

ASSESSING THE ACADEMIC BEHAVIOURAL CONFIDENCE (ABC) OF FIRST-YEAR STUDENTS AT THE CENTRAL UNIVERSITY OF TECHNOLOGY, FREE STATE

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ABSTRACT

First-year university students make judgements about their capabilities in mathematics which mainly stem from their past school experiences. It is against this background that the researchers decided to conduct a study with the aim of assessing the academic behavioural confidence of first-year students enrolled in the B.Ed. (FET): Natural Sciences programme and the B.Ed. (FET): Economic and Management Sciences programme offered by the School of Teacher Education at the Central University of Technology, Free State. Bandura's (1986) Social Cognitive Theory is the overarching theoretical framework of the self-efficacy construct and therefore also for this study. A quantitative approach was followed and the Academic Behavioural Confidence scale (ABC) designed by Sander and Sanders (2006), was adopted for use in the study. The study sought to first of all determine whether a significant difference in the academic behavioural confidence of the first-year students within the Natural Sciences and Economic and Management Sciences programmes does exist. It furthermore wanted to determine if a significant difference in the academic behavioural confidence between male and female students within these two programmes exists. The results indicated that there is a significant difference in the academic behavioural confidence of the NS and EMS groups. There is, however, no significant difference between male and female students within and between the two groups. Based on the findings some recommendations on dealing with first-year students have been made.

Keywords: Social cognitive theory, self-efficacy, academic behavioural confidence, academic performance, first-year students.

1. INTRODUCTION

Teacher preparedness has been found to be related to self-efficacy or confidence. Self-efficacy has been identified as an important predictor of teacher effort and persistence (Emmer & Hickman, 1991); instructional effectiveness (Ashton & Webb, 1986); and efficient classroom organisation, planning and practices (Pajares, 1992). With reference to the students, research has shown that differing levels of student preparation affect students' academic confidence in different subjects and consequently their study patterns and behaviours.

Regarding mathematics as a specific subject domain, it has been reported that learners make judgements about their mathematical capabilities based on accumulated knowledge and experiences.

Based on these judgements students tend to see themselves as either mathematically inclined or disinclined. Student perceptions of mathematics efficacy are shaped by a number of personal, environmental and behavioural factors. Learners make judgements about their capabilities based on comparisons of performance with peers, successful and unsuccessful outcomes based on standardised and authentic measures, and feedback from teachers, parents and peers. These sources of information about their capabilities accumulate within individuals to form perceptions of mathematical competencies. These judgements are, however, fluid in that they can be altered along the way according to new experiences and knowledge.

First-year university students also make judgements about their capabilities in mathematics which stem from their past school experiences. Hence they have to be helped and supported during their transition from high school to higher education in all subjects, including mathematics.

It is against this background that the researchers decided to conduct a study with the aim of assessing the Academic Behavioural Confidence of first-year students enrolled in two different programmes offered by the School of Teacher Education at the Central University of Technology, Free State. These two programmes are the B.Ed. (FET): Natural Sciences programme and the B.Ed. (FET): Economic and Management Sciences programme. Students who enrolled for the programme specialising in Natural Sciences (NS) have to take mathematics as a compulsory major subject during their first year with the option of continuing with the subject during their second and third years of study. This implies that they had to have mathematics at school in grades 10-12. Students who enrolled for the programme specialising in Economic and Management Sciences (EMS) has the option of taking mathematics as a major subject, although it is not compulsory. This implies that only some students in the EMS programme had a mathematics background formed in grades 10-12. The mathematical focus of the students in the two programmes is thus very different.

Relevant literature has been consulted in order to inform the study and develop a suitable theoretical framework.

2. THEORETICAL PERSPECTIVES BASED ON LITERATURE

The Social Cognitive Theory is the overarching theoretical framework of the self-efficacy construct (Bandura, 1986). This theory will now be addressed.

2.1 The Social Cognitive Theory

Through the Social Cognitive Theory Bandura advanced a view of human functioning that accords a central role to cognitive, vicarious, self-regulatory, and self-reflective processes in human adaptation and change (Pajares, 2002).

People are viewed as self-organising, proactive, self-reflecting and self-regulating rather than as reactive organisms shaped and shepherded by environmental forces or driven by concealed inner impulses. From this theoretical perspective, human functioning is viewed as the product of a dynamic interplay of personal, behavioural and environmental influences. Bandura (1986) calls this three-way interaction of behaviour, personal factors (in the form of cognition, affect and biological events), and environmental influences or situations the "*triadic reciprocity*." Within the classroom setting students' academic performances (behavioural factors) are influenced by how learners themselves are affected (cognitive factors) by instructional strategies (environmental factors), which in turn builds itself in a cyclical fashion.

Pajares (2002) argues that of all the thoughts that affect human functioning, and standing at the very core of the social cognitive theory, are self-efficacy beliefs. The next section therefore looks at self-efficacy

2.2 Self-efficacy Beliefs

Self-efficacy beliefs are defined as "people's judgements of their capabilities to organise and execute courses of action required to attain designated types of performances" (Bandura, 1986:391). Self-efficacy beliefs provide the foundation for human motivation, well-being, and personal accomplishment. It is also a critical determinant of self-regulation. In a later edition Bandura (1995:2) defines self-efficacy as "the belief in one's capabilities to organise and execute the courses of action required to manage prospective situations" while Pajares (2000) defines it as people's confidence in their ability to do the things that they try to do. The ideas that come through in these definitions are one's judgements, beliefs and confidence in one's abilities to perform a particular task. Bandura's (1997) key contentions regarding the role of self-efficacy beliefs in human functioning is that "people's level of motivation, affective states and actions are based more on what they believe than on what is objectively true" (p.2).

How people behave can often be predicted by the beliefs they hold about their capabilities rather than by what they are actually capable of accomplishing, as these self-efficacy perceptions help determine what individuals do with the knowledge and skills they have (Pajares, 2002).

Pajares (2002) warns that people's self-efficacy beliefs should not be confused with their judgments of the consequences that their behaviour will produce. They, however, do help determine the outcomes one expects. Confident individuals anticipate successful outcomes. Students who are confident in their social skills anticipate successful social encounters, while those who are confident in their academic skills expect high marks in examinations and expect the quality of their work to reap personal and professional benefits. The opposite is true of those who lack confidence. Students who doubt their social skills often envisage rejection or ridicule even before they establish social contact.

Likewise, a lack of confidence in academic skills could lead students to anticipate a low grade or pass in a particular subject or course.

Because individuals operate collectively as well as individually, self-efficacy is both a personal and a social construct. Collective systems develop a sense of collective efficacy, that is, a group's shared belief in its capability to attain goals and accomplish desired tasks. Schools develop collective beliefs about the capability of their learners to learn and of their teachers to teach. As a result of shared beliefs, schools enhance the lives of their students and teachers by creating environments conducive to the desired tasks. Organisations with a strong sense of collective efficacy exercise empowering and vitalising influences on their constituents.

2.3 How self-efficacy beliefs influence human functioning

The role of self-efficacy on human functioning can be summarised as follows:

- Self-efficacy beliefs can enhance human accomplishment and well-being.
- Self-efficacy beliefs help determine how much effort people will expend on an activity, how long they will persevere when confronting obstacles, and how resilient they will be in the face of adverse situations. The higher the sense of efficacy, the greater the effort, persistence and resilience.
- Self-efficacy beliefs influence an individual's thought patterns and emotional reactions. High self-efficacy helps create feelings of serenity and composure in approaching difficult tasks and activities. People with low self-efficacy may believe that things are tougher than they really are, a belief that fosters anxiety, stress, depression, and a narrow vision of how best to solve a problem. Consequently, self-efficacy beliefs can powerfully influence the level of accomplishment that one ultimately achieves.

2.4 Sources of self-efficacy

Self-efficacy stems from four sources: mastery experience, vicarious experience, verbal persuasion and physiological states (Bandura, 1993). The following explanations of these sources are taken from Pajares (2002).

Mastery experience refers to how one interprets the results of previous performance, and this has been found to be the most influential source. Individuals engage in tasks and activities, interpret the results of their actions, use the interpretations to develop beliefs about their capability to engage in subsequent tasks or activities, and act in concert with the beliefs created. Outcomes interpreted as successful raise self-efficacy; those interpreted as failures lower it.

In addition to interpreting the results of their actions, people form their self-efficacy beliefs through the vicarious experience of observing others perform tasks. This source of information is weaker than mastery experience in helping create self-efficacy beliefs, but when people are uncertain about their own capabilities or when they have limited prior experience, they become more sensitive to it. The effects of modelling are particularly useful in such contexts.

Individuals also create and develop self-efficacy beliefs as a result of social persuasions they receive from others. These persuasions can involve exposures to the verbal judgements that others provide. Persuaders play an important part in the development of an individual's self-beliefs. Effective persuaders must cultivate people's beliefs in their capabilities while at the same time ensuring that the envisaged success is attainable.

Physiological states, referred to as somatic and emotional states, such as anxiety, stress and mood also provide information about efficacy beliefs. People can gauge their degree of confidence by the emotional state they experience as they contemplate an action. Strong emotional reactions to a task provide cues about the anticipated success or failure of the outcome. When they experience negative thoughts and fears about their capabilities, those affective reactions can themselves lower self-efficacy perceptions and trigger additional stress and agitation that help ensure the inadequate performance they fear.

The sources of self-efficacy information are not directly translated into judgements of competence. Individuals interpret the results of events, and these interpretations provide the information on which judgements are based. How people select information, integrate it, interpret it and make recollections, influence judgements of self-efficacy.

2.5 Academic confidence

Bandura (2001) uses the terms confidence and self-efficacy interchangeably, while Sander and Sanders (2004) argue that the two concepts are distinct but related. They see academic confidence as a new construct which is distinct from its parent concept, self efficacy. Academic confidence, therefore, has its theoretical foundations in Bandura's work of self-efficacy. Sander and Sanders (2004) argue that academic confidence is a mediating variable between the individual's inherent abilities, their learning styles and the opportunities afforded by the academic environment of higher education. In their comparative study of two distinct groups, namely Medical and Psychology students using an Academic Confidence Scale (ACS), they concluded that the scale could be used to identify students who are not coping well with a course of study as well as in the exploration of the impact of teaching and learning methods.

Sander and Sanders (2004: 2007) argue that as part of its parent concept, self-efficacy, academic confidence may also stem from the same four sources, mastery experience, vicarious experience, verbal persuasion and physiological states. These sources have been dealt with earlier. We now look into academic behavioural confidence.

2.6 Academic Behavioural Confidence

Academic behavioural confidence (ABC) is conceptualised as how students differ in the extent to which they have a strong belief, firm trust, or sure expectation of how they will respond to the demands of studying at a higher education institution (Sander and Sanders, 2004; 2006). They further argue that ABC is distinct from the academic performance aspirations that students may have, although the two may be related to some extent. This confidence applies to the demands of the course as a whole rather than to individual module specific issues where self-efficacy measures would be more appropriate (Sander and Sanders, 2007).

Sander and Sanders (2006) developed the ABC scale for use as a survey instrument to assess the confidence that higher education students have in their own anticipated study behaviours in relation to their degree programme. It was developed within an ethos of using survey techniques to try and understand students within the large student groups that many higher education lecturers have to teach. The main argument raised for its use was that with large classes, there is little or no opportunity for the informal interactive discourse possible within small groups and which allows the teacher to understand his/her students or help and guide them by effective teaching. This argument holds true for this particular study as well. Lecturers have to deal with large groups of students who come from different home and school backgrounds. The transition from high school to higher education could prove to be a traumatic experience for some.

The literature study has provided a theoretical framework on which to locate this research. Based on the literature the following aim of the study was formulated: to explore the differing levels of academic behavioural confidence among two first-year education student groups enrolled during 2009 in the School of Teacher Education at the Central University of Technology, Free State.

3. RESEARCH QUESTIONS

The study sought to answer the following research questions:

- Is there a significant difference in the academic behavioural confidence of the first-year students within the Natural Sciences (NS) and Economic and Management Sciences (EMS) programmes in the School of Teacher Education at the Central University of Technology, Free State?

- Is there a significant difference in the academic behavioural confidence between male and female students within these two programmes?

4. HYPOTHESES

Two hypotheses have been formulated for the study:

- There is a significant difference in the academic behavioural confidence of the first-year students within the Natural Sciences (NS) and Economic and Management Sciences (EMS) programmes in the School of Teacher Education. It was hypothesised that the Natural Sciences (NS) students have greater academic behavioural confidence than the Economic and Management Sciences (EMS) students.
- There is a significant difference in the academic behavioural confidence between male and female students in the two programmes. It was hypothesised that male students have greater academic behavioural confidence than female students.

5. RESEARCH METHODOLOGY

The research approach followed in the study was quantitative. It was an exploratory and descriptive survey of the perceptions of the first-year students enrolled in the Natural Sciences and Economic and Management Sciences programmes in the School of Teacher Education at the Central University of Technology, Free State.

The Academic Behavioural Confidence scale (ABC) designed by Sander and Sanders (2006), was adopted for use in the study. The ABC scale was used as it had already been tested for internal reliability by its developers.

The researchers wanted to determine if the scale, when used in a different context, could yield similar results, as some problems addressed in the scale are context-specific. Minor adaptations regarding the wording of certain statements as well as the reduction of the response categories, were made to comply with the purpose of this study. Statements addressing common areas were also grouped together. The adapted scale was then used as an instrument to collect data from first-year education students in the two mentioned programmes. Academic behavioural confidence was measured on a three-point Likert-type scale comprising of the categories "Very confident", "Slightly confident" and "Not confident". The scale was administered to the students by the researchers with the assistance of the subject lecturers at the beginning of February 2009. This point in time at the beginning of the year was chosen as the registration of new students had been completed and it was felt that all students had settled in their class groups according to a given timetable. The questionnaire was administered immediately at the end of a lecture which the whole programme group had to attend and was collected directly after completion.

Microsoft Excel was used to record and analyse the data and it was done by the researchers themselves. The following analyses of the captured data were made:

- A calculation of the mean scores (MS) for each student's responses to the 24 questions (statements).
- A calculation of the mean scores (MS) per question (statement) considering all students' responses.
- A calculation of the standard deviation (SD) for each student's responses to the 24 questions.
- A calculation of the standard deviation (SD) per question (statement) considering all students' responses.
- An analysis of the variance between the NS and EMS groups.
- An analysis of the variance by gender.

6. PRESENTATION AND ANALYSIS OF FINDINGS

An analysis of the findings of the study will now be presented.

6.1. Biographical Information

Table 1 provides a breakdown of the analysis of respondents according to gender and programme that existed among the 235 respondents that formed part of the study. It shows that 112 (47.7%) respondents were male, while 122 (51.9%) were female. One respondent did not indicate his/her gender. Of the 235 respondents, 86 belonged to the Natural Sciences programme and 149 were students in the Economic and Management Sciences programme.

Table 1: Respondents by gender and programme

Gender	Programme		Total
	Natural Sciences N=86	EMS N=149	
Male	58 (67.4%)	54 (36.2%)	112 (47.7%)
Female	27 (31.4%)	95 (63.8%)	122 (51.9%)
No response	1 (1.2%)	-	1 (0.4%)
Total	86	149	235

6.2. Academic Behavioural confidence (ABC) scores for each Individual student

A copy of the administered questionnaire is attached as Appendix 1 as a reference for the reader. Scores obtained by the students for each individual statement across the two programmes were examined and analysed. Table 2 shows a summary of the frequencies of responses for each individual statement per programme.

The two columns describing the frequencies obtained by the NS and EMS groups regarding the "Very confident"-option has been highlighted specifically. (The values given to the response categories were 1 for Very confident, 2 for Slightly Confident and 3 for Not Confident). A higher score has been highlighted in yellow. If we note that the NS students obtained a higher frequency in 20 of the 24 statements, it gives us a preliminary hunch that the NS students might have greater academic behavioural confidence than the EMS students. This will be formally proved later in the paper.

Table 2: Frequency of responses per question and per programme (NS: N=86); EMS: N=148)

I am confident that I can:	Very confident		Slightly confident		Not confident		No Response	
	NS	EMS	NS	EMS	NS	EMS	NS	EMS
1. Study effectively on my own.	52 60.5%	88 59.1%	34 39.5%	56 37.8%	-	5 3.4%	-	-
2. Prepare thoroughly for lectures and tutorials.	38 45.3%	38 25.5%	43 50.0%	100 67.1%	4 4.7%	8 5.4%	-	3 2.0%
3. Read the recommended background material with understanding.	47 54.7%	69 46.3%	36 41.9%	75 50.3%	2 2.3%	2 1.3%	1 1.1%	3 2.0%
4. Attend most lectures.	75 87.2%	139 93.2%	11 12.8%	7 4.7%	-	3 2.0%	-	-
5. Be on time for lectures.	69 80.2%	129 86.6%	16 18.6%	16 10.7%	1 1.2%	4 2.7%	-	-
6. Attend tutorials (practise classes) when offered.	70 81.4%	101 67.8%	13 15.1%	42 28.1%	3 3.5%	3 2.0%	-	3 2.0%
7. Understand the content explained and discussed during a lecture.	29 33.7%	36 24.2%	53 61.6%	107 71.8%	3 3.5%	5 3.4%	1 1.2%	1 0.6%
8. Follow the thread of explanation provided by the lecturer during the lecture and not get lost or fall behind.	35 40.7%	22 14.8%	42 48.8%	112 75.2%	7 8.2%	15 10.0%	2 2.3%	-
9. Respond to questions asked by a lecturer in front of my classmates.	35 40.7%	45 30.2%	35 40.7%	81 54.4%	16 18.6%	23 15.4%	-	-
10. Ask my lecturer questions about the material he/she is teaching, in a one-to-one setting (in his/her office for example).	41 47.7%	73 49.0%	32 37.2%	50 33.6%	12 14.0%	24 16.1%	1 1.1%	1 0.6%
11. Ask my lecturer questions about the material he/she is teaching, during a lecture.	38 41.9%	43 28.9%	36 41.9%	74 49.7%	14 16.2%	30 20.1%	-	2 1.3%

I am confident that I can:	Very confident		Slightly confident		Not confident		No Response	
	NS	EMS	NS	EMS	NS	EMS	NS	EMS
12. Ask for help from a classmate or a friend if I don't understand.	71 82.6%	126 84.6%	15 17.4%	18 12.1%	-	5 3.4%	-	-
13. Seek appropriate support on whatever level, when the need arises.	58 67.4%	84 56.4%	25 29.1%	56 37.8%	3 3.5%	7 4.7%	-	2 1.3%
14. Manage my workload to meet the coursework deadlines.	58 67.4%	77 51.7%	27 31.4%	63 42.3%	1 1.2%	9 6.0%	-	-
15. Give a presentation to a small group of fellow students.	57 66.3%	76 51.0%	26 30.2%	63 42.3%	3 3.5%	10 6.7%	-	-
16. Engage in sensible academic debates with my peers.	47 54.7%	64 43.0%	29 33.7%	62 41.6%	10 11.6%	23 15.4%	-	-
17. Produce course results at the required standard.	52 60.5%	81 54.4%	33 38.4%	65 43.6%	-	3 2.0%	1 1.1%	-
18. Plan an appropriate revision schedule.	57 66.3%	85 57.0%	26 30.2%	55 36.9%	3 3.5%	9 6.0%	-	-
19. Produce good results under test and examination conditions.	65 75.6%	95 63.8%	21 24.4%	49 32.9%	-	3 2.0%	-	2 1.3%
20. Pass assessments at the first attempt.	54 62.8%	86 57.7%	30 34.9%	59 39.6%	2 2.3%	3 2.0%	-	1 0.6%
21. Produce good work when completing homework or assignments.	68 79.1%	93 62.4%	15 17.4%	56 37.6%	2 2.3%	-	1 1.2%	-
22. Write in an appropriate academic (mathematical) style.	53 61.6%	64 36.2%	30 34.9%	62 41.6%	3 3.5%	31 20.8%	-	2 1.3%
23. Remain adequately motivated throughout the year.	59 68.6%	92 61.7%	23 26.7%	53 35.6%	3 3.5%	2 1.3%	1 1.2%	2 1.3%

I am confident that I can:	Very confident		Slightly confident		Not confident		No Response	
24. Make the most of the opportunity to study for a degree at this university.	79 91.9%	141 94.6%	5 5.8%	7 4.7%	2 2.3%	1 0.7%	-	-

Table 3 provides a comparison of the mean scores (rounded off to two decimal places) and the standard deviations between the NS and EMS groups. Recall that the academic behavioural confidence scores that could be allocated ranged from 1 to 3. Table 3 furthermore gives an indication of the difference between the means of the two groups.

**Table 3: A comparison of means and standard deviations
[ABC – scale scores per student group]**

I am confident that I can:	Means		Standard Deviation		Difference between Means
	NS	EMS	NS	EMS	NS mean – EMS mean
1. Study effectively on my own	1.40	1.44	0.49	0.56	-0.04
2. Prepare thoroughly for lectures and tutorials.	1.59	1.79	0.58	0.58	-0.20
3. Read the recommended background material with understanding.	1.45	1.51	0.57	0.56	-0.06
4. Attend most lectures.	1.13	1.09	0.34	0.35	0.04
5. Be on time for lectures.	1.21	1.16	0.44	0.44	0.05
6. Attend tutorials (practise classes) when offered.	1.22	1.30	0.49	0.54	-0.08
7. Understand the content explained and discussed during a lecture.	1.67	1.78	0.56	0.50	-0.11
8. Follow the thread of explanation provided by the lecturer during the lecture and not get lost or fall behind.	1.63	1.95	0.67	0.50	-0.32
9. Respond to questions asked by a lecturer in front of my classmates.	1.78	1.85	0.74	0.66	-0.07
10. Ask my lecturer questions about the material he/she is teaching, in a one-to-one setting (in his/her office for example).	1.64	1.66	0.73	0.95	-0.02
11. Ask my lecturer questions about the material he/she is teaching, during a lecture.	1.74	1.89	0.72	0.73	-0.15
I am confident that I can:	Means		Standard Deviation		Difference between Means
	NS	EMS	NS	EMS	NS mean – EMS mean
12. Ask for help from a classmate or a friend if I don't understand.	1.17	1.19	0.38	0.47	-0.02
13. Seek appropriate support on whatever level, when the need arises.	1.36	1.46	0.55	0.61	-0.10
14. Manage my workload to meet the coursework deadlines.	1.34	1.54	0.50	0.61	-0.20
15. Give a presentation to a small group of fellow students.	1.37	1.56	0.55	0.62	-0.19
16. Engage in sensible academic debates with my peers.	1.57	1.72	0.70	0.72	-0.15
17. Produce course results at the required standard.	1.37	1.48	0.51	0.54	-0.11
18. Plan an appropriate revision schedule.	1.37	1.49	0.55	0.61	-0.12
19. Produce good results under test and examination conditions.	1.24	1.36	0.43	0.55	-0.12
20. Pass assessments at the first attempt.	1.40	1.43	0.54	0.55	-0.03
21. Produce good work when completing homework or assignments.	1.21	1.38	0.49	0.49	-0.17
22. Write in an appropriate academic (mathematical) style.	1.42	1.82	0.56	0.77	-0.40
23. Remain adequately motivated throughout the year.	1.33	1.38	0.56	0.55	-0.05
24. Make the most of the opportunity to study for a degree at this university.	1.10	1.06	0.38	0.27	0.04
Group Mean	1.41	1.51	0.54	0.23	

If we compare the means obtained per statement by the NS and EMS groups, we notice that the NS group obtained a more positive mean in 21 of the 24 statements. This once again provides support for deducing that the NS group may have greater academic behavioural confidence than the EMS group.

Table 4: An indication of the mean scores obtained from the confidence means and standard deviations per programme

	Confidence Means	Standard Deviations
NS	1.41	0.54
EMS	1.51	0.23

The t-test was used to compare the means obtained from the Natural Sciences and the Economic and Management Sciences groups. The t-value was found to be $t=1.97$ at a 95% confidence level (with $p\text{-value} = 0.05$) and degrees of freedom equalling $df=233$. From this we can conclude that the difference between the means of the two sample groups is considered statistically significant. Recalling our first hypothesis according to which the Natural Sciences students would have greater academic behavioural confidence than the Economic and Management Sciences students, we can now confirm that our hypothesis is indeed true.

Although we calculated the means and standard deviations and applied the t-test, we now need to show graphically how the students' individual scores were distributed around the mean, per programme. A graphical representation highlights the level of significance between the means of the two sample groups. A scatter plot was used for this purpose. Now follows two separate scatter graphs of the confidence means obtained by the students in the NS and EMS programmes. Each mean reflects the average of scores per student for all 24 statements of the questionnaire.

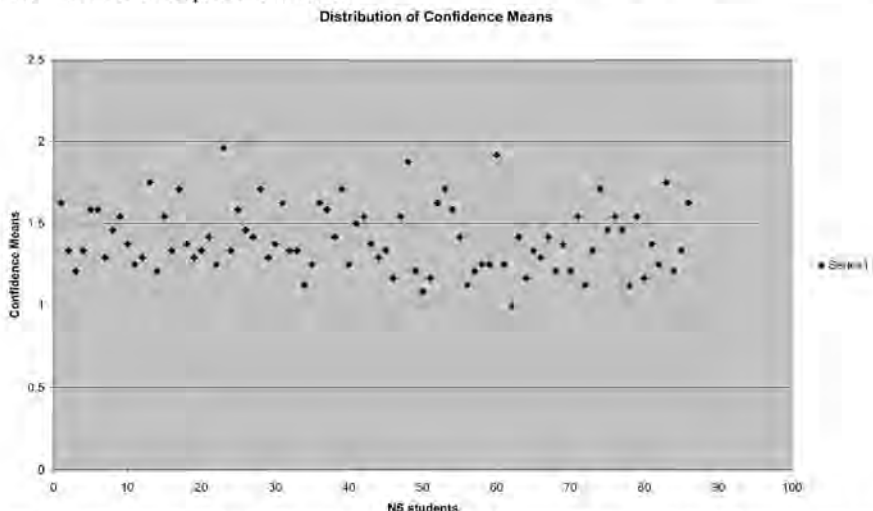


Figure 1: Scatter graph of the confidence means obtained by students in the Natural Sciences programme

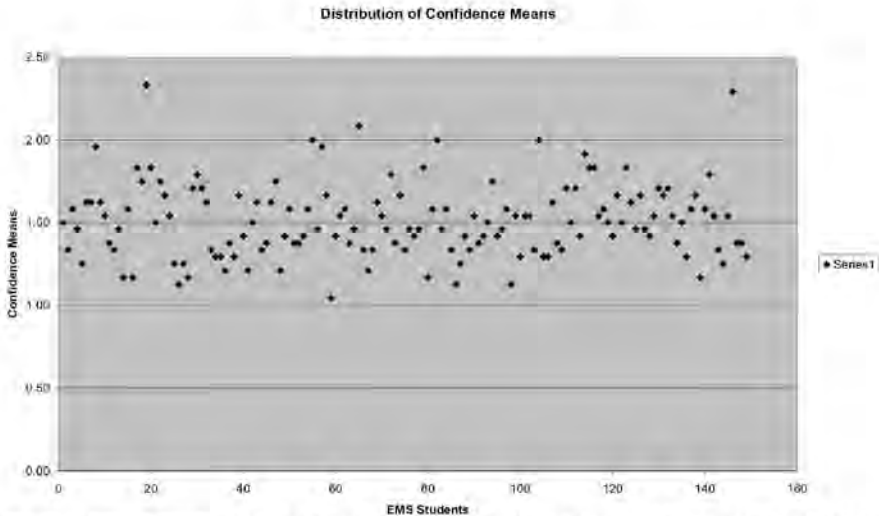


Figure 2: Scatter graph of the confidence means obtained by students in the Economic and Management Sciences programme

From Figure 1 and Figure 2 the following deductions can be made:

- The confidence means obtained by students in the NS programme varies between 1.96 (with a standard deviation of 0.36) and 1.00 (with a standard deviation of 0.00).
- The confidence means obtained by students in the EMS programme varies between 2.33 (with a standard deviation of 0.56) and 1.04 (with a standard deviation of 0.20).
- The confidence means of students in the NS programme therefore has a range of only 0.96 while that of the students in the EMS programme has a range of 1.29. This gives us a variance ratio of $F=1.34$, $df=85$ (NS), $df=148$ (EMS) and $p=0.05$. We can thus deduce that the confidence profiles of the students in the NS programme are more similar than the confidence profiles of the students in the EMS programme.
- Furthermore, the student in the EMS programme with the highest academic behavioural confidence (a confidence mean of 1.04 and standard deviation of 0.20) still has a lower score than the most academic behavioural confident student in the NS group (a confidence mean of 1.00 and standard deviation of 0.00).

- Also, the student in the NS programme with the lowest academic behavioural confidence (a confidence mean of 1.96 and standard deviation of 0.36) still has a higher score than the least academic behavioural confident student in the EMS group (a confidence mean of 2.33 and standard deviation of 0.56).

We now consider a table describing the level of significance of the statements from the questionnaire for which students from either programme obtained higher confidence means.

Table 5: A determination of the level of significance of individual statements from the questionnaire

Statements	Means and SD (NS)	Means and SD (EMS)	Tests of difference with df=233 t-value, p-value	Level of significance
1. Study effectively on my own	1.40 (0.49)	1.44 (0.56)	t=0.55; p=0.58	Not Significant
2. Prepare thoroughly for lectures and tutorials.	1.59 (0.58)	1.79 (0.58)	t=2.54; p=0.011	Statistically Significant
3. Read the recommended background material with understanding.	1.45 (0.57)	1.51 (0.56)	t=0.786; p=0.43	Not Significant
4. Attend most lectures	1.13(0.34)	1.09(0.35)	t=0.8527; p=0.3947	Not Significant
5. Be on time for lectures	1.21(0.44)	1.16(0.44)	t=0.8391; p=0.4023	Not Significant
6. Attend tutorials (practise classes) when offered.	1.22 (0.49)	1.30 (0.54)	t=1.13; p=0.2592	Not Significant
7. Understand the content explained and discussed during a lecture.	1.67 (0.56)	1.78 (0.50)	t=1.554; p=0.1215	Not Significant
8. Follow the thread of explanation provided by the lecturer during the lecture and not get lost or fall behind.	1.63 (0.67)	1.95 (0.50)	t=1606; p<0.0001	Extremely Significant
9. Respond to questions asked by a lecturer in front of my classmates.	1.78 (0.74)	1.85 (0.66)	t=0.4547; p=0.7488	Not Significant
10. Ask my lecturer questions about the material he/she is teaching, in a one-to-one setting (in his/her office for example).	1.64 (0.73)	1.66 (0.95)	t=0.1686; p=0.8663	Not Significant
11. Ask my lecturer questions about the material he/she is teaching, during a lecture.	1.74 (0.72)	1.89 (0.73)	t=1.5249; p=0.1286	Not Significant
12. Ask for help from a classmate or a friend if I don't understand.	1.17 (0.38)	1.19 (0.47)	t=0.336; p=0.7370	Not Significant
13. Seek appropriate support on whatever level, when the need arises.	1.36 (0.55)	1.46 (0.61)	t=1.2541; p=0.2111	Not Significant
14. Manage my workload to meet the coursework deadlines.	1.34 (0.50)	1.54 (0.61)	t=2.5804; p=0.0105	Statistically Significant
15. Give a presentation to a small group of fellow students.	1.37 (0.55)	1.56 (0.62)	t=2.3564; p=0.0193	Statistically Significant
16. Engage in sensible academic debates with my peers.	1.57 (0.70)	1.72 (0.72)	t=1.554; p=0.1215	Not Significant

16. Engage in sensible academic debates with my peers.	1.57 (0.70)	1.72 (0.72)	t=1.554; p=0.1215	Not Significant
17. Produce course results at the required standard	1.37 (0.51)	1.48 (0.54)	t=1.5348; p=0.1262	Not Significant
18. Plan an appropriate revision schedule.	1.37 (0.55)	1.49 (0.61)	t=1.5049; p=0.1337	Not Significant
19. Produce good results under test and examination conditions.	1.24 (0.43)	1.36 (0.55)	t=1.7392; p=0.0833	Not quite Statistically Significant
20. Pass assessments at the first attempt.	1.40 (0.54)	1.43 (0.55)	t=0.4055; p=0.6855	Not Significant
21. Produce good work when completing homework or assignments.	1.21 (0.49)	1.38 (0.49)	t=2.5619; p=0.0110	Statistically Significant
22. Write in an appropriate	1.42 (0.56)	1.82 (0.77)	t=4.2153;	Extremely

Statements	Means and SD (NS)	Means and SD (EMS)	Tests of difference with df=233	Level of significance
		t-value,	p-value	
academic (mathematical) style.			p=0.0001	Statistically Significant
23. Remain adequately motivated throughout the year.	1.33 (0.56)	1.38 (0.55)	t=0.6669; p=0.5055	Not Significant
24. Make the most of the opportunity to study for a degree at this university.	1.10(0.38)	1.06(0.27)	t=0.9388; p=0.3488	Not Significant

Although the students in the Natural Sciences group were shown to be more confident than those in the EMS group in 21 out of the 24 statements from the questionnaire (refer to Table 3), Table 5 shows that in only six of these statements (2, 8, 14, 15, 21 and 22) the difference between the means is considered statistically significant. The differences between the means obtained in statements 8 and 22 were considered "Extremely Statistically Significant", while statement 19 was deemed "Not quite Statistically Significant". According to the results in Table 3, the EMS group appeared to have displayed more confidence in statements 4, 5 and 24, although the t-test for significance proved no significant difference between the means for those statements between the two groups.

We will now compare data regarding the responses of male and female students within the NS and EMS programmes.

The t-test was used to compare the means of male and female students obtained from the Natural Sciences and the Economic and Management Sciences groups. The t-value of the NS group was found to be $t=0.0008$ at a 95% confidence level (with $p\text{-value} = 0.05$) and degrees of freedom equalling $df=83$. The t-value of the EMS group was found to be $t=0.1998$ at a 95% confidence level (with $p\text{-value} = 0.05$) and degrees of freedom equalling $df=147$. Neither differences, between the means of the male and females, in the NS nor the EMS groups were found to be statistically significant, however.

Table 6: An Indication of the mean scores obtained from the confidence means and standard deviations for male and female students per programme

	Confidence Means	Absolute difference in the means (male – female)	Standard Deviations	Absolute difference in the standard deviations (male – female)
Natural Sciences programme				
Male	1.4073	−0.0001 = 0.0001	0.5418	−0.0011 = 0.0011
Female	1.4074		0.5429	
Economic and Management Sciences programme	=		=	
Male=1.50	0.60	−0.02 = 0.02 =		0.02 = 0.02 =
Female=1.52			0.58	

Recalling our second hypothesis according to which the male students would have greater academic behavioural confidence than the female students, we can now deduce that our second hypothesis was not true. It is interesting to note, however, that although deemed statistically insignificant, the difference in means between the males and females in the NS programme is less than the difference in means between the males and females in the EMS programme. Male and female students in the NS programme therefore have a slightly greater similar academic behavioural confidence profile than male and female students in the EMS programme.

7. CONCLUSION

The aim of the study was to explore the differing levels of academic behavioural confidence of first-year students in two of the programmes that are offered by the School of Teacher Education at the Central University of Technology, Free State. These are the B.Ed (FET): Natural Sciences and the B.Ed (FET): Economic and Management Sciences programmes. Although the admission requirements to all the programmes is an M-score of 27, students with an M-score between 22 and 27 can be admitted after writing and passing a special selection test. Irrespective of the entry route into the programmes, the students' level of preparation for higher education is usually found not to be the same and can be traced back to their school backgrounds. Problems that were encountered at school include inadequate teacher preparation, under-qualified or unqualified teachers in mathematics and science subjects, ineffective leadership and management of schools and a lack of resources. All these have an effect on the level of preparedness of the students, their beliefs about their capabilities, and their confidence as they embark on higher education.

The results of this study point to differing levels of academic behavioural confidence between the students in the Natural Sciences programme and those in the Economic and Management Sciences programme.

It was hypothesised that the NS group would be more academically confident than the EMS group as indicated by the differences in the means of the two groups (1.41 for NS and 1.51 for EMS). This difference was found to be statistically significant. An analysis of individual statements, however, showed that there was a statistically significant difference between the means of the two groups in only six of the 24 statements, namely in statements number 2, 8, 14, 15, 21 and 22. In the study of Sander and Sanders (2006; 2007) they also reported on six statements where a statistically significant difference between medical and psychology students was noted. It is well known that these two groups of students are considered very different in terms of ability and admission requirements.

The six statements in which the NS group showed more confidence than the EMS group, and in which the difference were deemed statistically significant, are the following: prepare thoroughly for lectures and tutorials; follow the thread of explanation provided by the lecturer during the lecture; manage my workload to meet the coursework deadlines; give a presentation to a small group of fellow students; produce good results under test and examination conditions; and write in an appropriate academic style. The six statements in the study of Sander and Sanders (2006; 2007) in which a statistically significant difference was noted were: produce best work under examination conditions; give a presentation; attend most taught sessions; be on time for lectures; plan appropriate revision schedule; and remain adequately motivated throughout. These are statements for which the medical students displayed more confidence than the psychology students. It was only in two statements that the psychology group showed more confidence and they were: ask lecturers questions; and ask for help.

Although the NS group appeared to be more confident than the EMS group, there are still those students, even in the NS group, who were found to be only slightly confident or not confident at all. This observation calls for intervention in the form of academic support in order to boost their academic confidence. Sander and Sanders (2007) argue that academic confidence mediates between the individual's ability, learning styles and the academic environment of higher education. Through guidance and support from their lecturers and other institutional structures, students can be helped to adjust quickly to the demands of higher education.

Regarding the EMS group, it appears that they have difficulties in all six categories into which the 24 statements could be grouped, namely: studying; understanding; attendance of classes; attaining good grades; voicing out their feelings; and lastly seeking clarification when one does not understand. The fact that they showed more confidence in statements 4, 5, and 24 (although the difference was not statistically significant) could be an indication that they are aware of their deficiencies and are prepared to attend lectures regularly. These statements were: attending most lectures; be on time for lectures; and make the most of the opportunity to study for a degree at this university.

Attending lectures is not enough, however. Students need to have the confidence to study, to understand, to ask for help when it is needed and to speak out about their problems.

8. RECOMMENDATIONS

Based on the findings of this study the following recommendations are made in respect of mathematics as a subject domain:

- New students should be given a pre-test that will serve as a diagnostic tool to assess their level of understanding of mathematics.
- Students' learning styles should be assessed in order for lecturers to know their learning style preferences. Lecturers will then be able to adjust their teaching methods to cater for all student groups.
- Further academic behavioural confidence tests should be administered later in the year to assess whether there has been improvement during the course of the year.

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Appendix 1

Questionnaire on Academic Behavioural Confidence (ABC)

Dear student

The aim of this study is to determine the academic behavioural confidence of students studying in the School of Teacher Education. The questionnaire below will help us make this determination.

As part of this study, you are requested to honestly complete the 24 questions in the questionnaire by making a cross (X) in the block describing your level of confidence regarding the statement. If, for example, you feel very confident that you can study effectively on your own, then you draw a cross under "Very confident" in line with the first statement.

This questionnaire will be completed anonymously, but please provide information regarding your gender and programme specialisation by drawing a cross (X) in the appropriate box.

Gender	Male	Female
Programme specialisation	EMS	Natural Sciences

Thank you for participating.

I am confident that I can:	Very confident	Slightly confident	Not confident
1. Study effectively on my own.			
2. Prepare thoroughly for lectures and tutorials.			
3. Read the recommended background material with understanding.			
4. Attend most lectures.			
5. Be on time for lectures.			
6. Attend tutorials (practise classes) when offered.			
7. Understand the content explained and discussed during a lecture.			
8. Follow the thread of explanation provided by the lecturer during the lecture and not get lost or fall behind.			
9. Respond to questions asked by a lecturer in front of my classmates.			
10. Ask my lecturer questions about the material he/she is teaching, in a one-to-one setting (in his/her office for example).			
11. Ask my lecturer questions about the material he/she is teaching, during a lecture.			
12. Ask for help from a classmate or a friend if I don't understand.			
13. Seek appropriate support on whatever level, when the need arises.			
14. Manage my workload to meet the coursework deadlines.			
15. Give a presentation to a small group of fellow students.			
16. Engage in sensible academic debates with my peers.			
17. Produce course results at the required standard.			
18. Plan an appropriate revision schedule.			
19. Produce good results under test and examination conditions.			
20. Pass assessments at the first attempt.			
21. Produce good work when completing homework or assignments.			
22. Write in an appropriate academic (mathematical) style.			
23. Remain adequately motivated throughout the year.			
24. Make the most of the opportunity to study for a degree at this university.			

Adapted from Sanders and Sander, 2007: 650