

# FACTORS INFLUENCING STUDENTS' ATTITUDE AND INTEREST IN DESIGN AND TECHNOLOGY ACHIEVEMENT

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## Abstract

Academic achievement of students in the various subjects they are enrolled in at school is influenced by various external factors. It is therefore of utmost importance to investigate students personal and behavioural characteristics towards Design and Technology throughout the three year transitional junior certificate (JC) programme. The purpose of this study was to find out the factors that influences student's attitude and interest in the Design and Technology subject and how this affect their academic achievement. A focus group discussion with (N= 40) Design and Technology students from (N= 10) different Junior Secondary Schools in the Central Inspectoral Region was carried out to establish the views of the students towards the subject and how various elements they are exposed to in their average schooling life impact on their performance. A detailed discussion of the external factors indicated the selection criterion used for enrolment, assessment criterion and location of schools and language of instruction as some factors that influences the student's behavioural characteristics. The results show that the overall attitude of the students is positive towards the role of Design and Technology in their lives.

**Keywords:** *Factors influencing, attitude and interest, academic achievement, external factors.*

## Introduction

Academic performance for students has always been related to their behaviours. Even if the relationship has been established studies have yet to examine how the factors that influence student's attitude and interest factors affect their achievement in Design and Technology. The goal of this study was therefore to establish the relationship between the attitude and interest constructs in relation to students' academic achievement in Design and Technology. Design and Technology is a problem solving and an applied science subject. It incorporates a lot of concepts like materials and tools and their processes, basics of graphical communication and technologies like structures, mechanisms and electronics that gives learners the basics to application and problem solving on a wider context.

The growth and relevance of a discipline is primarily dependent on the students. So it is of utmost importance to enrol students who are ready, who knows its importance and who have interest hence will be able to perform to their best of abilities. The moment students sign up and are enrolled for subjects they have got no desire in doing and seeing it through then the value of education is degraded.

## Background of the study

Research has characterised Design and Technology into two phases; that of an old subject and a new subject (Steeg, 2002). As an old subject technology education dwells more on the capabilities and prowess of students to display their craftsmanship which is not a required survival technique for all (Gaotlhobogwe 2010, p.13). Design of this nature is associated with 'little manual skills' which a lot of people are not interested in. Gaotlhobowe (2010) argued further that, as a new subject, its emphasis is on technology competence, which is needed by everyone.

It is evident that the world needs the application of scientific knowledge for practical purposes to increase the profundity of Design and Technology in contemporary life. Combining and re-aligning concepts from the 'old and new' technology education to make it relevant has transformed the subject curriculum. Even though the curriculum has been transformed such that it keeps both students and educators up to speed with changes of technology and its reforms the number of students enrolling for the subject willingly has declined. The dynamics of Design and Technology has also exposed the conflict of its relevance and importance as compared to other subjects offered in the curriculum

One of the recommendations of the RNPE of 1994 was to make Design and Technology a core subject in Junior Secondary Schools in Botswana by the year 2000. The recommendation 32 on [para.5.5.13] (b) (Republic of Botswana, 1994) reads:

With respect to the junior Certificate Curriculum, each student should take eight core subjects, namely, English, Setswana, Social Studies, Mathematics, Integrated Science, Agriculture, *Design and Technology* and Moral Education (p. 62).

Twenty five years since the recommendation to change Design and Technology from an optional to a mandatory subject for all the junior secondary school students, there has not been any full implementation .This indicates a serious problem in the education system, a situation that warrants some investigations.

### **Statement of the Problem**

Research has established that that students harbour attitude towards Design and Technology and they show less motivation in doing the subject. Research has also reported the poor performance of Design and Technology in Botswana as (Gaotlhobogwe, 2010) confirmed students are not only performing poorly in Design and Technology but there has also been a decline in enrolment of willing students for the subject. Despite the recognition that attitude and interest toward Design and Technology are a significant outcome of Design and Technology teaching and relevant variables in students' cognitive learning of the subject, little has been done in specifying and determining the attributes that affect the dynamics and influence students' academic achievement.

The researcher's main aim therefore is to establish the relationship of attitude and interest constructs with how they influence and affect students Design and Technology achievement.

### **Purpose of study**

The purpose of this study was to determine the factors that influence students' attitude and interest towards Design and Technology and how such factors affect the students' academic achievement. Although research has documented the positive attitudes in support of teaching of the subject in the Botswana education system (Kumar, 2002; Gaotlhobogwe, 2010; Gaotlhobogwe, 2012) there is still so much that can be done to investigate how the attitude and interest factors influences the students' scores in the subject.

To fulfil this purpose, the following objectives guided the research process; (a) To determine the students' attitude and interest factors in Design and Technology, (b) Explore the level of the students' attitude and interest factors in influencing academic achievement. (c) Find out the views of students on the assessment and identify challenges that students face in doing Design and Technology.

### **Research Questions**

1. What are the factors that influence students' attitude and interest in Design and Technology?
2. To what extent do the factors that influence student's attitude and interest affect their academic achievement in Design and Technology?

### **Significance of the study**

The study will prove significant in contributing to the underdeveloped area of research related to behavioural attributes and provide basis for awareness and better understanding of how students' attitude and interest can affect their academic achievement. Likewise it gives students a more focused and clear perspective on how the specific behaviours related to their attitudes influence their performance.

The outcome of the study will also benefit the Teacher Training and Development department as it will get to understand the views of the students about their interest and attitude in doing Design and Technology. School management and Design and Technology teachers will also get to find out what could be done to improve the performance and create interest for students to do Design and Technology.

The findings of the study will also help teachers to understand the diversity of learning for their students better. As such, it is hoped that teachers could develop more effective methodologies in teaching the subject and come up with various ways of promoting the subject such that it could attract interest of many students. School administrators like subject area coordinators, will be guided in the

formulation of future modification of educational policies, curriculum and strategies towards a more effective delivery method of teaching and learning.

### **Literature review**

#### **Attitude of students towards Education and learning**

“Attitude is a central part of human identity. Everyday people love, hate, like, dislike, favour, oppose, agree, disagree, argue, persuade” (Mohamed & Waheed, 2011, p. 277). The aspects listed are evaluative responses to an object, whereas (Bohner & Wänke, 2002) defined attitudes as overall assessment of thoughts and engagement.

Patrick, Anderman and Ryan (2002) argued that attitude and interest towards learning and schooling depends on both cognitive and affective aspects and both the social and individual aspects. Patrick et al (2002) noted that factors such as the goals students set for themselves, school and classroom environment, peer and teacher relationships and the students’ personal investment are vital in that they will determine the attitude of students towards their learning and ultimately their academic achievement. According to Candeias, Rebelo and Oliveira (2010) students with a poor academic performance track record tend to have negative attitudes towards overall schooling as they believe learning add no value to their lives and will not help them succeed in future.

Akey (2006) also argued that the way that students behave in school, forms relationship with their peers and teachers and the effort that they put in towards their academic activities are norms that are influenced by the attitudes that learners have towards school and learning. Students with positive mind set about education perform so much better than students who do not value their education. Akey (2006) has indicated that students cultural background and the kind of family relationships they have plays a major role in building their attitudes and behaviours that can eventually contribute to their academic success.

Studies have indicated that the socio-economic level has an impact on how families are involved in their children academic life (Li, Lerner and Lerner, 2010). The support that parents give their children in their education and wellbeing motivates children to stay in school and study more. Li et.al (2010) noted that students who shows more positive school expectations, who performs better academically and are less disruptive mostly have got understanding parents who appear more engaged in their schooling.

#### **Attitude of students towards Design and Technology**

In their study Mohamed & Waheed (2011) noted that several factors play a meaningful role in influencing students’ attitude in learning. The factors revealed are; students associated factors (students’ self-efficiency, self-concept and according to (Tahar, Ismail, Zamani & Adnan, 2010) external motivation. The other factors mentioned being school associated are; the resources and materials that are used in schools, teaching methods and according to (Papanastasiou, 2000) reinforcement. Reinforcement in the form of adopted strategies that enable balanced teaching and conducive environment for teaching and learning.

Finally, factors associated with home environment and society are; educational background of parents, occupation of parents (Köğçe, Yilldiz, Aydin & Altindavy, 2009) and parental expectations (Tobias, 1993) that can influence students’ attitude in achieving academically. Parental background and expectations in that children turn to focus on careers that relate to their parent’s job prospects since that is what they are exposed to. Parents who are supportive of their children’s

education inspire them to want to do better and parents who discusses career options with their children can easily influence them to enrol for a particular course or

### **Students interest in learning Design and Technology**

The excitement and curiosity students have in learning Design and Technology shows their interest towards the subject. All this can be aroused by the fun in learning, the enjoyment of the content, the varying methods of teaching, the engagement in the teaching and learning and students seeing the need and importance of enrolling for technology education. Research has indicated that generally interest in Design and Technology has decreased among learners (Gaotlhobogwe, 2014; Indoshi, Wagah & Agak, 2010). Taylor (2001) noted that documents from various countries indicated that Design and Technology educators draw curricula that are compelling and pertinent to students' life encounters. However, to design relevant curriculum requires some understanding of what learners perceive to be relevant.

The curriculum should remain interesting and relevant to students' context in order for them to construct permanent technical and problem solving ideologies in their minds. Which bring these questions to the fore: What is an interesting and relevant curriculum? How do students gauge the level of interest and relevance in their subjects? To draw up a relevant curriculum for Design and Technology, broad range of needs that looks beyond the ordinary scope of 'design and make' should be considered.

According to Gaotlhobogwe (2012), "Design and Technology remains one of the most exciting areas of study that is in touch with every aspect of human nature" (p. 15). Exiting in that it covers a broad spectrum of content where students' learn to conceptualise and develop a range of practical skills associated with modern industry. Gaotlhobogwe (2012) argued that the lack of resources in secondary school laboratories and workshops hinders the development of the subject. It compromises the value of education as some objectives in the syllabus will not be covered. It also allows unsafe practises because in trying to compensate for the lack, a lot of improvising occurs which poses as a real danger to both the students and teachers.

### **Methodology**

A qualitative study approach was used to collect text data through focus group discussions to help explain why certain attitude and interest factors may be significant influencers of the student academic achievement in Design and Technology.

### **Population of study**

According to Burns and Grove (1993, p. 779), a population is defined as all element (individuals, objects and events) that meet the sample criteria for inclusion in a study. The subject sample of this study was students in 10 different public junior secondary schools in the central region inspectoral area, taking Design and Technology as their option practical subject. The population of students was made up of males and females in form 1, form 2 and form 3.

### **Sampling procedure**

Sampling involves selecting individual units to measure from a larger population. It is a process of systematically selecting cases for inclusion in a research project. (Gall, Borg, & Gall, 2003)

### School Sample

Ten different schools from the 5 different sub regions form the Central region inspectoral area were conveniently sampled to select schools which were easily accessible form the researcher base. The researcher’s base school was excluded from the sample as it was used for the pilot study.

**Table 1** Sampling frame of schools (Central region inspectoral area)

Sub Regions	Sample of schools
Selibe phikwe & Bobirwa (SELEBO)	4
Tswapong	2
Mahalapye	1
Serowe	2
Boteti	1
Total	10

### Students sample

The average age of participants was 12 years ( $SD=15.16$ ).The age of participants ranged from 12-20 years ( $M=15.16$ ,  $SD=1.55$ ). The age here is normally distributed with skewness of .02 ( $SE=0.22$ ) and kurtosis of .07 ( $SE=0.44$ ). This indicated that the sample was “normal enough” to use an inferential procedure that assumed normality of the population(s).

The sampling of students from the schools in this study was two-fold. First, stratified sampling was used to select students doing Design and Technology. A stratified random sample is one in which the population is first divided into relevant subgroups and then, using the simple random sample method, a sample is drawn from each subgroup (Agresti & Finlay, 2008), this will in this case allow the researcher to sample even the rare extremes in the population. By employing stratified sampling approach the researcher ensured that all the forms were represented, the researcher first divided the population into strata (Form 1, 2 and 3). Then purposive sampling was used to select participants for the focus group interviews. Purposive sampling techniques involves selecting sample units “based on a specific purpose rather than randomly” (Tashakkori & Teddlie, 2003, p. 713). This was in order to concentrate on students with particular characteristics who were better placed to be able to assist with the relevant research.

### Focus group discussions

Focus groups are group interviews that give the researcher the ability to capture deeper information more economically than individual interviews. A focus group discussion involving four students at the 10 different junior secondary schools in the Central Region Inspectoral area was executed. The method of focus group discussion enabled the participants to stimulate the feelings and thoughts of one another through mutual interaction and association of ideas, encouraged them to speak and share their anecdotes. The interviews were done in both English and Setswana as most students could hardly express themselves freely in English.

### Description of the data collection instrument

An interview guide, consisting of seven open ended questions with probes was used to gather information from each focus group. The interview guide was developed through a review of the literature relating to the students interest and attitude towards Design and Technology.

### **Data collection procedures**

The students were requested to participate in the study interviews and those who consented participated. The focus group method was employed and the group in each school sampled was interviewed face to face by the researcher. The interviews ranged in duration from 45 minutes to an hour and were conducted in the outdoor teaching areas of schools. The researcher informed the participants of the purpose of the research and reminded the students that the interest was in finding out anything in connection to their behavioural attributes that affects their performance, information that could help in informing policy to help improve the overall outlook of Design and Technology. The investigator began the interview using the interview protocol guide and recorded the information with participants' consent, by taking notes. They made sure that every participant responded to the same question and encouraged discussion among participants.

### **Data analysis**

*What are the factors that influence students' attitude and interest in Design and Technology?*

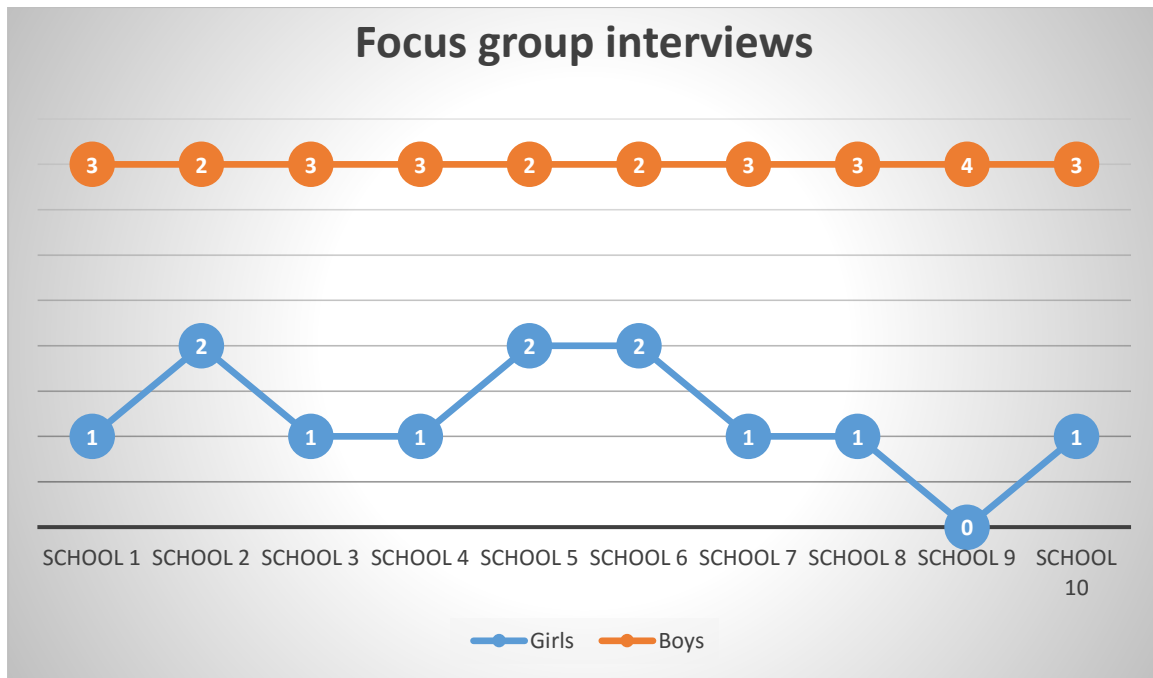
*To what extent do the factors that influence student's attitude and interest affect their academic achievement in Design and Technology?*

Thematic analysis based on themes emerging from the data collected through open ended questions was used to answer these questions. The data was transcribed verbatim into written text by the researcher. Analysis procedures then followed a step by step constant comparison method (Strauss & Corbin, 1990).

### **Findings**

#### **Focus group interviews**

The researcher conducted 10 focus group interviews across the 10 study schools sampled involving 40 students, with four students from each school. Twenty eight male students and 12 female students took part in the discussions. This gender imbalance was not unexpected because even after 25 years of Design and Technology being offered in Botswana, secondary schools are still experiencing a low enrolment of females for the subject as compared to their male counterparts. This is mainly because of the masculinity associated with the subject. The responses given by students under various questions were grouped and themed.



**Figure 1** Number of participants by gender and school

**1. Reasons for doing Design and Technology**

- Why are you doing Design and Technology?

**Selection criterion** - Of all the 40 students who were engaged in the focus group discussions, 32 (80%) of them have indicated that they are doing Design and Technology because they were forced to do it. The culture in schools is that when selecting practical subjects at form 1, there are not many or there are no students at all who opt for the subject so the practise is that teachers on their own select students to offer the subject. This is a criterion that has fuelled a lot of negative attitude towards the subject over the years.

For some students however, there was some likeness attached to it, **Table 2** below indicates 8 students opted for Design and Technology willingly. They felt that it could help them once they have completed their secondary schooling as it has got elements of craftsmanship; and therefore can give them a start-up of self-empowerment opportunities.

**Table 2** Selection of subject

Students enrolment	Number	Percentage%
Forced to enrol	32	80
Opted to enrol	8	20

**2. Perceived interest**

- Do you find the subject interesting to do? Explain

To explore this perception further, a question was asked that required students to explain their responses further and it was surprising how they responded to it. Over half of the students, 25 of the



40 interviewed as shown on **Table 3** did acknowledge that Design and Technology is a very interesting subject (Contrary to popular belief that they no longer find it interesting). What was gathered from the discussion though was that even though it is interesting, it does not mean that students harbour no attitudes towards it.

Students feeling	Number	Percentage (%)
Interesting	25	62.5
Not interesting	15	37.5

**Table 3** *Interest in subject*

**Exposure** - Design and Technology as an applied science subject is a very interesting and quite engaging subject, unfortunately a lot of students do not get to appreciate it mainly because of their exposure to everyday life outlooks. During the interviews conducted, some students argued that parents are not doing enough to sensitise their children about it, but on the other hand there is little that the parents themselves know. Even though they lack knowledge about it, it would not do harm for parents to redirect their children towards science and technology by making it a subject of communication in their homes, already there is so much talk about other socially binding issues in homes that drives students to think are the most important things to focus on hence they lack appreciation for the subject.

**Insufficient equipment** - Students listed lack of resources in their Design and Technology labs as another aspect that has an impact on how they perceive their interest in the subject. During the interviews students highlighted that a lot of them are forced to do it, some carry out their attitude to the end of their third year stay at JC but others learn to like it as they progress. They give it a chance hoping the application and practical part of it will keep them interested but end up being disappointed once they realise that it is not happening.

**Teacher - Student's relationship** - It appears that most Design and Technology teachers are either too friendly or not friendly at all. Some, like it was discovered in the interviews persistently threatened students. They mocked them and told them how badly they were going to fail. Only those who were performing better were constantly praised hence demotivating others. Mentoring of students is not something that is done in the D&T departments, adding to the students' low morale. It should be made clear that the teachers' roles are very crucial in the students learning as it could be through the teachers' assistance that there could be any transformation for students. A teacher's bad attitudes, poor teaching skills, and lack of involvement with students when teaching results in poor performance as some students relayed in the interviews.

### 3. Perceived importance

- *Do you think D&T can be important for your future career once you leave school? Explain your answer.*

**Relevance** - Research has indicated that interest in Design and Technology has decreased among learners (Gaotlhobogwe, 2010). A number of policy documents from different countries suggest that Design and Technology educators design curricula that are interesting

and relevant to the everyday experiences of students (Taylor, 2001). However, to design relevant curriculum requires some understanding of what learners perceive to be relevant. Relevance can be put up in the context of the options that one will be able to explore at post-secondary Design and Technology.

From the focus group discussions, just as for perceived interest, some students felt that Design and Technology was important. 70% as shown in **Table 4** felt it was important, even though 25% of them were quick to state that it is important but not necessarily for them, but that it could be important for those who would want to pursue it further particularly those who feel it can be a good career prospect.

**Marketability** - Students brought up the issue of market for Design and Technology in the discussion. Fifteen students from the five schools that brought in the issue of market in the discussion lamented that Design and Technology offers no growth as far as they are concerned. That the only time they hear of Design and Technology, it's in relation to teachers and teaching. Some even argued that it can hardly be said carpenters have gone through the subject as a lot of carpenters they know never went to school but learnt their skills through observations.

Industrialisation in Botswana is still very much at its infant stage. There aren't many options that one can choose from once they complete their secondary studies. Tertiary institutions in this country offer little advancement for those willing to proceed with Design and Technology as a career choice. A lot of people who have opted for Design and Technology careers have been limited to teaching and carpentry. In 2002, the Department of Industrial Design at the University of Botswana in the Faculty of Engineering and Technology went through a transition from offering only educational degrees to offering both educational and industrial degrees to increase graduates' scopes in being absorbed in the industrial market.

**Table 4** *Importance of Design and Technology*

Students views on relevance	Number	Percentage (%)
D&T is important	28	70
D& T is not important	12	30

NB: Views on market arose from only 5 schools

students views on market	Number	Percentage (%)
D&T marketable	5	25%
D&T has no market	15	75%

#### 4. Difficulty of the subject

- *Is Design and Technology a generally difficult subject to do? How are you performing in it?*

**Lack of resources** - Design and technology labs in schools are underequipped. Some schools have got insufficient machinery and equipment and teaching space. In the interviews conducted, of the 40 students interviewed 32 (80%) brought up the issue of inadequate teaching areas and insufficient equipment. According to some of them, it was difficult for their teachers to cover some of the IT based objectives of the syllabus e.g. electronics and graphics since there are no computers in schools and if they are available then the relevant software's are not installed in them.

**Graphical communication** - One aspect that has rendered Design and Technology a very difficult subject is graphical communication. In Design and Technology, communication is mainly done through sketching and it will be difficult for a student to score fair marks if they are unable to sketch. **Table 5** shows from the 40 students interviewed 28 (70%) of the students said they have been taught basics of graphics even though according to some it was rushed through. Twelve of the students said they have never done graphics. What the researcher discovered though is that even those exposed to the basics still struggled to express themselves through the technique.

**Packed syllabus** - The Design and Technology syllabus is very much congested. All the 40 (100%) students interviewed did indicate that they were overwhelmed by the voluminous content. In 2014, a panel of Design and Technology facilitators and educators met in Selibe-Phikwe to break down the syllabus to help distribute the topics of the syllabus objectives in the 3 years that it is being offered at JC. Even the panel could not come up with a comprehensive plan to divide the syllabus accordingly thus leaving some of the objectives to hang so teachers could squeeze them in for themselves. As a fulfilment of the Junior Certificate, Design and Technology students are required to come up with a design and make plan (Paper 3 that constitutes 40% of the Design and Technology examination marks) of a project they are to produce. The project is in 2 phases; phase 1 (design-portfolio) and phase 2 (make-manufacturing or realisation). Even the project which normally takes 2 form 3 calendar terms to complete has not been allocated any slot in the syllabus breakdown forcing Design and Technology teachers to 'scramble' for the little time available in the schools programme.

**Table 5** *Difficulty of the subject*

Students views	Number	Percentage (%)
Lack of resources as contributing factor	32	80
With Graphics communication basics	28	70
Packed Syllabus factor	40	100

**5. Relates to performance**

- *What do you relate to your performance in the subject? ( e.g .Why poor or good performance)*

**Gender** - Discussions in chapter two highlighted that although the last decade has witnessed an increasing number of women in the field of science and engineering, the number of girl students doing Design and Technology remains disproportionately small. '*Design and Technology is a subject for boys*' is a statement that circulates amongst secondary school students, a statement that has trickled down from tradition that has marginalised women in terms of their capabilities and what they have to offer. Although girls and women have the ability to work within science and technology, few qualify to do so since the nature of

technology relating to this has been presented too often as intensively narrow and divorced from women concerns. During the interviews, 18(45%) of the students indicated that indeed Design and Technology is way too physical for girls, and that issues of fixings and fabricating items is better off being done by males who from a younger age have been indoctrinated to align with the particular practise.

**Location of school** - Students have in the interviews suggested that the location of their schools plays a major role in their passing Design and Technology. 20 of the students, who were from the remote and semi-remote areas stated that they need a bit of exposure on some of the things, since most of the time they have no idea what the teacher will be talking about. They indicated that at least if one is familiar with a particular item and then a concept behind how it's used is relayed then it is easier to visualise for oneself

**English proficiency** - Of all the students interviewed, 35 (87.5%) of them indicated a serious hindrance to learning due to the medium of instructions that is used. Comments given indicate that there is a serious low development in learners' literacy skills which is assumed that learners could have acquired before progressing to secondary schools. Pansiri's (2008) findings indicated that "students transit from primary to secondary schools when they are not ready" (p.114) and it becomes a serious barrier to teaching when they are taught in a language that they are not familiar with.

**Teaching methods** - In the interviews, issues of teaching methods came up. 18 (45%) of the 40 students interviewed have indicated that since Design and Technology is a peculiar subject and a practical one for that matter, it means it cannot be taught in simpler terms as these other core subjects. They felt that there ought to be a lot of demonstrations and video visuals, but in their cases they have explained that workshops are so poorly equipped that illustrations from their textbooks are at the moment as far as they could get to have some class demonstrations.

**Table 6** Factors relating to performance

Students views	Number of students	Percentage (%)
Believes D&T is for boys	18	45
Argues that location has influence	20	50
Believes medium of instruction affects performance	35	87.5
Advocates for differentiated instructions	18	45

## 6. Measures to improve performance

- *What do you think can be done to improve student's performance in the subject?*

**Assessment paper reduction** - In Design and Technology, assessment is done through end of months test and end of term examinations. For end of term examinations, 2 papers are written for each form; paper 1 which is 40 multiple choice questions and paper 2 which is in two sections, Section A which takes 20 marks and Section B which contains 4 application questions with 10 marks each. For the final JC examination; paper 1, paper 2 and paper 3 (Final project) constitutes 20%, 40% and 40% respectively, of the exam marks. Of the 14 form 3 students interviewed, 9 of them felt very strongly

about the assessment criterion being reviewed and evaluated to come up with measures that will assist in compressing it. **Table 7** shows 29 (72.5%) of the students interviewed, including the form 3 mentioned above argued that the assessment papers are too many for them to handle.

**Syllabus review** - The Design and Technology syllabus is very packed for a practical subject. It is very difficult to thoroughly cover all the objectives in the breakdown. Some objectives are old fashioned looking at the context of the 21<sup>st</sup> century. Thirty (75%) of the students interviewed argued that the Design and Technology syllabus should be reviewed so that some of the content could be reduced so it will allow them time to have more practical lessons.

**Table 7** Measures to improve performance

Students views	Number	Percentage (%)
Assessment should be reduced	29	72.5
Syllabus should be reduced	30	75

## 7. Behaviour predicting performance

- *Does your behaviour have any significant relevance to your performance of Design and Technology?*

Looking at how students perceive the subject, the researcher sought to find out if students' behavioural elements have got any bearings to their performance. **Table 8** below shows that of all the 40 interviewed, all agreed that as a matter of fact, their behaviour does impact on their performance.

**Low self-concept** - During the interviews, the researcher discovered that the students misconceive Design and Technology to be a difficult subject. A lot of them tend to say 'Design and Technology is a difficult subject'. With these misconceptions, they are already defeated, subsequently, causing them to fail. Fears arise from previous failures, discouragements from siblings who did not perform well in Design and Technology, harsh attitudes of teachers, or comparison of low performing students to the top performing students. All these can cause students to despair and give up studies in this applied science subject. Good, Aronson, & Inzlicht (2007) discovered that the disposition that predetermines students' attitudes can help improve their performance. Teachers in Design and Technology departments should help the students develop positive mind-sets towards Design and Technology rather than instil fear in the students

**Thorough orientation** - A lot still needs to be done by the Ministry of Education and school administrators in an effort to promote Design and Technology to students and parents, as it stands a lot of them have no idea of its dynamics and what it entails. At the beginning of every year there are orientations done in schools to introduce form one students to their practical optional subjects. The presentations are monotonous, vague, not informing and simplified hence not enough to draft serious interest in students' minds. The issue is that there is not enough done and demonstrated that could indicate to students that this could be an interesting subject important for one's future career. In the interviews the students discussed that Design and Technology basics were done for their Creative and Performing Arts subject (CAPA) at primary level, but it is not enough to give them an overview of what it entails. All the 40 (100%) students agreed that orientations done in their schools when they

were introduced to the subject were very brief and lacked content hence could not accord them a comprehensive standing where the subject is concerned.

**Table 8** *Behaviour predicting performance*

Students views	Number of students	Percentage (%)
Have low self-concept	40	100
Poor orientation to D&T	40	100

## Discussion

Behaviour of students in their learning plays a vital role in determining their academic achievement. The attitudes that students have towards learning and their interest in learning are attributes that are recognized by policy makers as integral in the instructional process, as central ingredients for helping them learn effectively. Understanding students’ attitudinal stance can provide insight into how such elements may influence policy recommendations.

Research that has been carried out has shown that the positive attitudes that students’ harbour increases their chance for academic achievement. While on the other hand, negative attitude make academic success less likely (Loyd 1984). With the continuous growth and evolvement of technology, its educational modification has changed the educational landscape, providing solutions and at the same time creating situations that needs to be addressed (Zhang 1998). Different studies (Volk and Yip, 1999; Jones, Howe & Rua , 2000; George, 2006; Salminen-Karlsson, 2007) have found correspondence between characteristics of students and their views towards technology.

In influencing the attitudes of all students, the way teachers are prepared is of paramount importance. This is not only applicable to D&T teachers, but to all teachers who have direct influence on students’ lives. The adequate preparation of teachers is with no doubt essential in developing teachers’ competency to teach technology. Ogwa (2002 as cited in Okolie, 2014) argued that “sometimes teachers are responsible for students’ poor performance in examinations” (p.26). Educating young minds should be done in a diligent manner, hence requires educators with profound teaching abilities. For that to happen there should be adequate training of educators. Educators should be able to vary their teaching methods, they should be able to cater for all the learners and engage them in their teachings so that their interest and attention can be constant. This will in turn enable students to acquire the required knowledge and skills. The methods and strategies that are in use in schools are very traditional and out-dated with students required to copy notes from the chalkboard and to visualise ‘theory demonstrations’ (due to lack of resources) attempts by teachers. In order to achieve the objectives of the fundamental principles then it is of essential importance to improve the teaching methods. Poor teaching methods will only distract students from the objective of the lesson.

Poor acquisition and mastery of English language at primary school level affect the student’s learning experience. The mode of instruction used for Design and Technology and all the other subjects except for Setswana is English. Since there are lots of challenges that prevail due to students’ limited English language skills, they can never understand and grasp some concepts in the subject matter. Pansiri’s (2008)’s findings showed that “students transit from primary to secondary schools when they are not ready” (p.114) and that this becomes a pedagogical problem when they are taught in a language that they are not familiar with.

### **Conclusion and Recommendations**

The investigation of factors that influence students' attitudes and interest in Design and Technology as predictors of their academic achievement has indeed provided evidence that attitudinal differences exist among students doing Design and Technology. As similar findings have been obtained by different studies done in different parts of the world relating to students perception about D&T, the results were not really unexpected.

This study brought to light some of the beliefs that students have about Design and Technology and the implication that those beliefs have on their academic achievement. These beliefs ultimately affect the quality of students learning outcomes. This study is relevant for educational policy and practice in Botswana, especially at this time that the country is making tremendous changes to the educational policies through the implementation of the Education Training Strategic Sector Plan (ETSSP). The plan is to transform Botswana from overdependence on resources to a knowledge-based society, to be able to sustain its development and provide high standards of living for all, through the education structures available.

The following recommendations are hereby made based on the findings of the study;

- MOBE to resource school laboratories and workshops
- Conduction of in-service training for teachers
- Consultation with teachers on developments to be made to the subject.
- An evaluation of the curriculum for Design and Technology be done, so as to scrap off some of the objectives which are totally irrelevant in the context of the 21<sup>st</sup> century.
- Reduction of most of the theory content so students can be exposed to more workshop (practical) applications and activities so that they can recognize workshop/laboratories materials and equipment.
- Practical activities should be taught with varying techniques that generate interest in students.

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