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Students' Learning Preferences

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Abstract

Higher education institutions strive to alleviate the predicament of high failure and dropout rates by improving the quality of teaching and learning. Awareness of learning styles could help students understand how they learn and empower them to take ownership of their learning so that they persevere and succeed in the institutions of higher education. Research has indicated that knowledge of learning styles increase academic success. The purpose of this study was to identify student's individual learning styles. A sample of 130 first year students in six faculties was used in this study. The instrument used for data collection is the Innovative Learning Experience (ILE) (Mkonto, 2010). The ILE was adapted from Centre for Innovative Teaching Experiences (C.I.T.E.) by Mkonto (2010) and consists of a writing activity and a questionnaire. The results revealed that although students have dominant learning styles that they use in preference to other learning styles, there are some students who make use of multimodal learning styles preferences and also there are learning styles prevalent in faculties. Knowledge of students' learning styles, recognizing their strengths and weaknesses in learning ad provides the lecturer with valuable information.

Keywords: learning styles, learning styles awareness, higher education, teaching styles, learning styles assessment instruments, dominant learning styles

1. Introduction

Currently, in higher education institutions, there is a pervasive yet important debate on the development of effective pedagogic strategies to reduce student attrition and significantly increase throughput rates. Gilakjani (2012) maintains that students need a starting place for thinking about and understanding how they learn. This will allow students to become more independent as learners and play an active role in their own learning (Genovese, 2004; Gilakjani, 2012). To enable university students to gain epistemological access and succeed academically in their chosen disciplines, awareness of learning styles should be promoted. Knowledge of learning styles provides students with information on why they learn differently compared with others. Invariably, awareness of learning styles empowers students to become self-directed, independent and active learners.

2. Literature Review

Students generally have a preference for a particular learning style (Kolb, 1984; Collin, 2007; Hawk & Shah, 2007; Cekiso, 2011; Gilakjani, 2012; Rau, 2012). The preferred learning style portrays the student's capabilities, environment and past learning experiences (Nulty & Barrett, 1996; Gilakjani, 2012; Rau, 2014). In some situations students may adopt a different learning style, but tend to maintain a preference for a particular learning style. There is no learning style that is inferior to another, but learning styles have different attributes. Students interact with information differently, hence their variety of learning styles.

Recognising the differences in the way students learn is the first step in raising students' awareness of their own learning styles and the existence of other learning styles. When students are aware of their learning styles, they learn quickly and easily and eventually succeed in their studies. Their identification of learning styles helps them acquire problem-solving skills. As students succeed at problem solving, the more they take ownership of their learning (Biggs, 2001).

Student learning is enhanced when their learning styles match the lecturers' teaching style (Healey & Jenkins, 2000; Peacock, 2001; De Vita, 2001). Matching teaching styles and students' learning styles does not mean that the lecturer adjusts the teaching style to the individual student's learning style, nor that the lecturer should use an all-encompassing teaching style for all students (Mkonto, 2010; Gilakjani, 2012). Rather, a more balanced teaching strategy, one that accommodates the different learning styles in the class, is appropriate (Reid, 1987; Felder & Brent, 2005; Gilakjani, 2012). Felder and Brent (2005) assert that a teaching style that responds to one learning style will not address the needs of the rest of the students in the class. Kolb (1984), Peacock (2001) and Robotham (1999) argue that if students find a mismatch between their own learning styles and the lecturer's teaching style, they are likely to reject the learning environment. A mismatch between teaching and learning styles could make students lose interest in class, leading to poor performance in tests and examinations, failing their courses, and ultimately dropping out (Peacock, 2001; Williamson &Watson, 2007).

Intentional mismatch between students' learning styles and lecturers' teaching can also offer some benefits; where students experience some tension and conflict, they are compelled to explore less frequently used learning styles. From such tension and conflict creativity emerges (Healey & Jenkins, 2000). Development of the less frequently used learning style assists students to adjust in different learning environments (Williamson & Watson, 2007). This promotes self-directed learning which contends that learning is on-going and involves the analysis of the relationship between teaching strategies and the learning situation (Knowles, 1978), and it is not limited to instruction or to the classroom (Merriman, 2001). Self-directed learning focuses on the process whereby students take ownership of their own learning, by setting their own goals and striving towards achieving them, identifying resources and skills to achieve these goals, and assessing their own progress (Brookfield, 1995; Bezuidenhout & Alt, 2011). Creating awareness of learning styles can enhance self-directed learning and make students understand their learning strengths and the outcomes they want to achieve (Merriman 2001). Self-directed learning increases students' confidence and their capacity to learn.

A great deal of research has been conducted on learning styles worldwide in order to understand how students learn (Bacon, 2004; DeCapua & Wintergerst, 2005; Hall & Moseley, 2005; Gould & Caswell 2006; Boström, 2011). As a result, many learning style theories and models have evolved (Miller, 1991; Milburn, 2000; Bacon, 2004). Coffield, Moseley, Hall and Ecclestone (2004) have identified 71 learning style models. The learning style theories provide a basis for different learning styles, create self-awareness among students, help lecturers and students to become reflective, help students identify their learning styles, and enhance teaching (Dunn et al., 1990; Healey & Jenkins, 2000).

The lack of a single definition of learning styles has been criticised extensively, as this causes confusion as to what learning styles really are (Bowles, 2004; Gould & Caswell, 2006). Cassidy (2004) attributes the disparity in the definitions of learning styles to the fact that research in the field has spread from psychology, where it originated, to other disciplines. This inter-disciplinarity of learning styles has allowed diverse ways of understanding and examining learning styles to proliferate (Cassidy, 2004; Hall & Moseley, 2005). Another criticism is the use of the term 'learning style', which is, in some instances, used interchangeably with 'cognitive style', 'learning strategy', 'learning preference', and 'study style' (Cassidy, 2004). Although the concept of learning styles has been criticised, there is consensus on the existence of learning styles, and that students learn differently (Van Rensburg, 2009). Raising awareness regarding the diverse learning styles of students could prove invaluable in teaching and learning. Students who are aware of their learning styles can identify their strengths and weaknesses in learning and expand their range of learning styles (Robotham, 1999; Hall, 2005). Contradictory results have been found in terms of the relationship between learning styles and academic performance. Rochford (2004), and Kvan and Yunyan (2005) suggest a strong correlation between learning styles and academic performance. Abidin et al. (2011) contend that learning styles affect students' overall academic achievement. However, Aripin et al. (2008) and Pashler et al. (2008) find no correlation between learning styles and academic performance.

3. Methodology

A sample of 130 first-year students in six faculties (Applied Sciences, Business, Education and Social Sciences, Health and Wellness Sciences, and Information and Design) at a university of technology in South Africa participated in this study. The instrument used for data collection was an instrument adapted by Mkonto (2010) from the Center for Innovative Teaching Experiences (C.I.T.E.). The C.I.T.E. instrument has been used in various projects in the USA (Pyzdrowski et al., 2007). It was used to explore the learning styles of students in a college algebra class and to determine how the course component addressed the students' needs, as well as other components which could be developed and implemented to help students (Pyzdrowski et al., 2007). The C.I.T.E. instrument was also used with both speakers of English and non-English-speaking students across the USA (Reid, 1983). The Perceptual Learning Style Preference Questionnaire (PLSPQ) was adapted by Reid (1987) from C.I.T.E. for students with English as a second language. The PLSPQ assesses the learning styles of students based on how best they learn using their perceptions. The C.I.T.E. instrument was found suitable for the South African context, since the majority of students have English as a second and/or third language.

Both the original C.I.T.E. instrument created by Babich et al. (1975) and the C.I.T.E. instrument and PLSPQ by Reid (1987) comprised only a questionnaire to assess learning styles, where the students ticked their responses. The ILE was further adapted by Mkonto (2010) from the C.I.T.E. instrument and consisted of a writing activity and a questionnaire (Mkonto 2010). The writing exercise gave the students their own voice, where they could write about other issues that had an impact on their learning. Scores on the ILE categorised learning styles into major (when the student prefers to use one particular style), minor (where the student uses a learning style as a second choice or together with other styles), and negligible (when a learning style is hardly used or not used at all). All the participants completed the learning styles assessment tool that comprised a writing activity and a 27-statement questionnaire. The statements are divided into five sections measuring the nine learning styles: visual language, visual numerical, expressive written, expressive oral, social individual, social group, auditory language, auditory numerical, and kinaesthetic.

For each statement, the students were required to assess themselves using a four-point rating scale. The scale ranged from 1 (strongly disagree), 2 (disagree), and 3 (agree), to 4 (strongly agree). A score of between 21 and 27 for a learning style meant that this was the student's major learning style. A major learning style is one that the student prefers to use and feels comfortable with. A score of 12–18 indicated a minor learning style; this is one that the student generally uses as a second choice, in conjunction with other learning styles. A score of between 6 and 9 meant a negligible learning style, one that the student prefers not to use.

In the writing activity the participants had to write about their prior learning experiences, and how these experiences helped or hindered effective learning; the questionnaire helped the participants to identify preferred learning styles.

In the writing exercise, which preceded the completion of the questionnaire, the researcher looked for learning styles, without ignoring the impact of other issues on the students'

learning experiences. The responses from the writing exercise were analysed, and themes and patterns were identified. The learning styles created the main themes, while emergent sub-themes included those of language, the role of mature students, and peer pressure. This type of data analysis is referred to as concept mapping or pattern mapping (Henning, Van Rensburg & Smit, 2004). The concept mapping technique puts the main concept (in this study, that of learning styles) at the centre, and then links the other concepts to this main concept (Henning et al., 2004). Here, the other concepts were understood in relation to learning styles.

After completing the questionnaire, the students had to calculate the scores manually. In order to identify the learning styles, the calculations required that the numbers be added and the total multiplied by two. With the calculations, students could make mistakes and therefore fail to identify their learning styles accurately. This is recognised by Reid (1987) as one of the weaknesses of learning style assessment. To avoid student errors in the self-reports for this study, the researcher checked their calculations for accuracy and reliability. Therefore, this review helped to eliminate or reduce the margin of error in students' calculations.

4. Results

4.1 Summary of student scores on learning styles assessment questionnaire

The summary of scores from the learning styles assessment questionnaire demonstrates the dissemination of the different learning styles among students**.** The scores confirmed that the tool had validity, since the participants were able to measure their learning styles and, as a result, assess these styles in the context of their experiences, as expressed in the writing exercise.

It is interesting to note that the responses to the learning styles instrument demonstrated that the majority of students had strong, moderate, or low preferences for the different learning styles, depending on the nature of the disciplines in which they registered (i.e. within the aforementioned faculties). Tables 1–6 below contain summaries of students' scores on the learning styles assessment instrument, as per faculty.

Table 1. Faculty of Health and Wellness Sciences scores on the learning styles assessment instrument

(n=24)

Learning styles	Frequency	Percentage of students
Kinaesthetic tactile	**15**	**63**
Social individual	8	33
Social group	5	21
Visual language	10	42
Expressive oral	**2**	**8**
Expressive written	3	13
Visual numerical	4	17
Auditory language	3	13
Auditory numerical	**2**	**8**

Note: The items in bold show the significance of the findings.

The dominant learning style for students in the Faculty of Health and Wellness Sciences was the *kinaesthetic tactile* (63%). These students learn best when they are involved directly; they want to be hands-on in the process of learning and understand the work better when they are active participants. They like to touch and feel the material. The minor learning styles in this faculty were the *auditory numerical* (8%), and *expressive oral* (8%). Students with an *auditory numerical* learning style learn better when they hear numbers explained to them orally. When they learn, they read aloud and listen to themselves speaking. They are able to solve mathematics problems mentally. The *expressive oral* (8%) is another minor learning style in this faculty. Students who use the expressive learning style like to express themselves orally, and feel at ease in talking about their ideas.

Comments from the writing exercise on learning styles included:

I like to see demonstrations (ZA2); Making short notes during lectures helps (ZA9); I study better when things are written down (ZA11); I learn from practically doing things (ZA15); I read through my work so that I can understand (ZA7); I learn better from doing experiments (SA23); I like practical application of theory (ZA22).

In both the questionnaire and the writing exercise, the same learning styles emerged. Comments by ZA2 and ZA11 are the equivalent of the *visual language* in the questionnaire and comments by ZA9, ZA15, ZA23 and ZA22 are the equivalent of the *kinaesthetic tactile* in the questionnaire.

Table 2. Faculty of Engineering scores on the learning styles assessment instrument

(n=17)

Learning styles	**Frequency**	**Percentage of students**
Kinaesthetic tactile	7	41
Social individual	1	6
Social group	**9**	**53**
Visual language	1	6
Expressive oral	**0**	**0**
Expressive written	5	29
Visual numerical	4	14
Auditory language	6	35
Auditory numerical	6	35

Note: The items in bold show the significance of the findings.

The *social group* (53%) was the major learning style used by students in the Faculty of Engineering. Students with this learning style prefer to work with one or more people. Collaborative interaction increases their ability to learn. The *kinaesthetic tactile* (41%) was also very prevalent. Students with kinaesthetic learning style learn best when they are able to touch and feel the material, being active participants in the process of learning. The nature of this faculty is practical, students are hands-on, working in pairs or groups on projects and in the laboratory, therefore social group and *kinaesthetic tactile* are the appropriate styles for this faculty. The *expressive oral* (0%) was the minor learning style in the Faculty of Engineering. Students with expressive oral learning style like to express themselves orally, and feel comfortable in talking about their ideas.

Learning styles from the *writing exercise* were as follows:

When I do not understand my work I have a study group; we share problems and try to solve them together (ZB5); I do not work on my own very well (ZB13). We have a group; we rely on one another, helping, assisting, [and] explaining concepts, and [we] discuss various issues (ZB9).

Similar learning styles were therefore revealed in both the instrument and the writing exercise. Comments made by ZB5, ZB13 and ZB9 are the equivalent of the *social group* in the questionnaire.

Table 3. Faculty of Informatics and Design scores on the learning styles assessment instrument

(n=18)

Learning styles	Frequency	Percentage of students
Kinaesthetic tactile	**12**	**67**
Social individual	9	50
Social group	**0**	**0**
Visual language	4	22
Expressive oral	3	17
Expressive written	7	39
Visual numerical	4	22
Auditory language	4	22
Auditory numerical	4	22

Note: The items in bold show the significance of the findings.

The dominant learning style for students in the Faculty of Informatics and Design was the *kinaesthetic tactile* (67%). These students learn best through self-involvement, and through touching, feeling and handling the material. They may not understand or be able to concentrate on work unless they are actively involved. The nature of their course supports students with this learning style. The other dominant learning style was the s*ocial individual* (50%). Students using this style are motivated when they learn on their own, and prefer to work alone. In this faculty, the *social group* scored the lowest (0%).

From the *writing exercise*, the following approaches to learning emerged:

I prefer to study alone in a quiet place (ZA5); I like to memorise (ZA13); The best way to learn is by doing the work practically (ZA21); I like drawing (ZA7); I study by visualising things (ZA2).

In this faculty, the *kinaesthetic tactile* emerged as the major learning style as recorded in the instrument. In the writing exercise, a similar learning style emerged. Comments by ZA5 and ZA2 are the equivalent of the *social individual* in the questionnaire and ZA21 and ZA7 comments are the equivalent of the *kinaesthetic tactile* in the questionnaire.

Table 4. Faculty of Business scores on the learning styles assessment instrument

(n=31)

Learning styles	**Frequency**	**Percentage of students**
Kinaesthetic tactile	11	35
Social individual	**13**	**42**
Social group	3	10
Visual language	8	26
Expressive oral	**2**	**6**
Expressive written	7	23
Visual numerical	7	23
Auditory language	5	16
Auditory numerical	3	10

Note: The items in bold show the significance of the findings.

The major learning style for students in the Faculty of Business was the *social individual* (42%), with students using this learning style preferring to work alone. The *kinaesthetic tactile* (35%) also scored highly in this faculty, with many students choosing a direct, hands-on involvement with their work and material. The minor learning style was the *expressive oral (*6%), referring to students who like to express themselves orally and talk about their ideas.

From the writing exercise, the various learning styles were identified:

I write down key words and build around them (ZD6); I like studying alone and look at myself in the mirror (ZD11); I talk to myself when I learn (ZD9); I memorise and write down (ZD10); I prefer to study alone and scatter everything on the floor (ZD19); I study alone and hate it when people are around because I get distracted easily (ZD25); I like making my own notes (ZD24); I like repetition, especially with maths (ZD29).

The *social individual* style, which emerged from the questionnaire as the major learning style, also emerged in the writing exercise. *Social individual* emerged strongly from the comments of the students in the writing exercise. This involves learning through talking to oneself, studying alone, and making one's own notes.

Table 5. Faculty of Education and Social Sciences scores on the learning styles assessment instrument

(n=22)

Learning styles	**Frequency**	**Percentage of students**
Kinaesthetic tactile	10	45
Social individual	**12**	**55**
Social group	5	23
Visual language	10	45
Expressive oral	4	18
Expressive written	3	14
Visual numerical	6	27
Auditory language	5	23
Auditory numerical	**2**	**9**

Note: The items in bold show the significance of the findings.

The three major learning styles for students in the Faculty of Education and Social Sciences were the *social individual* (55%), the *kinaesthetic tactile* (45%), and *visual language* (45%). The *auditory numerical* (9%)was the minor learning style. These kinds of students learn best when they hear numbers explained orally, and can solve mathematics problems mentally.

From the *writing exercise*, the following learning styles emerged:

After reading I write down what I have read (ZE1); Sometimes I use mind maps where I put what I am reading in the middle and my questions about it (ZE7); I learn best by actually seeing things myself (ZE18); I want to learn alone, I do not like working in groups (ZE17); I have to do something physically in order to learn it (ZE9); I like to learn through experience (ZE 11); I do not like working in groups, I like doing my work on my own (ZE13); I like to make and touch things (ZE21).

The Faculty of Education and Social Sciences evinced a multimodal learning styles preference (*visual language 45%, social individual 55%, kinaesthetic tactile 45%)* both in the questionnaire and writing exercise. In the writing exercise, comments by ZE7 and ZE18 were the equivalent of the *visual language* in the questionnaire; ZE17 and ZE13 were the equivalent of the *social individual* in the questionnaire, and ZE9, ZE11 and ZE21 were the equivalent of *kinaesthetic tactile in the questionnaire.*

Table 6. Faculty of Applied Sciences scores on the learning styles assessment instrument (n=18)

Learning styles	**Frequency**	**Percentage of students**
Kinaesthetic tactile	7	39
Social individual	3	17
Social group	**8**	**44**
Visual language	2	11
Expressive oral	**1**	**6**
Expressive written	5	28
Visual numerical	5	28
Auditory language	3	17
Auditory numerical	4	22

Note: The items in bold show the significance of the findings.

The two major learning styles in the Faculty of Applied Sciences were the *social group* (44%), with students preferring to work collaboratively with one or more people, working with other people increase their ability to learn, and the *kinaesthetic tactile* (39%), in which students learn best when they play an active role in the process of learning. The learning style least used by students in the Faculty of Applied Sciences was the *expressive oral* (6%). Students with this learning style like to express themselves orally and talk about their ideas. It was clear that in this faculty, students did not feel comfortable in expressing themselves orally.

The issues emerging from the writing exercise were:

I am good with numbers (ZF5; I study best when I talk to myself (ZF11); I do not like oral presentations (ZF9); I learn better when I see things written down (ZF13); I like working with other students (ZF12); I found that when I study in a group it makes it easier because each one has their own perception on something (ZF15); I study by making mind maps (ZF16); I study better when I write down notes (ZF17); I am an international student and English is not my first language – it was difficult for me to understand what lecturers were saying in class. I would like them to write down some stuff (ZF18).

5. General Issues Emerging from the Writing Exercise

Besides confirming existing learning styles, the writing exercise highlighted other pertinent teaching and learning issues as they emerged. Students commented that they could not learn

effectively as they had difficulty in understanding the type of English language used at university for academic purposes. Their comments included:

The way the lecturer was speaking was not easy for me to get a picture, I did not hear well because I did not understand English (ZC13). Some lecturers speak fast with an English accent; I am a foreign student and I speak French, so sometimes it is difficult for me for understanding [sic] *some words and sentences and I cannot read or talk proper English (ZC9).*

Schooling also contributed to the linguistic challenges encountered by students. At school, they were taught through their mother tongue (isiXhosa, isiZulu, Afrikaans and French). Their comments were:

All my school life I was in [an] *Afrikaans-medium school, I struggle to learn in English (ZE11); I come from DRC, a French-speaking country; I did all my studies in French,* [and] *it was difficult for me to study in English (ZD5); Our teacher used to explain to us in isiZulu but now everything is in English (ZA7).*

Some are still struggling, but others have overcome this challenge through interacting with students who speak English, attending English tutorials, and reading more English books. As one student said: *I have made friends who speak English*, *I try not to speak my language, I speak English all the time (ZD5).*

Students commented on the negative effect peer pressure had on their learning. During their first year at university, they are for the first time outside parental control, so they often make took bad decisions and made bad choices, such as neglecting their studies and choosing peers over their studies; this resulted in poor attendance of classes, putting themselves at a risk of failure. Their comments were:

I spend more time with friends than my books (ZF8). It was my first time away from home and I could do anything I wanted to; studying became second on my list of priorities, and as a result I failed (ZB12).

Some were able to overcome their faults by making positive choices that helped them to learn more effectively, such as regular class attendance and making their studies take precedence over everything else. One student said: *I spend more time in the library and I am trying not to spend that much time with friends because I realised that I was working on my future (ZF8).*

Some of the students taking first-year courses were mature students who had worked before, who have been outside schooling/learning for some time and a great deal had changed. One comment was: *I left school in 2001; when I returned things were different (ZE9).*

These students struggle to learn because they have other responsibilities. One student said: *In the evenings I work at a restaurant, I do not have enough time to work on my assignments. In order to pay for my education I have to work till 2 in the morning and come back to class at 8h30; I have only a few hours to rest* (ZA17). To overcome this, these students put more effort into their studies.

Some students commented on the challenges they face at university because their schools had not prepared them for tertiary learning. At school, they were spoon-fed by the teachers, to the extent of explaining the work in their mother tongue if they did not understand it. Some said:

At the university you are on your own, our teachers used to chase us to study and now nobody does that, we are on our own (ZA8); At school the teachers would shout at you if you don't attend classes or you don't submit the work (ZD15); At school they spoon fed us (ZC3); At school I was doing well but now here in tertiary [sic] *I'm struggling because all my lectures are in English, so I have to put more effort into my studies (ZF8).*

6. Discussion

The learning styles assessment instrument provided insight into individual students' major and minor learning styles. From both the learning styles questionnaire and the writing exercise it occurred that students in various faculties have dominant learning styles that they employ in preference to others. In general, the findings from the study showed that although *individual* students in faculties had their own major learning styles, there were also certain learning styles evident in faculties. Kolb (1984) notes that the use of distinct learning styles is often the result of selection and socialisation processes in the learning context. Kolb (1984) argues that the structure of knowledge in different disciplines requires certain learning demands from the learner that "reflect a particular view of reality and the methods of inquiry used to create knowledge" (Kolb, 1984, p. 88). Kolb (1984) further asserts that students are drawn into certain disciplines because of the similarities that exist between the learning demands of a specific discipline and the students' learning styles. He states that where there is a mismatch between the individual's learning style and the learning style dominant in the discipline, the student either changes his or her learning style or leaves the discipline. Thus, learning in a discipline shapes the development of matching learning styles. It is therefore the duty of members of a particular discipline (especially the curriculum developers and lecturers) to develop and harness the requisite disciplinary learning styles to avoid high dropout and failure rates. This is supported by Hativa and Birenbaum's (2000) finding of discipline-specific learning styles.

The findings of this study are also supported by a study by Reid (1987) on learning style preferences of English Second Language (ESL) students in six fields of study in Colorado. Reid (1987) found that in the humanities faculty, the major learning style was *visual learning*; in computer sciences, business, applied sciences and medicine the preferred learning style was *auditory learning*; while in engineering the *kinaesthetic tactile* was the major learning style. In respect of engineering, this correlates with the findings in this study. A study of learning style preferences that included participants from universities in three countries, Universiti Teknologi Petronas (UTP) in Malaysia, Cape Peninsula University of Technology (CPUT) in South Africa, and Turku University of Applied Sciences (TUAS) in Finland, also established the social learning style as the most favoured amongst undergraduates in engineering, who also favoured the verbal learning style (Abidin, Ziegler & Tuohi, 2011).

In the Faculty of Education and Social Sciences, for instance, as indicated in the questionnaire, the findings of this study revealed the *social individual* (55%) as the major

learning style. This contradicts the findings of Cekiso (2011), who found the auditory the major learning style among BEd students. Whatever the differences between the two studies, lecturers need to be aware of the existence of learning styles and try to adjust their teaching styles to accommodate students' learning styles. Other dominant learning styles included *kinaesthetic tactile* (45%), and *visual* language (45%). Interestingly, also evident from the writing exercise, the same learning styles (*social individual*, *kinaesthetic tactile* and *visual language)* were evident in this faculty. This is proof that students in the Faculty of Education and Social Sciences have multimodal learning style preferences compared with those in other faculties. Students with multimodal learning styles may adjust to different teaching styles and learning environments. There are several studies that indicate the importance of using multimodal learning styles (Veena & Shastri, 2013). Breckler, Joun and Ngo (2009) found that the majority of students in the health professions had multimodal learning style preferences. This is in keeping with the theory of developing learning styles that are not only flexible, but also holistic and integrated.

A further interesting finding in this study was that students in five of the six faculties, Applied Sciences, Business, Engineering, Health and Wellness Sciences, and Informatics and Design, had an *expressive oral* learning style as their less frequently used learning style. This could be attributed to English as the predominant language of learning in South African higher education institutions, while most students in these institutions have English as their second or third language. They therefore find oral expression difficult, since they lack competency in English. Students reiterated this problem in their comments. The problem is further complicated by academic English, which communicates disciplinary knowledge, values and principles. Studies show that a lack of English language abilities prevents students from engaging in class and makes them less confident in interacting with classmates and lecturers both inside and outside the classroom.

7. Conclusion

Students' success in higher education is dependent on the relationship between learning styles and teaching styles. Students' awareness of their own learning styles could help them develop learning capabilities so that they can meaningfully choose the most suitable learning styles from a range of styles to meet the specific requirements of the task at hand. Lecturers need to be aware of the variety of learning styles that their students display in the classroom and develop a more balanced teaching strategy, one which accommodates the various learning styles displayed in the classroom. Students have learning styles that they use less frequently; an intentional mismatch should therefore be promoted.

8. Limitations of the study

The results of this study cannot be generalised beyond the sample group, since the study made use of a convenience sample. The teaching styles were not considered for this study.

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Learning Styles

Learning style

Learning style is the way you tend to learn best. Learning styles can be assessed using a learning styles assessment tool or instrument. The aim of assessing learning styles is to make students aware of how they learn so that they can learn effectively. If lecturers are aware of their students' learning styles they could adapt their teaching styles to suit the students learning styles.

Innovative Learning Experience

Please complete the learning styles assessment tool which consists of two parts:

Part 1: The writing exercise

Part 2: The learning styles questionnaire and scoring sheet

Duration: 30 minutes

PART 1

NAME ……..…….

COURSE ……..…….

YEAR OF STUDY ……..……

DATE ……..……

Write a short account of your past learning experiences, how you learn, mentioning strengths and weaknesses in learning and how these have made you learn effectively.

PART 2

NAME ……..…….

CLASS ……..……..

DATE ……..……

Instructions: There are four responses for each statement. Each response has a numerical value. Read the each statement and decide which of the four responses do you **strongly agree (4), agree (3), disagree (2) and strongly disagree (1). Put an X on the number of your response.**

Statements	Strongly agree	Agree	Disagree	Strongly disagree
1. When I am involved in practical work, I remember what I have learnt better.	4	3	2	1
2. I enjoy doing written assignments	4	3	2	1
3. I learn better when I listen in a lecture than when I study on my own.	4	3	2	1
4. I learn best when I study alone.	4	3	2	1
5. Having clear instructions on how to do an assignment makes it easier to understand.	4	3	2	1
6. I would rather do an oral presentation than write an assignment	4	3	2	1
7. I can solve maths problems without writing them down.	4	3	2	1
8. If I need help in the subject, I ask a classmate for help.	4	3	2	1
9. I understand maths better when I see the numbers written down.	4	3	2	1
10. I would rather write an assignment than be involved in discussion.	4	3	2	1
11. I remember things I heard better than things I have read.	4	3	2	1

12. I remember more of what I learn if I learn it when I am alone.	4	3	2	1
13. I would rather read a book myself than listen to somebody reading to me.	4	3	2	1
14. I engage more in discussions than writing on my own.	4	3	2	1
15. I work better with numbers when they are given to me orally.	4	3	2	1
16. I like to work in a group because I learn from others in the group.	4	3	2	1
17. Written maths problems are easier for me to do than the ones given orally.	4	3	2	1
18. Drawing something help me understand it better.	4	3	2	1
19. It is easier for me to understand what I have read than what I have heard.	4	3	2	1
20. When I work on an assignment I like working alone.				
21. I prefer to be given written directions than spoken ones.	4	3	2	1
22. I prefer oral tests/ examination to written ones.	4	3	2	1
23. I remember numbers for long without writing them down.	4	3	2	1
24. I get more work done when I work with others.	4	3	2	1
25. When I see numbers it makes it easier for me to work with them.	4	3	2	1
26. I like projects where I have to make things with my hands.	4	3	2	1
27. I prefer written tests to oral tests.	4	3	2	1

SCORE SHEET

Directions: Find the statement number on the Learning Style Inventory and write the number (1-4) on the blank spaces. Total the numbers under each heading. Multiply the heading by two. Look at the scores to decide on the dominant learning style.

Visual	**Language**	**Auditory**	**Numerical**	**Social Group**
5----------		7--------		8------
13--------		15------		16-----
21--------		23------		24-----
Total …….x2=		**Total ……..x2 =**		**Total …….x2**

Visual	**Numerical**	**Kinesthetic-**	**Tactile**	**Expressiveness Oral**
9 ------		1------		6--------
17-----		18-----		14------
25-----		26-----		22------
Total ……x2 =------		**Total ……x2 =------**		**Total …….x2 =-------**

Auditory	**Language**	**Social**	**Individual**	**Expressiveness-Written**
3 -------		4------		2-----
11------		12-----		10----
19------		20-----		27-----
Total……x2 =-------		**Total…..x2 =------**		**Total ……x2 =--------**

Score: 21-27= Major Learning Style – You prefer this learning style and feel comfortable using it.

Score: 12-18= Minor Learning Style – You use this style of learning, but usually as a second choice or in conjunction with other learning styles.

Score: 6-9= Negligible use – You prefer not to use this learning style.

Learning Styles Explanations

Learning styles	Explanation
Auditory language	These students learn best from **hearing** information presented to them.
Visual language	These students learn best **seeing** the information presented to them.
Auditory numerical	These students learn best from **hearing numbers**.
Visual numerical	These students learn best by **seeing numbers**.
Kinaesthetic tactile	These students learn best by **being involved**.
Social individual	These students like to **study alone**.
Social group	These students learn best when **in a group**.
Expressive oral	These students learn best when they can **express themselves orally.**
Expressive written	These students learn best when they **express themselves in written form.**