pure art programmes like School of Humanities and Social Sciences.

Participants in the study were further asked to give their opinions on whether studying alone was an effective strategy in their learning.

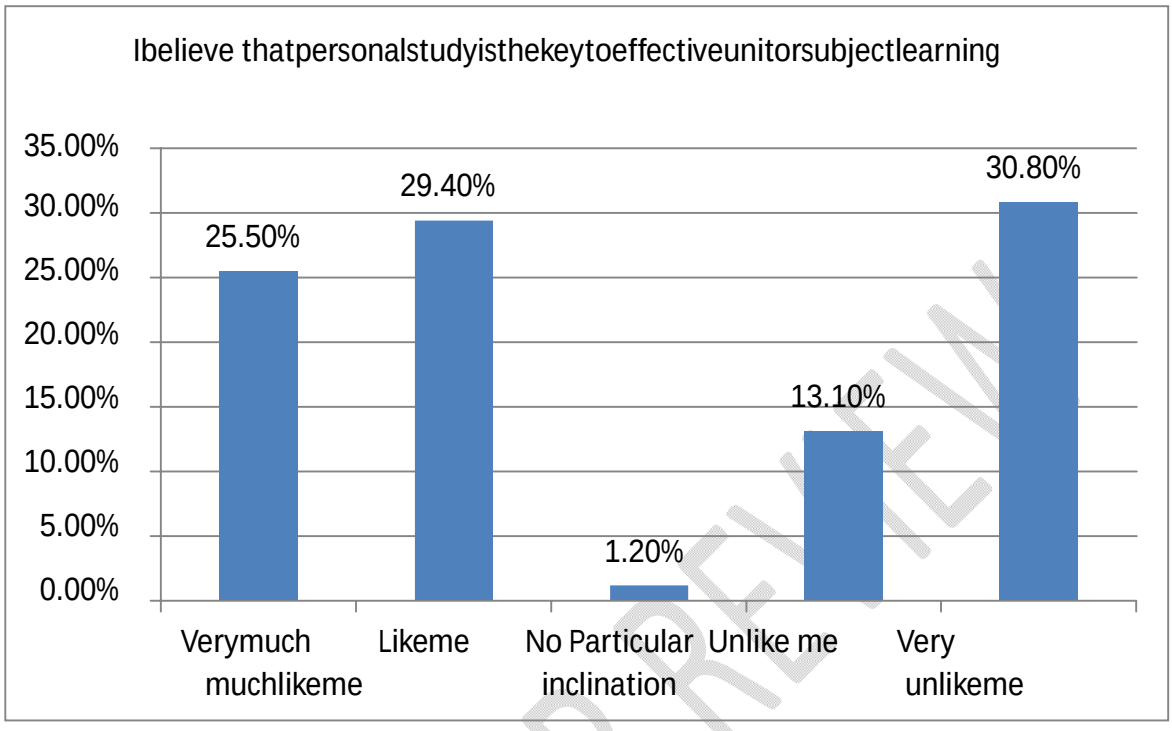


Figure 7: *Students belief about personal study*

Figure 7 shows that 54.9% of learners believe that personal study is key to effective learning. These are field independent students. 1.2% indicated that that either studying alone or with others is key to effective learning. On the other hand, 43.9% of learners do not believe that personal study is key to effective learning and were therefore field dependent.

3.3.2 Frame of Reference

Frame of reference refers to a personal attribute of a learner that predisposes him or her to emphasize both their own feelings and thoughts on approval or from other people before acting. Externally directed individuals seek approval or guidance from others, which is unlike internally directed individuals. Three statements on frame of reference were summarized in *figures 8, 9 and 10.*

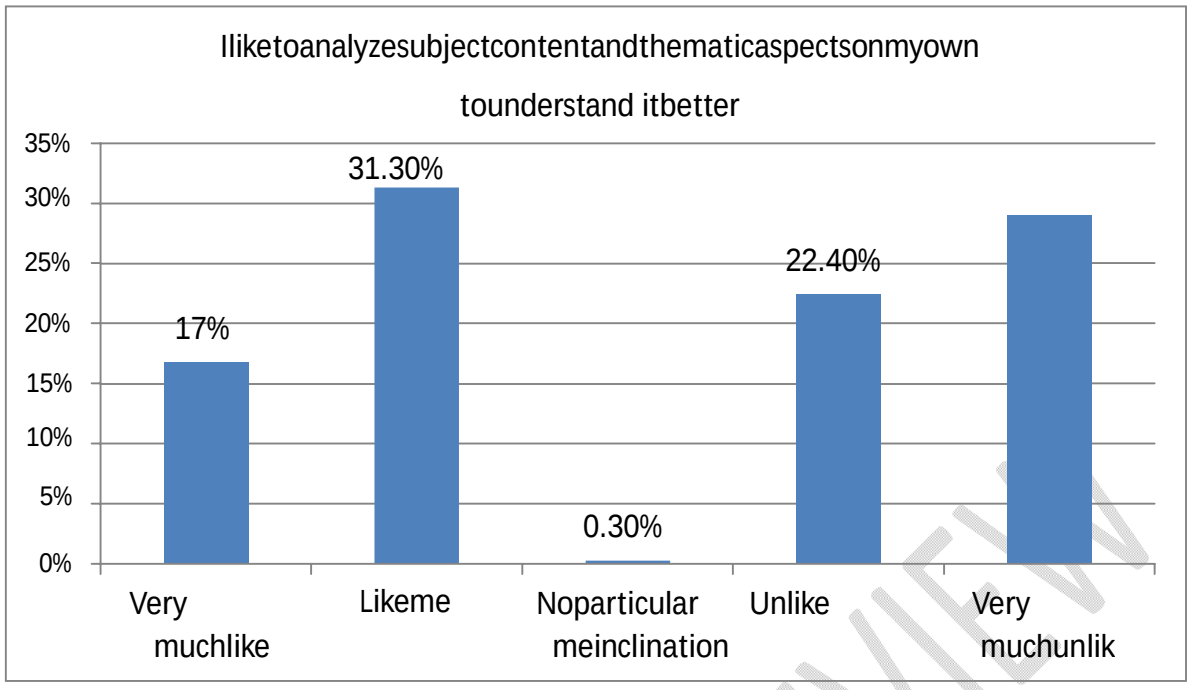


Figure 8: *Learner's analysis of content and thematic aspects*

As seen in *figure 8*, 48.3% of learners indicated that they typically do not rely on other people's input on analysis of thematic content in order to understand it better. Those learners were field independent. They are manipulative and creative in the learning process. 0.3% were intermediate and 51.4% were field dependent who rely on other people's input like their classmates on analysis of thematic content in order to understand it better. These students prefer working in groups hence prefer social set ups. Learners were also asked to report on their understanding of subject/unit content in class and the results summarized as shown below.

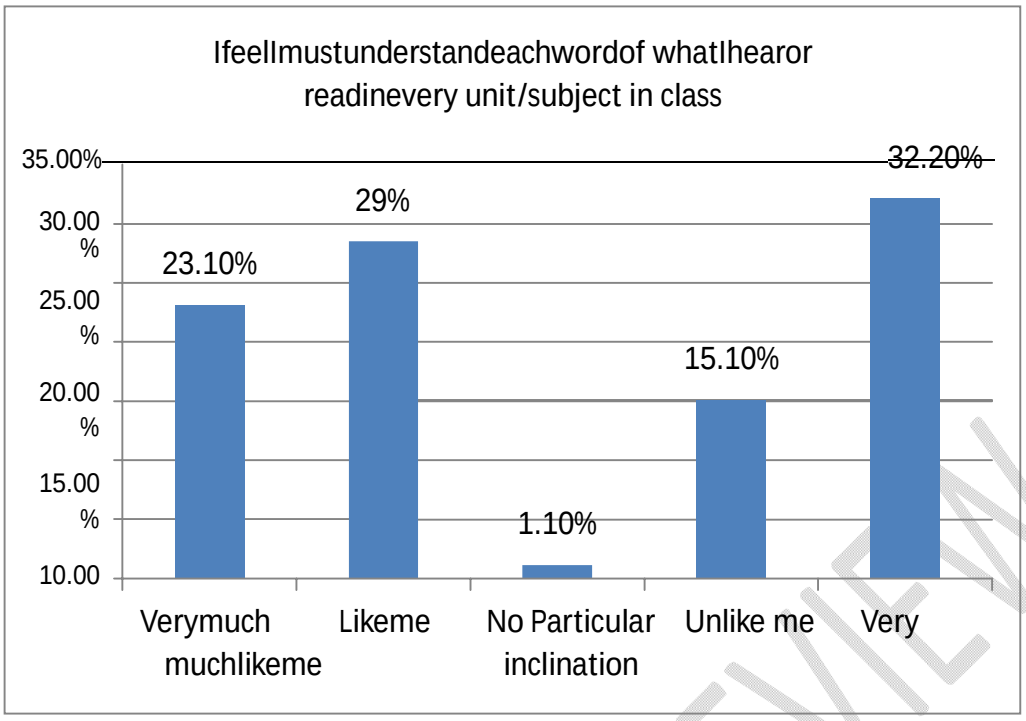


Figure 9: *Learners understanding of subject/unit content in class*

Figure 9 shows that 52.1% of learners felt that they must understand each word they learn in every unit hence are grouped as field independent. 1.1% showed no particular inclination and 47.3% felt that they needed not understand every word they learn in their study units for them to understand the concepts, which is a characteristic of field dependent learners. Participants of the study were also asked to report on their view about obstructive events while studying and the report is as shown below.

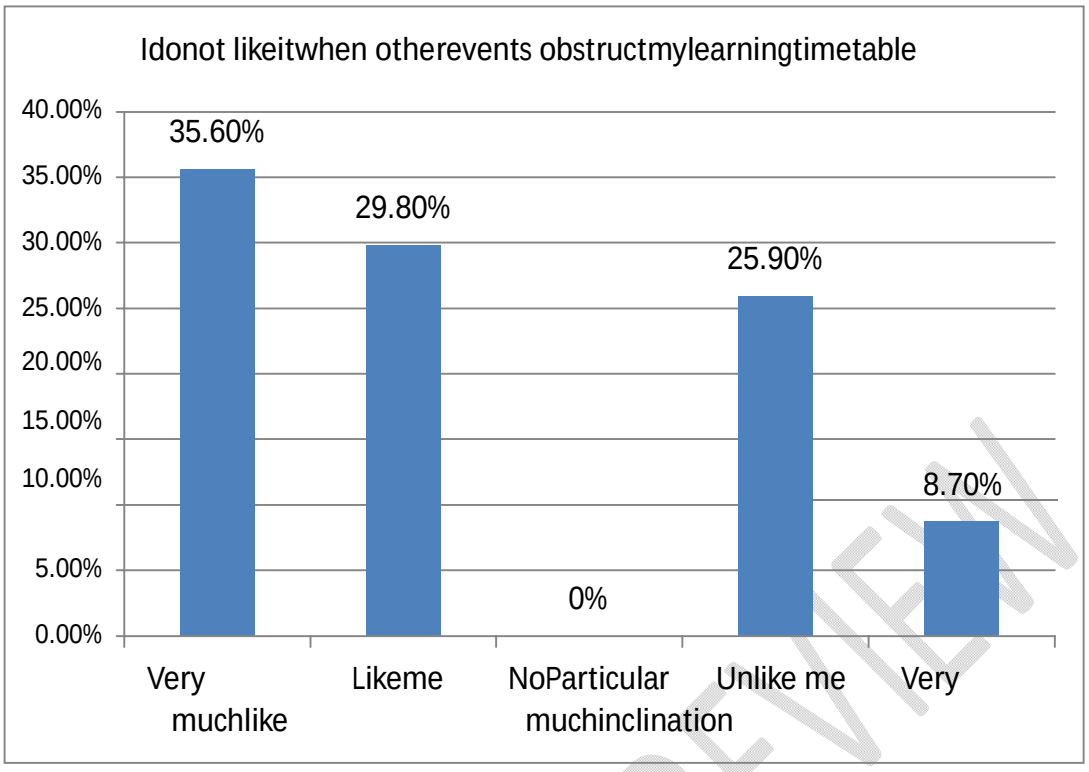


Figure 10: *Learner's view of obstructive events while studying*

Figure 10 shows that 65.4% of learners do not like it when other events obstruct their learning timetable and were, therefore, field independent. Field independent learners tend to be more focused on their studies. On the other hand, 34.6% like it when other events obstruct their learning timetable and were therefore field dependent. These learners feel comfortable attending to other activities during learning time.

3.3.3 Source of Motivation i.e. Intrinsic or Extrinsic

Source of motivation is a force that can either be from within (intrinsic) or surrounding factors (extrinsic) that drives a student to pursue their programme. Statements on source of motivation were analysed as follows:

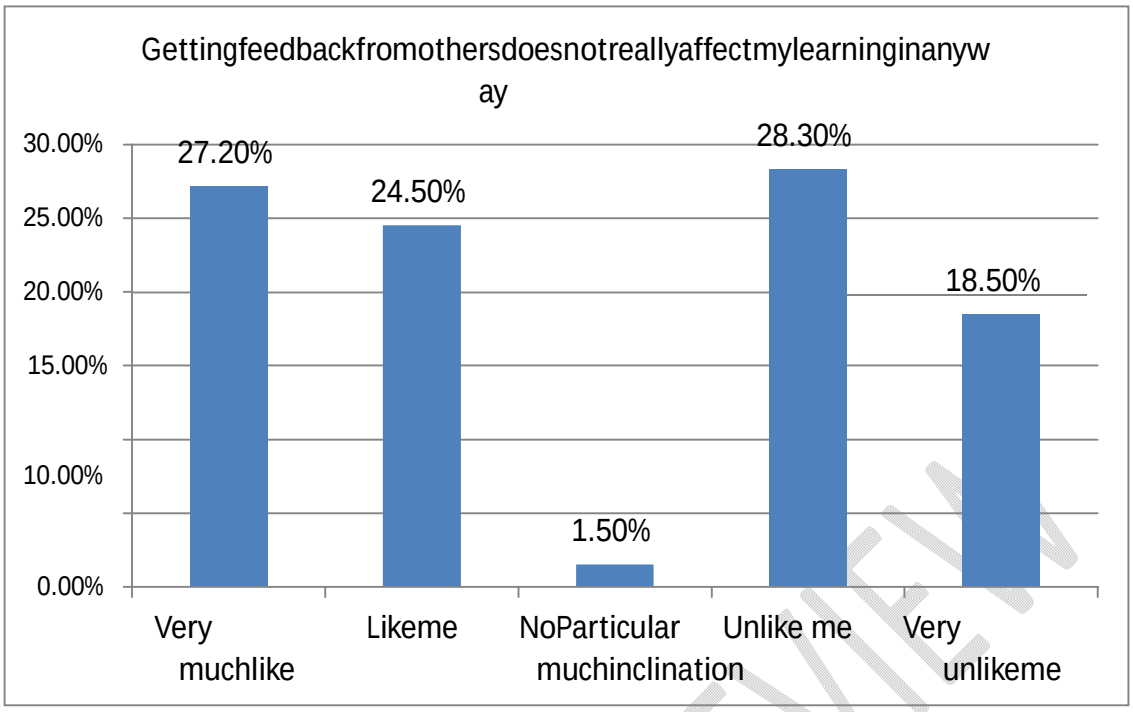


Figure 11: *Whether feedback from others affects respondents' learning*

The summary in *figure 11* shows that 51.7% of learners agreed that getting feedback from others does not really affect their learning in any way meaning that they were intrinsically motivated and therefore showed characteristics of field independence. A small percentage of 1.5% was intermediate. Conversely, 46.5% of learners agreed that getting feedback from others affected their learning meaning that they were extrinsically motivated, and therefore were field dependent since they relied heavily on input from others. Learners were further asked on their preference in seeking solutions to their learning tasks. The summary is as shown below.

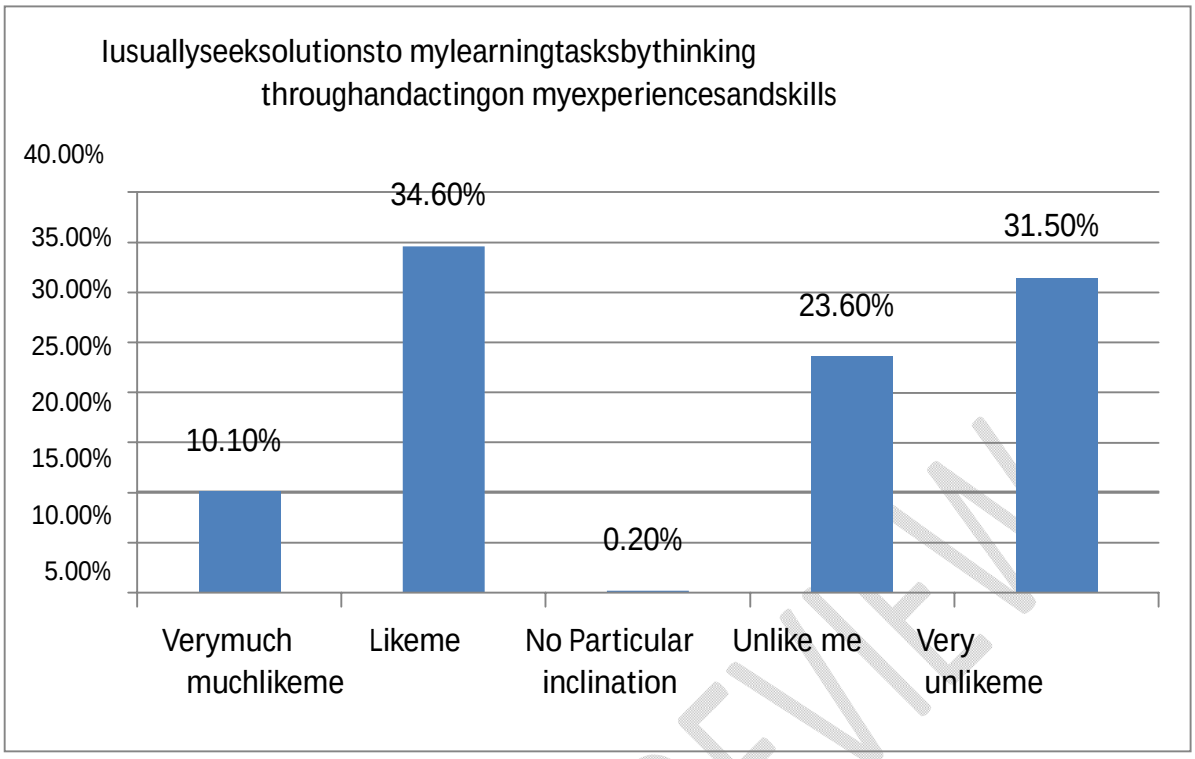


Figure 12: *Learner's preference in seeking solutions to their learning tasks*

As shown in figure 12, 44.7% of learners sought solutions to their learning tasks on their own by acting on their skills and experiences hence, intrinsically motivated and were therefore field independent. 0.2% of learners showed no particular inclination on this aspect. On the other hand, 55.1% of learners indicated that they did not seek solutions to their learning tasks on their own and hence were extrinsically motivated were therefore field dependent. Participants were further asked if they pick books and carry out their studies even when their classmates are relaxing in the fields and they responded as follows:

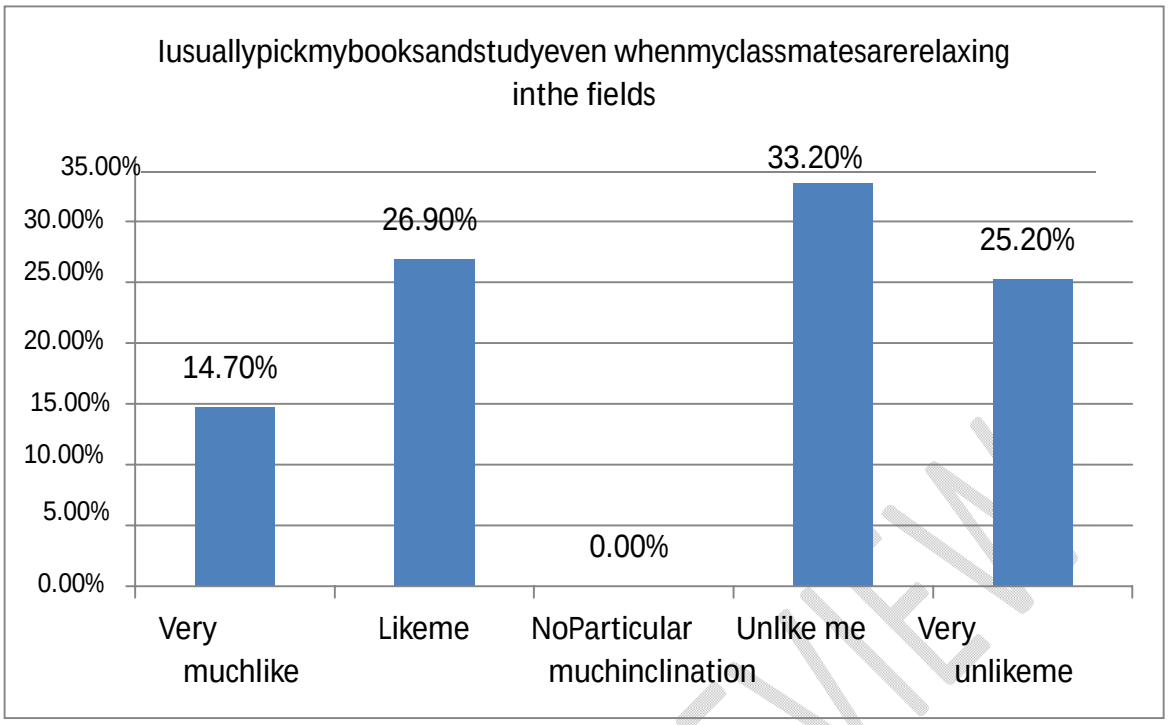


Figure 13: *Students' inclination to studying during their free time.*

As shown in *figure 13*, 41.6% of students indicated that they usually pick up books and study even when their classmates are relaxing meaning that they were intrinsically motivated hence were field independent. Conversely, 58.4% of students indicated that they do not usually pick up books and learn on their own initiative meaning that they were extrinsically motivated since they need to be prompted to do so. These learners portrayed characteristics of field dependence. To get the composite score on cognitive style, the researcher used SPSS to carry out data analysis on the cumulative cognitive style type for students. First, an SPSS template for the variables was created. The nine FI – FD statements on cognitive styles (See Appendix V) were coded on a scale of 1-5 and keyed in the template. The researcher then transformed them by computing the nine indicators for each individual learner to create a new continuous variable as a measure of FI-FD. The computed score was then recoded, and the range of 1 through 15 was given a value 1 to represent Field Independence, 16 through 30 was given a value 2 to represent intermediate, and 31 through 45 were given value 3 to represent Field Dependence. Frequency counts for these ranges were done. The prevalence of the FI and FD cognitive styles is shown in *table 2.*

	Frequency	Percent	ValidPercent
FieldIndependent	157	54.9	54.9
Intermediate	1	0.3	0.3

FieldDependent	128	44.8	44.8
Total	286	100.0	100.0

Table 2: *Frequency Descriptives for Cognitive style*

From the findings, majority (54.9%) of the respondents were Field Independent (FI), while 44.8% were Field Dependent (FD). This implies that most undergraduate students at Pwani University prefer an independent learning environment, have an internal frame of reference, and are intrinsically motivated. This could be attributed to the fact that the majority of the schools at Pwani University offer science related programmes. According to the Field Independence–Field Dependence (FI–FD) theory by Witkin (Witkin et al. 1962), Field Independent students are autonomous, individualistic, and manipulative. They also have a higher level of cognitive restructuring, are impersonal, self-reliant, and inner-directed, and are low on interpersonal qualities (Witkin & Goodenough, 1981). Conversely, 44.8% of students had field-dependent cognitive styles. Field Dependent students are good in interpersonal relations, are accommodating, prefer studying in a group, rely on extrinsic motivation, and are others-directed (Witkin & Goodenough, 1981). The findings agree with Motahari and Norouzi (2015), who claimed that the cognitive styles of students differ significantly with students exhibiting different cognitive styles. Additionally, these findings support those of Muhammad, et al. (2015), who found that more learners in Zamfara college in Nigeria were skewed towards the FI cognitive style dimension. However, the findings contradict those of Musya (2015), Oginga (2020), Okoye (2016), Jantan (2014), and Altun and Cakan (2006), who found that more learners were skewed towards Field Dependent dimension, they reported prevalence rates of 72%, 52%, 52.3%, 74.7%, and 47.7% respectively. The differing prevalence of Field Independent learners could be attributed to the selection procedures used by the various researchers. In the present study, the sample was drawn equally from arts and science-oriented programmes. In this study, the age of respondents, sex, and school in which they were enrolled were considered as intervening variables. To test whether these variables related with cognitive styles, chi-square tests of significance were run. A cross-tabulation of respondents' sex and cognitive styles was done to establish whether there were gender differences in cognitive styles. The results are illustrated in *Table 3.*

		CognitiveStyle Type			
		FI	Intermediate	FD	Total
Sex	Male	116(74.8%)	0(0%)	39(25.2%)	155(100%)

	Female	41(31.3%)	1(0.8%)	89(69.5%)	131(100%)
Total		157(54.9%)	1(0.3%)	128(44.8%)	286 (100.0%)

Table 3*: Cross-tabulation of sex and cognitive style*

The findings showed that Field Independence registered a much higher prevalence among males (74.8%) than among female students (31.3%). On the other hand, Field Dependence was more prevalent among females (69.5%) than it was among males (25.2%). Additionally, only a small percentage of learners 0.8% were intermediate. The results of this study correlate to those of Rostampour and Niroomand (2014) who reported a prevalence of 77%; and Oginga (2020) who found that more female learners (56.8%) were Field Dependent. However, this study contradicts the findings by Musya (2015), who found out that more male learners (55.9%) were field dependent and more female learners were field independent. Chi-square tests for significance for sex and cognitive style revealed the following results:

	Value	Df	AsymptoticSignificance (2-sided)
PearsonChi-Square	54.731[a]	2	.000
LikelihoodRatio	56.764	2	.000
Linear-by-Linear Association	53.450	1	.000
NofValidCases	286		

Table 4: *Chi-Square tests (Sex and Cognitive Style Type)*

From the findings in *Table 4*, the p-value (0.000) was less than .05. This implies that there is a significant difference in the prevalence in cognitive styles between male and female learners at Pwani University. These results were congruent to those of Okoye (2016), Musya (2015), Jantan (2014), and Altun and Cakan (2006), who found a significant difference between cognitive style resulting from a gender analysis. However, the findings contradict those of Maghsudi (2007), Oginga (2020), Rostampour and Niroomand (2014), who found insignificant relationship between the two genders. Further analysis was done on the prevalence of FI-FD cognitive style in various schools at Pwani University. The findings are illustrated in *Table 5*

		SchoolandCognitiveStyleType			
		FI	Intermediate	FD	Total
School	Education	18(42.9%)	0(0%)	24(57.1%)	42(100%)
	Humanitiesandsocial sciences	14(33.3%)	0(0%)	28(66.7%)	42(100%)
	Businessandeconomics	22(44%)	0(0%)	28(56%)	50(100%)
	Health and human sciences	21(61.8%)	1(2.0%)	13(38.2%)	34(100%)
	Agricultural sciences andagribusiness	21(63.6%)	0(0%)	12(36.4%)	33(100%)
	Environmental and earthsciences	15(44.1%)	0(0%)	19(55.9%)	34(100%)
	Pure and applied sciences	32(64%)	0(0%)	18(36%)	50(100%)
Total		157(54.9%)	1(0.3%)	128 (44.8%)	286 (100%)

Table 5: *Cross-tabulation of cognitive style by the school*

From the findings in Table 5, it is revealed that most science-oriented schools (Health and Human Sciences, Agricultural Sciences and Agribusiness, and Pure and Applied Sciences) had more Field Independent learners 61.8%, 63.6%, and 64% respectively. On the other hand, school of Humanities and Social Sciences which is predominantly arts oriented had a higher percentage (66.7%) of Field Dependent students. School of Education, Business and Economics, Environmental and Earth Sciences host a mixture of art oriented and science-oriented programmes. The prevalence of Field Independent learners was lower at 42.9%, 44% and 44.1% respectively. This could be as a result the aforementioned schools offering more arts-oriented programmes as opposed to science-oriented programmes. The results support Field Independence–Field Dependence theory by Witkin (1962). The theory argues that Field Independent learners prefer impersonal domains that need a lot of manipulation, analytical thinking, and independent working, while Field Dependent students

prefer interpersonal domains that require working in groups, with more reinforcement, through repetition and clarification, and socially oriented tasks. Additionally, the findings support Yamini (2003), who posited that field independent learners used memory, metacognitive, and cognitive strategies more often than field dependent learners. On the other hand, FD learners relied on social strategies more often than their FI counterparts. The present study findings therefore imply that, majority of the students are placed in the field of study that match their cognitive styles. A chi square test on school and cognitive style type was run and the results indicated on *table 6* below.

Table 6 :Chi-square tests(School and Cognitive style type)

	Value	Df	AsymptoticSignificance(2-sided)
PearsonChi-Square	265.084[a]	12	.000
LikelihoodRatio	355.938	12	.000
Linear-by-LinearAssociation	217.177	1	.00

From the findings in *Table 6*, the p-value (0.000) was less than .05. It indicates a significant relationship between cognitive styles and the school in which undergraduate students are enrolled in the study findings correlate to those of Musya (2015). Musya (2015) found a significant relationship between cognitive styles and science-related subjects. Further, Osipow (1969) found an insignificant relationship between cognitive style and vocational preference. Cognitive style types were distributed among first- and third-year undergraduate students as shown in the table below.

		CognitiveStyle Type			
		FI	intermediate	FD	Total
Yearof Study	First-year	54(37.0%)	1(0.7%)	91(62.3%)	146(100%)
	Thirdyear	84(60%)	0(0%)	56(40%)	140(100%)
Total		138(48.3%)	1(0.3%)	147(51.4%)	286(100%)

Table 7: *Year of Study and Cognitive Style Type*

The findings in Table 7 show that 60% of third-year students were Field Independent while among first year students; only 37% were Field Independent. Majority of first year students (62.3%) were Field Dependent and only 40% of third year students were Field Dependent. The chi square results are as shown in *table 8*.

	Value	Df	Asymptotic Significance(2-sided)
PearsonChi-Square	191.071[a]	2	.000
LikelihoodRatio	226.895	2	.000
Linear-by-LinearAssociation	189.600	1	.000
NofValidCases	286		

Table 8: *Chi-Square Tests (Year of Study and Cognitive Style Type)*

From the findings in *Table 8*, the p-value (0.000) was less than .05. This implies that there is a significant difference in cognitive style among undergraduate students at Pwani University, with first years being more Field Dependent while third years were more Field Independent. This could be attributed to a gradual shift in cognitive style as one ages. This is in line with the characteristics of FI individuals as described in the FI-FD theory like being more self-directed, having intrinsic motivation, and more preference to workingindependently. The third-year undergraduate students are likely to have found themselves and carry out their activities individually; a depiction of being self-directed and independent. This is opposed to first year undergraduate students who do most of their activities like walking around.Age was considered an intervening variable in the study. Age was delimited within the bracket of 18-24 years because studies have revealed cognitive inconsistency can result in a change in one's cognitive style and ability can occur after the age of twenty-five. This position is supported by Chan and Yan (2018), Anstey and Low (2004) as well as Baghel, Singh, Srivas and Thakur (2019). A Cross-tabulation of cognitive style by age was summarized in *table 9* below.

Ageand CognitiveStyle Type

Count				
	CognitiveStyle Type			Total
	FI	intermediate	FD	
Age	18	15(45.5%)	0(0.0%)	18(54.5%)	33(100%)
	19	27(67.5%)	0(0.0%)	13(32.5%)	40(100%)
	20	24(53.3%)	0(0.0%)	21(46.7%)	45(100%)
	21	17(53.1%)	0(0.0%)	15(46.9%)	32(100%)
	22	30(54.5%)	0(0.0%)	25(45.5%)	55(100%)
	23	22(52.4%)	0(0.0%)	20(47.6%)	42(100%)
	24	22(56.4%)	1(0.03%)	16(41.0%)	39(100%)
Total		157	1	128	286

Table 9*: Cross-tabulation of cognitive style by age*

Twenty-two-year-old learners formed the largest percentage of respondents, as shown in table 9.A chi-square test was run to assess whether there were cognitive style differences that could be attributed to the age of the learner.

Chi-SquareTests (Ageand Cognitive StyleType)

	Value	df	Asymp.Sig. (2-sided)
PearsonChi-Square	6.210[a]	12	.905
LikelihoodRatio	6.191	12	.906
Linear-by-Linear Association	.909	1	.340
NofValidCases	286		

Table 10: *Chi-Square Tests (Age and Cognitive Style Type)*

The results in *table 10* show that the p-value (0.905) was more than .05. Hence the relationship between age and cognitive styles was not significant. This shows that age has no significant relationship with the cognitive style of a student. Studies have revealed that cognitive inconsistency, which can result in a change in one's cognitive ability and style can occur after the age of twenty-five, as supported by Chan and Yan (2018), Anstey and Low (2004) as well as Baghel, Singh, Srivas and Thakur (2019). Since the study was delimited to learners below 25 years, the results above, which show almost similar prevalence of FI-FD style, were anticipated.

4. CONCLUSION

The objective of the study sought to describe the cognitive styles of undergraduate students at Pwani University on the Field-Independence and Field Dependence dimensions. The study found that slightly more than half (54.9%) of the learners had field-independent cognitive styles while 44.8% were field dependent. It suggests that most students prefer autonomy over a structure for their learning. The study also found that the majority of students with Field Independent cognitive styles were male students (74.8%) compared to female students (69.5%) who were

Field Dependent at Pwani University and that science-oriented schools had more Field-Independent learners while arts-oriented schools had more Field Dependent students.
This finding is consistent with most prior results that found males to be more fieldindependent when compared to their female counterparts. Based on the study's Chisquare significance tests, the p-value (0.000), which is less than .05. It implies that a significant difference exists between cognitive styles of male and female students at Pwani University. The study revealed no significant relation between age and cognitive styles.
The study concluded that a significant difference exists in the cognitive styles among undergraduate students at Pwani University. Slightly more than half of the learners were field independent; third year students' cognitive style was significantly different from first years, with more third year students being field independent while more first years field dependent. This implied that as individuals progress in age, there is a slight gradual tendency of a shift of their cognitive style and this necessitated the researcher to sample learners below 25 years of age. The study also shows that there was a significant gender difference in cognitive styles of the students implying that the unique nature of men and women cannot be ignored in the learning process.

5. RECOMMENDATIONS

5.1 Recommendations for Policy and Practice

1. The study recommends that Pwani University should strive more to cater for students' academic needs as their customers as well as offer the best to their satisfaction as the study found that 21.7% of learners were dissatisfied and 15.3% deferred their studies because they did not like their programmes of study.
2. Since the study established that there is a significant difference in cognitive styles among undergraduate students at Pwani University, the study recommends that the University management, through academic mentorship programs, should facilitate as many as possible first-year undergraduate students who request for inter and intra school transfers to shift to programmes they prefer to improve their academic performance, programme loyalty and productivity. The study established that only about 50% of learners were granted their requests.
3. The Ministry of Education, KUCCPS and the Commission for University Education can use the study findings to create meaningful ways of improving students' programme

welfare by guiding them appropriately before making programme choices back in high schools such as administration of cognitive styles tests to form four students and then advising them on programmes that could best suit them.

4. The study noted that learner preferences on learning environment, frame of reference, and source of motivation differed depending on the cognitive style. The study, therefore, recommends that lecturers should engage learners more in academic activities that best fit their cognitive preferences to enhance their learning abilities and hence foster intellectual growth. Importantly, lecturers should utilize a variety of teaching approaches so that they can accommodate the individual cognitive style preferences of learners.
5. Pwani University should organize academic workshops for all undergraduate students to mentor them on appreciating their varied cognitive styles on field dependence- field independence dimension as well as the need to align them to academic programmes of study as a means of achieving programme satisfaction. It can help reduce the number of semester deferments and the contemplation of dropping out of the programme among students.

5.2 Recommendations for Further Research

1. The study drew its respondents from only Pwani University. This study therefore, recommends that the study can be replicated in other universities or colleges in Kenya.
2. Future studies should shift focus to consider the effect cognitive styles have on academic performance among various levels of learners, including postgraduate students.
3. The tool for programme satisfaction can be expanded to include other reasons for deferment and attrition in universities as well as other contributing factors to academic programme satisfaction.
4. A study on relationship between cognitive styles and job performance after graduation should be done.

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