























research as the validation of other well-known tests (e.g. Myer-Briggs and Solomon Fielder) have also not been confirmed (Avenant, 2001; Hawk & Shah, 2007), and yet are being used extensively.

This simpler version was used as a screening instrument to compare the brain profiles of the lecturers with those of their students and colleagues. The screening instrument (Bendigo Secondary College, 2004) consisted of 10 rating scale items and students completed it in class. Ethical clearance was obtained from the Research and Ethics Committee and the research was conducted in an ethical manner.

The results were analysed using descriptive statistics (Leedy & Ormrod, 2010). The results obtained from the original HBDI<sup>®</sup>, presented as a sum out of 300, and were presented as a percentage in order to compare it to the other shortened version. Data obtained from the adapted version was entered into an Excel spread sheet to obtain averages and percentages. Results are presented as figures and tables for comparison of the data.

## Results and discussion

Within each discipline the results of the lecturer were compared to that of students and colleagues. The results for the three disciplines, i.e. brain profiles/learning style preferences were obtained for each discipline prior to comparing them to the other two disciplines.

Table 1: Comparison of the learning preferences across disciplines

Quadrant	Scores			*Preference		
	Lecturer N=1 in %	Students N=25 in %	Colleagues N= 10 in %	Lecturer	Students	Colleagues
<b>SLP&amp;A</b>						
A	11	16	22	4	2	2
B	24	64	20	3	1	3
C	34	16	34	1	3	1
D	32	4	34	2	4	1

OT						
A	25	25	22	2	2	4
B	30	31	29	1	1	1
C	23	24	28	3	3	3
D	18	22	26	4	4	2
PT						
A	19	25	26	4	2	2
B	25	30	24	3	1	3
C	32	23	20	1	3	4
D	25	22	40	2	4	1

\* Preference of 1 depicts the most preferred and 4 the less preferred

Next each discipline is discussed in detail.

### ***Speech-Language Pathology:***

The *lecturer* in SLPA presented with a double dominant profile in the C and D quadrants, which is in accordance with previous research (Herrmann, 2010a; Avenant, 2001) and showed a right brain dominance profile (C>D>B>A). Her most dominant thinking preference was in quadrant C whilst her less preferred styles are in the A and B quadrants.

The *students* in SLPA (Table 1) appear to be mainly (80%) left brain dominant. The majority (64%) prefer learning in the B quadrant, whereas equal numbers (16%) prefer the A and C quadrants. Only one student (4%) preferred the D quadrant. In Figure 2 the comparison of the brain profiles of the lecturer (represented by the thick red line) and students in the discipline SLPA (represented by the thick black line) can be seen.

### Speech Therapists

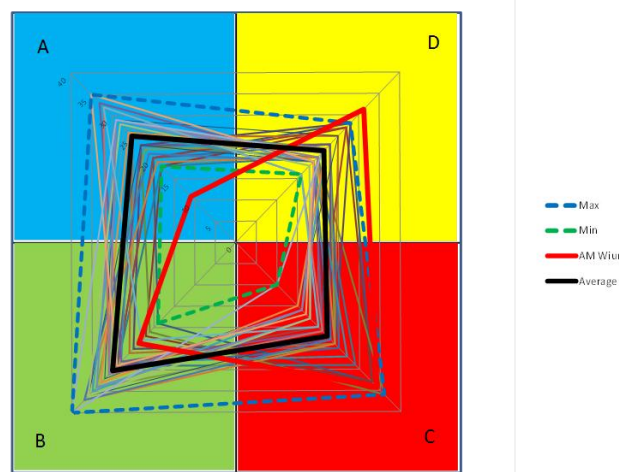


Figure 2: Comparison of the brain profiles of the lecturer and students in the discipline SLPA

The trend of SLPA students appears to be left brain dominant, while their lecturer is right brain dominant. Typical of people with a preference for learning in the B quadrant, the SLPA students generally prefer learning with material in an organised and structured manner where the content is neatly sequenced. This is probably because such content is much easier to learn, especially for those who rely on memorising facts. The second most preferred style of the SLPA students is the A quadrant, as they like to think about ideas and to form theories. In general their least preferred style is the D quadrant, which results in their avoiding of learning experiences that require them to take the initiative and to explore hidden possibilities. They may dislike participation in learning opportunities where they are required to construct concepts or to synthesise content. These second-year students learn well through applying theory or acquiring skills through practice.

The *colleagues* in the SLPA as a group (Table 1) tend to be mainly in the limbic system which comprises the B and C quadrants, as the average of their preferred learning profiles as a group falls within these two quadrants. It is, however, not possible to consider only averages of scores as an indicator of brain profiles of disciplines, as there are several

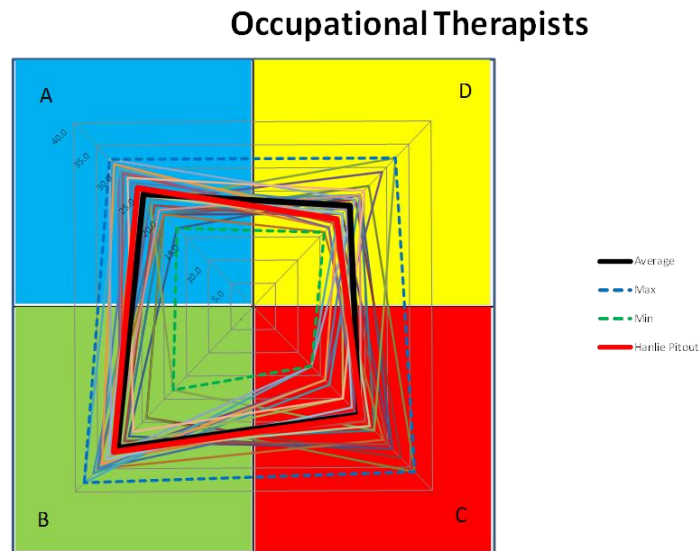
staff members who differ from the average profile. There are some individuals (n=2) who prefer the B and A quadrants of thinking, and some (n= 2) who prefer the C and D quadrants of thinking. One cannot assume that the SLPA discipline attracts lecturers who are mainly limbic in terms of their style of thinking as it is not representative of the entire group.

The colleagues' profiles are not in accordance with the predictions made by Herrmann (1995, 1997) and Avenant (2001) who claimed that SLPA as a group is typically right brain and mostly in the C Quadrant. Their profiles differ also from those of their students, who are mainly left brain dominant, although they share a preference for the B Quadrant.

### ***Occupational therapy:***

The *lecturer* in OT shows a preference for the B quadrant. The B quadrant relates to a preference for processes that require an organised, planned, orderly, and step-by-step approach and her strength in this quadrant lies in the implementation of tasks and the design of tasks to be executed by students. Her second most preferred style is in the A quadrant.

The brain profiles of the lecturer and her students are compared in Figure 3. Similar to the lecturer, the OT students on average tend to have mainly a left brain dominant profile. To meet the needs of her students, the lecturer has to present learning content in a neatly organised and sequential manner. However, she has to provide students with sufficient opportunities to practise their skills, as it is an important aspect in the OT profession. The occupational therapy colleagues' combined profiles are stronger right brain dominant, which fits in with the profile as suggested by Herrmann (1995). There are some individuals (n=5) who prefer the A and B quadrants of thinking (left brain), and some (n= 2) who prefer the B and C quadrants (limbic system) of thinking/learning. It is, therefore not possible to assume that the OT discipline attracts lecturers who are right brain dominant, as being right brain dominant is not representative of the entire group.



**Figure 3: Comparison of the brain profiles of the lecturer and students in the discipline Occupational Therapy**

***Physiotherapy:***

*Brain profiles of the lecturer and students*

The lecturer in physiotherapy has a triple dominant profile, which Herrmann (2010a) describes as typical for the majority of the female population. Her profile (C>D>B>A) is typical of teachers (educators) and people in occupations that require an understanding and ability to function on various levels. This profile implies that in day-to-day life her mental preferences can be described as musical, spiritual, emotional and intuitive. Work elements strongly related to her C-quadrant are the teaching and interpersonal descriptors. This means that she likes to involve others and is sensitive to their feelings. The adjective pairs of her profile describe how she will react under pressure and appear to be different from her general behaviour. This means that at work she prefers Quadrant B that relates to being systematic, organised, sequential and planning ahead. Contrary to her profile, her students (n=32) are mainly left brain dominant. The results shown in Figure 4 show how her students prefer to think and learn.

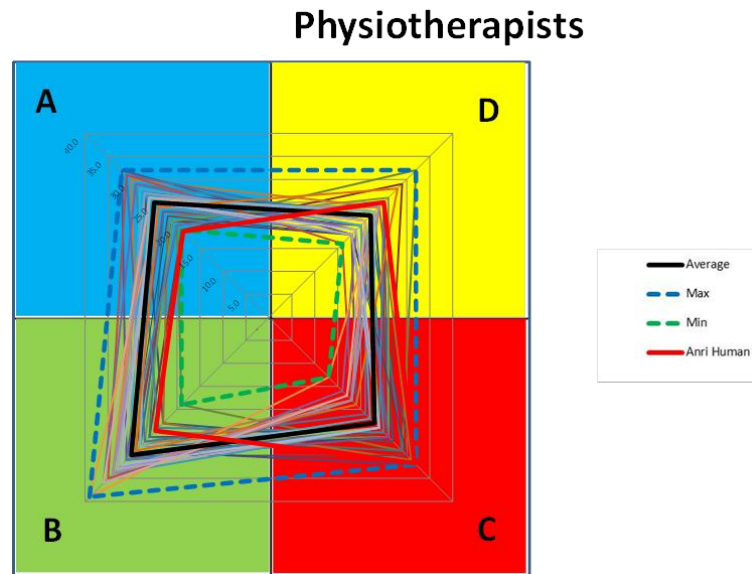


Figure 4: A comparison between the brain profiles of the lecturer and students in the discipline Physiotherapy

The PT students preferred learning in the B quadrant (the so-called safe-keeping self) and preferred to learn significantly lesser in quadrant D (the so-called experimental self). When calculating the scores of all students as well as the average per quadrant, there is, however, not a significant difference between the four quadrants. When comparing the profiles of the lecturer and students (Figure 5), it is clear that the lecturer has a slightly different brain profile from her students. She is mainly right brain dominant, even though she has a triple dominant profile, while her students show a left brain preference.

The comparison of the brain profiles of the lecturer (represented by the thick red line) and students in the discipline PT (represented by the thick black line) (Figure 4). The second-year students (n=32) in PT appear to be mostly (55%) left brain dominant, similar to that of the OT students.

The mentioned profile implies that the PT lecturer has to challenge herself to challenge her learners in the A and B quadrants by, for example, creating self-directed learning activities where they are required to do some independent reading. Having a C



quadrant dominant profile, she has to challenge herself with the preparation of, for example, PowerPoint presentations that are structured and sequential, and therefore more suited for her students. However, she may need to include some role play or group work to challenge those learners with a preference for the A and B quadrants.

The physiotherapy colleagues' profiles (n=12), are similar to the profiles of their students, as the staff members also favoured the left brain quadrants (A and B) rather than those of the right brain (C and D quadrants). Most of the staff members had a more dominant B quadrant profile, which could imply that this type of profile suits the PT profession.

In general, the majority of students in the three disciplines had similar brain profiles and presented as left brain learners (Figure 5).

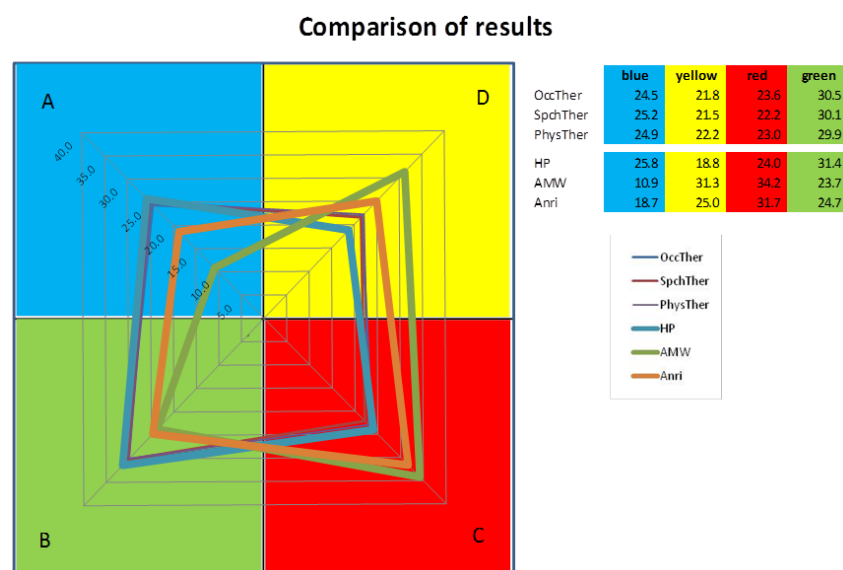


Figure 5: Comparison of results

Similar results were found by Brown, Gosgriff and French (Brown *et al.*, 2008) using the VARK and Kolb instruments, which categorised physiotherapy and occupational therapy students as assimilators (left brain), whereas speech therapy students were considered as

diverges (right brain). The results depicted in Figure 5 are contradictory to what is believed to be the typical preferences of the disciplines Occupational Therapy and Speech-Language Pathology (C quadrant) (Avenant, 2001) but are moderately consistent with those of Physiotherapy (A quadrant) (Herrmann, 1996). It is not possible to generalise the results on the grounds of averages, as it will exclude a significant number of the students. It is, however, not possible to consider only averages of scores as an indicator of brain profiles of disciplines, as there are several staff members who differ from the average profile. It is important that the lecturers be made aware of their students' profiles in order to meet their needs. The students should also be challenged to learn through strategies which are not in their preferred brain profiles.

#### *Reflection on results*

As the shorter adapted version had not been validated, it is acknowledged that the use thereof could cause bias in the interpretation of the results. Notwithstanding that, it is possible that the students are mainly left brain dominant and mostly prefer the B quadrant because they come from an education system where they had been taught in a didactic manner. This could be attributed to the fact that learner-centred approaches were only considered best practice after 1997 (Motseke, 2005). The majority of educators currently in the system are more familiar with teaching through didactic and direct teaching approaches (e.g. lecturing). A didactic teaching approach does not require learners to work in groups or to brainstorm, which is more in accordance with learners who are right brain dominant with a learning preference for the C and D quadrants. When planning learning opportunities, lecturers should consider the fact that these students are mostly left brain dominant and therefore have a learning preference that appreciate it when learning material is well organised and presented in an accurate, precise and logical manner. To accommodate those learners with a preference to learn in the A quadrant, the lecturer may want to start each session with a concept map of

what the students can expect from the learning opportunity, but also to show how the specific module fits within the course. The students' strengths in the A quadrant require that they be given some research to do on a specific topic. These students may find it difficult to synthesise information from several sources because they have a lesser preference for the D quadrant. They may also find it challenging to work within a group, which is preferred by students who have a C quadrant dominance. However, students should be challenged in their less preferred quadrants in order to facilitate whole brain learning and to develop professionally. Therefore, the left brain dominant group should be challenged to participate in group work, brainstorming sessions and role-play activities.

## **Conclusions**

A comparison of brain dominance profiles revealed that it is not possible to make assumptions based on the average student profile as it may exclude many students. Due to the diversity within classes, it is important to use a range of methods of facilitating learning to accommodate all students and to activate the less dominant styles. This will prepare them for the world of work where they will be faced with complex demands (Boyle, 2005; Herrmann, 1995).

This research considered only one specific year group from each discipline. It is possible that different year groups may demonstrate different profiles. It is, however, important to evaluate each specific cohort's profile to accommodate the students' different strengths and weaknesses. In order to contribute to this field of knowledge further research should focus on other institutions where these programmes are presented and/or include more disciplines (e.g. medical and nursing students).

An additional advantage is that knowledge of individual thinking styles creates a better understanding of how to work in a team, and contributes towards more effective

teaching and learning (Hauer *et al.*, 2005; Kolb & Kolb, 2006). The implementation of the Whole Brain Dominance Instrument (WBDI<sup>®</sup>) (Herrmann, 2010b) based on the Whole Brain Learning theory (Herrmann, 1995) assists team work as it facilitates an appreciation for the value of diverse thinking styles and helps to overcome thinking style barriers to cross-team integration.

The identification of learning preferences is a first step in developing more effective teaching practices. However, more research is required to establish if a relationship between learning styles and methods of facilitating learning do exist, but more robust experimental methodologies should be used.

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Qualified as a physiotherapist and worked in private practice for four years before becoming a full-time lecturer at the Physiotherapy department of Medunsa in 2008 (now Sefako Makgatho Health Sciences University). She has a passion for research in higher education and completed her Postgraduate Certificate in Higher Education at the University of Pretoria in 2011. Furthermore her field of interest is in Paediatrics and she is currently registered for her PhD in this field.

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Pieter du Toit specialises in higher education, specifically in the educational professional development of academic staff. He is the coordinator of the Postgraduate Certificate in Higher Education offered at the Faculty of Education, University of Pretoria. He holds a postdoctoral scholarship from the University of Antwerp, Belgium. He has a passion for action research and the application of the principles of whole brain learning with a view to innovate higher education practices.

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