

# ASSESSING THE LEVEL OF PREPAREDNESS, PREFERENCES, AND FEARS OF FIRST-YEAR SCIENCE STUDENTS AT THE CENTRAL UNIVERSITY OF TECHNOLOGY, FREE STATE

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## ABSTRACT

This exploratory and descriptive study examines the perceptions of first-year science students regarding their preparedness for the programme, their preferences and their fears as they embark on university education for the first time. A questionnaire was used to collect data from all the first year students enrolled in the programme in 2008. Seventy students answered the questionnaire from a class of 78. Both quantitative and qualitative data analysis methods were used to analyse and present data in the study. The results showed that students differed in their preparedness for the programme, their preferences regarding teaching methodologies, learning methods, and classroom climates, and the kinds of fear or apprehension about the programme and university education. Some recommendations regarding the teaching and learning of science are made.

**Keywords:** Transition, student preferences, academic preparedness, fears, academic support.

## 1. INTRODUCTION

University lecturers and professors often assume that students from the school system are well prepared for programmes in the higher education sector. Research has shown, however, that any transition from one level to another has its own challenges. The transition from one phase of schooling to another (Brandsfort, 2004) and from school to university (Green, 2005; Lowe, 2003; Smith, 2004; Burt & Mills, 2006) has been found to be problematic. The problems that are usually associated with such transition include the preparedness of students (Zeegers & Flinders, 1994; Smith, 2004), the teaching methods or practices and the demands of the content knowledge (Smith, 2004; Green, 2005) at the new phase. Green (2005) cites study patterns, levels of independence, assumptions, expectations and assessment procedures at tertiary level as well, while Zeegers and Flinders (1994) report on academic progress, personal, family, financial and social problems as factors associated with this transition. Potgieter, Rogan and Howie (2005) argue that incoming chemistry students at tertiary institutions have a variety of academic backgrounds that influence their prospects of success at first-year level.

They further argue that in order to ensure a smooth transition from secondary to tertiary education, university lecturers should be well informed about the content knowledge, conceptual understanding and skills development of prospective first-year students.

This observation suggests that students have to make certain adjustments in order to cope with the varied demands at a higher level of education. The ease with which students adjust to the new situation will depend on many factors such as the attitudes of the university lecturers, their preparedness to understand the students' problems and their willingness to provide the relevant academic support.

This study focuses on the level of preparedness of the first-year science students, their preferences, and their fears about the BEd (FET): Natural Sciences programme at the Central University of Technology, Free State. This is a four-year qualification which prepares teachers to teach in the Further Education and Training (FET) sector (high school) phase of the South African schooling system. The major subjects in this programme are mathematics, physics, chemistry and biology. The motivation for the study was triggered by the findings of an earlier study (Matoti & Lekhu, 2007) in which a lack of resources such as textbooks and laboratory equipment in the feeder schools, and a tendency among teachers to avoid teaching sections of the syllabi which are perceived as difficult, were identified as problems. Furthermore, during the registration of the first-year students we observed that some had developed a negative attitude towards biology and chemistry and were therefore uncomfortable with the fact that they had to register for these subjects as part of the prescribed curriculum. They blamed their teachers for developing the negative attitude towards these subjects. It is against this background that this study focuses on the preparedness, preferences and fears that the 2008 cohort of students might have regarding the programme.

## **2. LITERATURE STUDY**

The literature that has been reviewed focused mainly on the level of preparedness, preferences and fears of first-year university students. The literature review has also touched on learning style models and their implications for teaching and learning.

### **2.1 Preparedness of students**

Academic preparedness is a multi-dimensional concept which includes skills such as the ability to read, write, take notes and take examinations (Alliance for Excellent Education, 2006:1). Miller, Bradbury and Pedley (1998:104) describe under-preparedness as the after-effects of a problematic educational past which is characterised by learning environments that inadequately prepared students to deal with the demands of higher education.

This definition supports the findings by Smith (2004) and Green (2005) on the preparedness of students to cope with the demands of content knowledge and teaching practices at higher education institutions (HEIs). Taking the argument further, Brussow (2007) describes the typical under-prepared student groups as those who enter HEIs directly after matriculation but lack reading, writing, and mathematical skills. A second group is made up of re-enrolling students, a group that consists of adult students who need to relearn academic skills, and a third group includes those students with inadequate English proficiency because English is their second and even third language. This study focuses on the first and third groups of students. The second group is accommodated through the Advanced Certificate in Education (ACE) programmes and not the undergraduate BEd programmes.

Three domains of under-preparedness have been identified in the literature, namely academic, cultural and emotional under-preparedness (Robinson, 1996:1). Academic under-preparedness entails a lack of proficiency in English, lack of mathematical ability, and ineffective study skills. Hardman and Ng'ambi (2003:140) point out that some students display textual under-preparedness or inability to meet the linguistic demands of higher education; and this they ascribe to a lack of opportunities or intervention at school level to develop such abilities. Miller et al. (1998: 108) argue that English as a second language, although not a direct factor for under-preparedness, hinders the understanding of mathematical concepts, since concepts are acquired through language. Textual under-preparedness has created among students a particular tendency to present text assignments in a word for word manner from textbooks rather than dealing with or raising arguments (Slonimsky & Shalem, 2004:86). This is called the "cut and paste" method of writing assignments which results in a product that lacks structure and coherence. This is also common among the postgraduate students.

Cultural under-preparedness has also been found to affect students. Students entering university from a cultural environment that differs from that of a typical higher education institution are categorised as culturally under-prepared (Robinson, 1996:2). An example of this, from my own observation, could be students from the remote rural areas like those in the Eastern Cape, KwaZulu-Natal, Venda and others, coming to study at an urban university, such as the University of Cape Town. Such students really need support in order to adjust. In fact this is commonly known as "culture shock". Students need counselling and guidance in order to cope with cultural under-preparedness which could lead to problems of emotional adjustment.

Emotional under-preparedness refers to those students who display a lack of self-efficacy and self-regulation. Self-efficacy is regarded as learners' beliefs about their performance capabilities in a specific context, task or domain (Dunlap, 2005:65). Higher levels of self-efficacy have been found to correlate with higher levels of cognitive strategy, together with higher levels of self-regulation and eventually academic achievement (Kitsantas & Chow, 2007:383).

First-year students could have one or a combination of these domains of under-preparedness. Student under-preparedness is therefore a major factor that has to be addressed. The question is: are the HEIs succeeding in addressing this problem? What is the situation in South Africa?

### *The South African context*

The 1999 Third International Mathematics and Science Study (TIMSS) and the National Assessment of Educational Progress (NAEP) indicated that the majority of South African students are under-prepared for higher education. The studies further revealed that of the 38 countries that took part, South Africa attained the lowest proficiency scores. The tests predicted that 69% of the students entering higher education institutions (HEIs) in South Africa would not be prepared adequately to cope with the demands of higher education studies (SAUVCA, 2003:25). The continuing low levels of academic performance and unsatisfactory throughput rates suggest that the responses of higher education institutions to the teaching and learning needs of under-prepared students are not sufficient. McClean (2003) reports that students from disadvantaged schools are under-prepared for the medical programme, while Brussow (2007) indicates that the majority of first-year students in the natural sciences and mathematics are under-prepared. This suggests that the problem of student under-preparedness continues to exist in the HEIs and remains a major factor to be addressed.

A variety of factors contribute to the level of preparedness of students for higher education. The research findings of Howie and Plomp (2003) on the poor performance of South African learners in mathematics and science point to a number of contextual factors including inadequate subject knowledge of teachers, inadequate communication ability of learners and teachers, lack of instructional materials, pressure to complete the examination-driven syllabi and overcrowded classrooms which render individual attention practically impossible. Such students bring to science classes a baggage of problems that have to be uncovered and addressed because they affect academic progress. Brussow (2007) highlights a number of factors that contribute to academic failure in under-prepared students. The following were high on the list: a lack of reading and writing skills, language barriers, lack of effective study skills, employing a surface learning approach, lack of intrinsic motivation and a lack of self-efficacy. Other factors were dependence on teacher support, ineffective management of study time, academic work overload, different learning styles which are not addressed, too large class sizes, anxiousness in academic environment, lack of guidance in academic proficiency and dissatisfaction with the academic course.

From the foregoing exposition it is evident that students at universities come from diverse school and cultural backgrounds which contribute to their preparedness to learn content knowledge which will eventually contribute to their academic progress.

Students who are well prepared academically stand a better chance of progressing well at university than those who are not. It is therefore essential that all the lecturers understand the different backgrounds of students in their lecture rooms to be able to help them to overcome their learning problems. Besides the level of preparedness, students also have different preferences which may affect their study methods and learning.

Students do not only come to university with different levels of academic preparedness, they also have different needs and preferences as explained in the next section.

## **2.2. Student preferences**

This sections deals with student preferences.

### *Preferred learning styles and learning methods*

Nooriafshar and Maraseni (2004) used two groups of students from different cultural backgrounds to compare their preferred learning styles and learning methods. Regarding the learning styles, both groups indicated a high preference for visually oriented teaching materials such as graphs, pictures and images in learning statistics concepts, an idea that was supported by Nooriafshar et al. (2004). The “self-reading and then asking questions” approach was preferred by a very low percentage (10%). As far as the learning method is concerned, both groups had a preference for learning the concept before exploring the application. In the study by Glass and Sue (2008), homework emerged as the method of study students preferred and used the most, and which they felt had the greatest impact on their learning. Although the study focused on an online mathematics class it has implications for other classes as well. Students therefore have preferred learning styles as well as learning methods.

### *Thinking style preferences*

Students do not come to tertiary institutions with different levels of academic preparation only, they also come with thinking style preferences that have been established through schooling and life experiences. These existing preferences influence all the cognitive activities in which students are engaged. A thinking style preference leads to a learning style preference and in turn determines a student's dominant cognitive mode in which he or she communicates and receives information (De Boer & Bothma, no date). Research by Steyn and Maree (2003) on the thinking style preferences of first year engineering and science students reveals a diversity of views representing an array of preferences distributed across all four quadrants (A,B,C and D or left cerebral, left limbic, right limbic, and right cerebral modes) as measured by the Herrmann Brain Dominance Instrument (HBDI).

The study has also shown differences between the thinking style preferences of science students and engineering students. Steyn and Maree (2003) have suggested facilitation strategies that are aimed at developing the mathematics potential of the learners, as well as those that foster an awareness of thinking style preferences.

### *Learning style preferences, learning methods and instructional strategies*

Fedler (1996) argues that students have different learning styles and preferences in the ways they take in and process information. Some students tend to focus on facts, while others are more comfortable with theories and mathematical models. Some respond strongly to visual forms of information like pictures and diagrams, while others benefit more from written and spoken explanations. Some prefer to learn actively and interactively, while others work more introspectively and individually. Fedler (1996:18) further argues that for one to function effectively one has to work well in all learning style modes. This is captured in the following extract:

If professors teach exclusively in a manner that is less preferred by the students, students may be uncomfortable and such discomfort could in turn interfere with their learning. On the other hand if the lecturers teach exclusively in their students' preferred modes, the students may not develop the mental dexterity they need to reach their potential for achievement in school and as professionals (Fedler, 1996:18).

According to Fedler, an objective approach would therefore be to help students build their skills in both their preferred and their less preferred modes of learning.

Since the learning style modes have been found to affect teaching and learning it thus becomes necessary to look into some of the learning style models. The aim of the study at this stage is not to use a particular model, but to get an idea of the learning style preferences that exist in this particular cohort of students which will inform later studies.

The literature study has focused on the nature and consequences of student preparedness, students' preferences and implications for teaching and learning. It is against this theoretical background that the aims and objectives of the study were formulated.

### **3. AIMS AND OBJECTIVES OF THE STUDY**

The main aim of the study was to assess the level of preparedness of the first year science students, their preferences and perceived fears about university science, with the view of informing the teaching practices of lecturers in the programme and providing the relevant academic support to students. The following were the objectives of the study:

- To assess the extent to which first-year science students are prepared for the demands of the science subjects and mathematics in the programme.
- To examine whether first-year science students have particular preferences regarding the teaching methods that are used at tertiary level.
- To identify the different study patterns or learning methods of students.
- To examine the fears that first-year science students might have regarding science and mathematics at university level.

On the basis of the stated objectives a teaching methodology that would cater for the needs and preferences of the majority of students in the programme would then be proposed.

## **4. RESEARCH METHODOLOGY**

### **4.1. Research design**

The study follows both the quantitative and qualitative research approaches. It is an exploratory-descriptive survey of the perceptions of first-year science students. The target population for the study was all the first year students enrolled for the four-year BEd programme in the Natural Sciences at the School of Teacher Education of the Central University of Technology, Free State (CUT) in 2008. The student enrolment was 78. The instrument used to collect data was a questionnaire as the researcher wanted to reach all first-year students in the programme. The questionnaire comprised both closed-ended and open-ended questions. The questionnaires were administered to all the students who attended the chemistry class on the day of data collection. Students' perceptions were measured on a three-point Likert-type scale as well as through open-ended questions. Seventy (70) students answered the questionnaire.

### **4.2. Data analysis and findings**

#### **4.2.1. Quantitative data**

##### ***Biographical data***

An analysis of the 70 respondents by gender indicated that 45 (64.3%) respondents were male students while 25 (35.7%) were females. Table 1 shows the breakdown of the respondents by province and gender.

**Table 1: Distribution of respondents by province and gender (N=70)**

Province	No. of schools	Male students	Female students	Total
Free State	32	24	16	40
Mpumalanga	25	20	8	28
Eastern Cape	1	0	1	1
Northern Cape	1	1	0	1
Total	59	45	25	70

The 70 students in the sample came from a total of 59 schools from four provinces of South Africa. Forty (57.1%) respondents came from 32 schools in the Free State province where the institution is located, while 28 (40%) came from 25 schools in Mpumalanga. Surprisingly, only one student came from the Eastern Cape and Northern Cape respectively.

An analysis of respondents by home language is shown in Table 2. Nine of the eleven official languages in South Africa were identified. This shows a diverse cultural background of students in the programme.

**Table 2: Home language of students N=70**

Home Language	Frequency	%
Sesotho	27	38.6
Setswana	5	7.1
IsiXhosa	9	12.9
IsiZulu	6	8.6
Sepedi	3	4.3
SeSwati	10	14.3
IsiNdebele	7	10.0
XiTsonga	1	1.4
Afrikaans	2	2.9
Total	70	100

The majority of the respondents (38.6%) speak Sesotho, which is the language of the majority of people in the Free State province. The respondents from Mpumalanga speak mainly SeSwati (14.3%) and isiNdebele (10%). This situation, according to Robinson (1996), could lead to both cultural and emotional under-preparedness among the students as English is their second or even third language.

The students were also requested to provide their matriculation results. The matriculation (matric) results in South Africa up to the end of 2007 were categorised as follows: M for a pass with Merit, E for Matric Endorsement and S for a School leaving certificate. The first two are recognised admission requirements to university. Table 3 shows a breakdown of the matric results while Table 4 shows results of the three subjects concerned.



**Table 3: Matric results of respondents (N=70)**

Pass category	Frequency	%
Merit	22	31.4
Endorsement	34	48.6
School leaving certificate	14	20.0
	70	100

**Table 4: Mathematics, Biology and Physical Science results**

Mathematics N=70		Biology N=67		Physical Science N=69	
HG	SG	HG	SG	HG	SG
13	57	42	25	19	50
18.6%	81.4%	62.7%	37.3%	27.5%	72.5%

Table 4 shows that the majority of the respondents passed Grade 12 mathematics and physical science on standard grade. The performance is better in biology as 42 (62.7%) respondents passed biology on higher grade. The difference between standard grade and higher grade is the depth of the subject content to which students are exposed at high school, and assessment procedures which require higher order skills on higher grade as opposed to lower order skills on standard grade. The picture that is depicted by the results does not show thorough preparation of the students in these three key subjects in the programme.

Since English is the medium of instruction, the respondents were also requested to indicate the symbols that they obtained in matric for this subject. Table 5 shows the breakdown of the results. All the respondents in the study did English as a second language.

**Table 5: English Second Language results (N=70)**

Symbol	Frequency	%
B	2	2.9
C	11	15.7
D	33	47.1
E	24	34.3
Total	70	100

The majority of students (47.1%) passed English Second Language with a D symbol (above 50%).

### ***Preparedness, anxiety and fears of the respondents***

This section presents the responses of the students to twelve statements that were used to ascertain their level of preparedness for the key subjects in the programme, mathematics, biology, chemistry and physics. There were also statements about the respondents' level of anxiety regarding the teaching methods used at university level as well as assessment procedures.

The response categories were: *To a great extent* (3), *To some extent* (2) and *Not at all* (3). Table 6 gives a summary of the level of agreement of the respondents regarding individual statements.

**Table 6:** Level of preparedness of the respondents for the programme (N=70)

	Statement	3	2	1	No Response	Total
1	I am fully prepared for the qualification that I have chosen.	40 57.1%	26 37.1%	4 5.7%	-	70
2	The content knowledge that I have gained in Grade 12 mathematics makes me confident to handle Mathematics 1.	42 60.0%	25 35.7%	3 4.3%	-	70
3	The content knowledge that I have gained in Grade 12 physical science makes me confident to handle Chemistry 1.	34 48.6%	29 41.4%	5 7.1%	2 2.9%	70
4	The content knowledge that I have gained in Grade 12 physical science makes me confident to handle Physics 1.	25 35.7%	36 51.4%	7 10.0%	2 2.9%	70
5	The content knowledge that I have gained in Grade 12 biology makes me confident to handle Biology 1.	28 40%	34 48.6%	7 10.0%	1 1.4%	70
6	I am anxious about the level or depth of content in Mathematics 1.	6 8.6%	33 47.1%	30 42.9%	1 1.4%	70
7	I am anxious about the level or depth of content in Chemistry 1.	8 11.4%	28 40%	34 48.6%	-	70
8	I am anxious about the level or depth of content in Physics 1.	7 10.0%	32 45.7%	29 41.4%	2 2.9%	70
9	I am anxious about the level or depth of content in Biology 1.	10 14.3%	35 50%	23 32.9%	2 2.9%	70
10	I am anxious about English as a medium of Instruction.	7 10.0%	28 40%	35 50%	-	70
11	I am anxious about the teaching methods that are used at university level.	6 8.6%	40 57.1%	24 34.3%	-	70
12	I am anxious about the assessment procedures that are used at university level.	5 7.1%	37 52.9%	28 40%	-	70

**N.B.** *Students who fall under the 'No response' category are those who did geography instead of physical science in Grade 12, and those who did physiology instead of biology.*

From Table 6 the following deductions can be made:

#### ***Level of preparedness of the respondents***

The students showed more confidence in handling Mathematics I than the other three first-year subjects in the programme. Some level of academic under-preparedness on content knowledge of the key subjects in the programme has been identified. This is cause for concern and has implications for the teaching methods that individual lecturers use to teach the first-year students.

### *Level of anxiety about the content knowledge and medium of instruction*

- More than 50% of students were anxious about the depth of content knowledge for Mathematics 1. There appears to be some correlation between these responses and those expressed for statement 2, regarding the level of preparedness of the respondents for Mathematics 1.
- Students showed a higher level of anxiety in biology, followed by physics and then chemistry. From an earlier study (Matoti & Lekhu, (2007) students showed a negative attitude towards biology.
- 50% were anxious about English as a medium of instruction.

### *Level of anxiety regarding teaching methods and assessment procedures*

- The majority of students (65.7%) were anxious about the teaching methods used at university level, while 60% were anxious about the assessment procedures.

The results do indicate some level of uncertainty regarding whether or not the grade 12 syllabi had instilled some level of confidence in the respondents to be able to face the challenges of mathematics, physics, chemistry and biology at tertiary level. They are also anxious about the teaching methods and assessment procedures.

#### **4.2.2. Qualitative data analysis**

Of the 70 respondents in the sample, 61 (87.1%) indicated that they had preferences regarding teaching methods while 9 (12.9%) indicated that they did not prefer a particular teaching method from the lecturers. What follows is the presentation of qualitative data from the open-ended questions in the questionnaire.

#### **Preferred teaching methods and learning styles**

Respondents were asked to explain their preferred method of teaching. The findings are organised around the themes that emerged from the data as follows:

- The need for notes
- Involving or engaging students during lectures
- Assignments in the form of exercises
- Working independently
- Prefer not to be called upon to do exercises on the chalkboard
- Preferred study patterns or methods
- Classroom climate

## *The need for notes*

The issue of notes came up very strongly from the respondents. They indicated that they understand the work better when they learn from the notes rather than from the textbook. *(The notes in this instance imply structured information or facts. They also imply the stressing of the important points in a simplified form which students understand easily. Students prefer both written and spoken explanations. According to Felder-Silverman Learning style model, they are verbal learners, and according to Kolb they are Type 2 learners abstract, reflective).*

To this end, two views came up. There are those who prefer to be given notes before the lecture or at the beginning of the lecture so that they can follow from the notes rather than listening to the lecturer (*dependence on the lecturer's notes*), while others prefer to take down their own notes as the lecture progresses. The latter group pointed out that they understand the notes that they have compiled themselves better than the packaged notes from the lecturer, either distributed in class or placed on the WebCT. *(This group showed a level of independence as far as the notes are concerned. They want to do things on their own.)* This however requires that the lecturer present the lecture at a reasonable pace that will enable them to write down the notes. The following excerpts capture the two views expressed regarding notes.

*"Lecturers should give us notes before they introduce a new topic or chapter so that we can go through them".*

*"I would like to be given notes. That will give me sufficient time to prepare thoroughly before going to class. It gives me confidence to participate in class".*

*"As lecturers teach, I must make my own notes because it is easier to understand the notes that you have prepared by yourself."*

*"I refer to the textbooks, make my own notes. This makes things easier for me."*

Following the arguments about notes further, it can be argued that these students are under-prepared for engaging in academic text hence they have problems dealing with text in the prescribed textbooks and preferred notes. This confirms the findings by Hardman and Ng'ambi (2003) that textual under-preparedness is a factor in academic under-preparedness and Anderson (2004:3) who noted that the higher education under-prepared student is characterised by weak academic skills. Note-taking is a skill which seems to be lacking among the students who preferred to be given notes by the lecturers. Lack of proficiency in English has also been identified as students complained about the difficult language that is used in the textbooks.

This has implications for the readability of the textbooks that are used at tertiary level. Other reasons that were given for requiring the notes were financial rather than academic as the respondents indicated that they needed notes because they did not have the money to buy the prescribed textbooks as the following excerpts show:

*"We need summarised notes from the lecturer to help students who do not have books."*

*"University books are very expensive. Most of the lecturers do not provide us with notes, even to put them on WebCT for those who cannot afford to buy books".*

### *Involving or engaging students during lectures*

The respondents indicated that they would like to be actively involved in class activities either individually or in groups. The following strategies of active involvement or engagement came to the fore.

- Using the question and answer method to assess students' understanding
- Giving students a chance to work out problems on the chalkboard
- Class discussions
- Demonstrations especially in physics, chemistry and biology
- Individual class work
- Group work
- Using a variety of teaching methods to cater for individual differences
- Practical work to follow immediately on theoretical lessons.

The following illustrate the argument raised:

*"We must engage in debate so that we become confident and not be afraid to talk in class and this will help us later on in life."*

*"I believe that engaging learners in the work that they do and assessing them regularly will help them to think critically. They can assess their progress."*

### *Assignments in the form of exercises*

Some respondents indicated that they need assignments (homework) in the form of exercises so that they can practise in their own time and come to class prepared for the next lecture. The need for homework supports the findings by Steyn and Maree (2003) that students valued the role of homework. Homework in this study was seen as a way of reinforcing learning that took place during the lecture.

The respondents felt that even when the lecturers involve them by asking some questions in class, calling upon them to work out problems on the chalkboard or allowing them to work in groups, not all of them get an opportunity to raise their problems because of the large class sizes. They therefore see homework in the form of exercises as a necessary tool to support teaching and learning, especially in mathematics and physics. They expressed concern that in group work the talkative students overshadow the contributions of the shy ones. Working out exercises then gives them a chance to work independently and at their own pace, and by so doing they can assess their understanding of what is presented in class.

*"I prefer to be given some exercises after every chapter and not after three or more chapters."*

*"I prefer to be given lots of exercises, assignments and previous examination papers to answer on my own. This will help me to be a hard worker and will force me to go through the work before and after class."*

### *Working independently*

In addition to independent note taking, some respondents preferred to be told what is expected of them (*for example, the chapters to be covered*) and then be given an opportunity to work and discover information and solutions to problems on their own. They stated that they do not want to be "spoon-fed".

### *Prefer not to be called upon to do exercises on the chalkboard*

Some respondents indicated that they are very shy. While some respondents liked the idea of being called upon to do exercises on the board, the shy students disliked the idea because they claimed that they are afraid of making errors, both factual and language errors, or skipping some steps in solving mathematical and physics problems, as other students would laugh at them. They see this as humiliating and degrading. They were really concerned about their command of English as a medium of instruction.

### *Preferred study patterns or methods*

A variety of study patterns or learning methods were identified among the respondents. These included the following:

- Communication in IsiXhosa to be taught in IsiXhosa
- Self study (study alone) without interference from classmates and roommates/study alone
- Hands-on approach to learning
- Revision of previous examination papers
- Using different textbooks

- Studying in a group
- Listening attentively
- Reasonable pacing of lectures by lecturers.

Some of the students' responses are captured in the following excerpts:

*"I prefer to be taught Communication in IsiXhosa in IsiXhosa and not in English. I wish that IsiXhosa can be different from English so that I can express myself fluently when I am answering some questions in tests. I really wish that I can speak, read and write isiXhosa in IsiXhosa."*

*"Discussion groups can help us to understand what is presented in class better."*

*"Lecturers should understand that students are different. A lecturer has to be patient, and should not teach quickly to give the slow learners a chance to catch up"*

*"Lecturers should not be hard on us. They should have patience because we are fresh from high school".*

The identified study patterns have implications for teaching and learning, hence it is important to use strategies that identify the different needs and preferences of students and then in facilitating learning to try and accommodate all the students in a particular class.

### *Classroom climate*

As far as the classroom climate is concerned, the following came up:

- Students need lecturers who have patience with them
- They need a situation where everybody treats everyone with respect and where a sense of collaboration and teamwork prevails
- An open classroom climate is preferred where everybody is free to ask questions without fear of any form of intimidation and discrimination
- They need to work in a friendly and welcoming environment.

This is illustrated by the following excerpts:

*"To be free to ask questions in class when we do not understand."*

*"A calm and controlled classroom is perfect for me. It becomes easy for educators to interact with learners."*

The next section looks into student fears regarding the programme.

## Students' fears

The students were asked to explain the fears that they might have regarding university education. Some indicated that they did not have any fears at that moment while others had. Fear of failing at the end of the year came up very strongly from the responses. These fears are linked to the academic, cultural and emotional under-preparedness of the students as they progress from secondary to university education. The reasons that were provided for the perceived fears were categorised as follows:

- Fear of failing either subjects or the final examinations
- Academic exclusion
- Balancing academic work and social life
- Practical work because of lack of exposure to it at high school
- Too much work to be done
- Concern about their level of English which might affect their academic performance
- Doing teaching practice for the first time
- Fear of contracting HIV/AIDS.

The students' fears of failing either subjects or the examinations are captured in the following excerpts.

*"I'm scared to fail a subject because failing means spending an extra year which will cost me much. That is my biggest fear."*

*"Failing my courses because the work is piling up. I am not able to manage my workload."*

*"Examinations because I do not know how they are set and how difficult they will be."*

*"Fear of not achieving the 50% which is a pass mark at university as opposed to 40% at high school."*

Subject related fears included the following:

*"We are not taught the way we were taught at High school. Some lecturers do not ask us whether we understand or not."*

*"I am scared of Physics."*

Fears related to Teaching Practice are captured in the following statements:

*"To stand in front of a class for the first time during teaching practice."*



Other fears included the following:

*"Being affected by AIDS and die young and see all my hopes and dreams going down the drain. I am afraid of being expelled before I graduate."*

## **5. DISCUSSION OF FINDINGS AND RECOMMENDATIONS**

Research has shown that the students entering university for the first time have different levels of preparedness for the university programmes for which they have enrolled (Zeegers & Flinders, 1994; TIMMS, 1999; McClean, 2003; Brussow, 2007). This study has also shown that the students in the programme have had different levels of preparation regarding the content knowledge of the four key subjects in the programme, namely, mathematics, physics, chemistry and biology. This links to the fact that the majority of students did these subjects on standard grade at Grade 12 as reflected in Table 4. This therefore has implications for teaching and learning at the first year level.

The results reveal a level of uncertainty about whether or not the Grade 12 syllabi has instilled some level of confidence in the respondents to be able to face the challenges of mathematics, physics, chemistry and biology at tertiary level as shown in Table 6, Figure 3, as well as responses to statements 2 to 5. The choice of the middle category, *agree to some extent*, shows some lack of confidence as well as some lack of preparedness which cannot be ignored. The following are the results: mathematics (35.7%), physics (51.4%), chemistry (41.4%) and biology (48.6%). These results correlate with the respondents' level of anxiety in these subjects, that is: 47.1% for maths, 40.0% for chemistry, 45.7% for physics and 50.0% for biology. The respondents have also shown some anxiety regarding the use of English as a medium of instruction (40%), teaching methods at the tertiary level (57.1%) as well as assessment procedures (52.9%). This points to a need for academic support for first-year students.

The study has also confirmed that first-year university students have certain specific preferences regarding teaching methods, study patterns and classroom climate. These preferences are varied and need to be taken into consideration when planning and presenting lectures. Students in the study came mainly from two provinces, the Free State and Mpumalanga, and from a total of 59 schools. Nine different home languages have been identified among the students and this implies a great deal of code switching from mother-tongue to English since English is the medium of instruction.

The diversity of academic and cultural backgrounds of the students is evident in the different preferences that were identified in the study, for example, the need for notes and homework in the form of exercises to supplement teaching and learning, the need by some to be actively involved in class activities either

as individuals or groups, a friendly, open and welcoming classroom environment, and lecturers who are patient, flexible and supportive of students. The need for notes indicates a level of textual under-preparedness, an observation that was made earlier by Hardman and Ng'ambi (2003). In addition to their preferences, the students also indicated their dislikes and fears. The dislikes included fast-paced lectures, working out problems on the board for fear of making mistakes, and concerns regarding their proficiency in English. Their fears and dislikes are linked to what Dunlap (2005) calls a lack of self-efficacy which is categorised under emotional under-preparedness. There appears to be a causal link between their level of preparedness, fears and preferences. All these could be traced back to their previous school environments and experiences.

In the light of the findings in this study, it is imperative that students' academic and cultural backgrounds, their needs and preferences, be taken into account when faced with a new set of first-year university students. The fear of failure came up very strongly from the respondents and this could be linked to their being academically unprepared and the level of support they need to cope at tertiary level. I argue that no meaningful academic support can be provided without knowing the students' needs. The constructivist view of learning suggests that learners should be responsible for constructing meaning for their own learning and to be able to do that they should be exposed to learning opportunities which will promote that. In the same vein, knowing the students' level of preparedness for a particular programme of study and their preferences for certain learning styles and teaching methods can help to plan and present activities that will cater for all student groups.

### **Suggested guidelines and recommendations**

In the light of the foregoing discussion the following methods and approaches are suggested in dealing with these students.

#### *Dealing with under-preparedness*

Academic under-preparedness has been identified among the students. Dzubak (2005:1) describes the "under-prepared" as a diverse group of students with different levels of aptitude, and from different educational and socio-economic backgrounds. The students in the study fit this description. There is evidence of textual academic under-preparedness which is coupled with the use of English as a medium of instruction, which presents a language barrier when students have to deal with textual material. Strategies that assess the level of preparedness of students should be used. These could include diagnostic tests in the form of concept tests, concept maps, and essays at the beginning of the year to assess the level of both the content and language ability of students in a particular subject. This will enable the lecturer to comprehend the level of understanding of the students in the programme, exercise some patience and help them to succeed.

### *Dealing with student preferences*

Student preferences in the study have pointed to the need for academic support. Addressing the student preferences could reduce the fear of failure among the academically under-prepared students.

### *Notes and note taking*

The role of the lecturer in giving academic support to the students has been identified as a significant factor. The lecturers should render academic support to students who have weak academic skills in dealing with the text (reading and understanding) and those who lack note-taking skills. Such support could help students to deal with the demands of university education. Proper guidance should also be given to those who display a certain level of independence to remove any misconceptions that could hinder learning.

To cater for all the student groups the lecturers should give students notes at the beginning of the year and gradually encourage or introduce them to taking their own notes. Note-taking should also be supervised because students might take down incorrect information, for example writing wrong chemical formulae in chemistry, or confusing certain terms like absorption and adsorption. Putting information on WebCT can also help students to compare their own notes with information on the WebCT.

### *Take home short assignments and exercises*

Students should be given homework in the form of practice exercises and/or tutorials as they see homework as a way of reinforcing learning and assessing their own understanding. This should enable lecturers to give proper feedback to students.

### *Interactive instructional strategies*

Students indicated that they want to be involved in various class activities. In such activities they should be encouraged to discuss with one another, take own notes, and write reports which are going to be assessed. Once the students have gained a certain level of confidence in the subject, class presentations and demonstrations by individual students can then be encouraged.

### *Preferred study patterns*

Tests that categorise students according to learning style preferences should be used at the beginning of each year to give lecturers an indication of the different style preferences in their classes. Learning activities can then be organised around the learning style preferences. In this way all learning style preferences can be addressed.

## 6. CONCLUSION

The study has shown that students are not always well prepared academically when they enter university education. They come from different academic and cultural backgrounds which affect their needs and preferences regarding teaching methods, study patterns and classroom climates. When lecturers present their lectures, they should not assume that students operate on the same level as that upon which they present their lectures. They should use a variety of teaching strategies that will diagnose as well as rectify the problems that students might have. By so doing they can be in a position to cater for all the student groups in their classes. Furthermore, finding out what the students already know, and what their needs and preferences are, could help lecturers to plan and organise activities that will cater for all the student groups.

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