

**Whole Brain® participatory action research to enhance professional  
development of academic staff in higher education**

By

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Submitted in fulfilment of the requirements for the degree of

**PHILOSOPHIAE DOCTOR**

In the Faculty of Education

University of Pretoria

**Supervisor: Prof. Pieter du Toit**

August 2019

## DECLARATION OF ORIGINALITY

I, Christinah Dlamini, student number 14181194 hereby declare that this thesis titled **Whole Brain® participatory action research to enhance professional development of academic staff in higher education** that is submitted for the degree Philosophiae Doctor at the University of Pretoria is my own original work and has not been submitted to any other tertiary institution. All sources quoted or cited in this dissertation have been acknowledged and indicated in a detailed list of references.

**Christinah Dlamini**

  
\_\_\_\_\_

Signature

\_\_\_\_\_  
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CLEARANCE CERTIFICATE	CLEARANCE NUMBER: <b>HU 17/02/01</b>
DEGREE AND PROJECT	PhD Whole Brain® participatory action research to enhance professional development of academic staff in higher education
INVESTIGATOR	Ms Christinah Dlamini
DEPARTMENT	Humanities
APPROVAL TO COMMENCE STUDY	19 April 2017
DATE OF CLEARANCE CERTIFICATE	29 August 2019

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- Informed consent/assent,
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## **ETHICS STATEMENT**

The author, whose name appears on the title page of this thesis, has obtained, for the research described in this work, the applicable research ethics approval. The author declares that he/she has observed the ethical standards required in terms of the University of Pretoria's *Code of ethics for researchers and the Policy guidelines for responsible research*.

## ABSTRACT

As an education practitioner I had taken cognisance of the existence of a gap in the professional development of academics at the exemplar higher education institution where most lecturers were novices in facilitating and assessing learning. I adopted the Whole Brain<sup>®</sup> Teaching and Learning Model by Ned Herrmann (1996) to transform our teaching practice. The model calls for innovative methods of facilitating learning. I adopted participatory action research to transform our teaching practice. In a community of practice, 10 novice lecturers between 35 and 50 years of age who had taught in higher education for 10 years and less implemented the Whole Brain<sup>®</sup> Teaching and Learning Model. The study's aim was to promote a scholarship of teaching and learning in the higher education setting. I formulated the primary question: *How can my fellow-lecturers and I as a collective use the Whole Brain<sup>®</sup> Thinking Model to transform teaching in higher education in Zimbabwe?* A mixed methods approach was used to obtain various thoughts and views about Herrmann (1996) Whole Brain<sup>®</sup> Model of transforming practice. Diverse learning opportunities which included: different questioning techniques; various learning activities and different media were adopted. The Herrmann Brain Dominance Instrument<sup>®</sup> (HBDI<sup>®</sup>) data was used as baseline study to determine our thinking style preferences; while student feedback questionnaire data was used to evaluate the learning opportunities. Interviews, focus group meetings that were video - and audio-recorded were used to solicit qualitative data. Quantitative data was analysed using the Statistical Package for Social Sciences version 23 and qualitative data was analysed using deductive thematic analysis. Results from the HBDI<sup>®</sup> report affirmed the diagnosis of our thinking preferences. The results showed that lecturers inspired students by their enthusiasm for work (73%); lecturers initiated learning by providing opportunities that reflected real - life situations (70%); lecturers promoted cooperative learning (71%). Students also contributed to their learning by developing a greater sense of responsibility (66%). The results of the two examinations were skewed towards the A and B quadrants. The general observation was that Whole Brain<sup>®</sup> methods of facilitating learning and the skill of setting Whole Brain<sup>®</sup> examinations were lacking.

**Key words:** Whole Brain<sup>®</sup> Model; participatory action research; learning preferences/styles professional development; novice lecturers, community of practice.

LANGUAGE EDITOR'S DISCLAIMER

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22 July 2019

**TO WHOM IT MAY CONCERN**

I, the undersigned, hereby declare that the doctoral thesis titled

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**professional academic staff in higher education** by

**Christinah Dlamini** has been edited for grammar errors.

It remains the responsibility of the candidate to effect the recommended changes.

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Prof. Tinus Kühn

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(helping them find solutions/answers) **153**

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## ACKNOWLEDGEMENTS

An endeavour of this magnitude in pursuing the highest level of academic achievement, I confess, is only possible with the support of loving people who believe in one's abilities. As proof of my interpersonal thinking preference, let me acknowledge a great number of institutions, families and individuals who contributed to the accomplishment of this prolonged but gratifying academic excursion.

- Prof. Dr Pieter du Toit, my supervisor, Whole Brain® role model and father figure who offered professional guidance in my search for new knowledge. Thank you for trusting my abilities. I am confident about my newly found construct of facilitating learning in higher education.
- Prof. Tinus Kühn, for your linguistic expertise and for refining the language usage in the thesis.
- The University of Pretoria for contributing to the realisation of my scholarly dream.
- The exemplar institution, for permitting me to use the institution as my research ground.
- My fellow participants: Prof. Stella Muchemwa, Sihle Nyathi, Primrose Ndlovu, Tafadzwa Vambe, Bhekimpi Ndiweni, Tipson Maleti Brian Mahaso, Khanyisa Malufu and Givemore Benesi; in a community of practice we worked tirelessly to improve our teaching practice and practitioner research.  
I could not obtain this doctorate without you.
- My respondents, your honest comments about our teaching practice helped us to be better facilitators of learning.
- The Media team: Mr Kumbirai Mkanganwi, Dalu, Senzo, Uriah, Mkhululi and Manyara; your sacrifice is greatly appreciated.
- Dr Colwasi Mthunzi, your transcription of data brought me this far.
- My loving husband, Dickson, Innocent Dlamini, your unwavering support from the beginning of the journey to the end humbles me.

- My amazing, loving and inspiring children: Ruby Ndlovu, Dumisa Dale, Cydee Buhlebenkosi and Cinderella Donate Dlamini: I could not have made it without your support.
- My sister's family: Sindisiwe, David and Ellah-Rumbie: You were with me all the way from the start to the finish; your social and financial support humbled me.
- Ntando, my nephew, my statistician, your numerical advice is really appreciated.
- Fanwell Ncube, your patience with a novice ICT mother will always be appreciated.
- Enock Chayerera, your ICT advice cannot be ignored.
- Dr Nhlanhla Mpofo, Dr Novuyo Nkomo, Dr Mildred Nyamayaro, Dr Ivonne Ndlovu, Dr Moreblessing Dziva, Ms Dudu Matshisela, Ms Ednah Mhosva, Ms Phana Mahlangu, Pastor Tshuma, and the late Paul Ndlovu: Your advice and encouragement always kept me on my feet.
- Mr and Ms Ntokozo Charity Ncube: and Blessing Your concern and support greatly contributed to this success.
- My large family: Isizukulwane, Bakwethu and Maswazi Amahle: Your prayers strengthened me.
- My entire Solusi family: I could not have made it this far without your support.

## **DEDICATION**

This work is dedicated to my family, my late mother, Sonengani Ngwenya and all innovative facilitators of learning in higher education

## ABBREVIATIONS

AAA: Adventist Accrediting Association

ACCA: Association of Chartered Certified Accountants

AR: Action Research

Bed: Bachelor of Education

BSAC: British South Africa Company

CAF: Central African Federation

C&MIS; Computer and Management Information Systems

ECE: Early Childhood Education

GPA: General Point Aggregate

HBDI<sup>®</sup>: Herrmann Brain Dominance Instrument<sup>®</sup>

HE: Higher Education

IQ: Intelligence Quotient

LSF: Learning Style Flexibility

MBA: Management and Business Administration

M.Ed: Master of Education

MMA: Mixed Methods Approach

MI: Multiple Intelligences

NCHE: National Council of Higher Education in Zimbabwe

PAR: Participatory Action Research

PGDHE: Post-graduate Diploma in Higher Education PGDE: Post-graduate Diploma in Education

RIE: Research and Lecturer Intellectual Expo

SADC: Southern African Development Community

SDL: Self-Directed Learning

STEM: Science, Technology, Engineering and Mathematics

SU: Solusi University

WBM: Whole Brain® Model

WBEPL: Whole Brain® Experiential Professional Learning

WBESL: Whole Brain® Experiential Student Learning

WBPAP: Whole Brain® Participatory Action Research

WBPMI: Whole Brain® Professional Multiple Intelligences

WBSRPL: Whole Brain® Self-Regulated Professional Learning

WBSRSL: Whole Brain® Self-Regulated Student Learning

WBSMI: Whole Brain® Student Multiple Intelligences,

ZIMCHE: Zimbabwe Council of Higher Education

ZIMSEC: Zimbabwe School Examinations Council

## ACRONYMS

LP1: Lecturer-Participant 1

LP2: Lecturer-Participant 2

LP3: Lecturer-Participant 3

LP4: Lecturer-Participant 4

LP5: Lecturer-Participant 5

LP6: Lecturer-Participant 6

LP7: Lecturer-Participant 7

LP8: Lecturer-Participant 8

LP9: Lecturer-Participant 9

LP10: Lecturer-Participant 10

LP1R1: Lecturer-Participant 1 Respondent 1 LP1R2:

Lecturer Participant 1 Respondent 2

LP2R1: Lecturer-Participant 2 Respondent 1

LP2R2: Lecturer-Participant 2 Respondent 2

LP3R1: Lecturer-Participant 3 Respondent 1

LP3R2: Lecturer-Participant 3 Respondent 2

LP4R1: Lecturer-Participant 4 Respondent 1

LP4R2: Lecturer-Participant 4 Respondent 2

LP5R1: Lecturer-Participant 5 Respondent 1

LP5R2: Lecturer-Participant 5 Respondent 2

LP6R1: Lecturer-Participant 6 Respondent 1 LP6R2: Lecturer-Participant 6 Respondent 2

LP7R1: Lecturer-Participant 7 Respondent 1

LP7R2: Lecturer-Participant 7 Respondent 2

LP8R1: Lecturer-Participant 8 Respondent 1

LP8R2: Lecturer-Participant 8 Respondent 2

LP9R1: Lecturer-Participant 9 Respondent 1

LP9R2: Lecturer-Participant 9 Respondent 2

LP10R1: Lecturer-Participant 10 Respondent 1

LP10R2: Lecturer-Participant 10 Respondent 2

## CHAPTER 1

### RESEARCH ORIENTATION

#### 1.1 INTRODUCTION

This study addresses a gap in the teaching practice of novice lecturers at the exemplar institution of higher learning. By investigating our teaching practice we constructed new meaning and contributed to the current body of knowledge, based on our lived experience (Hendricks, 2013; McNiff and Whitehead, 2006). The Whole Brain® Thinking and Learning Model (Herrmann, 1995) has been used to enhance the professional development of the lecturers involved in the study. The ten novice lecturers who participated in the study were empowered to transform their teaching practice and practitioner research. The model formed the epicentre of our participatory action research. Since the main focus of the research was on the professional development of lecturers, participatory action research was adopted as scholarly process for this development (Hendricks, 2013; Wolvaardt and Du Toit, 2012). A participatory action research design establishes a scholarly community of practice (Smit and Du Toit, 2016). The Whole Brain® Model promoted creativity, innovation and expertise in the respective subject areas.

The nature of the selected site coerced a participatory action research process that was complemented by a mixed methods approach. A mixed methods approach permits integration of both quantitative and qualitative data (Creswell, 2014). The qualitative approach captured the lived learning facilitation and research while a baseline study – a quantitative approach – was used to determine the thinking style profiles (Herrmann International, 2018). The Herrmann Brain Dominance Instrument® (HBDI®) was used as a diagnostic assessment tool (De Boer, Bothma and Du Toit, 2011); its results formed the baseline data for the study.

The imperative for academic staff members in higher education (HE) is to provide academic proficiency and competency by obtaining the preferred outcomes for the 21<sup>st</sup> century students, engage in curriculum transformation, evaluate programmes in new ways and refine practitioner research skills (Brew, 2010; Shava, 2015;). Hence the lecturers of the exemplar institution expressed the need for professional development, which is “a continuing and constant progression of inquiry into,

development of and reflection on one's teaching practice" (Henard and Roseveare, 2012, 17).

The need for the educational professional development of lecturers is spelt out in the vision and mission statement of the Ministry of Higher and Tertiary Education, Science and Technology Development of Zimbabwe (2016), namely to "provide an effective system for the production of patriotic and competent high level manpower through the provision and accreditation of higher education programmes and institutions for sustainability and global competitiveness". Vatalaro, Szente and

Levin (2015, 43) reiterate the vision by stating, "Global competence is a vital skill for all 21<sup>st</sup> century students and HEIs are obliged to find ways for pre-professionals to increase their global competence skills." Henard and Roseveare (2012, 8) postulate that the professional development of lecturers has become paramount in advancing world internationalisation that is rapidly widening the scope of education with its great diversity of students. To remain abreast of diverse student expectations and to increase their global competence, lecturers should upgrade themselves with innovative ways of improving their practice (Cekiso, 2015; Mkonto, 2015). In a bid to upgrade the novice lecturers, they explored the Whole Brain<sup>®</sup> Thinking approach as a model for professional development (De Boer, Du Toit, Sheepers and Bothma, 2013).

My twenty-five years of experience in the teaching fraternity, both in secondary schools and on higher education level has shaped my professional development. Experience has created the need to further my academic and professional development. I enrolled for a Bachelor of Education and Master of Education degree with Solusi University in Zimbabwe from 2001 to 2003, and from 2007 to 2010 respectively. I believed a degree in my teaching career would augment both theoretical knowledge and research skills in the subjects I taught. My master's degree research experience acquainted me with Howard Gardner's Multiple Intelligences Theory (MI) (1983; 1993), which I found very effective in facilitating learning. The findings revealed that all eight intelligences were significant for teaching and learning (Dlamini, 2010, 43). I learnt that it is imperative for a teacher to understand one's learning styles and competences as well as those of one's learners (De Boer et al., 2013).

The education sector in Zimbabwe faced the dilemma of a shortage of lecturers in higher education in 2008. About 80% of qualified and experienced lecturers left the country for greener pastures in neighbouring countries (Majoni, 2014; Muzenda and

Duku, 2014; SARUA, 2012). The brain drain was a major drawback for the education system in Zimbabwe, and as a result unqualified and inexperienced lecturers were employed (Machawira and Mbizvo, 2009). In some universities employees with only a bachelor's degree qualification were recruited to teach. These newly recruited lecturers lacked appropriate teaching experience for reliable and effective delivery (Machawira and Mbizvo, 2009; Majoni, 2014). My fellow participants and I were some of the novice lecturers with only a bachelor's degree, employed by institutions of higher learning as assistant lecturers. Under normal circumstances, assistant lectures work under the supervision of senior, experienced lecturers. My case was unfortunate as very few lecturers were qualified to mentor a novice. The few qualified lecturers had overwhelming workloads so that they could not afford an extra load of assisting inexperienced lecturers to teach.

Pedagogical psychology on adolescent learning was all I had acquired during my teacher education. Now I had to broaden it into knowing and understanding the concept of andragogy (Knowles, 1979; Knowles, Holton and Swanson, 2015). Andragogy is "the art and science of helping adults learn" or "adult pedagogy" (Gravett, 2005, 70-71). To aggravate my dilemma, I was expected to produce course outlines, set and mark assignments, quizzes and examinations. I later discovered through literature that this was a common challenge to most university lecturers as reiterated by Race (2015). The brain drain also affected the areas of research and publication in that there was a lack of training in research and publication (Majoni, 2014; SARUA, 2012).

The exemplar institution does not offer a Post-Graduate Diploma in Higher Education (PGDHE). As a result the lecturers lacked the criticality of professional growth that is acknowledged by scholars such as: Brew (2010); Desimone and Garet (2015); Henard and Roseveare (2012); Moreno-Murcia, Torregrosa and Pedreno (2015); Pretorious, Steyn and Johnson (2011); and Shava (2015). A PGDHE is a professional development programme that aims at equipping lecturers with skills and theoretical knowledge on how to teach in higher education. The qualification advances lecturers' skills to plan, facilitate and assess student learning. It is a formal higher education qualification that focuses on the professional development of lecturers and heightens their professional skills and experiences as well as positions them for greater academic success in teaching, research and community service (De Boer et al., 2013; Fringe, 2013; and Shava, 2015).

Literature on academic professional learning informed me about the existence of a gap in the professional development of academics at the exemplar university; hence the decision to adopt the Whole Brain® Teaching and Learning Model to transform our teaching practice. I have formulated the following primary research question that is epistemological in nature: *How can my fellow-lecturers and I as a collective make use of the Whole Brain® Thinking Model to transform teaching in higher education in Zimbabwe?*

A collective approach to transforming our scholarship of teaching and learning was influenced by the Whole Brain® participatory action research that is the key theory in this study. Brew (2010, 108) posits that scholarship is “preparing and creating new knowledge ... it is thinking about your work as something that needs to be done well, that stands up to the scrutiny of other scholars”. The constructivist concept is further explained by De Boer et al. (2013):

Professional development of academic staff is no luxury, but an imperative. If everyone wants to see higher education practices of facilitating learning being transformed, be they managers or lecturers as practitioners, there is no other way than to take a collective position. Ultimately each lecturer is responsible for transforming their own practice and constructing new meaning about this practice in a scholarly way (101).

Mizell (2010) and Shava (2015) are of the opinion that professional development improves the quality of teaching and learning. Knowledge of teaching skills improves to a great extent as a result of professional development and enables lecturers to provide high quality learning opportunities for students. Pitsoe and Maila (2012) concur that professional development changes lecturers’ teaching methods and assists them to operate beyond a narrow conception. For instance, lecturers in the digital age should increase their subject content and teaching methods to suit the new technology in areas such as Science, Technology, Engineering and Mathematics (STEM), internet usage and social media (Hunzicker, 2010; Race, 2015).

I mentioned earlier that this study was motivated by my zeal to innovate and transform my teaching practice and practitioner research and of my fellow novice lecturers. However, the changes I noted in the Zimbabwean context of higher education augmented this motivation. Like any other country in the 21<sup>st</sup> century, higher education in Zimbabwe faces the pressure of the establishment of many universities and the multiplicity of academic programmes. The Ministry of Higher and Tertiary Education

Science and Technology Development in Zimbabwe has the responsibility to improve the quality in higher education. Notwithstanding the various setbacks facing HEIs, ZIMCHE under its mandate to promote and coordinate higher education in Zimbabwe carries out audits in HEIs to verify quality teaching. Special attention is given to, inter alia, qualifications of lecturers, research and student academic programmes (Garwe, 2014; Research and Lecturer Intellectual Expo (RIE), 2013; 2012; 2011; Shizha and Kariwo 2011; UNESCO, 2013-2015; ZIMCHE Act, 2006).

## 1.2 THE ZIMBABWEAN HIGHER EDUCATION CONTEXT

To propagate a full understanding of the purpose of this study, information regarding the Zimbabwean higher education system is provided.

### 1.2.1 Geography and demography

Zimbabwe is located in the southern region of Africa and is a landlocked country of 390 580 square kilometres with a population of 16 033 709 (Marist International Solidarity Foundation, (2011). The country lies on a plateau between two river basins: the Zambezi in the north and the Limpopo in the south. Zimbabwe shares borders with five countries, namely South Africa (to the south), Botswana (to the west), Mozambique (to the east), Namibia (northwest) and Zambia (to the north) (UNESCO, 2013-2015). See Figure 1.1 for Zimbabwe's neighbouring countries, and its geographical location in Africa.



**Figure 1. 1: Zimbabwe's neighbouring countries and Zimbabwe's location in Africa**  
(<https://www.halotrust.org/wherework/africa/zimbabwe/>&<http://ontheworldmap.com>)

The capital city of Zimbabwe is Harare that is the head office of ten administrative provinces in the country: Bulawayo, Harare, Manicaland, Mashonaland Central, Mashonaland East, Mashonaland West, Masvingo, Matabeleland North, Matabeleland South and Midlands.

The British colonised Zimbabwe in 1890 through an agent, the British South Africa Company (BSAC). The native Shona people living in Zimbabwe built their homes with stones, hence the name *Zimbabwe*, which means *dzimba dzamabwe* or houses of stone. The colony was then named Rhodesia after Cecil John Rhodes, the leader of the white European settlers (Matsika, 2000; 2012).

### **1.2.2 Genesis of HEI in Rhodesia**

The Government of Rhodesia introduced a racially prejudiced education system that favoured the white minority at the cost of the black majority. It formed two systems of education, one for the white European settlers and the other for the Africans ( SARUA, 2012; Zvobgo, 1999). In 1957 formal higher education was introduced at the University College of Rhodesia and Nyasaland, also known as the Central African Federation (CAF). This was a pseudo-autonomous federation of three southern African territories: Southern Rhodesia, Northern Rhodesia and Nyasaland. The Federation formally ended on December 31, 1963 with Northern Rhodesia becoming Zambia, and Nyasaland becoming Malawi, and Southern Rhodesia becoming Zimbabwe (SARUA, 2012; Zvobgo,1999). The University College of Rhodesia and Nyasaland was the first colonial government initiative to offer university education. Admittance to university education was determined more by phenotype (the physical appearance) than by the academic abilities of individuals. Because of this policy, very few blacks were admitted. Out of the 71 students who came from the three territories, only eight were blacks. By 1960, out of the 168 students enrolled 30 were Africans. The University College of Rhodesia and Nyasaland became the University of Zimbabwe in 1980 when Zimbabwe attained its independence (SARUA, 2012; Shizha and Kariwo, 2006; ZIMCHE, 2006).

### **1.2.3 HEIs in post-independent Zimbabwe 1980**

Higher education in Zimbabwe is provided through universities, technical colleges, teacher training institutions, vocational and skills training centres, and polytechnics. The advent of independence brought a vast expansion in the education system in Zimbabwe (Matsika, 2000). This caused enormous pressure on the one university in the country. It prompted the establishment of a second state-funded university, the National University of Science and Technology (NUST) in Bulawayo in 1991. This is the second largest university after the University of Zimbabwe. As is reflected in its name, NUST focuses mainly on hard or natural sciences (SARUA, 2012). The drive to increase access to higher education resulted in the establishment of nine government-funded universities and six privately owned ones. The exemplar institution is one of the six private universities.

#### **1.2.4 Policies and bodies that govern HEIs in Zimbabwe**

Higher education in Zimbabwe is governed by a number of policies that have informed the formation and supervision of higher education institutions in postcolonial Zimbabwe; among others is the Manpower and Planning Act of 1984, which is responsible for the establishment, maintenance and operation of technical and vocational institutions and universities. It promotes human capital development (SARUA, 2012). The Zimbabwe Council for Higher Education (ZIMCHE) monitors and regulates the qualifications offered by private and public institutions of higher learning in the country. It controls the standards of teaching, examinations, academic qualifications and research in higher education. ZIMCHE is a clear indication of the direction that the country is taking to guarantee that the higher education system produces quality graduates who are capable of competing at an international level (ZIMCHE, 2006). In a move to raise the standards and quality of higher education in Zimbabwe, the Minister of Higher and Tertiary Education, Science and Technology Development outlined plans for every university lecturer to be in possession of a doctoral qualification by 2015 (University World News, 2012).

Because of the country's economic doldrums, universities are unable to assist lecturers in upgrading themselves; therefore the problem echoed by SARUA of having few academics with doctoral qualifications still stands (SARUA, 2012).

#### **1.2.5 Challenges facing higher education in Zimbabwe**

Quality education in higher education has since been marred by the economic backdrop witnessed in the past ten or so years of education (UNESCO, 2013-2015, 3). The resulting brain drain has left the education system in a dilemma (Shizha and

Kariwo, 2011). Majoni (2014, 2) provides a summary of the challenges that relate to teaching and learning in higher education: “Shortage of skilled and experienced teaching staff; new staff lack of training and induction; poor academic leadership and management of processes and unavailability of modules for students”. Matsika (2000); Garwe (2014) avers that HEIs are capable of bringing solutions to the challenges through qualitative research. Qualitative research is exploratory as researchers delve deeper into the problem and gain insight into the problem. Research according to Garwe (2014) harnesses leading innovations and intellectual output from Zimbabweans, thereby encouraging the development of the nation. This study is a response to Matsika and Garwe’s call as it delves into the problem of teaching and practitioner research in higher education. Our experience with Whole Brain® Teaching at the exemplar institution should foster Zimbabwe higher education development as is shown in Chapters 4 and 5 of this study.

### **1.2.6 HEIs’ academic degrees and duration in Zimbabwe**

Higher Education Institutions offer both full-time and part-time diploma and degree programmes. Full-time undergraduate (bachelor) degree programmes last three to four years, five years in the case of mining engineering, medicine and dental surgery. Honours programmes normally take one year to complete. Master’s degree programmes last one to two years and doctoral degrees take a minimum of two to three years (World Data on Education, 2010/11). Entry qualifications for the degree programmes vary. The academic year in Zimbabwe is organised into semesters. The duration of a semester is four months. Entry into university requires two Advanced Level (A Level) subjects passed with at least grade E. Ordinary Level (O level) holders qualify for university when they are 25 years old and above, have a minimum of five subjects including Mathematics, Science and English. The applicants write a mature entry examination that should be passed with 50% and above grade. Bachelor of Education (B.Ed.) degrees are entered by teachers with a diploma qualification from any recognised teacher training college while Master of Education (M.Ed.) degrees require a B.Ed. and a General Point Aggregate (GPA) of 2.75 (Solusi Bulletin, 2011-2018). Table 1.1 below provides a summary of the academic programmes.

**Table 1.1 HE degrees and duration**

<b>Academic Programmes</b>		
<b>Programme</b>	<b>Academic Degrees</b>	<b>Duration</b>
Undergraduate	Bachelor	3 - 5 years

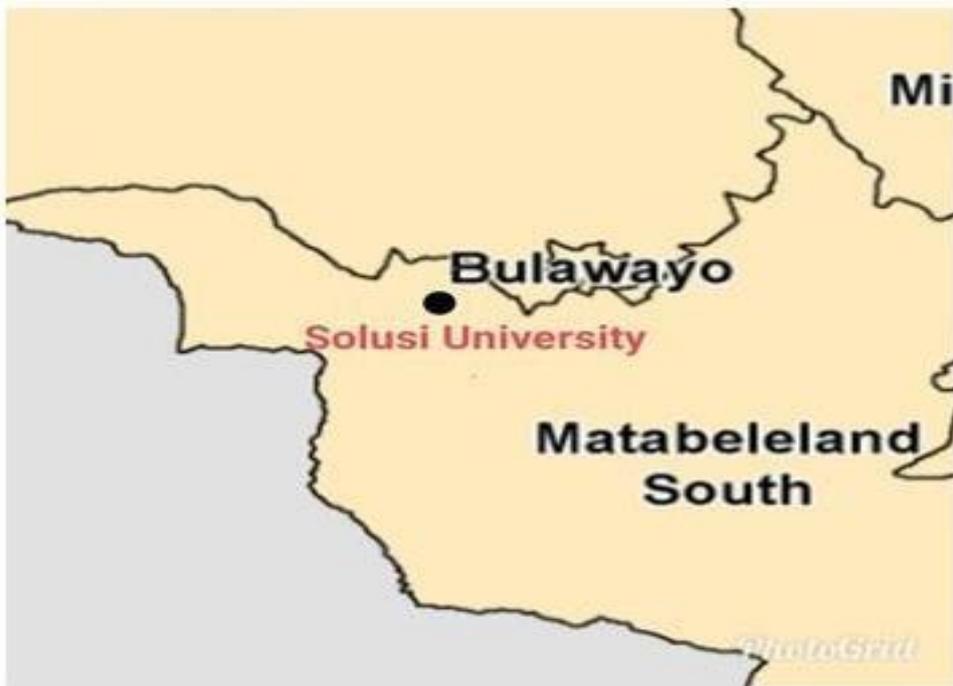
Post-graduate	Honours	1 year
Masters		1 - 2 years
Doctorate		2 - 3 years

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### 1.3 BACKGROUND OF THE EXEMPLAR INSTITUTION

The high demand for university placement in the country influenced by the competitive role of learning prompted the government of Zimbabwe to allow private providers to establish own universities (ZIMCHE, 2006). On 4 October, 1994, Solusi College was granted a charter establishing it as a university. A charter is an instrument of authority given to a private institution upon fulfilling or meeting the requirements of ZIMCHE. If the Council, after considering the application and making such inspection of the institution as it deems fit, is satisfied that the provisionally registered private institution has fulfilled the terms and conditions under the provisional registration certificate, it may make recommendations to the president through the minister that a charter be granted to the institution concerned (ZIMCHE Act, 2006).

Solusi University (SU) is a co-educational private university administered by the Seventh-day Adventist Church. It was founded by American missionaries in 1894 and started as a college for training pastors in Africa, hence the Adventist description that it was the mother of all missions in Africa. With the growing demand for church workers in the various fields, the mission college started a teacher training college in 1929. The college was affiliated to Andrews University of America until 1994 when it was granted a charter by the National Council of Higher Education in Zimbabwe (NCHE) that affiliated it to the government of Zimbabwe. In 1998 the institution was recognised as a private university and it started to run academic programmes from elementary to tertiary level. The name *Solusi* is derived from the local chief's name, *Soluswe*, a local farmer whose land was taken by the colonial settlers led by Cecil John Rhodes (Solusi University, 2016). The missionaries could not pronounce the name properly in the native Ndebele language. It is located approximately 50 kilometres southwest of Bulawayo in the Matabeleland South province, 60 kilometres away from the Plumtree Botswana border post. Bulawayo is the second largest city in Zimbabwe.



**Figure 1. 2: The location of Solusi University in Bulawayo Matabeleland South Province. (Source: Solusi Website [www@solusi.ac.zw](http://www.solusi.ac.zw))**

The University occupies 12 000 acres of land, the Solusi farm (Solusi University, 2016). On the farm there are three other academic centres of learning that including: Solusi Pre-school, Solusi Primary School and Solusi High School. There are two major industries that service the university and these include the bakery and gown industries. There are five faculties at Solusi University that I present in alphabetical order. The first is the Faculty of Arts, which has two departments, the Department of Languages and Communication, and the Department of History, Peace and Development Studies. The second is the Faculty of Business with six departments, namely Graduate Studies in Management and Business Administration (MBA), the Department of Accounting, the Department of Business Studies, the Department of Finance, the Department of Computer Management and Information Systems, and lastly, the Department of Marketing.

Following the Faculty of Business is the Faculty of Education that, as the name suggests, concentrates on teaching. It has two departments, the Department of Graduate Studies that has two programmes running, namely the Post-graduate Diploma in Education (PGDE) and Master of Education (M.Ed.) that has two modules, Master of Education in Education Management and Master of Education in English Language and Literature. The second department in the faculty of education offers undergraduate studies in education: The Bachelor of Education (B.Ed.) in the following subjects: Agriculture, Biology, Business Studies, Clothing and Textiles,

Environmental Science, English, Food and Nutrition, Mathematics, Ndebele, Religious Studies, Science, Family and Consumer Sciences, and Shona. The department also offers certificates and diplomas in Early Childhood Education (ECE) (Solusi University Bulletin 2011-2018).

The fourth is the Faculty of Science and Technology with five departments, namely the Department of Agribusiness, the Department of Environmental Sciences, the Department of Food and Nutrition, the Department of Mathematics, and the Department of Clothing and Textiles that offers both a Bachelor of Science in Clothing and Textiles and Bachelor of Clothing and Textiles Education. The fifth is the Faculty of Theology and Religious Studies. Solusi University was initially a theology centre that trained pastors for certificates and diplomas. Today the faculty awards undergraduate and graduate degrees in Theology and Religious Studies, not only to members of the Seventh-day Adventist Church but to any denomination.

Apart from certificates in Early Childhood Education (ECE), the institution offers studies in English as a Foreign Language, and Chaplaincy, and a diploma in Early Childhood Education. Degrees are offered at undergraduate, graduate and postgraduate levels in the following disciplines: Accounting, Agriculture and Agribusiness, Business Studies, Clothing and Textiles, English and Communication, Computer and Management Information Systems (C&MIS), English Language and Literature (Honours), M.Ed. in English Language and Literature, M.Ed. in Educational Management, Ndebele, Shona, Environmental Health, Finance, Food and Nutrition, Master of Science in Nutrition, History, Peace and Conflict, Developmental Studies, Management and Marketing, Management of Business Administration (MBA) Mathematics, Theology and Religious Studies (Solusi University Bulletin, 2011-2018).

Solusi University is an international university. It enrolls students and employs lecturers from all over the world. Students currently enrolled are from Botswana, South Africa, Lesotho, Zambia, Mozambique, Angola, Malawi, Namibia and Swaziland. Solusi University adheres to the Southern African Development Community (SADC) conventions on regionalisation that encourage partnership in education of Southern African countries (SARUA, 2012). Globalisation strengthens relations all over the world; therefore universities are subject to a global knowledge system. I am a beneficiary of the SADC partnership as I am studying in South Africa (Solusi University Bulletin 2011-2018).

The exemplar institution (Solusi University) was the case under investigation and the context was that of professional development of academic staff in higher education. Professional development is the responsibility of every institution of higher learning and the exemplar institution is affected by the necessity to address the issues of learning, teaching and practitioner research (Matsika, 2012; SARUA, 2012; UNESCO, 2013-2015; ZIMCHE, 2006, 2012). The exemplar institution had no programme that supported the professional development of its lecturers; the institution was selected because of this concern. A second reason was my epistemological desire to know how we as lecturer learners could transform our teaching practice in higher education (Guskey, 2002). The final consideration was my ontological zeal to discover and confirm what other education scholars mentioned in the literature review concerning the use of the Whole Brain® Model as a method of professional development and transformation of practice (Coffield, 2004; De Boer et al., 2013; Herrmann, 1982; 1995; 1996; Herrmann International, 2017; 2018). Whole Brain® Theory was used, not to test it but as an innovative model that enables the lecturer to transform his teaching practice and practitioner research.

#### **1.4 MY PRACTICE AS INFORMED BY EDUCATIONAL ETHICAL VALUES**

As a researcher I regard it as an obligation to be guided by certain educational principles since I work with humans in collecting data that concerns our practice. I conduct research responsibly, basing it on human values such as honesty, fairness, objectivity, reliability, accountability, freedom and openness (Gravett, 2005). I commit myself to those I work with, and respect their rights, freedom, needs and desires by spelling out precisely the purpose of my research both orally and in writing. The legitimacy of the values of freedom and equality of the participants was observed to avoid undermining “human diversity through coercive enforcement and the application of single sets of beliefs” (Fringe, 2013, 9).

#### **1.5 RATIONALE FOR THE STUDY**

Various factors motivated me to execute this study. First and foremost I share my supervisor’s view of professional development that I, as an educator, am responsible for my professional development and the professional development of all educators with whom I have scholarly encounters – encounters that involve making a difference in the professional lives of other members of the society (Du Toit, 2013). Together

with my fellow-lecturers I am concerned about inexperience in teaching in higher education; hence our concern regarding the scholarship of teaching and learning (De Boer et al., 2013).

Albert Einstein's maxim, "It is simply madness to keep doing the same things, and expect different results" Race (2015, 254) motivates me as a lecturer in the 21<sup>st</sup> century. As lecturers at the exemplar institution, we could not continue using traditional ways of facilitating learning to 21<sup>st</sup> century technological students (Race, 2015; Palmer, 2015).

I was also motivated by the turmoil that overwhelmed and is still engulfing Zimbabwean higher education – the mass exodus of experienced academics and researchers in higher education (SARUA, 2012). The exodus hampered HEIs' research output and the professional growth of academic staff. Despite the increase in number of HEIs in Zimbabwe (15 universities), uncertainty concerning professional development activities devoted to innovative scholarly methods of teaching, assessment and research still remains as the Zimbabwean economy continues to decline. Furthermore, the exemplar institution has no Centre for Learning – a department that is significant for professional development in higher education. As reiterated in the introduction to this chapter, the institution has no PGDHE, i.e. a programme that equips professionals with skills and knowledge to teach in higher education.

The call by the then Minister of Higher and Tertiary Education Science and Technology Development, that all lecturers teaching in universities should possess a doctoral qualification by 2015 (University World News, 2012) influenced my decision to embark on a Ph.D. journey to meet the requirements currently needed in institutions of higher learning. Solusi University has 41 full-time lecturers and out of the 41, only 11 hold doctoral degrees. Despite the minister's timeline, especially considering the harsh economic circumstances, the nation is experiencing, I find the call astute and fecund for one who is a partisan and would like to see transformation in HEIs. I enrolled for doctoral studies and embarked on this research with the confidence that the output would contribute to the body of knowledge significant for the transformation of Zimbabwe's higher education in the 21<sup>st</sup> century.

The other motivating factor was the concept of internationalisation. Higher education institutions are pressurised to broaden their scope of education to accommodate a greater diversity of students and to make sure that their graduates meet the requirements of the labour market (Adamu, 2017; Henard and Roseveare, 2012;

Knight 2014; Muzenda and Duku, 2014). Therefore as contemporary lecturers, we are obliged to embrace the concept of internationalisation to contribute significantly to its prospects.

The vital factor for this research, *inter alia*, was my personal experience as well as my fellow lecturers' professional experience as novice lecturers at an institution of higher learning. Bullough and Gitlin (2010, 44) aver that "when teachers understand themselves and the contexts in which they teach they are better able to answer the question: Can I be who I am in the classroom?" As novice lecturers and researchers at the exemplar institution, we understood our limitations in andragogy/ pedagogy – the philosophy of teaching adults, as Knowles, (1979) and Knowles et al. (2015) put it. Through reflective inquiry of our practice we were able to realise that we were not performing according to our education values; hence we sought innovative ways of addressing our problem and the denouement was Whole Brain® participatory action research.

The evaluation of lecturers' teaching and assessment by both chairpersons and students at the exemplar institutions in the past five years has shown that most lecturers lack innovation and creativity in teaching and in the assessment of students' work. Recurring comments, especially from B.Ed. and M.Ed. students were on poor teaching methods (Solusi University Faculty Evaluations, 2011-2016). These comments have the potential to be authentic as most of these students are professionals who are already aware of how best a lesson should be delivered. As a community of professionals we share a common responsibility of deepening our knowledge and expertise in our teaching practice and research (Ampartzaki, Kyriotaki, Voreadou, Dardioti and Stathi, 2013).

## **1.6 AIM AND OBJECTIVES OF THE WHOLE BRAIN® PARTICIPATORY ACTION RESEARCH STUDY**

The study's aim is to promote a scholarship of teaching and learning in the higher education setting with constructivist, self-directed, experiential and multiple intelligences thinking through the Whole Brain® Model. The primary question to be answered is: *How can my colleagues and I as a collective make use of the Whole Brain® Model to transform the teaching practice and practitioner research of academic staff in higher education in Zimbabwe?*

The objectives of the study are the following:

- To define Whole Brain® Thinking and Learning Theory.
- To identify our thinking preferences as lecturer participants.
- To determine whether there is a relationship between our thinking preferences and our styles of facilitating and assessing learning.
- To establish through the Whole Brain® Thinking Model innovative ways of facilitating learning and enriching our practitioner research.

## 1.7 RESEARCH PROBLEM

Devoted, competent and qualified lecturers are the prop of any university as these lecturers make certain that quality teaching and learning take place (Knight, 2014; Shava, 2015). Boshoff (2014) avows that private higher education lecturers need to make certain that competence and high quality standards are retained in their respective institutions. The 10 novice participant lecturers in this study lacked expertise and experience in teaching, in assessing students' work and in practitioner research in higher education. Student evaluation scripts for the past five years (2011 to 2016) have shown that lecturers lack creativity in teaching (Solusi University Faculty Evaluations, 2011-2016). There is no viable research department that supports or encourages research writing and publication of papers at the exemplar institution as is witnessed by the low number of publications by the participants in this study.

Literature has shown that one research study for professional development has so far been recorded in Zimbabwe this research was conducted at the National University of Science and Technology (NUST). Ozgen, Tataroglu and Alkan (2011) affirm that the number of studies that investigates the brain hemisphere preferences and learning styles of teachers is limited. The lack of publicity of research on Whole Brain® Thinking in Zimbabwe is a great concern, especially considering the assertion by Herrmann International (2017) that the Whole Brain® concept is rapidly increasing in importance worldwide and will in no doubt continue to be the major foundation for understanding the nature of human beings since it gives the opportunity to improve one's work performance, communication and effectiveness, both as an individual as a group. Furthermore, Coffield, Mosley, Hall and Ecclestone (2004); Herrmann (1995); May and May (2012); Mkonto (2010); De Boer et al. (2011); Du Toit (2013) among other researchers, recommend the use of the Herrmann Whole Brain® Model to teaching and learning. In a nutshell the problem statement of the study is the following: A lack of a scholarly teaching practice of novice lecturer participants, inadequate research on Whole Brain® Thinking and Learning in higher education in

Zimbabwe, the recommendation by scholars of the Whole Brain® Model for professional development and the pressing need for experienced academics and researchers in higher education in Zimbabwe have created a gap in current research that propagated this study at the exemplar institution.

## 1.8 RESEARCH QUESTIONS

Universities across the globe face the need to adopt various innovative ways to enhance the educational professional development of academic staff. This is paramount as the relationship between the academics and their students are fast changing: students can easily access content globally, and seek accreditation and recognition of learning by local, national or international providers (Brown, 2013, 321; Race, 2015, 1). Higher Education Institutions in Zimbabwe face the pressure of improving the quality and relevance of academic curriculum as stated in one of the ministry' goals: "Enhancing quality education and relevance of higher education and training" (SARUA 2012, 120). Considering the criticality of academic professional learning in higher education, I formulated the following primary research question, which is epistemological in nature:

*How can my colleagues and I as a collective make use of the model to transform the teaching practice and research of academic staff in higher education in Zimbabwe?*

For a full exploration of the primary research question, the following secondary research questions were formulated:

1. What constitutes Whole Brain® Thinking?
2. What are the thinking preferences of the participants?
3. What is the relationship between our thinking preferences and our styles of facilitating and assessing learning?
4. How can we innovatively improve and enrich our teaching practice and practitioner research through the Whole Brain® Thinking Model?

The last question seems to be subsumed in the primary or the main research question; both questions aim at promoting innovative, transformative methods of enriching teaching practice and practitioner research – a fundamental requisite for lecturers in HEIs in Zimbabwe. The first question aims at clarifying the model that forms the core of this research. It is directly related to research questions 2 and 3 that form the baseline for the research. For lecturers to understand the thinking styles of their students, they first of all need to know theirs (De Boer et al., 2013). The lecturers first filled in the Herrmann Brain Dominance Instrument® (HBDI®) online. The inventory informed

each lecturer of his/her brain profile. Research question 4 is related to these profiles as it explores whether there is significant relationship between the lecturers' thinking preferences and their styles of facilitating and assessing learning. Our experience with the Whole Brain® Model has revealed that there is indeed a significant relationship between the lecturer's thinking and his<sup>1</sup> style of teaching (Herrmann International, 2017; Du Toit, 2013, 2016; Mkonto, 2010).

## **1.9 PURPOSE STATEMENT**

The intent of this study was to use Whole Brain® Participatory Action Research (WBPARG) to transform our teaching practice and practitioner research in higher education in Zimbabwe. We used Whole Brain® Participatory Action Research (WBPARG) as novice lecturers in the quest for practical solutions to our own pressing teaching and learning and research issues in higher education. Participatory Action Research (PAR) focuses on real problems and improves practice.

Research on Whole Brain® Thinking and Learning is lacking significantly in Zimbabwean higher education; I found that there was only one research document on Whole Brain® Teaching by Phuthi, a lecturer at NUST. To comprehend the research problem a concurrent mixed methods approach was used to collect data. Both quantitative and qualitative data was collected at the same time and triangulation was done. Through the base-line study, our profiles revealed our thinking preferences that we then used collaboratively in a self-regulated community of practice to transform our teaching strategies and research, our assessment of students' work, curriculum development, and research supervision. The study is characterised by a constructivist learning perspective as we, the lecturer-learners, participated actively and interactively to construct meaning from our teaching context, experience and our environment (Solusi University, 2016).

Our awareness of the various quadrants and learning styles acquired during this journey contributed to new and better approaches to our teaching practice. At the end of the research all the participants noted changes in the way they taught and set quizzes, tests and examinations. Some students even noted some significant changes in themselves.

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<sup>1</sup> For the sake of fluidity only the male form of the pronoun is used in the rest of the thesis.

## **1.10 LIMITATIONS OF THE STUDY**

Limitations are always incurred in every study; our study was no exception. The lack of studies on teaching with the Whole Brain® Model in Higher Education in Zimbabwe as reported above limited our knowledge as participant researchers in that substantial information or adequate literature promoting the use of the Whole Brain® Model in academic professional learning in higher education was viewed from an outside perspective rather than an inside one. The inclusion and exclusion premise of participants left out other participants who may have benefited from participatory action research. Because of this limitation, the faculties of Theology and Arts were represented by one lecturer each instead of two. Out of the eleven participants six were already engaged in their part-time Ph.D. studies at universities in South Africa, Kenya and the Philippines and every now and then they would leave their classes to pursue their studies; seven were heads of department or chairpersons. Total commitment was therefore difficult to obtain. Because of the general taxing nature of higher education lecture loads and doctoral studies, not all the lecturer participants could write comprehensive personal reports on their thinking styles as is shown in Section 4.2. Hence, the reports were written by one participant, namely the principal researcher. The reports lacked the multiple perspectives of the nine participants.

One of the 10 participants was transferred from the education field to another university post; this crippled the completion of our planned teaching schedules. Also, the perpetual and seemingly perennial economic doldrums of Zimbabwe affected the progress of this research; continuous power cuts and disrupted internet services derailed the writing most of the time. Zimbabwe has no viable currency that can be used outside the country. To get the South African currency needed to pay for the HBDI® I had to look for Zimbabweans working in South Africa who could deposit South African currency into the Herrmann account while I transferred the bond in their Zimbabwe account. Furthermore, the busy schedule of teaching and doing administrative work did not allow us to meet monthly as we had planned. The limited financial resources did not enable me to hire a full-time video recorder. As a result, I recorded the interviews myself and requested the media personnel to videorecord our lessons as well as the interviews. They had their own busy schedules, so they managed to record two lessons of each participant, the first and the last one. The recorded videos and audio files were kept in the media computers as the office of research had been temporarily closed.

## **1.11 EXPLANATION OF KEY CONCEPTS**

### **1.11.1 Whole Brain® Model**

The model, according to De Boer et al. (2011) shows the left and right of reason (cerebral system) and the left and right of emotion (limbic system). There are four quadrants: A, B, C and D that form modes of diverse styles of thinking. These modes of thinking inform one's approach to problem solving, communication, and ways of facilitating and assessing learning (Du Toit, 2013).

### **1.11.2 Herrmann's Brain Dominance Instrument®**

The Herrmann Brain Dominance Instrument® (HBDI®) is a diagnostic test that shows how one prefers to think. It is an online self-assessment questionnaire comprising 120 items that quantify mental (thinking) preferences for each of the four thinking styles (De Boer et al., 2013; Herrmann International, 2013).

### **1.11.3 The HBDI® profile**

A profile means a survey, assessment, inventory style, trait or learning tool. The profile is largely self-assessments and can help with designing learning strategies, business and strategic issues, communication, problem solving, decision making, leadership strategies, teaming, lifestyles, attitudes and even determine why employees do not do what they are supposed to (Herrmann Group, 2004).

### **1.11.4 Constructivism**

Constructivism is discussed by Coetzee, Van Niekerk, Wydeman and Mokoena (2015); De Boer et al. (2013); Creswell (2014); Knowles, Holton and Swanson (2015) and Maree (2007) as a world view or constructivist learning perspective where researchers, learners, lecturers, individuals, and participants actively and interactively construct meaning from their context, experience, environment, world, minds, existing knowledge and real-life situations. The constructs result in the generation of new patterns of meaning or in the development of their own original concepts.

### **1.11.5 Thinking preference**

A thinking preference is a preferred way and mode of thinking that affects the way one takes in and processes information (Herrmann International, 2017). In this study our thinking preferences were diagnosed by the HBDI® and the awareness of our thinking

preferences improved our teaching practice, communication and research as we were able to recognise our preferences in our teaching practice.

#### **1.11.6 Participatory action research**

It is a systematic, self-critical inquiry with the purpose of self-study where knowledge is connected to one's practice that aims at constructing new meaning as living theory, based on lived experience (Hendricks, 2013; Lichtman, 2010; McNiff, 2002; McNiff and Whitehead, 2006). These tenets of participatory action research prompted us as novice lecturers at the exemplar institution to examine our teaching practice and the assessment of our students' work to transform our practice.

#### **1.11.7 Reflexive inquiry**

Rossmann and Rallis (2012, 47) define reflexivity as "a bending back" that requires introspection and a consideration of the ways in which one's history and experiences affect what one thinks, believes and values. As participants we reflected upon teaching, specifically looking at our classroom delivery strategies, media usage, questioning techniques and classroom learning activities.

#### **1.11.8 Community of practice**

Wenger (2011) defines community of practice as a group of people who share a concern or a passion for something they do, and learn how to do it better as they interact regularly. The members of the group are brought together by a learning need that they share. The community is therefore reflected in their collective learning as they develop a bond among them over time. The practice is their interaction that produces resources that effect their practice. They engage in actual practice together. The 10 of us were joined together by the need to improve our teaching practice.

### **1.12 SUMMARY OF THE CHAPTER**

The chapter provides an overview of the context in which the research took place and outlines the major drivers of the study encapsulated in the aims, objectives and the research questions. The main theories and key concepts that inform the study and the core participants are presented too. The next chapter discusses the theoretical framework of the study.

## CHAPTER 2

### THEORETICAL FRAMEWORK

#### 2.1 INTRODUCTION

This chapter gives a literature review of the Whole Brain® Thinking and Learning Model that forms the epicentre of the study. A literature review is used to frame the problem in the introduction of the study. It requires an integrative and critical identification of central issues that are relevant to the research. A literature review deals with a number of aspects that have a direct or indirect bearing on the research topic (Creswell, 2014; Kumar, 2011). An overview of the adult learning theories that are integral to this study is given as well as a discussion of the importance of professional development in higher education. As a researcher within the 21<sup>st</sup> century, I was not cognisant of the professional and academic prospects of the era; hence I familiarised myself with the attributes of the 21<sup>st</sup> century to guide and influence our professional development as participant lecturers. One such attribute is developing professionalism that forms the fulcrum of this research. I start the chapter by discussing the metaphoric innovative teaching model to help the reader understand the context of the study. I then relate the model to the professional development of lecturers in higher education, which is *inter alia* the fundamental focus of my study. I also present related studies by prominent researchers in the field of education to authenticate the model's significance. The study intended to promote an understanding of the need for the professional growth of lecturers in higher education. Finally, a conceptual framework of the adult theories is provided to form a holistic view of my study.

#### 2.2 THEORETICAL FRAMEWORK

##### 2.2.1 The Whole Brain® Thinking Model

As teaching practitioners in higher education we were cognisant of the complexity of our teaching practice; hence we chose a theoretical framework that would address this complexity. The Whole Brain® Learning style theory (also known as Learning Style Flexibility, LSF) as is defined by (Bostrom, 2011; De Boer, Bothma and Du Toit, 2011; Kirstein and Kunz, 2016; Sugahara and Boland, 2010; Van Oort and Du Toit, 2014) became the focus of our learning as lecturer learners. Learning styles are

common likings or desiring to process information in different or diverse ways, usually measured by self-reported preferences (Knowles et al., 2015). There is a whole array of learning style theories; the following few have been selected because they are closely related to adult learning styles: Cognitive styles (Knowles et al., 2015); the Felder-Silverman Learning Style (De Boer et al., 2013); Kolb's Learning Style Inventory (De Boer et al., 2013; Knowles et al., 2015); the Myers-Briggs Type Indicator (De Boer et al., 2013); The Dunn and Dunn Model of Learning Styles (1989) (Knowles et al., 2015) and the Learning Style Inventory (Knowles et al., 2015).

The sources that define learning styles contain different but interchangeable terminology as the same construct refers to *Cognitive styles, learning style, Learning Style Inventory, Type Indicator, thinking preferences and learning style flexibility*. The four quadrants denote cerebral preferences that result in diverse thinking styles (Herrmann, 1995). Each of the four quadrants represents a style of learning and necessitates flexibility. The dominant learning style and quadrant is determined by completing the HBDI® (Herrmann Brain Dominance Instrument®) consisting of 120 items. Although the instrument was initially designed to identify one's learning style, it is widely applied to indicate one's preference for solving problems in different ways (De Boer et al., 2012; 2013; De Jager, 2011; Du Toit, 2014; Fringe, 2013). The HBDI® is also significant in education and training (De Boer et al., 2011).

The thinking and learning theory was adopted for the purpose of innovation and transformation of our teaching practice. Through the model we were cognisant of our various thinking and learning patterns and those of our students. Dew (1996) asserts that really innovative professionals will discover ways to integrate the abilities of both the brain hemispheres (all four quadrants) to maximise their individual effectiveness, thereby abandoning their comfortable thinking processes and opening up avenues to deal with problems that confront them. Dew borrowed from Herrmann's discussion of the *Participant Memo*, stating that professional growth comes from self-awareness of one's thinking processes and through understanding how one's comfortable thinking patterns influence one's ability to learn and perform (Creswell, 2013; Denzin & Lincoln, 2011; Herrmann International, 2017).

Herrmann (1995) and Roux (2011), report that in the early 1980s, while studying the brain as the basis of creativity, William Ned Herrmann, learnt of the pioneering brain research on the split brain of Roger Sperry, Paul MacLean, Joseph Bogen and Michael Gazzanaga. The four researchers perceived that the brain had four distinctive

and specialised structures. Herrmann as a physicist was inspired and hence carried out many tests and questionnaires to ascertain the pioneers' findings.

He focused on "understanding how the creativity of human brain is unleashed" (De Boer et al., 2013, 3). The result was the Whole Brain® Model. In 1979, he then developed a valid self-assessment tool - the Herrmann Brain Instrument® (HBDI®).

The instrument enabled individuals to understand their own thinking styles.

The brain dominance is derived from hemispheric dominancy of the right hemisphere and the left (Cave, 2003). Herrmann (1982) defines these two "sets of hemispheres" as the cerebral hemispheres that differentiates between cerebral left and the cerebral right and the limbic system, which is positioned at the bottom of each of the cerebral hemispheres. The left limbic influences planning and organising activities while the right limbic system is the source of emotional activity. The cerebral and the limbic hemispheres give a four-way separation, graphically forming quadrants. Each quadrant defines the specialisation of the part of the brain (Herrmann, (1982). Herrmann describes the two hemispheres as follows:

The cerebral hemispheres which are sharply differentiated between cerebral left – the logical, analytic, mathematical processor, are in contrast to cerebral right – the conceptual, holistic, synthesizing processor. The second set are those associated with the limbic system. The left limbic appears to be the source of great influence on our planning and organising activities. The right limbic system is the source of emotional activity – musical, spiritual, interpersonal (Herrmann, (1982, 75).

Figure 2.1 provides a summary of the distinct functions of the two hemispheres.

# Whole Brain Model<sup>®</sup>

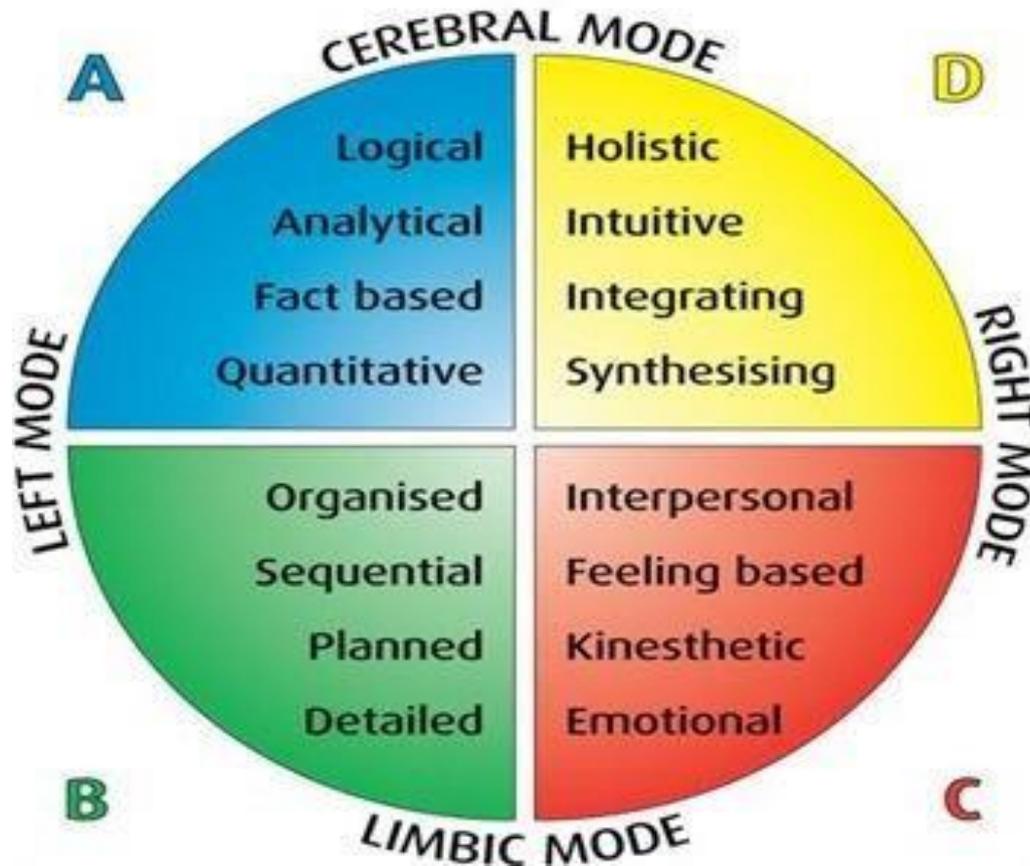


Figure 2. 1: The cerebral and limbic systems of Herrmann's whole Brain<sup>®</sup> Model (Source: [www.bing.com/images](http://www.bing.com/images))

The first, upper left cerebral is referred to as quadrant A and the second, lower left limbic is quadrant B. The first lower right limbic is referred to as quadrant C and the upper right cerebral is referred to as quadrant D. The four quadrants are “interconnected clusters of specialised mental processing modes that function together and iteratively making up a Whole Brain<sup>®</sup> in which one or more parts become naturally dominant” (Fringe 2013, 65; Herrmann International 2017, 2). Each quadrant represents distinctive purposes, describing the ways one prefers to study, outlining typical professions, dressing habits and the like. For instance, the logical one (A) would take legal or managerial or accounting occupations, while the organiser (B) would prefer supervisory/administrative fields. The interpersonal (C) would take the supporting/service or education careers while the creative (D) would prefer entrepreneurial and artistic fields of occupation (Fringe, 2013; De Boer et al., 2013; Herrmann International, 2017; 2018).

The model is further explained by De Boer et al. (2011); Herrmann (1995), Herrmann International (2017); Meneely and Portillo (2005) as having two left side structures that combine to represent the commonly known left brain thinking and the two on the right represent right brain thinking. The A quadrant describes one who prefers logical, analytical and fact-based information. Such a thinker prefers collecting data, analysing, checking how things work and giving judgement based on facts. The cerulean blue colour is assigned to it. De Boer, Bothma, Du Toit and Scheepers (2012) describe the quadrant A students as those who favour content presented in a challenging manner. The learner with a B quadrant favours linear information. Such a thinker prefers planning things and implementing them timeously, following clear directions, and solving problems chronologically, i.e. in a step-by-step way. Such students prefer detailed lectures that have clear teachings and well-structured assignments. Like quadrant A students, the B students prefer practical examples. The colour green is allotted to the mode.

With its emotional, feeling and interpersonal orientation, the learner with a preference for the C quadrant is a thinker who favours expressing ideas and group or team interaction. The red colour is assigned to it. Students with a preference for this quadrant are hands-on learners who prefer doing or acting out ideas. They learn by teaching others since they are people-oriented. They also prefer watching videos, singing, moving around and sharing ideas. Finally, those with a liking for the D quadrant that is assigned the yellow colour are characterised mainly by a holistic and conceptual approach to thinking and dislike strict time management, lack of flexibility and too much detail (Herrmann International, 2013; 2017; 2018). The learner is imaginative, visionary and always looks at the bigger picture. Such students prefer learning through playful approaches just like those with a preference for the C quadrant. They enjoy experimental learning where they have the freedom to explore and discover new ideas (Herrmann International, 2017). The reader should note that the colours allocated to the quadrants have no significant relevance to one's way of thinking.

The four modes of thinking equip one with skills of problem solving, interacting with other people and ways of enhancing learning (Du Toit, 2013: 2016). The modes also indicate the preferred teaching and learning strategies of each type of thinker (May and May, 2012). Whole Brain® Thinking gave us as lecturer learners the opportunity to improve our teaching performance, communication and our effectiveness in assessing students' work, both as individuals and as a collective. It enabled us to take

a comprehensive view of our practice as we engaged a multiplicity of teaching activities that involved questioning techniques, teacher-student classroom activities, media integration and the setting of quizzes and examinations. The results are discussed in Chapter 4 under data analysis. The experience enlightened us regarding the limitations of the traditional lecture approach in teaching and learning. The one-size-fits-all approach to teaching proved to be archaic and irrelevant to the calibre of student we now have. In a nutshell, Whole Brain<sup>®</sup> Teaching is similar to differentiated teaching. This kind of teaching means presenting a lesson to all students, using a variety of learning opportunities (Bostrom, 2011; Cekiso, 2011; Hill, Tomkinson, Hiley and Dobson, 2014; Mkonto, 2015). Differentiated teaching means keeping students' learning styles or learning preferences in mind when developing course outlines/syllabuses, lectures, assignments, tests, examinations and interactive activities, thus embracing the diverse learning preferences of students (Tomlison, 2018). In terms of flexibility/adaptability, the Whole Brain<sup>®</sup> Learning Theory involves accommodating students according to their thinking style preferences (Cekiso, 2011; De Boer et al., 2013; Du Toit 2013; Mkonto, 2015; Ngozo, 2011).

Graham Duncan, a professor responsible for the professional development of ministers at the University of Pretoria, professes that he realised through Whole Brain<sup>®</sup> learning that he cannot facilitate learning and assess student learning with his preferred logical, fact-based, rational thinking (quadrant A), and controlled, organised and methodical preferences (quadrant B) because these two preferences do not accommodate students with thinking preferences in the C and D quadrants (Du Toit, 2016).

In order to determine the thinking styles of an individual the Herrmann Brain Dominance Instrument<sup>®</sup> (HBDI<sup>®</sup>); a questionnaire that shows how one prefers to think, was adopted. It is a virtual self - assessment survey with 120 statements that enumerate intellectual preferences for the four styles of thinking (De Boer et al., 2013). The responses evaluate the strength of the four quadrants and relate each to one another. This results in a four quadrant profile that displays the degree of preference for each of the four quadrants (Herrmann International, 2018). Du Toit (2013, 8) confirms the validity of the instrument as having “good face, factorial and construct validity”. The good face validity is linked to “the fact that the HBDI<sup>®</sup> relates to one's life experience”; hence it is “as an instrument with authentic quality”.

The following paragraphs offer a brief discussion of what a profile entails. The illustrations come from (Boshoff, 2014; De Boer et al. 2013; Du Toit, 2013; Herrmann

1982; Herrmann International, 2017; 2018). For each profile there are three sets of numbers placed in order of the quadrants, A, B, C and D. The preference code is indicated by the number 1 with a numerical value of 67 to 99, termed *strong preference* or *primary*; code 2 with a numerical value of 33 to 66 is a general or secondary or intermediate preference that shows neither preference nor avoidance; code 3 indicates tertiary preference, which symbolises low preference or a lack of interest in that quadrant's thinking, or avoidance with a numerical value of 0 to 33.

In the HBDI® questionnaire there are 24 pairs of adjectives designed to show how one prefers to think. The 24 points are distributed among the four quadrants. The highest score has a maximum of 12, which typically reveals the thinking style favoured in pressured or stressful situations that may differ from the preferred style. The distribution of responses into the A, B, C and D quadrants, arranged in descendent order could indicate a less preferred quadrant becoming more dominant or a generally preferred one receding into the background. The profile score is the total score allocated to the four quadrants, based on individuals' responses to the HBDI® survey form (De Boer et al., 2013).

Herrmann, 1982; Herrmann International, 2018; Essential to the model is the brain dominance or preference. Preferred ways of understanding relay to how an individual likes doing things or how he enjoys learning (Herrmann, 1995). Herrmann (1982, 80) avers that the "brain dominance characteristics of a person greatly affect that person's learning style because these characteristics determine the person's preferred mode of thinking". If one intensely prefers one mode, one will reject another; this is termed *avoidance* (*ibid*). Therefore Whole Brain® Thinking encourages a person to balance the four quadrants in order to have a holistic approach to life. I present the various thinking styles using our own thinking styles as reported by the HBDI®. The second research question of the study: *What are the thinking preferences of the participants* is best answered by the report.

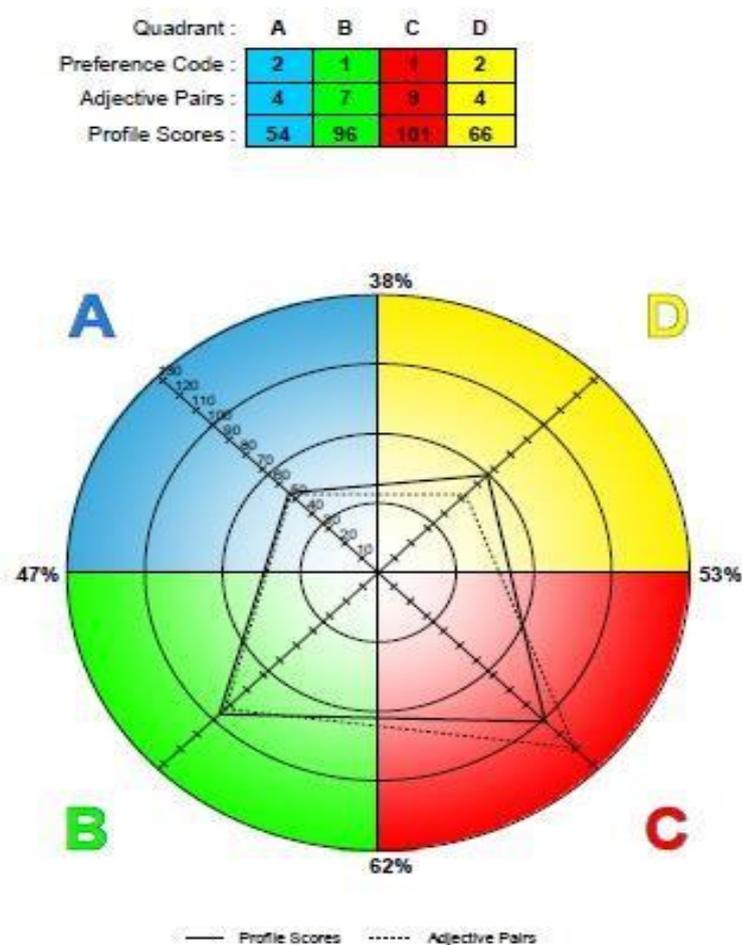
### **2.2.2 Single dominant profile**

There is a single dominant preference code that takes different patterns, such as 1222, which has a strong preference for Quadrant A; 2122 with a strong preference for Quadrant B; 2212 with a strong preference for the C quadrant and 2221 with a strong preference for the D quadrant (De Boer et al., 2013; Du Toit, 2013; Herrmann Group 2004).

### **2.2.3 Double dominant profile**

In the case of a double dominant profile, the Herrmann Group (2004) explains that there are three characteristics that define the profile: the double dominant profile – left or right; the double dominant profile – upper and lower; then the double dominant profile diagonally. Both the left and right dominant profiles reinforce each other.

Figure 2.2 shows a profile score of 2112 - double dominant left and right profile for LP1 that indicates high preference for Lower quadrants B and C and less preference for upper A and D. I was the only one among the 10 with this type of dominance

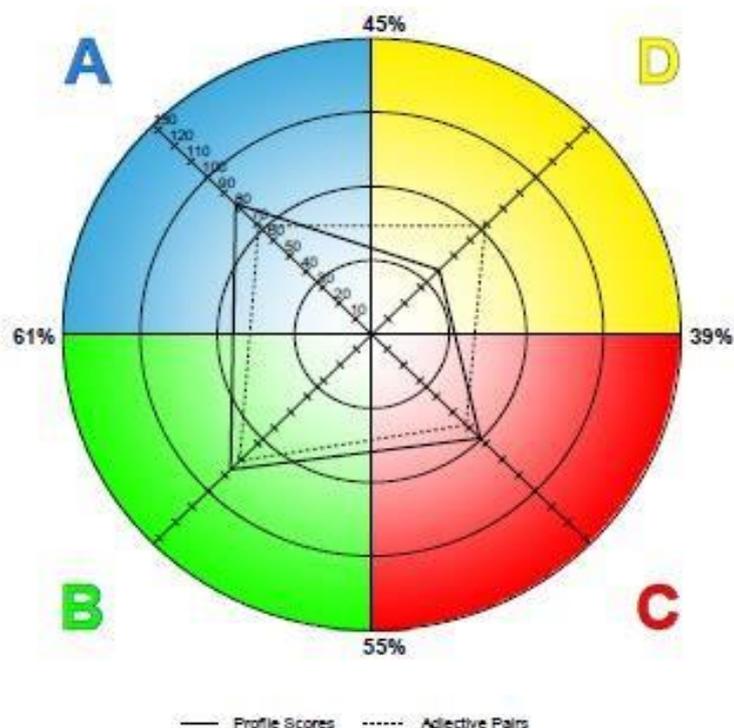


**Figure 2. 2: LP1’s double dominant profile**

### 2.2.4 Double dominant profile

We had LP5 and LP10 with this kind of domination. Their inclination code was 1122. Figure 2.3 reflects a double dominant outline for LP5 preferences for the.

Quadrant :	A	B	C	D
Preference Code :	1	1	2	2
Adjective Pairs :	6	7	5	6
Profile Scores :	83	86	66	41

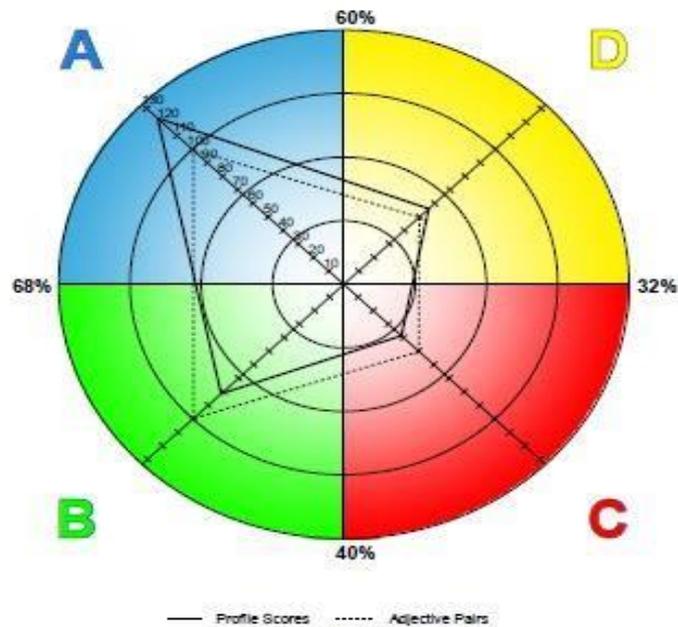


**Figure 2. 3: LP5's double dominant style**

Similar to LP5's profile is LP10's profile. Although the two participants share the double dominance profile of 1122, I noticed that they have different patterns and different scoring percentages in each quadrant. These variations authenticate the Whole Brain® Model that emphasises human diversity in thinking.

Figure 2.4 shows LP10's double dominant profile, indicating strong preferences in the Upper A and Lower B quadrants and less preference in Lower C and Upper D quadrants. LP10 has a strong Left hemisphere.

Quadrant :	A	B	C	D
Preference Code :	1	1	2	2
Adjective Pairs :	8	8	4	4
Profile Scores :	123	81	38	56

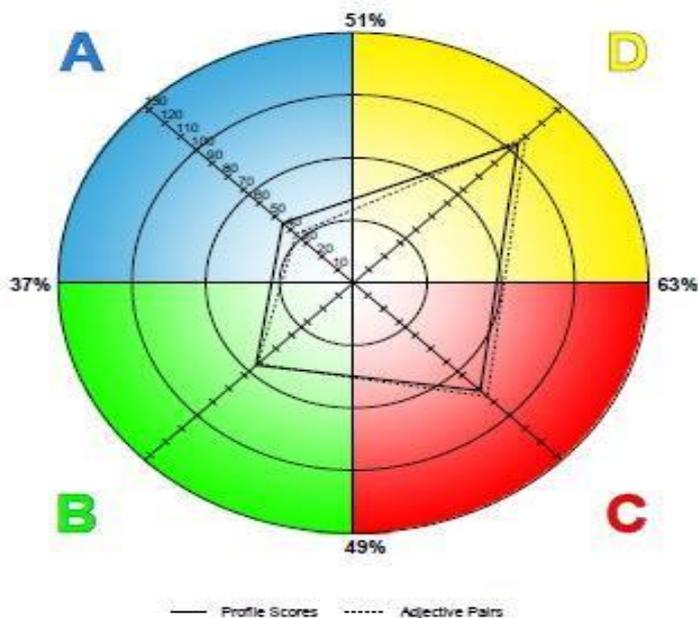


**Figure 2. 4: LP10's dual dominant style**

### 2.2.5 Double dominance in the same hemisphere

Lecturer-participant 6 had a profile of 2211, the only one among the 10 with this kind of dominance. It is a dual dominance in the D (Upper) and C (Lower) quadrants (Herrmann Group, 2004). A graphic illustration of LP6's thinking style is illustrated in figure 2.5.

Quadrant :	A	B	C	D
Preference Code :	2	2	1	1
Adjective Pairs :	3	5	7	9
Profile Scores :	45	62	81	105



**Figure 2. 5: LP6's thinking style preference**

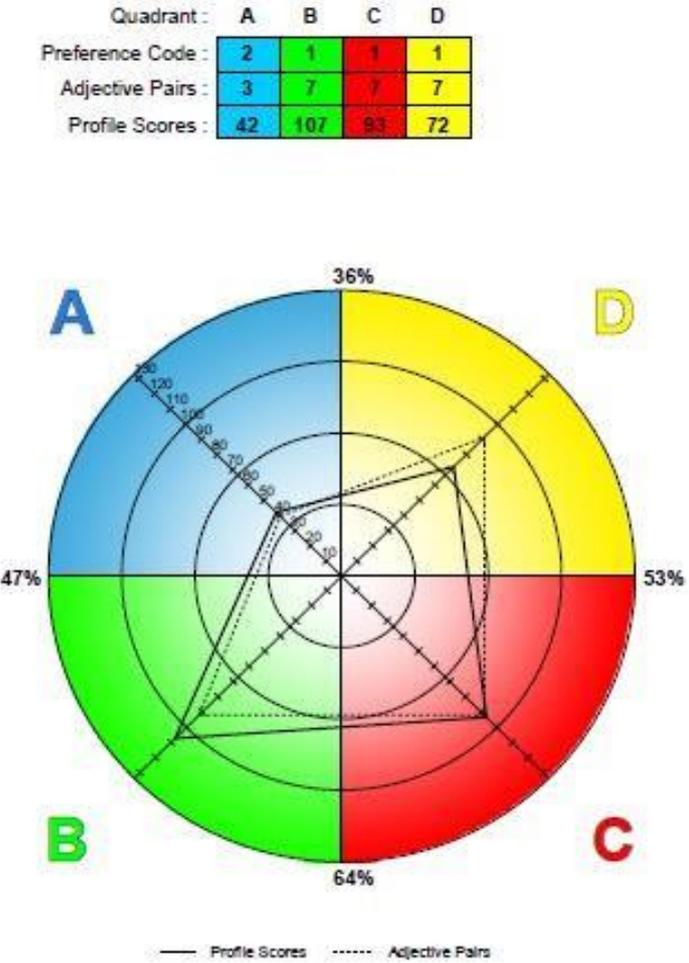
### 2.2.6 Double dominant diagonal

This is a diamond-shaped profile that crosses the diagonals from either B to D or A to C. The profile constitutes 58% of the total population diagnosed by Herrmann (Herrmann Group, 2004). This is the most common of all four dominances as is shown by the high percentage; though we did not have this kind among the participants.

### 2.2.7 Triple dominant profile

The third dominance is the triple dominant profile that constitutes 34% of the population of people diagnosed by Herrmann. It has the following variations: 2111, 1121 and 1112. These allow the individuals to move among their three dominant modes without any constraints as they first look at all the perceptions before making decisions (Herrmann Group, 2004). Five of the participants had a triple dominant profile with the following variations: 2111 (LP2; LP3 and LP9). Although the three participants share the triple dominance of 2111 they have different patterns and different scoring percentages in each quadrant, again authenticating the model's emphasis on human diversity in

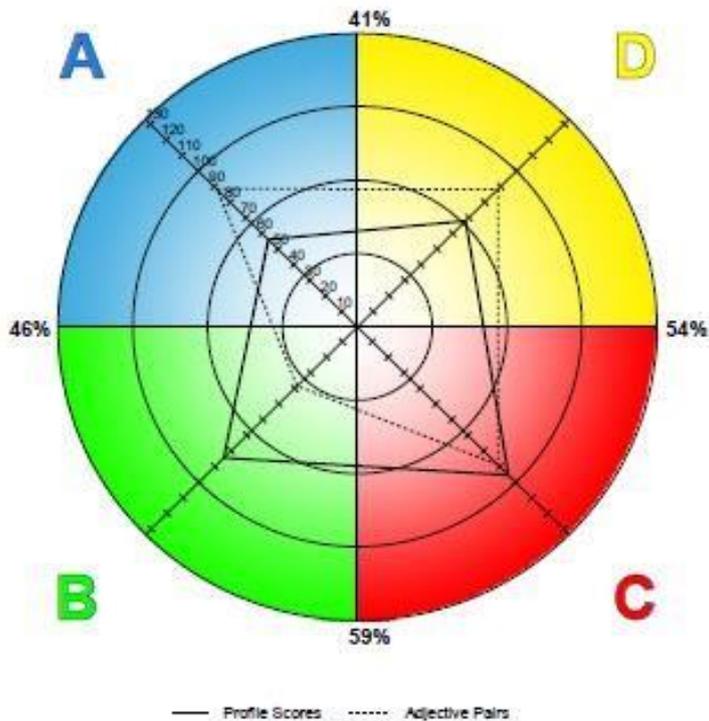
thinking. To a lecturer, this implies careful planning of learning prospects as there are no students who would prefer learning in the same way, even though they share a similar quadrant. Figure 2.6 indicates LP2's three-fold dominance.



**Figure 2. 6: LP2's triple dominance**

Figure 2.7 demonstrates how LP3's triple dominance mode was, indicating a strong preference for Lower C, B and Upper D quadrants and less preference for Upper A.

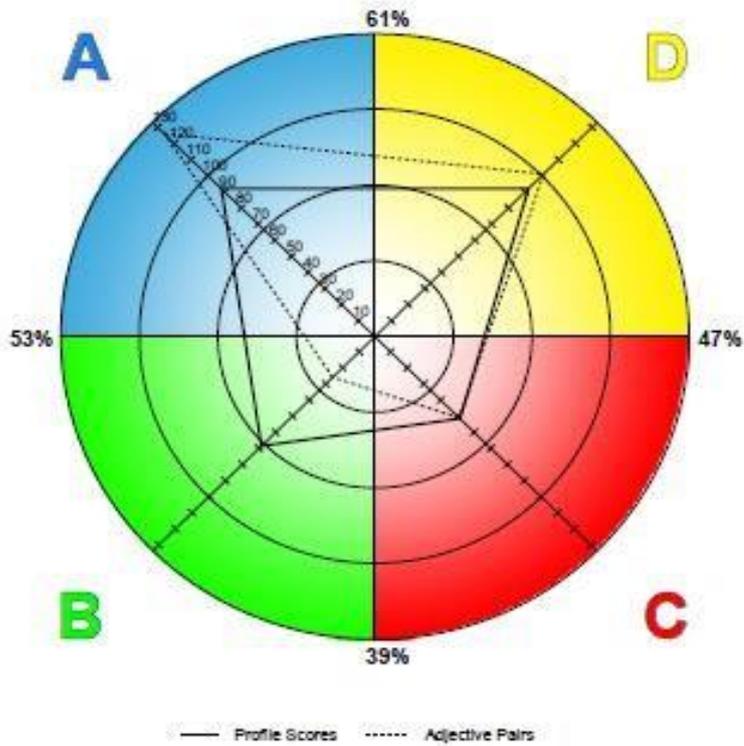
Quadrant :	A	B	C	D
Preference Code :	2	1	1	1
Adjective Pairs :	7	3	7	7
Profile Scores :	56	84	95	68



**Figure 2. 7: LP3's triple dominance style**

On figure 2.8 is another variation of a triple dominance profile for LP7 representing a strong preference for Upper A, D and Lower B quadrants and less preference for Lower C quadrant.

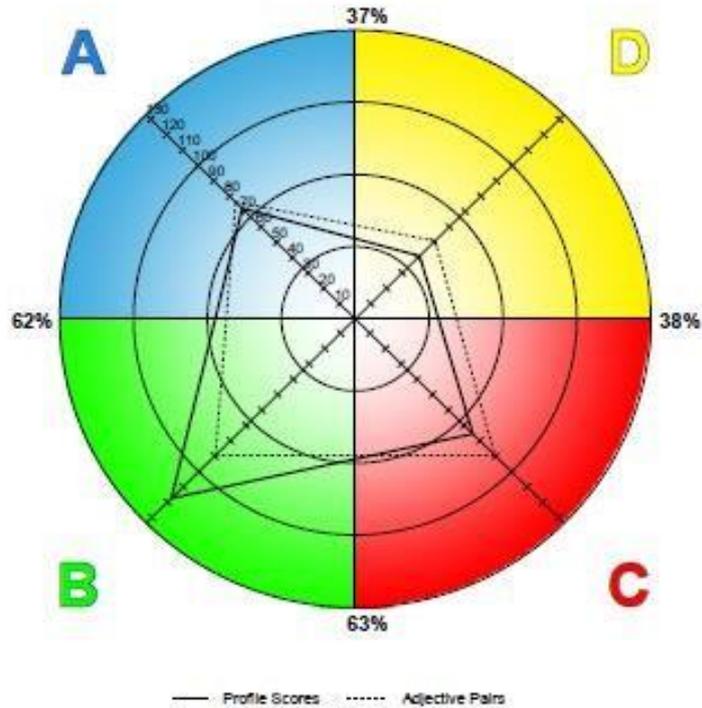
Quadrant :	A	B	C	D
Preference Code :	1	1	2	1
Adjective Pairs :	10	2	4	8
Profile Scores :	92	68	51	92



**Figure 2. 8: LP7's triple dominance profile**

Another triple dominance pattern is shown on visual 2.9. It is LP9's triple dominance style with a score of 1112. There is high preference for Lower B, C and A and less liking for A.

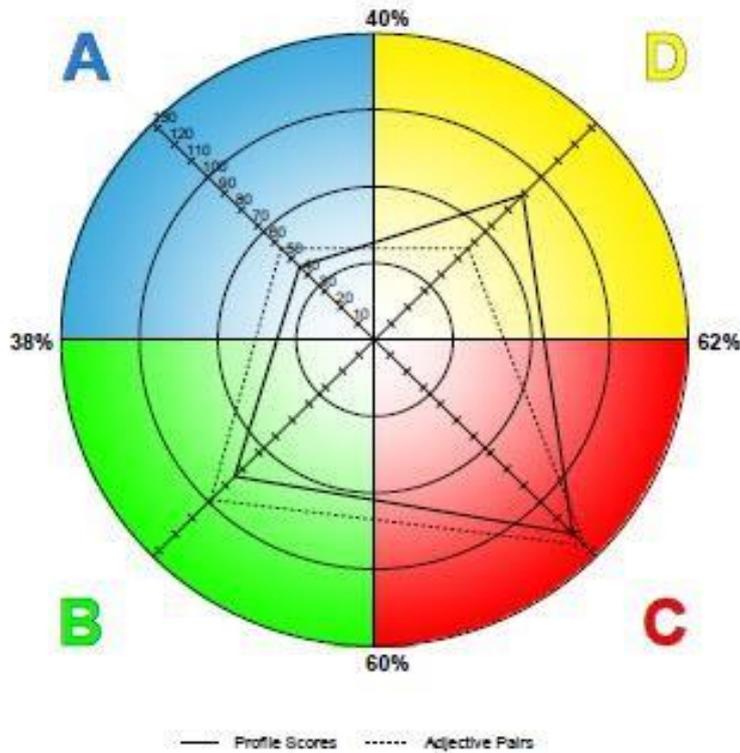
Quadrant :	A	B	C	D
Preference Code :	1	1	1	2
Adjective Pairs :	6	7	7	4
Profile Scores :	72	117	75	41



**Figure 2. 9: LP8's triple dominance profile**

The last triple dominance variation we had indicates strong preference for Lower C, B and Upper D quadrants and less preference for quadrant A. The preference is illustrated by the score: 2111. Figure 2.10 shows LP8's three-fold dominance profile.

Quadrant :	A	B	C	D
Preference Code :	2	1	1	1
Adjective Pairs :	4	7	9	4
Profile Scores :	45	84	119	89



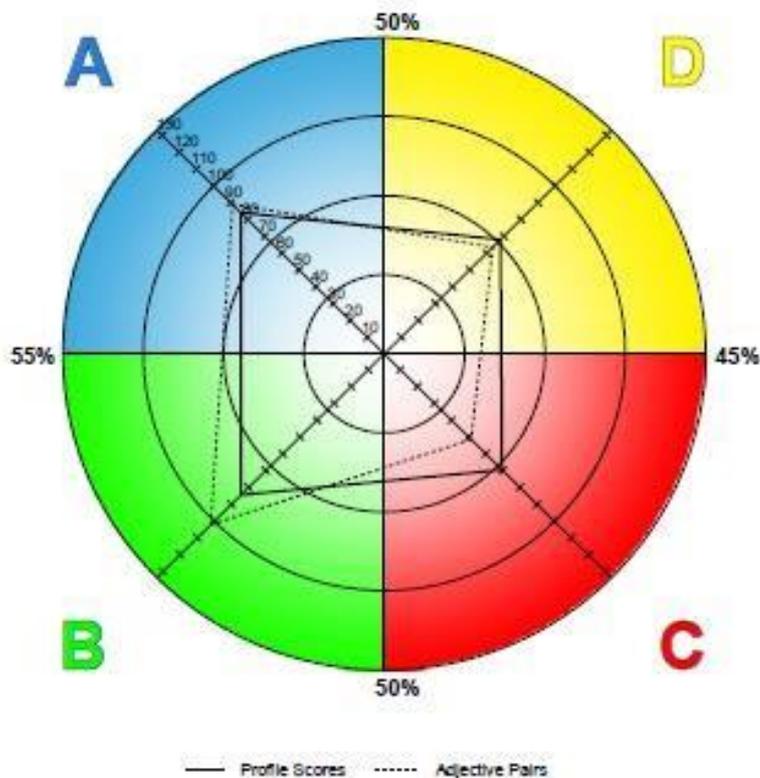
**Figure 2. 10: LP9's triple dominant profile**

### 2.2.8 Quadruple dominant profile

The last but not the least profile is the quadruple (quad) dominance. This profile shows a strong preference for all four quadrants and such profiles have a 3% occurrence. This means that very few people have such dominance. The people with this dominance are said to be balanced because they integrate all four quadrants. The individuals have the ability to function effectively in groups or work conditions that need flexibility (Herrmann International, 2017). In the study we were fortunate to have LP4 with this profile. The participant related well to all the respondents.

A graphical representation of LP4's quadruple thinking style on figure 2.11 below is reflected signifying strong preference for all quadrants.

Quadrant :	A	B	C	D
Preference Code :	1	1	1	1
Adjective Pairs :	7	8	4	5
Profile Scores :	84	84	89	68



**Figure 2. 11: LP4's quadruple dominance, illustrating balanced preference for all quadrants**

The awareness of our thinking and learning styles not only contributed to our growth in the facilitating of learning but further enlightened our communication skills.

### **2.3 RESEARCH ON THE WHOLE BRAIN® MODEL IN HIGHER EDUCATION**

As has already been mentioned, the Whole Brain® Model forms the epicentre of the study. Literature authenticates the significance of the Whole Brain® Model in professional development in higher education. Herrmann International (2017) provides significant studies on the model; over 200 doctoral theses and master's dissertations document the model in theoretical and practical applications; more than 200 books and journals refer to the HBDI® and over two million individual profiles and thousands of group analyses and interpretations are in their database; around the

globe articles have been published and a comprehensive literature review is available upon request. May and May (2012) from Yale University in the United States confirm the effectiveness of the Whole Brain® Model, in that it is of value in education fostering creative thinking and problem solving skills. Bunderson (1982) promotes the use of the model by affirming that it helps one to understand the self and others; it enhances communication and productivity in teaching and learning, among other things.

The Whole Brain® Model is a model that "... exemplifies the shift away from traditional transmission education to a transformative approach to professional development, characterised by different information sharing activities and types of participant engagement ..." (Dobozy, 2012, 24). When used in educational professional learning of academic staff the Whole Brain® Model improves "established practice, knowledge and understanding, relationships with students and colleagues, collaboration on learning, publication of research work, communication, problem solving and decision making" (May and May 2012, 3). Although the model is well-established in the cooperate world, its application has not extensively researched in higher education. Coffield et al. (2004) analysed learning style models and found that Herrmann's Whole Brain® Model is suitable for use with learners as well as teachers (lecturers) as it is intended to encourage awareness and understanding of the self and others.

The University of Pretoria in South Africa has a significant record of studies on the application of the Whole Brain® Model on lecturer professional development in higher education. The Whole Brain® Model is defined as a holistic, integrated whole that serves as an instrument for lecturers and students. The higher education community is invited to be part of scholarly innovation to effect the principles of Whole Brain® learning (Boshoff, 2014; De Boer et al., 2011; 2012; 2013; De Boer, Du Toit and Bothma, 2015; Lucas, Dippenaar and Du Toit, 2014; Smit and Du Toit, 2016).

De Boer et al. (2011, 77) affirm that the "Whole Brain® Thinking Model caters for diversity and that various thinking styles can lead to more effective learning". Furthermore, Boshoff, (2014) recommends the use of the HBDI® to managers in companies. It can be used in a motivational manner to distribute tasks based on individual employee preferences to obtain ultimate work output by increasing satisfaction levels (Coffield and colleagues, 2004; De Boer and co-researchers, 2013; Du Toit, 2014; Margaryan, Littlejohn and Vojt, 2011). Mkonto (2015) acknowledges that using Whole Brain® Teaching creates opportunities for lecturers to consider their students' preferred learning styles, thereby developing students' other skills and

competencies. Furthermore, Du Toit (2013) argues that Whole Brain® Theory forms part of the scholarship of teaching and learning in that it enriches teaching and research, assessment, curriculum development, mentoring and research supervision. Kirstein and Kunz (2016, 18) affirm that “understanding the different learning styles of students may assist lecturers in designing differentiated case studies to accommodate all learning styles across a diverse student group”.

Fringe (2013) carried out research in Mozambique and used the Whole Brain® Model in the development of lecturers’ professional practice. He observed ways of reflection linked to the Model as lecturers reflected mostly in their preferred brain quadrants and less out of their comfort zones. In Zimbabwe, Phuthi (2012) acknowledged the Whole Brain® Model and HBD I® as widely used and ideal. It is important to note that the two research endeavours carried out in Mozambique and Zimbabwe were conducted by doctoral students from the University of Pretoria. Ozgen, Tataroglu and Askan (2011) in conclusion recommend Whole Brain® Theory to teachers who wish to understand the learning processes better and attain individualisation in education by considering individual differences.

## **2.4 PERCEPTIONS OF PROFESSIONAL DEVELOPMENT IN HIGHER EDUCATION**

Professional development largely signifies ongoing learning opportunities presented to lecturers and other education personnel through their institutions to increase their professional knowledge, competence, skills and effectiveness. Shava (2015) defines the professional development of lecturers as a lifetime activity that is substantial in a lecturer’s determination to increase appreciation of his personal advancement and scholarly practice in HEIs. He further postulates that in educational circuits, the academic professional development of lecturers has proved a vital foundation for excellence and success in university teaching and learning. The modern world of academics is in constant need of lecturers who are competent in their work.

In a fast changing academic and professional world, lecturers need to keep abreast of these changes. Furthermore, Vatalaro, Szente and Levin (2015, 43) advise that “Global competence is a vital skill for 21<sup>st</sup> century learners and higher education institutions must find ways for those who are in the education programmes to increase their global competence skills”. Guskey (2002) views professional development as vital for lecturers in higher education who are obliged to produce quality academic programmes. Roux (2011, 426) adds that “lecturers need to change their own way of

thinking about teaching in order to include the unique differences of students in an attempt to prepare them as they progress with their studies”.

Manesi and Betsi (2013, 111) describe professional development as transforming “personal growth” and expanding “one’s knowledge base” as well as building “new skills and competencies”. This, according to the attributes of the 21<sup>st</sup> century, is being a reflexive practitioner who is able to build his professionalism by self-inquiry. Ismail (2015) proposes a plan to facilitate self-reflection systematically when he says lecturers should keep portfolios of their teaching activities, and arrange to be observed by supervisors and colleagues. To complement the idea of self-reflection, Lyons (2010) suggests that professionals collaborate through action research and examine their professional purposes and possibilities. Though it might be uncomfortable to examine one’s prospects, Bolton (2010) suggests that examining one’s educational values, biases and hidden assumptions is needed for professional development.

Shava (2015, 11-12) postulates that professional development “should be considered in higher education as it has effects on the university teaching staff since most university teaching staff do not have teaching qualifications and they tend to teach the way they were taught”. Shava’s point of view authenticates the attributes that professionals should develop their skills with a view to developing others. Furthermore, they should reflect on their execution of tasks and find ways to become more effective. This view echoes what I stated in Chapter 1 that in Zimbabwe there are only three universities with a PGDHE programme, the implication being that most lecturers teach the way they were taught at teacher training colleges. These colleges equipped teachers to teach in primary and in high school only. This research therefore responds to the 21<sup>st</sup> century call for developing professionalism through being action-oriented and aspiring to be role-models in our teaching and assessment of students’ work in higher education.

Literature on the significance of professional development in higher education emphasises the need for lecturers to be visionary practitioners who understand how students in the 21<sup>st</sup> century learn. Race (2015, x) defines the role of the lecturer as complex as he has to keep abreast of the “ethos of the lecture room which has changed beyond recognition”. The traditional classroom of handouts and textbooks has since been replaced by the internet. Information is now obtained online. The students now claim high quality in the ways that their learning and assessment are implemented. Joseph (2013) affirms Race’s analysis:

Twenty-first century learners are quite different from the students we taught fifteen or twenty years ago. Today we utilise a range of Web 2.0 Tools, Learning Management Systems and interactive media as important teaching and learning support to supplement and sometimes replace the traditional teaching aids of the past. Since students do not all learn the same thing on the same day in the same way, educators are increasingly faced with the challenge of knowing students well enough to cater for their varying needs in the classroom (97).

Brew (2010) explains the scholarship of teaching and learning in universities as that which should focus on how students learn. Students identify and analyse real-life problems with a view to solving them in a creative fashion, thereby developing entrepreneurial capabilities.

The salient need for educational professional development of lecturers in higher education is a grave concern in Zimbabwe. The concern is well spelt out in the vision and mission statement of the Ministry of Higher and Tertiary Education, Science and Technology Development of Zimbabwe (2016): "To provide an effective system for the production of patriotic and competent high level manpower through the provision and accreditation of higher education programmes and institutions for sustainability and global competitiveness." Competent and high level manpower is manifested in lecturers in HEIs who are obligated to produce a product that should meet global competition in all skills. For the implementation of the mission statement and vision, ZIMCHE was set in 2006 and its responsibility is to promote and coordinate education provided by institutions of higher education and to act as a regulator in the determination and maintenance of standards of teaching, academic qualifications and research in the institutions of higher education (ZIMCHE, 2006). Boshoff (2014, 4) authenticates the importance of professional development by this assertion, "The quality of learning that takes place in an educational institution relies heavily on the professional abilities of the academic staff of the institution". Professional development is therefore pivotal in the transformation of lecturers' professional practice.

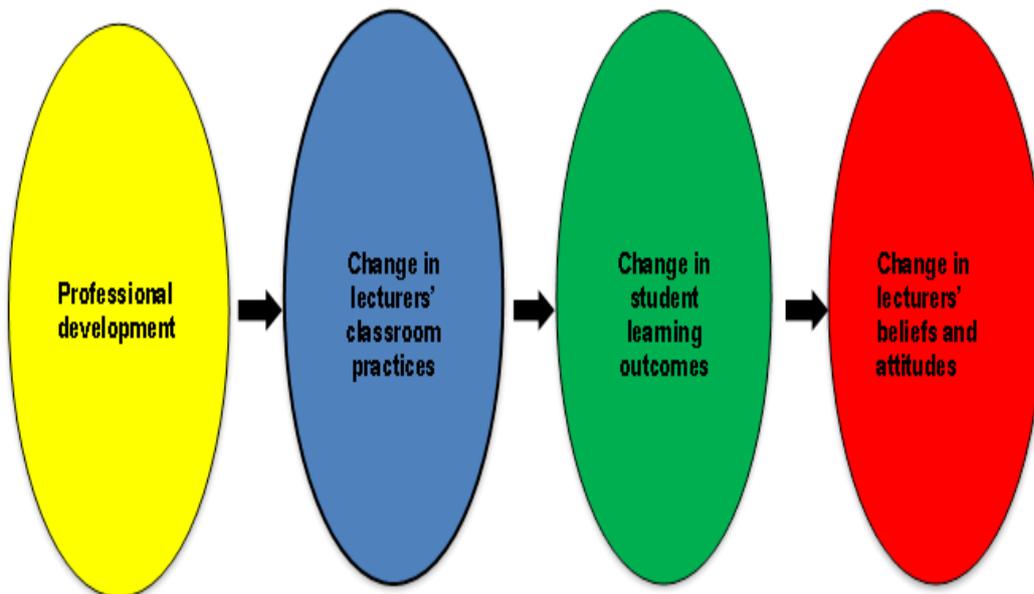
Through diverse learning strategies we corresponded with (De Jager, 2011, 11)'s proposition that professional development is effective and would enhance teaching and learning when "learning opportunities are intensive, and sustained over time". Fringe (2013) calls this lecturer-initiated learning. Together, in a community of practice we collaborated with one another in taking responsibility for our teaching practice by observing each other teach.

When we embarked on this professional journey, we accommodated two core approaches, namely a scholarship of teaching and learning, and research (De Boer et al., 2013). We used the Whole Brain® Model to develop our professional learning, hence adopting what May and May (2012, 3) advise, namely that the Whole Brain® Model be used in educational professional learning of academic staff to improve practice, knowledge and understanding, relationships with students and colleagues, collaboration in learning, and publication of research work. De Boer et al. (2013) encourage the uses of teaching in different ways by asserting the following:

Our knowledge of the brain and its inherent uniqueness indicated that a student has unique learning experiences, preferences and avoidances that are different from those of other students. If we are serious about improving the quality of learning, we need to be aware of this. Each mode and quadrant of the brain is optimised when aligned with an appropriate task. However, [...] our university systems concentrate heavily on sequential and fact-based learning; creative abilities have become completely overshadowed and are often discouraged by [...] lecturers (26).

Above all, professional development must bring about change in the facilitator of learning and the student who produces the outcome of the learning. However, change is not an event; it is a process (De Jager, 2011). Guskey (2002) reiterates that Whole Brain® professional learning can change the attitudes and beliefs of lecturers and students. Whole Brain® teaching equips the lecturer with skills to design multiple learning opportunities that enhance learning. Attitudes and beliefs change when the lecturer enjoys facilitating learning. Guskey (2002) illustrates the transformational change by visualising it as shown in Figure 2.12 below.

Figure 2.12 illustrates the transformational process that takes place among the lecturers and students after multiple learning opportunities have been implemented.



**Figure 2. 12: Model of lecturers' change after Whole Brain® Learning (Source: Guskey, 2002, 383)**

In embarking on this Whole Brain® participatory professional development process, we were answering the primary research question: *How can my colleagues and I as a collective make use of the model to transform the teaching practice and research of academic staff in higher education in Zimbabwe?*

## 2.5 CONCEPTUAL FRAMEWORK

The conceptual framework guided the research. Kumar (2011) regards a conceptual framework as the basis for a research problem that focuses on the section(s) that become the basis of one's study. To me a conceptual framework is a map or direction that a researcher uses to direct him and the reader on how to administer research. I integrated a few adult learning theories to form a holistic framework of our scholarly practice. The participants were adult learners (lecturer learners); therefore, using theories that define how adults learn was appropriate. *Andragogy* is a term that Knowles coined as he defined adult learning. He describes adult learners as "motivated toward learning that helps them solve problems in their lives" (Knowles, Holton and Swanson 2015, 183). I related this definition to my study in that the novice lecturers who had little skill in teaching in higher education were aware of their limitations and were motivated to solve their problem by innovatively transforming

their teaching practice and research in a community of practice. By taking this action we specifically considered the secondary research question: *How can we innovatively improve and enrich our teaching practice and practitioner research through the Whole Brain® Model?*

As already alluded to in the preceding paragraph, in this study four adult learning theories were merged with the Whole Brain® Model to form my conceptual framework. The four adult learning theories were constructivist teaching and learning theory, self-regulated learning theory, experiential learning, and multiple intelligences learning theory. Illieris (2009) declares that any theory of learning must answer at least four central questions: Who are the subjects of learning and how are they defined and located? Why do they learn and what makes them make the effort? What do they learn and what are the content and outcomes of learning? How do they learn and what are the key actions and processes of learning?

All four selected theories of adult learning answer the four questions asked above. The four theories define the participants as researcher-lecturer-learners who, having realised their lack of teaching and research skills, actively sought to transform their profession through the Whole Brain® Model.

Constructivist learning according to Coetzee and co-workers (2015) and Knowles and colleagues (2015) can be explained as knowledge that cannot be transferred from the lecturer to the learner. Instead, the learner makes personal meaning of his experiences. The theory further articulates that “social knowledge is created and recreated in the personal knowledge of the learner” (Kolb and Kolb, 2005, 194). Directly linked to constructivist learning is experiential learning. The theory is drawn from the work of prominent 20<sup>th</sup> century scholars of human learning and human development, such as John Dewey, Kurt Lewin, Jean Piaget, William James, Carl Jung, Paulo Freire and Carl Rogers among others (*ibid*). The scholars share six propositions that can be summarised in two statements: Learning is the process of creating knowledge (constructivist theory), and knowledge is created through the transformation of experience (Kolb and Kolb, 2005).

Coetzee et al. (2015) and Knowles et al. (2015) acknowledge that knowledge is not just transmitted or implanted by the educator; old knowledge is modified into new knowledge or new ideas. Coetzee et al (2015, 123) state that “by applying their prior knowledge and experience, learners make sense of the new knowledge and develop their own original concepts as learning takes place”. In a nutshell, adults’ “experiences shape or inhibit new learning” Coetzee, (2015, 123).

The third theory is self-regulated learning. Self-regulated learning has been studied since the 1970s and is still receiving much attention in the 21<sup>st</sup> century. The term *self-regulated learning* is used interchangeably with what Knowles et al. (2015) term *self-directed learning* (SDL). Because of maturity and possibly the zeal to achieve something, adults tend to be motivated to learn. Hence Knowles et al., (2015) premise that adults are naturally self-directed learners. SDL is self-teaching as learners take charge or regulate the process and practices of teaching themselves. It is taking ownership of the goals and purposes of learning (personal autonomy) (*ibid*). Zimmerman (2008) posits that self-regulated learning proposes that students work on their own metacognitive learning processes.

The fourth theory of adult learning is Multiple Intelligences (MI) by Gardner (1983). Like self-regulated learning, MI theory was developed in the late 1970s to counter psychosomatic views that postulated that there was distinct intelligence measured by Intelligence Quotient (IQ) (Gardner, 1983). Gardner claimed that humans had numerous discrete intellectual capacities. Applied to education, Gardner postulates that there are two core educational implications: individualisation (personalisation) and pluralisation. Individualisation suggests that human beings have unique patterns of intelligences that should be taken into account during teaching, mentoring or nurturing. Pluralisation calls for teaching consequential materials in a variety of ways as students learn in multiple ways (Gardner, 2011).

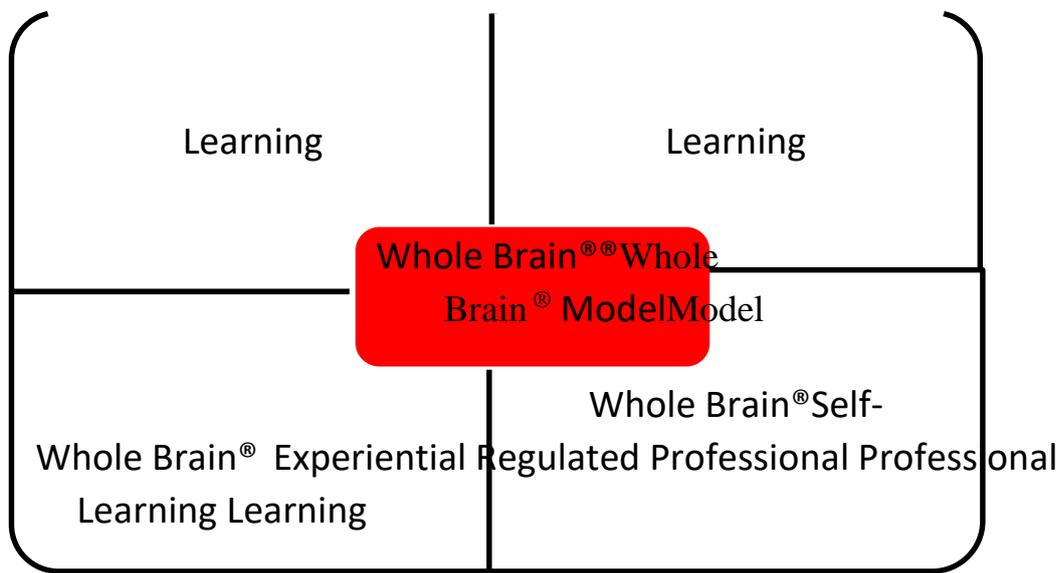
All four theories discussed above aver that adult learners are aware of their learning experiences and are intrinsically motivated to learn and improve the self. This is in line with the Whole Brain<sup>®</sup> Theory that encourages knowing and understanding the self if one has to improve professionally (De Boer et al., 2012; Shively, 2015; Woodfork, 2007; Zimmerman, 2002; 2008).

We constructed new theories of professional development and student learning by integrating existing adult learning theories into Whole Brain<sup>®</sup> Theory. As selfregulated adult learners we used our experience in the teaching fraternity as well as our multiple intelligences to generate new theories. For better precision of the concept of our living theory a visual representation is provided below.

Figure 2.13 below shows how the four adult learning theories selected for this study are connected to the Whole Brain<sup>®</sup> Theory.

Whole Brain<sup>®</sup>  
Constructivist Professional

Whole Brain<sup>®</sup> Multiple  
Intelligences Professional



**Figure 2. 13: Visual representation of the interconnectedness of learning theories with the Whole Brain® Model**

In as much as we participated and improved our professional skills as novice lecturers, our students were directly involved in what Schlicht and Klauser (2014) term *Research-Based Learning* (RBL). It is the kind of research that links both our teaching and learning by involving our students in systematic surveys of real educational issues. Through our transformed multidimensional teaching practice that included lesson observation, assessment of student work through the use of tests, quizzes, assignments, presentations, portfolios and examinations, the students were motivated to self-regulate their learning. The improved teaching methods that now encompassed all the learning style preferences (quadrants) benefited each student in that the learning preferences were addressed. The improved teaching practice was acknowledged by the respondents in the questionnaire they filled in as well as during the interviews. Most of the students reported that they had witnessed change in the way we facilitated learning. This is in line with Guskey's (2000; 2002) recommendation that Whole Brain® professional learning should result in change in lecturers' classroom practice, change in student learning outcome and change in lecturers' beliefs and attitudes. Chapter 4 of this study reports on these changes.

Our students were adult learners; Gravett (2005, 7-8) defines an adult learner as "an adult who engages in further studies at a university [...] and has varying life experiences". Because we were facilitating the learning of adults like ourselves, some principles of adult learning theories were applied for adult students to realise their learning too.

### **2.5.1 The Whole Brain® Professional Thinking and Learning Model**

Section 2.3 has already provided a comprehensive discussion on the Whole Brain<sup>®</sup> Model as core to the professional development of academic staff; therefore, this section briefly refers to the theory and its relation to teaching practice. I later focus on the other four theories that are interwoven with the model in developing the conceptual framework. Each quadrant of the model is associated with different learning preferences (Herrmann 1995). Studies have to a great extent attributed to the need for lecturers to facilitate learning in various ways to cater for diverse learning (Coffield et al., 2004; De Boer and colleagues, 2013; Du Toit, 2014; Margaryan, Littlejohn and Vojt, 2011). Herrmann (1995) defines this style of facilitating learning - Whole Brain<sup>®</sup> Teaching. The model illustrates the unique individual preferred way of thinking which has an effect on the way one grasps and processes information. When a lecturer therefore presents learning opportunities in a manner that addresses all the thinking styles displayed in the four quadrants of the model, the lecturer facilitates Whole Brain<sup>®</sup> Learning (Cekiso, 2011; Ngozo, 2011). 9Cekiso, 2011; Buzan, Jensen, Knowles and Ornstein in Du Toit, 2014; Lucas, Dippenaar and Du Toit, 2014; Mkonto, 2015) aver that each of the four quadrants should therefore be addressed in learning opportunities. Once the learning styles are addressed students will understand content and increase their commitment to learning.

Teaching according to the Whole Brain<sup>®</sup> Model involves creating learning opportunities that permit students to develop into active learners (Coffield et al., 2004). If lecturers embraced student differences and included fun and active learning opportunities there would be no room for student failure (Cekiso, Arendas and Mkabile, 2015; Tomlinson, 2018). Lindstrom (2010) points out that Whole Brain<sup>®</sup> teaching in the 21<sup>st</sup> century classroom integrates music, dance, singing, chanting and technology-based projects. I tried using music in one of my Morphology lectures and some of my students enjoyed that lecture while others said music distracted them.

To demonstrate the correlation between thinking styles and learning, Herrmann (1995) provides the visual representation in Figure 2.14 below.

<p><b>A</b>           Learns by:</p> <ul style="list-style-type: none"> <li>▪ Acquiring and quantifying facts</li> <li>▪ Analysis and logic</li> <li>▪ Thinking through ideas</li> <li>▪ Building cases</li> <li>▪ Forming theories</li> </ul>	<p><b>D</b>           Learns by:</p> <ul style="list-style-type: none"> <li>▪ Taking initiative</li> <li>▪ Exploring hidden possibilities</li> <li>▪ Relying on intuition</li> <li>▪ Constructing concepts</li> <li>▪ Synthesising content</li> </ul>
<p><b>B</b>           Learns by:</p> <ul style="list-style-type: none"> <li>▪ Organising and structuring content</li> <li>▪ Evaluating and testing theories</li> <li>▪ Practice</li> <li>▪ Implementing theories</li> </ul>	<p><b>C</b>           Learns by:</p> <ul style="list-style-type: none"> <li>▪ Listening and sharing ideas</li> <li>▪ Integrating experiences with self</li> <li>▪ Moving and feeling</li> <li>▪ Emotional involvement</li> <li>▪ Harmonising with content</li> </ul>

**Figure 2. 14: Learning styles of the four quadrants (Source: Herrmann, 1996, 154)**

Du Toit (2016) expands on learning styles and presents a comprehensive model of various learning opportunities lecturers can employ in facilitating learning. He explores the diverse students' preferred ways of learning as well as their avoidances. Literature on learning style preferences proves that identifying students' learning preferences could help academicians choose suitable learning opportunities (Cekiso, 2011).

As a Whole Brain® student I found this model detailed and helpful. In summary, the Whole Brain® Model was designed to help thinkers tactically influence the full range of thinking available to Herrmann (Herrmann, 1995; Herrmann International, 2017). Du Toit, 2016's presentation includes a variety of learning opportunities that we as novice lecturers used to improve our teaching practice. Any professional who wants to develop his profession may try them as they are not limited to lecturers only.

Like any other theory, Whole Brain® Theory has received criticism though the criticism is not very substantive. There is more positive than negative criticism of the theory. Current literature, however, criticises the theory for assigning cognitive tasks to one hemisphere as it localises creativity in one hemisphere. In essence, both hemispheres are involved in cognitive tasks. Meneely and Portillo (2005) postulate that creativity is actually not restricted to a specific thinking style, such as right-brain dominance it spreads even to the left hemisphere.

To accommodate all the different learning needs of students, the lecturer would have to acquire a teaching style that reflects all the learning styles of students. When a lecturer facilitates learning in a manner that addresses all the thinking styles presented by the four quadrants, he facilitates Whole-Brain® Learning. This results in the lecturer adopting a well - balanced and accommodative manner of facilitating learning (Herrmann, 1982). Therefore, all the quadrants are incorporated in learning resulting in a better understanding of content and deep thinking (Du Toit, 2014).

Three adult learning theories were selected for their construct and interrelatedness to the core theoretical framework. As novice lecturers of the exemplar institution, we endeavoured through participatory action research to change our teaching practice and practitioner research. In a community of practice we purposed to instil the same zeal into our students and colleagues (Du Toit, 2013) As principal researcher with a constructivist mind set, and as a lecturer who is expressive I came up with the following theories with the intention of bringing out the construct that can be integrated with Whole Brain® learning: Whole Brain® Professional Multiple Intelligences (WBPMI); Whole Brain® Student Multiple Intelligences (WBSMI); Whole Brain® Experiential Professional Learning (WBEPL); Whole Brain® Experiential Student Learning (WBESL); Whole Brain® Self-regulated Professional Learning (WBSRPL); Whole Brain® Self-regulated Student Learning (WBSRSL); Whole Brain® Constructivist Professional Learning (WBCPL) and Whole Brain® Constructivist Student Learning (WBCSL). Each of the living theories is discussed in detail in the paragraphs that follow.

### **2.5.2 Whole Brain® Professional Multiple Intelligences**

The theory of Multiple Intelligences was proposed by Gardner in 1983 in *Frames of the Mind*. Hanafin (2014, 127) quotes Gardner's definition of intelligence as the "ability to solve problems or fashion products that are of consequence in a particular cultural setting or community". Gardner's multiple intelligences are precise capabilities (potentials) an individual has that are used to solve problems (Malm, 2001). The theory first claimed eight intelligences and Shearer (2012) describes them as follows: Interpersonal – the person who interacts effectively with other people; the intrapersonal – plans effectively to achieve personal goals; kinaesthetic – uses the body in skilled ways for expressive and goal directed activities; linguistic – uses language to express and understand complex meaning; logical-mathematical – uses inductive and deductive reasoning skills as well as critical and creative problem solving; musical – thinks in sounds, rhythms, melodies and rhymes;

the naturalist – understands the natural world, including plants, animals and scientific studies; the visual-spatial – thinks in pictures and perceives the visual world accurately. The ninth, tenth and eleventh intelligences have since been added and these are the existential, spiritual and pedagogical intelligences (Gardner, 1983; 2004; 2011; Malm, 2001; Woodfolk, 2007).

Analogous to Whole Brain® Thinking and Learning is the Multiple Intelligences theory that both motivates and improves the performance of learners. Sibanda and Maposa (2010) perceive that any form of innovation in education needs to factor in multimedia technologies as a panacea to effective teaching and learning practices of students. I take this observation to mean that the lecturer should understand and acknowledge the diverse intelligences and learning preferences of the students in his class. Once the students' learning preferences have been observed, the lecture can vary the learning opportunities. Integrating various forms of technology in the classroom is another form of innovation that this study used as is outlined in the research chapter. In this study both the lecturer and the students were learners; hence the constructs Whole Brain® Professional Multiple Intelligences and Whole Brain® Student Multiple Intelligences (WBPMI, WBSMI) respectively. Additionally WBPMI and WBSMI can become effective tools in the learning process in that they both open levels of inherent motivation based on lecturer and student potential. The different profiles of the learner lecturers contributed constructively to understanding the self as well as the thinking preferences of the students we taught. The modes of thinking contributed positively to the approach to problem solving, communication, assessing and teaching (Du Toit, 2013). Whole Brain® quadrants do not function in isolation. No intelligence can function in isolation but needs to be integrated with others. As part of my lived theory, and inspired by the constructivist determination to construct new meaning, I designed Table 2.1 that demonstrates the interconnectedness of some of Gardner's intelligences and the quadrants of the Whole Brain® Thinking Model.

**Table 2.1: Visual representation of the interrelatedness of MI and Herrmann's quadrant**

Multiple Intelligences	Whole Brain® Quadrants
Logical mathematical	Quadrant A: logical
Naturalist	Quadrant B: sequential

Bodily kinaesthetic, interpersonal  
interpersonal

Quadrant C: kinaesthetic,

Visual spatial

Quadrant D: holistic, intuitive

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I also noticed the interconnectedness of some careers or occupational fields of Herrmann's quadrants and Gardner's multiple intelligences. For instance, Herrmann's logical has an accounting occupational field that is similar to Gardner's accounting career. Herrmann's Quadrant C *interpersonal* has *educational* as occupational field and Gardner's interpersonal intelligence has *teacher* as suitable career. Finally, Herrmann's D quadrant has *artistic* and *entrepreneur* as occupational fields that are similar to Gardner's intrapersonal and spatial intelligences and that have entrepreneur and artist (Shearer, 2009; 2012). These similarities underscore the fact that the lecturer's learning opportunities are directly related to the students' careers or professions. If student thinking and learning preferences are accommodated in the classroom, students will be able to fulfil their realising expectations.

### **2.5.3 Whole Brain® Constructivist Professional and Student Learning**

The integration of various learning theories as part of our study gave new meaning to teaching practice. Constructivist learning theory defines how individual learners comprehend and practise things, even though as abstract, physical and practical processes in terms of development stages and learning styles (Vygotsky, 1978; 1980). Constructivism entails active participation of individuals in creating meaning from received information (Woodfolk, 2007). Furthermore, the following scholars acknowledge that central to constructivism is the active role of the learner as an individual and as part of a community in making meaning of own experiences (David, 2015; De Boer et al., 2012; Lalonde, 2011; Piaget, 2013; Shively, 2015; Smit and Du Toit, 2016).

While traditional educationists view learning as the transfer of knowledge from the teacher to the learner, to the constructivists, learners discover their own new ways of solving problems. They apply own previous knowledge and experiences and make sense of new knowledge and then develop their own original concepts (Coetzee and colleagues, 2015).

To elaborate on the theory, I borrowed Piaget (2013)'s view of constructivism as part of our approach to professional development. Piaget's constructivism entails an active

learner effort to construct new meaning. As learner - participants, we were actively involved in preparing diverse learning opportunities that encapsulated lecturer and student activities. We took cognisance of our learners' learning styles too. "Educators (lecturers) have to adapt to the role of facilitator so that they can be able to accommodate learners in their classes. Constructivists encourage educators (lecturers) to create learning environments that support and encourage learners' thinking. Learning style flexibility accommodates learners' learning styles" (Ngozo, 2011, 32). Constructivist learning activities answered the secondary epistemological question: *How can we innovatively enrich our teaching practice and practitioner research through the Whole Brain® Thinking Model?*

#### **2.5.4 Whole Brain® Experiential Professional Learning and Student Learning (WBEPL, WBESL)**

Constructivist Learning Theory supports Kolb's (1984) Experiential Learning Theory by encouraging learners to construct their own meaning. Kolb's experiential learning explores the cyclical process of all learning. It can be used to describe the process for recording educator (lecturer) continuous professional development, through taking time to capture and record and implement learning in our daily work (Kolb, 1984; Ngozo, 2011). Kolb's experiential theory (1984) describes the adult learner as one who is motivated to learn about the self. Experiential learning theory describes learning as the process whereby knowledge is created through the transformation of experience. Knowledge is a result of a combination of grasping and transforming experience (Kolb, 1984). The theory portrays two dialectically related modes of grasping experience: Concrete Experience (CE) and Abstract Conceptualisation (AC). There are also two dialectically related modes of transforming experience: Reflective Observation (RO) and Active Experimentation (AE).

Experiential learning is a process of constructing knowledge that involves creative tension among the four learning modes that is responsive to contextual demands. This process is portrayed as an idealised learning cycle or spiral where the learner touches all the bases – experiencing, reflecting thinking and acting – in a recursive process that is responsive to the learning situation and what is being learned (Kolb and Kolb, 2005, 194). Kolb (1984) and MacLeod (2013) observes learning as a integrated development with all the cycles equally supportive of one another.

An in-depth discussion of the four cycles is provided by Chang, Wen and Chen (2011). They underscore the fact that learning involves the totality of human

Learning cycle	Description
<b>Table 2.2: Concrete Experience (CE) Kolb's four learning cycles</b>	
	The learner encounters a new experience or interprets an existing experience
Reflective Observation (RO)	The learner reviews and reflects on the new experience or identifies inconsistencies between experiences and understanding
Abstract Conceptualisation (AC)	The learner concludes or reflects on previous experience by giving rise to a new idea or a modification of an existing abstract concept
Active Experimentation (AE)	The learner applies or tries out what has been learnt activities and these activities are presented in table 2.2 below.

As lecturer learners in this study in a community of practice, we engaged Kolb's learning cycles. In the first cycle, i.e. the concrete experience, we discussed the purpose of the research. Being the principal researcher I facilitated the discussions by explaining Whole Brain® professional learning, which as a collective and in a community of practice we were going to engage in. We then embarked on the filling in of the HBDI®. The second cycle that is reflection and observation included the discussions of the HBDI® profiles. We reflected on our current teaching styles and the implications of our profiles. The lecture method and student individual class presentations were the most commonly used teaching strategies. As far as student assessment was concerned, the essay type question was the most popular assessment strategy. Most of the questions set were biased toward the cognitive domain as is reflected in Chapter 4. The cycle involved the mapping of the study. We discussed the suggested observation sheets we were going to use in class. Four strategies were going to be used; these were teacher-student activities, media integration, Whole Brain® questioning techniques and Bloom's questioning techniques. Cycle 3 included other assessment strategies by Race (2015) that were current and reflective of the 21<sup>st</sup> century attributes. We then agreed to vary our teaching and assessment methods by adopting the teaching strategies stipulated in the observation sheets as well as by Race. This was our acquired new knowledge and experience. We reflected on these methods as individuals and also in pairs (RO).

Through our reflection we were able to compare our old and new approaches to teaching (AC). The final cycle was Active Experimentation that was the practical implementation of intervention. We went into our lecture rooms to try out the strategies. We designated observers for the practice to witness the various strategies. We realised the strengths of the new approach as our lectures were now interesting and our examinations were passed better than the previous ones as is evidenced by the interview results in Chapter 4. Some students underscored this improvement during the interview responses. The experimentation took place continuously until the end of the second semester (AE). Finally we concluded our findings and formulated our own living theory (McNiff and Whitehead, 2006; Whitehead, 2009): Whole Brain® teaching and learning theory that encapsulated using a variety of teaching methods and assessment acknowledging the cognitive, psychomotor and affective domains. The results in Chapter 4 authenticate our experience.

Kolb's learning theory (1984) defines four distinctive learning styles. The concept learning style describes individual differences in learning based on the learner's preference for employing different phases of the learning cycle (Kolb, 2005). Herrmann International (2017) postulates that an individual may prefer to use a single learning style at any given time. MacLeod (2013) posits that there are many reasons why an individual prefers a certain style. Some of the reasons mentioned may be social or educational.

Kolb identifies four learning styles connected to the four cycles discussed above and these are: diverging, assimilating converging and accommodating. The following lines discuss the four.

**Diverging:** Kolb (2005) termed this style diverging because learners with this thinking style perform better in situations that require the generation of ideas. Learners with a diverging learning style have broad cultural interests and enjoy gathering information. They are interested in people, are imaginative, emotional, and inclined to the arts. Herrmann's C quadrant and Gardner's interpersonal intelligence would align well with this kind of learner. Learners with a diverging style prefer to work in groups, to listen with an open mind and to receive feedback. Such learners also like concrete experience and reflective observation as part of their learning. They view concrete situations from many perspectives and adapt by observation rather than action (De Boer, 2013; Ngozo, 2011; McLeod, 2013). This learning style was typical of LP1, LP2, LP3, LP4, LP6, LP8 and LP9. Interaction among fellow participants and our students in this study contributed much to the success of this professional journey.

**Assimilating:** assimilating learning preference favours a concise, logical approach. It emphasises that ideas and concepts are more important than people. Therefore these learners require good clear explanation rather than practical opportunity. The thinking style best describes Herrmann's A quadrant, and Gardner's logical mathematical intelligence. In formal learning situations learners with this style prefer reading, lectures, exploring analytical models and having time to think things through (Ngozo, 2011). De Boer (2013) points out those learners with this style of thinking like to reason inductively and construct models and theories. In the study LP4, LP5, LP7 and LP10 had this learning style.

**Converging:** learners with a converging learning style are best at finding practical uses for ideas and theories. Learners with a converging learning style are attracted to technical tasks and problems rather than social or interpersonal issues. Learners with this thinking style "prefer the 'how' question and opportunities to work actively on well-defined tasks as well as learning by trial and error. They respond well to abstract conceptualisation and active experimentation" (De Boer, 2013). Equating this style with the quadrants, these learners may be classified under the B and D quadrants and Naturalist Intelligence for the MI theory. In the study LP6 and LP7 had this style of thinking.

**Accommodating:** the accommodating learning style favours hands-on activities and relies on intuition rather than logic. Such learners use other people's analysis, and prefer to take a practical, experiential approach. They are attracted to new challenges and experiences in solving problems as well as to carrying out new plans in new situations. Ngozo (2011) states that such learners prefer to work in teams to complete tasks. They set targets and actively work in the field, trying different ways to achieve an objective (Ngozo, 2011). Herrmann would call these B, C and D quadrant learners while Gardner classifies them as having Visual-spatial and Musical Intelligence. Most of the participants had B and C quadrant thinking styles.

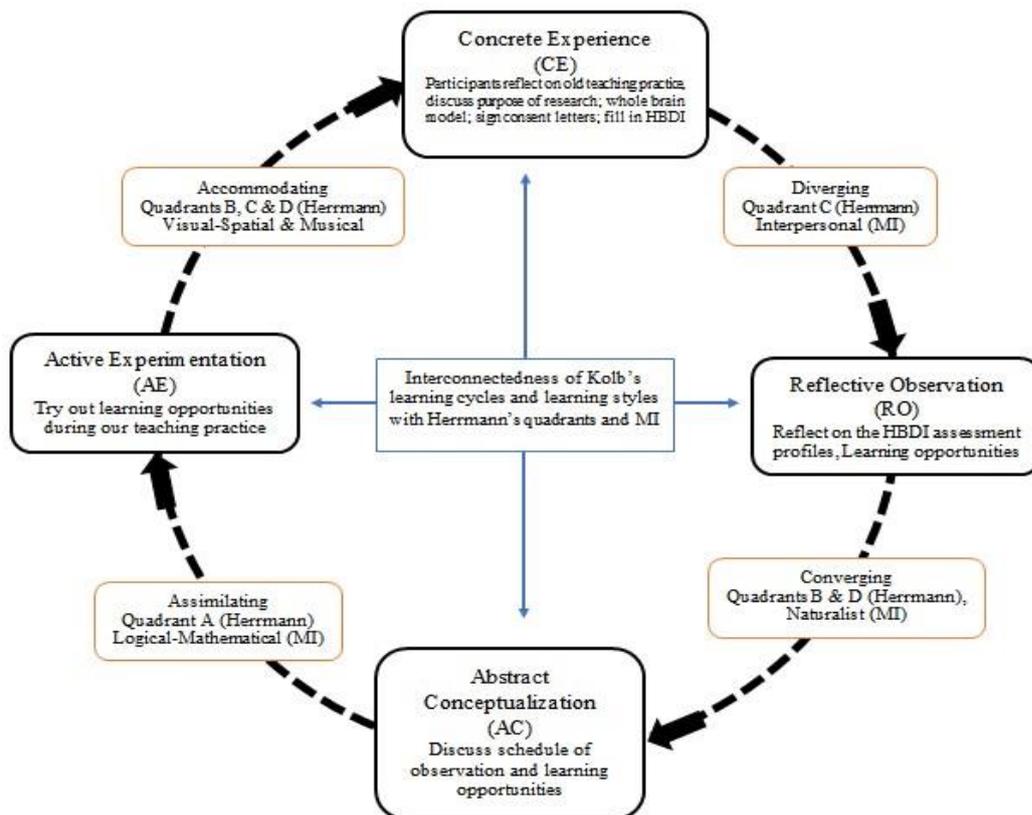
Kolb's four learning styles relate well to Herrmann's four quadrants and MI theory in that learners "show a preference for, or will to cope with some stages better than others and learning is seen as a continuous, interactive process" (Cassidy, 2004, 430). Knowing one's learning style permits learning to be positioned according to the preferred method. As lecturer learners in this study, knowing our thinking preferences helped us to present our lectures and assess students' work. Our students benefited from our transformed teaching practice as we introduced practical learning

opportunities that encouraged independent, self-discovery and logical thinking (self-regulated, experiential and constructivist learning). As Whole Brain® experiential learner lecturers Kolb's theory would mean that we used the learning cycles and styles to evaluate our teaching practice critically, thus engaging the A quadrant; design and develop sequential learning opportunities that accommodated all our students' learning styles (Quadrants B and D). The learning activities and media should attract all student capabilities from each stage of experiential learning cycles (McLeod, 2017). As part of my lived theory as principal researcher, I drafted visuals to illustrate the interconnectedness of Herrmann's (1995) quadrants, Kolb's (1984) learning styles and some of Gardner's Multiple Intelligences. The following table is a visual illustration of how Kolb's cycles and learning styles merge with Herrmann's quadrants and Gardner's multiple intelligences. Table 2.3 below shows the interconnectedness of Kolb's learning styles, Herrmann's quadrants and Gardner's multiple intelligences.

**Table 2.3: Interconnectedness of Kolb's learning styles, Herrmann's quadrants, and Gardner's MI**

<b>Kolb's learning styles</b>	<b>Herrmann's quadrant</b>	<b>Gardner's MI</b>
Diverging (CE/AC)	Quadrant C interpersonal	– Interpersonal
Assimilating (AC/RO)	Quadrant A – logical	Logical – mathematical
Converging (AC/AE)	Quadrant B – sequential, D - experimental	Naturalist
Accommodating (AC/AE)	Quadrant B – methodical, C – feeling, D – intuitive	Visual – spatial, musical

I linked Kolb's learning styles, Herrmann's quadrants, Gardner's multiple intelligences to the steps we took in our study in my bid to construct my own meaning as a Whole Brain® self-regulated experiential learner. Figure 2.15 below shows the interconnectedness of the steps we took in the study with Kolb's learning styles, Herrmann's quadrants and Gardner's multiple intelligences.



**Figure 2. 15: Kolb's learning styles, Herrmann's quadrants and Gardner's multiple intelligences merged with our action research steps**

Following is a brief discussion on the steps we took that I linked with Kolb's learning styles. All of us with our different thinking preferences contributed something in each step taken. The first step was the concrete experience. As a focus group we met for the first time to discuss the significance of the research. We reflected on our experiences in teaching in higher education. All of us echoed our lack of skills in teaching adults. Our next step was taken to reflect on HBDI results. Each one shared their profile and commented on the authenticity of the diagnosis. We all agreed that the instrument reflected our thinking preferences. Step three was taken by individuals in planning for the lessons - preparation for learning opportunities. The last step was the implementation stage. We observed each other teach. We then met as a focus group to evaluate each other. We concluded that Kolb, Gardner and Herrmann's thinking and learning styles helped us to know both ourselves and our students' ways of doing things. Varying our learning opportunities helped to move out our comfort zones.

### **2.5.5 Whole Brain® Self-regulated Professional Learning and Student Learning (WBSRPL, WBSRSL)**

Merging Whole Brain® Thinking with Self-regulated or Directed Learning was part of our journey as lecturer learners to self-awareness and self-motivation that we did instil into our students as well. Zimmerman (2000; 2002; 2008) is said to be one of the top researchers of self-regulated learning. The theory is on constructive behaviours that affect one's learning. It entails "self-awareness, self-motivation and behavioural skill to implement knowledge appropriately" (Zimmerman, 2002, 65-66). It also implies that as lecturer - learners we needed to be aware of our inexperience in teaching in higher education and to be motivated to improve our old teaching strategies, using innovative ways. Using Whole Brain® participatory action research, we, together with our students, were able to reflect on our teaching and learning practice to transform our professional practice and research. Because we as novice lecturers were aware of our lack of creative, innovative ways of teaching and assessing our modern higher education adult we had to employ Whole Brain® Thinking and Learning strategies in a bid to self-direct our professional development.

Zimmermann, (2002) asserts that self-regulation aids the learning process in three ways. Firstly, before the learning task is tackled, the learner should analyse the task, set goals and develop a plan of approach. Secondly, learners need to self-regulate as they perform the task. They need to deploy specific learning strategies or methods and then observe how well those strategies and methods are working.

Thirdly, learners must self-reflect after the accomplishment of the learning task. Furthermore, "Learners have to believe they can learn, whatever the task before them, and they need to be motivated" (Zimmerman, 2002, 66). Knowles et al. (2015, 171) endorse that self-directed learning is "Self-teaching, whereby, learners are capable of taking control of the mechanics and techniques of teaching themselves. It is also conceived as personal autonomy, which means taking control of the goals and purposes of learning and assuming ownership of learning."

The assumption in this study was that the novice participants were motivated to construct new methods of teaching, assessment of students work and conducting research. The age group 30 to 55 years included in the study assumed that we were still energetic enough to handle whatever task we encountered. As a community of practice, we were motivated to use WBSRPL in a scholarship of learning, hence assuming ownership of our learning (Zimmerman, 2002).

## **2.6 SUMMARY OF THE CHAPTER**

The chapter presents a combination of the modern-day discourses in literature on professional development. I discussed the crucial learning theories on professional development. I also discussed in depth the philosophies behind the model that forms the epicentre of the study. The model's interconnectedness to other adult learning theories was also clarified.

## **CHAPTER 3**

### **RESEARCH DESIGN**

#### **3.1 INTRODUCTION**

The research was carried out guided by the primary research question, which is epistemological in nature: *How can my colleagues and I as a collective make use of the Whole Brain<sup>®</sup> Thinking Model to transform the teaching practice and research of academic staff in higher education in Zimbabwe?* The purpose of the study is to promote professional growth and change of novice lecturers by exploring the relationship between their thinking preferences and their teaching styles. In this chapter Whole Brain<sup>®</sup> Participatory Action Research (WBPARG) is the research design in the study. A mixed methods approach forms the methodological paradigm while

the HBDI® report presents the baseline study that relates the participants' brain dominance profiles. Finally, the chapter presents data collection, data analysis and interpretation, and the ethical measures that were adhered to in the study.

## **3.2 RESEARCH PARADIGM**

A research paradigm according to Fringe is directed by a set of suppositions, which constitute a researcher's manner "of looking at, thinking about and acting toward the world" (Fringe, 2013, 100). Put in another way, a paradigm is a worldview that is "a basic set of beliefs that guide action" (Guba, 1990, 17). A paradigm or worldview is subjective in nature as it focuses on an individual's meanings of new knowledge and new experiences (Clarke, 2005; Creswell, 2009; 2013). This premise highlights the individual and diverse reality in our teaching practice as no two lecturers can have the same lived experience (Mertens, 2014). Paradigms or worldviews are shaped by "the discipline area of the student, the beliefs of advisers and the faculty in the student's area" (Creswell, 2009, 6). Creswell further explains that there are four different worldviews: "Post-positivism (positivist, or scientific/empirical method, theory verification), advocacy/participatory (political, change-oriented), pragmatism (pluralistic, real-world practice-oriented) and constructivism (social and historical construction, naturalistic inquiry, theory generation)" (Creswell, 2009, 6).

The nature of my discipline – education – compelled me to adopt the constructivist or social constructivist paradigm because it allows researchers to construct meaning actively and interactively from their context, experience, environment, world, minds, existing knowledge and real-life situations ( Coetzee et al., 2015; Creswell 2009; 2014 Knowles et al., 2015). Creswell (2014) avers that the social constructivist worldview engages humans with their world and makes sense of it, based on their historical and social perspectives. In this study, the participants' professional and education history portrays novice lecturers in higher education who lack skill and experience in teaching and assessing adult learners at the exemplar institution.

Constructivist theories have been used to explain how human beings learn. "New experiences, understandings and information that are built on existing structures and learning will not take place unless the schemes have changed" (Majoni, 2014, 121). By engaging in Whole Brain® Participatory Action Research, we sought innovative ways of transforming our facilitating of learning and practitioner research.

### **3.2.1 The application of constructivism in the study**

In the next section I discuss the constructivism paradigm as it relates to the study in its ontological, epistemological and axiological aspects.

**Ontology:** (Clarke, 2005; Henning and Smit, 2011; Creswell, 2009; Mertens, 2014) posit that reality is subjective and exists in multiple realities for participants. We acknowledged this in our diverse thinking and learning styles diagnosed by the HBDI®. Our facilitating of learning was different and unique. Such an ontological position takes into cognisance the fact that lecturers should in turn understand the students' subjective realities in the classroom. We also took cognisance of the Whole Brain® construct that both lecturer learners and students' realities are shaped by their thinking and learning preferences. Lichtman (2010) adds that reality is a creation of a single person's consciousness, formed by practice and experience. This means that both the lecturer and the student's knowledge is experiential. Our old ways of thinking, teaching and learning influenced our current way of thinking and learning (Kolb and Kolb, 2005).

**Epistemology:** As participants (researchers) we understood our relationship with the exemplar institution (the researched). We understood the needs of our academic institution and our need for professional development to transform our practice (Clarke, 2005; Creswell, 2009). Through the Whole Brain® Model we discovered our diverse thinking and learning styles and this knowledge helped us construct new ways of facilitating learning and assessment of student work that were different from our traditional ways. We understood as lecturer participants with diverse learning styles that we needed to be partners in the creation of new knowledge (Mertens, 2014). Social constructivism permits participants to create meaning from abstract concepts actively by using concrete experiences. Together, as a community of practice, we observed one another teach, using various media to enhance learning.

**Axiology:** As participants we were aware of our educational beliefs and values that pertain to teaching practice emanating from our dual role as researcher-lecturers. We conducted the research responsibly, basing it on human values such as honesty, fairness, objectivity, reliability, accountability, freedom and openness (Gravett, 2005). We were also aware of that we could not conceal our values and lived experiences from the research process (Lincoln, Lynham and Guba, 2011; Neuman, 2011; Wahyuni, 2012).

### 3.3 RESEARCH DESIGN AND METHODOLOGY

### 3.3.1 Whole Brain® Participatory Action Research Design

Kumar (2011) outlines the functions of research designs by explaining that the main function of a research design is that of explaining how a researcher finds answers to research questions. An appropriate research design enables the researcher to arrive at findings that are valid, comparative and conclusive. The design for this research is a phrase that combines two tenets: the Whole Brain® Model (WBM) and Participatory Action Research (PAR).

The selection of the design for this study was guided by two opinions, the first being the professional development of novice lecturers, coupled with our zeal to learn and innovatively transform our teaching practice, and secondly practitioner research. This self-judgement or self-study compelled us to embark on this professional development journey. Hence we adopted the Whole Brain® Model that empowers one to plan innovative ways of facilitating learning. The Whole Brain® Thinking Model is a new approach to teaching in higher education in Zimbabwe; exploring it, understanding it and applying it would add to the literature on facilitating learning in higher education in Zimbabwe. Since the Whole Brain® Model has already been presented in Chapter 2. the next section discusses the Participatory Action Research component: “**P**lanning a change, **A**cting and observing the process and consequence of change, **R**eflecting on these processes and consequences, and then re-planning, acting and observing, reflecting and so on ...” (Kemmis and McTaggart, 2000, 595).

Participatory action research (PAR) has been described in much the same way as action research with little to distinguish between the two (Gaffney, 2008). In this study the two are regarded as identical. Literature traces the origins of action research to Kurt Lewin (1946), a social scientist, who is said to have been interested in changing human actions, hence his publication on “community action programmes” (Cohen et al., 2011). Action research has evolved and today it is widely used in various fields of study, including education. (Clarke, 2005; Cohen et al. 2011; Creswell, 2009; Hendricks, 2013; Koshy, 2010) link action research to the teaching fraternity as a collaborative and critical examination of their own teaching practice. It is a systematic, self-critical inquiry with the purpose of self-study where knowledge is connected to one’s practice that aims at constructing new meaning as living theory, based on lived experience (Hendricks, 2013; Lichtman, 2010; McNiff, 2002; McNiff and Whitehead, 2006). Wolvaardt and Du Toit (2012) point out that action research is a practical way of learning whereby individuals look at their work and determine whether it is as they want it to be and then take responsibility for bringing about change.

Action research involves reflection, which according to Dewey (1933), the master theorist of reflective thinking occurs when one is “confronted with a problem, recognizes it, and then attempts to resolve the problem” (Hendricks, 2013, 28). When lecturers reflect as part of the action research cycle, they develop new knowledge about facilitating learning and hence contribute to the knowledge base on best practices Zeichner and Lui, 2010).

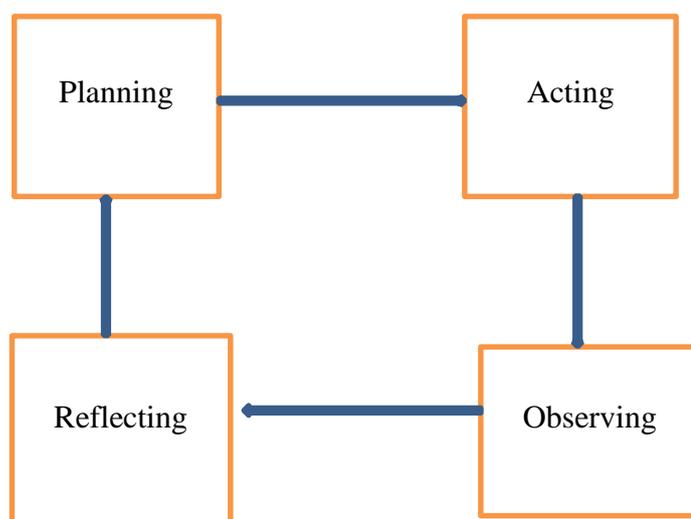
Action research is significant in education in that as practitioner research, it transforms the teaching practice into a meaningful pedagogical process. It compels lecturers to take responsibility for monitoring their practice or professional learning. Through it as a collective, lecturers are open to opportunities to explore or learn about themselves as professionals and finally develop practice theory. Through this self-study, lecturer researchers experiment with novel ideas, change practice; promote lifelong professional learning and scholarly thinking (Burns, 2010; Du Toit, 2016; Lesha, 2014; Kapachtsi and Kakana, 2014; Whitehead, 2010). Action research is therefore a model of professional development that allows lecturers to learn about their own teaching practices (Mills, 2011).

Some scholars underscore the advantages of participatory action research in education. Among some of the advantages are the improvement of teaching practice that results in change; the establishment of self-critical communities and involvement of people in making critical analyses of their situation; making research a less lonely endeavour; encouraging collaboration among educators and propelling ongoing professional development. The collaboration permits researchers to celebrate their success with one another, creates ways of helping their students learn more successfully and creates strong professional relationships (Cole and Knowles, 2009; Hobson, 2001; Kemmis and McTaggart, 1992). Our study kept the advantages listed above in mind. As a community of lecturers we adapted to the world of technology through the use of computers, videos, Moodle and PowerPoint. This was our new knowledge and new constructivist experience reiterated by (Coetzee and Van Niekerk, 2015; Henning, Rensburg and Smit, 2011).

Lewin (1946) in Cohen et al. (2011) codified action research into four main stages: Planning, acting, observing and reflecting. The model is a series of spirals that is described by Cohen et al. (2011, 352) as incorporating a cyclical process of strategic planning, implementing the plan, observing, evaluating and self-evaluation. There is critical and self-critical reflection of the results of planning followed by implementing

and observing the results, and finally making decisions for the next cycle (Kemmis and McTaggart, 2000). The process of action research is an unending reflective process like Kolb's (2005) phases of experiential learning and Dick's (2000; 2002) natural pattern of research: Act > review > act > review. Similar to Dick's cycle is Hendricks's (2013) action research process that he too describes as unending.

In this study we designed our own action research process. We designed our action research cycle that we described as a Teaching Practice Participatory Action Research Process. It entails the following pattern:



**Figure 3.1: Our formulated action research cycle**

We used a pattern that is similar to what we are conversant with in our teaching practice at the exemplar institution. Our planning phase/cycle commenced with a first focus group meeting. During the two hour meeting we discussed our entire research schedule, from the April to the end of August semester, which involved the filling in of the HBDI®, the drafting of the calendar of events that we would follow in the study. The second phase or cycle included the acting spiral. In this cycle we had a number of activities that involved a two-hour discussion of HBDI®; 30 minutes of filling in the

online HBDI® survey report; three-hour lecture observations; 20 minutes of filling in the respondent questionnaire, and 30 minutes interviews held at the end of the two semesters. The third cycle included observing and evaluating the actions in our classroom interaction. The last cycle, which is the reflection spiral, involved a two-hour long focus group discussion. The meeting was a reflection of the experiences of the participants in the research. It was held at the end of July, and it signified the end of the prolonged research.

### 3.4 PURPOSIVE CONVENIENCE-BASED SAMPLING

A sample is a sub-group of the population the researcher is interested in (Kumar, 2014). Typical case sampling is a type of purposive sampling that “includes the most typical cases of the group or population under study” (Cohen et al, 2011, 157). The 10 novice lecturers teaching at the exemplar institution in Zimbabwe were the typical group selected for the particular characteristic of professional development because of being inexperienced in teaching, assessment and research. Convenient and volunteer sampling is interwoven in the sampling technique used in the study. Convenient/opportunity/accidental sampling, according to (Cohen et al. 2011, 155-156) involves selecting the nearest “individuals or those who happen to be available and accessible at the time and may be the sampling strategy which can be selected for a case study”.

Pertaining to the sample size (Cohen et al., 2011; Merriam, 2009; Patton, 2014) point out that there are no clear rules on the size of the sample in qualitative research; size is informed by fitness for purpose. The selected lecturers fitted well on the purpose of this study in that they had taught in higher education institutions for ten and fewer years with their ages ranging from 30 to 55 years. They were inexperienced in research as five had not published any paper and five had fewer than five publications; only LP6 had published 17 publications. Table 3.2 below gives the biographic information of the 10 participants.

**Table 3.1 Biographic information of the participants**

<b>Participant</b>	<b>Faculty</b>	<b>Gender</b>	<b>Age</b>	<b>Education qualification</b>	<b>Teaching experience in HE</b>	<b>Number of publications</b>
LP1	Education	Female	47	M.Ed.	6	2
LP2	Theology	Male	43	M.A., PGDE	1	0

LP3	Business Finance	Male	39	MBA	5	0
LP4	Business ICT	Male	45	M.Com. MBA, B.Ed.	2	1
LP5	Business ICT	Male	33	M.Com., MBA, PGDE	6	3
LP6	Education	Female	46	M.Ed.	8	17
LP7	Business Accounting	Male	31	M.Com., MBA	5	0
LP8	Science Nutrition	Female	45	M.Ed.	4	0
LP9	Arts English and Comm.	Female	33	M.A.	2	3
LP10	Science Maths	Female	31	M.A.	1	0

The gender distribution of participants was balanced, which benefited the exemplar institution in having both its female and male lecturers equally developed in the scholarship of teaching and learning, and in research. All the participants were under the age of 50. This reflects that the exemplar institution had a long serving group of lecturers who might contribute positively to the professional and research growth of the institution if they were retained. Five of them were below 40 years old. They were young and vibrant with brilliant technological minds, which when supported academically and professionally, may place the institution on a high level of academic prowess. I did experience their novel contribution as we discussed our assessment strategies. The use of the computer, Moodle in particular, was heavily underscored as one of the best tools all learners and lecturers could use in this era of technology. Four of the participants were already using it. These were LP4, LP5, LP6 and LP7.

A lack of teaching experience in higher education and research was evident among the 10 participants; seven of the 10 participants had taught in higher education for at least five years and three had taught for at least six years. Most significant were four who had taught for two years and less. Because of their inexperience in teaching, the participants were purposively sampled.

Respondents too were purposively selected from the five faculties. Only students who were taught by the lecturer participants were purposively selected and out of these 20 volunteered to participate. The faculty of Business Studies, which had four lecturers, had 80 students participating in the study as respondents. The Faculty of Science, which had two departments represented, had 40 students, the Faculty of Education with two lectures had 40 respondents, the Faculty of Theology with one

lecturer had 20 and lastly the Faculty of Arts with one lecturer had 20 students. Of the 200 respondents, 134 (67%) were female and 66 (33%) male.

### **3.5 MIXED METHODS APPROACH**

Qualitative and quantitative data were collected hence a mixed methods approach (MMA) was adopted in order to afford extensive analysis of the research problem (Creswell, 2014; Johnson and Christensen, 2012). The approach was specifically selected for the purpose of obtaining numerous opinions and viewpoints on the use of the Whole Brain® Model. To obtain numerical data; the students' feedback questionnaire; the HBDI® report; examinations and learning opportunities observation sheets were used while interviews, focus group meetings were used as source of qualitative data. Concurrent triangulation was adopted to compare and confirm results (Creswell, 2009).

### **3.6 DATA COLLECTION**

In exploring the innovative model and to ensure credibility, validity and reliability of the study, numerous data gathering instruments were employed namely: questionnaires, observation sheets, audio - and video-recording, text analysis and interviews (Creswell, 2013; 2014; Hendricks, 2013; Henning, Rensburg and Smit, 2011; Stringer, 2014)

### **3.7 STUDENT FEEDBACK QUESTIONNAIRE**

A questionnaire is a valued research instrument used to collect data from participants or respondents in the absence of the investigator. It is economical in both time and cost. The language used in a questionnaire should be simple and suitable for the level of participants and respondents (Cohen et al, 2011; Kumar, 2014; Hendricks, 2013; McLeod, 2018).

We used a closed-ended questionnaire designed by an expert in Whole Brain® Learning, Prof. Du Toit who considers Whole Brain® Learning a learner-centred approach in facilitating learning (Du Toit, 2013). The closed-ended questionnaire was used to elicit students' attitudes to our lessons (Farrell, 2016; McLeod, 2018). Questionnaires were most chosen because we could administer data to large numbers of respondents more cheaply and quickly, notwithstanding the major drawback of having respondents not providing honest responses (McLeod, 2018).

### **3.8 THE HBDI®**

The HBDI® survey questionnaire was used to identify the participants' thinking profiles and learning preferences (Consult Addendum G). The instrument was designed by experts so the vagueness of questions had already been taken care of. The Instrument provides reliable mental diagnosis of ways individuals prefer thinking or learning. Literature confirms the validity of the instrument among which are: (Bunderson, 1982; The Coffied report, 2004; Herrmann International, 2017; May and May 2012).

“Baseline data are collected before the implementation of an intervention, and they are used to make comparisons of participants before and after the intervention” (Hendricks, 2013, 119). The HBDI® report on each participant showed the diverse thinking preferences of the lecturer participants in the exemplar institution. The baseline data was instrumental in helping each participant getting to know himself better and to understand other people, i.e. other colleagues and their students' thinking preferences. The Whole Brain® Model helped in the realisation that diversity in teaching and assessment was significant in our teaching practice; hence our observation schedule encouraged media integration, the use of various questioning techniques and teacher-student activities. Determining the learning styles of the students served as a benchmark for the need to adapt our style of facilitating learning as one's learning style directly influences one's style of facilitating learning. More elaboration is provided in Chapter 4.

### **3.9 COMPLETE PARTICIPANT CLASSROOM OBSERVATION**

Classroom observation measures behaviour directly. Observations vary in different researches due to different roles an observer can assume (Maree, 2007; Kumar, 2011; Mavuto, 2011). In the study all of us were complete participant observers as we were wholly involved in observing one another teaching. We used an observation sheet (Consult Addendum H) for our classroom observation. A list of diverse classroom activities and media was well spelt out on the observation schedule. During our first focus group meeting, which was our planning meeting, we scheduled six lectures for observation per participant. Of these lectures, two would be video-recorded. Because of the busy university schedule, not all participants had all six lecturers observed, but all had two lectures video-recorded.

### **3.10 STRUCTURED INTERVIEWS**

Hendricks (2013, 110) defines a structured interview as a prepared list of specific questions in which content and procedures are organised before the interview (Consult Addenda I and J). It is meant to guide the process of getting specific or intended information from participants or respondents. A structured interview also provides opportunities for the participants to describe the situation in their own terms, thereby revealing the many features of an experience that has an effect on the issue investigated (Hendricks, 2006; 2013; Stringer, 2014). Nieuwenhuis (2007) points out that an interview aims at seeing the world through the participant's eyes. Though interviews have more advantages than questionnaires as reiterated in preceding paragraphs, they are time-consuming, both in the interviewing process and in analysing data.

### **3.11 FOCUS GROUP DISCUSSIONS**

Focus group meetings were preferred because they gave all of us chances to present our views and observations pertaining our learning opportunities (Fringe, 2013; Matiere, 2011) (Consult Addendum I). The first meeting was held without any cameras present as the media team was busy with other university schedules. As the principal researcher, I explained Herrmann's Whole Brain<sup>®</sup> Theory and its significance for professional development. I had failed, due to illness and financial constraints, to bring my supervisor for the two-day seminar on Whole Brain<sup>®</sup>

Learning. We discussed the observation sheets' expectations as we were going to use them in our lesson observations. Our lesson observation schedule was decided during this meeting. Our last two-hour focus group discussion that was videorecorded was held on July 20, 2018. During our discussions each participant was given a chance to reflect and describe his experience with Whole Brain<sup>®</sup> Learning and present his perspective on personal growth pertaining to facilitating learning and assessing students' work.

### **3.12 AUDIO - AND VIDEO-RECORDING**

Video - and audio-recordings were done for our lectures and interviews to capture every detail of the conversations (Hendricks, 2013). The video recordings are kept in a hard drive in a locked file cabinet at Solusi University media centre. A copy of all the recordings will be kept at the University of Pretoria.

### **3.13 TEXT-ANALYSIS**

Documents and records offer substantial evidence for researchers. “Documents are often prolific, and researchers need to be selective, briefly scanning their contents to ascertain their relevance to the issue under investigation” (Stringer, 2014, 115). The advantage of using documents is that they can be accessed at any convenient point in time. The HBDI® profiles of 10 participants, data transcribed from videos and audio files, observation sheets, respondent questionnaires, interview guides, notes on Whole Brain® and Bloom’s Taxonomy, and mid-semester and final examination scripts were used in the study. This study used documents that are authentic and are widely recognised as valid. For instance, the HBDI® and Bloom’s taxonomy are documents used in various scholarly realms. The major disadvantage of using documents is that it requires transcribing or scanning for computer usage. This disadvantage was experienced as the study progressed. Failure to buy the N-Vivo computer software to transcribe the large amounts of data, due to financial constraints, led to the transcription done manually and it took three months to transcribe data verbatim. Transcribing large amounts of data was not an easy task. Coding was used to generate themes that show the different behaviours of participants and respondents.

### **3.14 DATA ANALYSIS**

Data analysis is defined as the systematic coding, categorising and interpreting of data in order to make meaning of the data sources (Hendricks, (2013; McMillan and Schumacher, 2010).

#### **3.14.1 Analysis of quantitative data**

Quantitative data was analysed using frequency scores, mean, standard deviation, percentiles and through comparative analysis of our profile scores. The data is represented by the HBDI® profile score sheets, bar charts, pie charts and tables for better illustration. The methods of data collection were the HBDI® report on profiles, feedback student questionnaires and observation sheets

#### **3.14.2 Analysis of qualitative data**

For qualitative data, interviews that were video - and audio - recorded were transcribed verbatim by a qualitative research expert and themes and sub-themes were identified. The data was analysed by organising it in alignment with the research questions. Because of the limited time and resources resulting from the researcher, being a novice researcher and a part-time international self-sponsored student who

faced overwhelming teaching and administrative duties at the exemplar institution as well as immigration challenges, deductive thematic analysis was the most suitable option to take in this study. The researcher was cognisant of the lack of flexibility and researcher bias in deductive analysis; hence a mixed methods approach coupled with multiple data collecting instruments was adopted.

There is inadequate literature that explains explicitly the practical and rationale for conducting trustworthy thematic analysis. Again there is no clear agreement about how researchers can meticulously apply the method (Nowell et al., 2017). However, Braun and Clarke (2006) suggest six steps researchers can use to carry out inductive thematic analysis while Yin (2011) offers five. In this study we were guided by deductive thematic approach where responses to the interview guides were grouped according to how they answered the four secondary research questions. Because of this analysis approach, no theme was irrelevant in the study; therefore no theme was discarded.

Literature was used to confirm the research findings as well as provide an opportunity to add to the literature. Braun and Clarke (in Nowell, 2017, 17) emphasise using participants' words when reporting by suggesting that direct quotations from participants assist in the understanding of specific points and they give the reader the essence of the original speech. I took the advice given above and in some sections of the study I have quoted lecturer participants and respondents directly to clarify or emphasise some concepts. I also linked literature with the findings to produce a scholarly account of our study.

### 3.14.3 Visual representation of data

Table 3.2 below provides a summary of the way in which both quantitative and qualitative data was analysed

**Table 3.2: Summary of mixed methods data analysis**

<b>Methods</b>	<b>Analysis</b>	<b>Representation</b>
	<b>Quantitative analysis</b>	
HBDI® assessment: Participants profiles	Comparative analysis of our profiles	HBD® I report score charts
Feedback student	Percentiles	Written report illustrated



and audio-recording, respondent questionnaires and two examinations. Continuous, ongoing reflection on our experiences was done through discussions of our lessons soon after observing one another teach. Interviews were transcribed verbatim by an expert in qualitative research and participants and respondents were asked to read through the transcriptions and verify them by signing them off if the transcriptions were correct.

Lincoln and Guba (1985, 300) posit that validity and reliability are imperative in qualitative and quantitative research designs. They prefer the use of the term *dependability* for the qualitative paradigm. They add that when readers are able to examine the research process, they are better able to judge the dependability of the research. Being aware of the probability of loss or change of data during its transfer from the interviewee to the interviewer, I used the feedback evaluation data saturation processes that follow to minimise such data transfer-related mistakes. Feedback evaluation according to (Lincoln and Guba, 1985) involves returning transcribed written scripts to respective participants for assessment and confirmation of information given in the interview meetings. The purpose of the process is to identify whether there might be loss or alteration of information given by the interviewee to the interviewer. The participant would then approve or disapprove the script. The participants were asked to sign at the end of the script. Lecturer participant 5 (LP5) noted some wrongly transcribed word and statement and corrected them. The correction was on two words, ZIMSEC and ZIMCHE that had been exchanged. The correct word was ZIMCHE. The second was a statement wrongly translated; the interviewee meant that adult students should not feel that the lecturer treated them like high school students; the initial transcription said adult students should not see the lecturer as one of the high school children.

### **3.16 RELIABILITY**

Cohen et al. (2011) posit that in qualitative research reliability can be considered as the correspondence between the researcher's interpretations and the concrete meaning communicated by the participants. In this study the responses generated through questionnaires and interviews were related to our focus group and individual interview responses. These, together with lesson observations data, were triangulated to signify the end of the initial phase of our research but our action research spirals did not end. We continue to implement our intervention through our teaching practice and practitioner research as is affirmed by Hendricks (2013, 1): "[...]

action research is an ongoing process that individuals use to constantly improve their practices”.

### **3.17 GENERALISATION AND TRANSFERABILITY OF THE OUTCOMES**

Since the results of the study have demonstrated a high level of professional development, it implies that the findings of the study can be generalised or transferred to other institutions of higher learning since the site of the study is an institution of higher education. The construct is in line with Kumar, (2014) who defines transferability of outcomes as the extent in which the results of the research can be conveyed to other similar locations or settings.

### **3. 18 ETHICAL CONSIDERATIONS**

Historically, individuals engaging in academic educational research, including higher educational faculties, have been bound by ethical guidelines that protect the rights of human subjects or participants. In support of the above claim, Hendricks, 2013 avers that:

You need permission to conduct an action research study if the data you are collecting on human participants will be disseminated including as research paper for a course, as a presentation at your school or district, as a conference presentation or publication ( 83).

Ethical clearance was obtained from The Ethics and Research Committee of the Faculty of Education at the University of Pretoria (Consult Addendum A) The exemplar institution’s University Administration Board (ADBORD) had authorised to me carry the research (Consult Addendum C).

The following guidelines were implemented to ensure the safety of the participants and respondents. To comply with the people in authority, I sought permission from academic deans since my participants were lecturers and students from five faculties. In this step I was guided by Oliver (in Fringe, 2013) who states that some persons in positions of authority need to be informed about what is taking place in their institutions (Consult Addendum D).

Consent letters explained to both participants and respondents of their roles in the study. We were going to use their lecturing times and also work after lectures in the evenings. They had to agree that they were willing to participate and that they had been assured that the confidentiality of their responses and their participation would be guaranteed (Creswell, 2009; Hendricks, 2013). Respect for the participants’ and

respondents' desires, rights, values and needs, were observed. I safeguarded their rights by communicating the aims and procedures of the study, both verbally and in written communication. I emphasised that confidentiality of all information would be observed and no name or any personal characteristics that may reveal someone's identity would be disclosed. Instead acronyms would be used, unless respondents wanted their names to be disclosed (Henning et al., 2011) (Consult Addenda E and F).

Respondents were also assured that the interviewers would not be their subject lecturers. Since the study employed participatory action research, every respondent and participant's contribution was valued. Power is ever-present in human communication; its course can be made to serve the interests of many people rather than few but it can never be denied or removed (Fringe, 2013). Borrowing the above idea and applying it in my research to generate respect, cooperation and consideration, I introduced myself to both the lecturer participants and respondents as a lecturer. Together in a community of practice we would be free to share our experiences.

Ethical rules pertaining to data collection, such as not answering a question they did not like to answer; withdrawing any time they wished; requesting to be interviewed at whatever time they felt convenient; guaranteeing that the information they provided would be kept confidential and the questionnaires completed anonymously (Mouton in Fringe, 2013) were considered

I identified the 10 lecturer participants with their respondents with acronyms or codes, which were designed according to their surnames' alphabetical order. The acronyms denoted the lecturers and students participating in the research. Since the lecturers participating were 10 in number, numbers from 1 to 10 were assigned to each participant. The students who participated as respondents were coded lecturer participant respondent (LPR) as shown on table 3.3 below. There were two volunteer respondents for each lecturer (except for lecturer participant 8 who had only one student who volunteered). Consequently there is LP1R1, LP1R2, indicating the respondents are for lecturer participant 1. Two respondents wished their names to be disclosed and these were students for lecturer participant 7. They are Nazrana – LP7R1 Kahn who is referred to as Nazrana- LP7R1 and Silvio Tune, who is referred to as Silvio-LPR2. One respondent (LP8R1) opted for audio-recording instead of being video-recorded. Table 3.3 indicates how participants and respondents were coded.

**Table 3.3: Coding of participants and respondents**

<b>Participant Code</b>	<b>Respondent Code</b>
LP1 (principal researcher)	LP1R1, LP1R2
LP2	LP2R1, LP2R2
LP3	LP3R1, LP3R2
LP4	LP4R1, LP4R2
LP5	LP5R1, LP5R2
LP6	LP6R1, LP6R2
LP7	Nazrana - LP7R1 Silvio- LP7R2
LP8	LP8R1
LP9	LP9R1, LP9R2
LP10	LP10R1, LP10R2

### **3.19 SUMMARY OF THE CHAPTER**

The chapter presented the constructivist paradigm which allowed the researchers to construct meaning actively and interactively. The Whole Brain Participatory research design was discussed to show how it empowered researchers to plan innovative ways of facilitating learning. Further, the chapter presented purposive convenient based sampling which was adopted in order to select the ten novice lecturers. Multiple data gathering instruments were used to ensure validity, reliability and credibility of the study. Finally, data were analyzed both quantitatively and qualitatively.

## CHAPTER 4

### RESEARCH IN ACTION

#### 4.2 QUANTITATIVE DATA ANALYSIS

The following section gives an account of the HBDI® reports. The set of data is a detailed discussion of our HBDI® profiles as lecturer learners. The data is presented on profile sheets that clearly show the scores and patterns of our thinking styles. The HBDI® data answer the question: *What are the thinking preferences of the participants?*

##### 4.2.1 Participants' scoring attributes

The following paragraphs present detailed scores and narratives about our various styles of thinking.

#### 4.1 INTRODUCTION

The major concern that has driven this study is embedded in the primary research question, *How can my colleagues and I as a collective make use of the Whole Brain® Model to transform the teaching practice and practitioner research of academic staff in higher education in Zimbabwe?* The purpose of the study was to find innovative ways of studying ourselves and our practice in order to change (Guskey, 2002) for our own professional growth and the academic growth of our students. On this journey I discovered it is not only us as participants and our students who benefited by professional growth but the entire exemplar institution. Our change in one way or the other impacted positively on people we interacted with - at home, church, the cafeteria, clinic, and in our academic meetings. Through the influence of Whole Brain® Thinking and Learning, as novice lecturers we honed our skills of facilitating learning, practitioner research and even strengthened our relationships with other people (De Boer et al., 2011; Du Toit, 2013). Realising our strengths and weaknesses initiated our desire for a scholarship of learning in a community of practice. By so doing we broadened our scope for using diverse modes of thinking preferences (Herrmann International, 2017).

In this chapter I present and analyse the findings of the research. This is where I interpret data collected and relate it to the research questions and the insights gained from the literature study. Literature "is vital in grounding the assumptions, results, and

conclusions of [the] the research in the broader context of professional inquiry” (Phillips and Carr, 2010, 52). Data is represented according to the subquestions elicited from the primary research question posed in Chapter 1, Section 1.6.

#### 4.2.2 The principal researcher’s scores

The discussion that follows presents the ‘I’ or the principal researcher of the study. Goldstein in Boshoff, (2014, 39) says, “Understand yourself first before trying to understand others”. As the principal researcher I was obliged to know who I was and how I preferred thinking and doing things so that I could better understand how my fellow participants and my students thought and preferred doing things.

Figure 4.1 below is a visual plot of my thinking style preferences as the principal researcher.

	COLUMN A UPPER LEFT	COLUMN B LOWER LEFT	COLUMN C LOWER RIGHT	COLUMN D UPPER RIGHT
PROFILE SCORES	54	96	101	66
PREFERENCE CODE	2	1	1	2
ADJECTIVE PAIRS	4	7	9	4
KEY DESCRIPTORS (*MOST DESCRIPTIVE)	factual x quantitative critical rational mathematical logical analytical x	conservative controlled sequential detailed x dominant x speaker x reader	emotional musical x spiritual x symbolic intuitive talker x reader	imaginative * artistic intuitive holistic synthesiser simultaneous spatial
WORK ELEMENTS	analytical 5 technical 1 problem solving 4 financial 2	organisation 2 planning 3 administrative 3 implementation 2	teaching 5 writing 3 expressing 5 interpersonal 5	integration 4 conceptualising 3 creative 4 innovating 4

**Figure 4. 1: Visual plot of thinking preferences for principal researcher**

Since childhood I have enjoyed singing at home during our family devotions. I sing four parts: soprano and alto in mixed voices, i.e. when singing with both males and females; tenor and baritone when singing in a female group. I have sung from my childhood and still sing in the church choir, even after turning 50. I do not see myself stopping singing at any point in the future. I have been instrumental in founding six

religious music groups as well. To develop my interest in music I have taken lessons on staff notation (D quadrant) and am currently learning how to play the piano. Composing and transcribing involves imaginative, creative and innovative skills (Quadrant D, self-regulating and constructivist elements). I noticed that staff notation needs insight into mathematics and logical thinking (Quadrant A); so understanding maths is significant in music. Currently I am a music coordinator and associate choir director at the exemplar institution church. With the ladies group *New Dawn* we have recorded our religious music as audio cassettes that we have sold to raise money for charity. As a singing group we adopted a blind student from our church primary school whose tuition fees we pay. In line with this descriptor is Gardner's musical Multiple Intelligence. Shearer (2012) lists of careers of choir director, music teacher, song writer and vocalist those are associated with musical intelligence

Besides religious music, I like country music; Don Williams, Dobby Hendricks and Dolly Parton are my favourite's artists. During one lesson I played Dobby Hendricks's songs and some of my students enjoyed that lesson. I am sure these were Quadrants C and D students. One student disapproved of the use of music in class as she said she could not concentrate on the lesson; instead her attention was on the music.

I am a Christian and a spiritual mentor at church. I was born in a Christian family and ever since I have served in the church. I taught at two Christian high schools in Zimbabwe before joining the exemplar institution. While I was in Form II I was elected to be a student deaconess. This is a duty of high responsibility in our church. The task includes taking care of the church property and drafting duty schedules for the services of the church (Quadrant B). I have also served as a church secretary who takes down and keeps minutes of board meetings and advises members on the doctrine of the church (Quadrants A, B, C and D).

I guide and counsel youth and young couples. I have presented church seminars at different churches in Zimbabwe on topics of courtship, marriage and communication. So besides singing, I am a preacher and counsellor. I counsel my children who are young adults now and my students as well. Below is a statement by one of my students after being asked to explain why she enjoyed my lectures:

The lecturer talks to us and gives us advice based on life and maybe church matters, principles like devotions before we start our lectures. After devotion, she asks about our welfare and that makes us have a connection with our

lecturer. Whenever you have someone who cares for you, you also need to be with her (LP1R2).

The combination of singing, preaching and teaching contributes to my being a talker. I spend most of my time talking to people; that is why the interpersonal element scored high in my profile. I teach languages (English and Ndebele), literature; drama and communication skills. These subjects can best be taught by someone who has an interest in talking and expressing oneself. I have noticed that most of my students who are neither linguistically inclined nor expressive have not been scoring high marks in my tests, quizzes and examinations. Some of my students have complained that even after they have put in maximum effort they always get Cs. Coherence, organisation of ideas, and critical and analytic thinking are skills (Quadrants A and B) we inculcate into our literature and language students. I have noticed that these quadrants are interconnected. The Whole Brain® Model has taught me to accommodate the learning preferences of my students. This study has enriched my knowledge on how to handle various learning preferences and related skills. In doing so, I have revised my methods of facilitating learning to accommodate the four quadrants. I now challenge my students to work beyond their comfort zones, as I have to do the same.

As a spiritual person, I love working with and for the community. In our church we have a social welfare department of women called Dorcas. Its task is to identify the needy in the community and supplies them with food, clothing and shelter. I am a member of the social welfare organisation. The success of this research heavily relied on my love for people and my Christian persuasive skills. I continuously had to look for and encourage the participants to endure the pressures of carrying their workloads with those of this research. The five faculties represented are located far apart; so besides phoning the participants at times there was a need for walking to their offices or lecture rooms and even homes to remind them of our meetings and our observation schedule. Furthermore, my love for working with people as a team steered me to co-author a paper we published. In the classroom I prefer using group activities as these are interactive. Such a method accommodates mostly the C and D quadrants. I also adopted learning opportunities that incorporate the use of Eportfolios for the assessment of students' work. E-portfolios are modern assessment tools that are student-centred. They motivate students to take responsibility for and manage their own learning (Gravett and Geyser, 2004, 107; Race 2015). I also used videos for learning activities. These lessons were great fun and they were generally liked by

most of my students. The interview respondents confirm the effectiveness of these learning opportunities in Section 3.3. The question that guided my interpersonal preference is, *How does my decision affect others?*

By a slight margin my next preferred is the B quadrant, with 96 points characterised by very strong preferences for conservative thinking and controlled behaviour. I love change, but I am jealous of my traditional African values. Perhaps this is the reason why I have *conservative* and *controlled* as core descriptors. I adore the *Ubuntu ideology* of respect and love for one another, especially the communal spirit of sharing. I also love traditional food such as okra, mushrooms, sadza. Traditional food is best cooked on fire, not on an electric or gas stove and I was fortunate to teach at the exemplar institution that is located in the farms. Every now and then I make a fire to cook my food. Maintaining my kinky African hair is another conservative and controlled element in me. I believe in the natural beauty endowed by God. This conservative element has made me very unpopular with most young people, especially my children as they say I am old-fashioned.

As a lecturer most of my teaching includes a step-by-step unfolding of the topic. Planning for my lessons, making schedules for teaching practice and chairing meetings are part of my job description. I tend to worry much about detail and accuracy as I plan and organise my schedules. The question that guides my planning is *What is the appropriate sequence?* When I do sketchy work, be it in class or in church or even at home, I do not feel good. I will not be at ease until I have put all the detail in place. I am emotionally affected by work that is not well organised and structured. As a result I do not tolerate anyone who does unsatisfactory work, especially among my students.

I have held leadership positions both at work and in church, and it was difficult to work with subordinates whose work was disorganised. At one high school I resigned from heading the English Department because of one teacher whose records were always not up to date and clumsy. Du Toit (2016) explains that lecturers with a B quadrant thinking preference struggle with unclear concepts and teachings.

As a conservative, domineering becomes significant in order to avoid change. I have noticed that I do not take easily to losing an argument, especially in meetings. I have also realised that at times I tend to use my leadership position both in class as a lecturer and out of class in church as an elder and mother as a tool to dominate those

younger or subordinate. The Whole Brain® Model has taught me that I should get out of my comfort zone and accommodate others. Students' learning preferences should be prioritised. I am going to work on the dominant descriptor thoroughly in and out of the classroom to accommodate other people's opinions. Furthermore, as my students are adults, experiential learning theory states that adults learn from their experiences. Therefore I will not take centre stage in their learning. As a constructivist lecturer, I should create an environment that is conducive to the creation of new knowledge by giving my students freedom to work on their own through individual assignments, thereby propagating self-regulated learning.

My next preferred quadrant is D, with 66 points. In this quadrant I selected *imaginative* as key descriptor – the one most descriptive of me. Elements that define my preferences at work include *integration*, *creativity* and *innovation*. The three descriptors are interchangeable, so I have integrated them. In my profession being creative is obligatory. For the students to enjoy lessons learning opportunities need to be fun. The driving force behind this study is innovation or creativity. Using the Whole Brain® Model to develop our profession is being imaginative. As a musician and dramatist I have written lyrics for religious songs and have acted in religious plays (Quadrants A and C). I remember (*recall* – Quadrants A and B) very well in 1985 when I was in high school, I acted emotionally (Quadrant C) the role of Tshaka Zulu's mother (Nandi) during a prize giving day. I can clearly see (*visual*) the faces of the parents who had come for the occasion, expressing their excitement at the way I acted the motherly role at that young age. Most of the time, I write programmes for our singing group that we present when invited by different churches out of campus. When composing music and when writing scripts for drama, I engage Quadrants B and D most as repetition and step-by-step organisation of staff notes are required. Synthesising and integrating notes and lyrics are obligatory if melody and meaning of the songs has to materialise.

As a scholar of literature and lecturer, critiquing and analysing texts (Quadrant A) is a priority and one cannot critique any text without creating a mental picture of the story. Dressing is art, and I love creativity in my dressing. I like mixing or integrating colours that match. I prefer contrasting dark colours with bright ones; for instance, I match black and any bright colours like white, red, green, etc. I love the Whole Brain® colours as they contrast very well.

In my lessons I love to integrate media in the facilitation of learning to accommodate all the learning preferences. I have since adopted the use of Moodle in my teaching practice. Moodle provides immediate student feedback. Although I am conservative, I also follow a modern life style to keep abreast of global trends.

My least preferred quadrant is the A quadrant, with a value of 54. In this quadrant I selected *analytical and factual* as characteristics. My literature and drama lessons require critiquing and analysing texts, hence the descriptors *analytical* and *factual* best describe how I teach. In planning learning opportunities (Quadrant B) I use facts to analyse the curriculum for the students to find out what is relevant to their learning. I analyse the assessment tools to check whether they cover the learning domains appropriate to higher education. In research there is a great deal of analysis of data that is done to present factual findings. I am not comfortable with mathematical, quantitative and technical descriptors; therefore they were not picked. I do not avoid them because there is no way I can avoid mathematics. In this study I have used quantitative methods of collecting data. I need technical knowledge to present my data in a scholarly fashion. In conclusion, the distribution of my responses to 120 questions in the A, B, C and D quadrants was 4 - 7 - 9 - 4 respectively, summing up my double dominant thinking preferences. The Whole

Brain<sup>®</sup> Model has taught me, *inter alia*, that students' learning preferences should be prioritised; hence as a facilitator of learning, I should accommodate all thinking and learning preferences. Outside the classroom I should appreciate diversity. My communication skills should develop as I will be able to interact with anybody.

#### **4.2.3 The other nine lecturer participants' scores**

The next discussion focuses on the other nine lecturer participants' thinking preferences. It is discussed according to my own perspective as a member of the community of practice. It was difficult to get each participant to give a comprehensive discussion of his profile and its relationship with their daily life and work experience, due to pressure of setting and running final examinations. We had just completed the semester; therefore, the participants needed to concentrate on marking examination papers to comply with the institution's examination policy of presenting the students' grades two weeks after the end of the examinations.

Guided by the code of ethical conduct, I respected their rights to choose what they wanted to do in the research and to choose to work on their institutional obligations. I realised that action researchers should be conscious of larger social justice matters

that go beyond a classroom or school. I also needed to be true to the statement on the consent letter they signed that stipulated that they could withdraw from the study at any point in time (Hendricks, 2013). The discussion is based on the HBDI® profiles report, the interview responses, the students' responses and my own observations of their behaviours during our interaction in focus group discussions, classroom observations and as fellow lecturers.

#### **4.2.4 Lecturer participant 2 (LP2)'s scores**

This participant had one year teaching experience in higher education and at the exemplar institution. He taught Theology in a different faculty from mine. Because of this we rarely met except in senate meetings and church services. Lecturer participant 2 (LP2) has a triple dominant profile. His preference code is 2111. He confirmed that the profile reflects his thinking preferences. The thinking style quadrant he most prefers, based on his responses to the HBDI® survey, is the B quadrant, with a value of 107. Descriptors in this thinking style are *sequential*, *conservative*, *controlled* and *reader*. The B quadrant that scored highest best described his orderliness, organisation and sequential preference. Work elements he strongly related to in this quadrant included *planning* and *implementation*. Despite the pressure of work that all of us were experiencing LP2 managed to accommodate this research's tight schedule.

Figure 4.2 below shows LP2 graphical representation of his thinking style preferences.

	COLUMN A UPPER LEFT	COLUMN B LOWER LEFT	COLUMN C LOWER RIGHT	COLUMN D UPPER RIGHT
PROFILE SCORES	42	107	93	72
PREFERENCE CODE	2	1	1	1
ADJECTIVE PAIRS	3	7	7	7
KEY DESCRIPTORS (MOST DESCRIPTIVE)	factual quantitative critical rational x mathematical logical analytical	conservative x controlled x sequential x detailed dominant speaker reader x	emotional musical spiritual x symbolic intuitive x talker reader x	imaginative artistic intuitive x holistic x synthesiser simultaneous spatial
WORK ELEMENTS	analytical 3 technical 1 problem solving 5 financial 2	organisation 3 planning 4 administrative 2 implementation 4	teaching 5 writing 4 expressing 5 interpersonal 2	integration 3 conceptualising 3 creative 4 innovating 2

**Figure 4. 2: Visual plot of the thinking preferences for LP2**

LP2 was most instrumental in conducting interviews and in lesson observations (Quadrant C). Of the nine participants, he was the one who interviewed most of the respondents. It was his organisation and sequencing (B quadrant) and peoplecentred preferences (C quadrant) that helped him to manage the pressure by classifying the tasks and balancing them. Together with LP10, he was eager to implement Whole Brain® Innovative ways of improving our practice (D quadrant). For instance, he testified that he had, for the first time, used rhetorical questions in his lessons. I am positive that with this style of thinking, even after this study, he will continue to implement some of the ways of facilitating learning we have implemented for his professional growth.

The Upper Left Quadrant A was least preferred, but still the respondent was typically quite functional in his use of the logical and analytical aspects of this quadrant. He is the director of the prayer ministry. This links well with his spiritual descriptor. There is a prayer band that meets every day at 05:00 in the church to pray, and he is the coordinator. He plans (B quadrant) prayer and fasting sessions for the church and most of them have been enriching. His students made positive comments pertaining to his spirituality. I have observed him teach in this study and he had shown that he loved his job. His students confirmed his punctuality in lessons that is a positive attribute for a lecturer. He was willing to learn how to facilitate learning in higher

education. This attribute was shown at the incident where he asked what rhetorical questions were. The orderliness and organisation descriptors match classroom management. He is a Sabbath school teacher using our denominational language, which means he teaches the Bible to church members. I am his student in the Sabbath school class and I have witnessed his student-centred approach. He is also the director of the church's education department and in charge of the church's spiritual growth. Therefore he plans and organises (B quadrant) biblical learning opportunities. The spiritual descriptor was significant in his willingness to take extra responsibilities in the study.

His simultaneous execution of tasks in this study and in church and his willingness to explore the various questioning techniques aligned well with the holistic descriptor. His least preferred quadrant, based on his survey responses, was the A quadrant, with a value of 42. He pointed out in the interviews that he was mathematical but would put a lot of effort into being diverse in his facilitating learning and include statistics, especially in his lessons on pornography. He was one lecturer whose final examination questions balanced all the four quadrants.

#### **4.2.5 Lecturer participant 3 (LP3)'s scores**

As in the case of LP2 we had few interactive opportunities as he was a member of a different faculty from mine. We interacted mostly in formal meetings and in church. He concurred in the interview that the profile reflected his preferences.

Figure 4.3 shows LP3's visual representation of his thinking style preferences

	COLUMN A UPPER LEFT	COLUMN B LOWER LEFT	COLUMN C LOWER RIGHT	COLUMN D UPPER RIGHT
PROFILE SCORES	56	84	95	68
PREFERENCE CODE	2	1	1	1
ADJECTIVE PAIRS	7	3	7	7
KEY DESCRIPTORS (MOST DESCRIPTIVE)	factual quantitative critical rational mathematical logical analytical	conservative x controlled sequential detailed dominant speaker x reader	emotional x musical x spiritual * symbolic x intuitive talker x reader	imaginative x artistic intuitive holistic x synthesiser simultaneous spatial
WORK ELEMENTS	analytical 5 technical 2 problem solving 4 financial 3	organisation 4 planning 4 administrative 2 implementation 5	teaching 4 writing 2 expressing 3 interpersonal 5	integration 2 conceptualising 5 creative 3 innovating 3

**Figure 4.3: Visual plot of the thinking preference for LP3**

LP3's quadrants in descending order were C > B > D > A. Similar to LP2, his preference code was 2111. This is a triple dominant profile with two primaries in the Lower Right C and Upper Right D quadrants, and the third in Lower Left B. Descriptors in this thinking style that he selected were *musical*, *talker*, *emotional* and *symbolic*, with *spiritual* being his key descriptor. Of the five descriptors, I can confidently talk about his key descriptor *spiritual* because he is a pastor in our church. He was responsible for the spiritual growth of the congregation and an active member in the prayer ministry like LP2. Besides his preference for prayer, he showed great concern for the youth's spirituality. He often did Bible studies with them during Sabbath afternoons and usually accompanied them on their youth camping expeditions. I was yet to observe his musical descriptors because I had not seen him participate in any music programmes I had organised in the church. I always requested volunteer choristers and encouraged people to join choirs and singing groups but he never came forth.

Work elements he strongly related to in this quadrant included *teaching* and *interpersonal*. These elements reflect his mental preferences at work. Though he did not have a teaching profession qualification he showed great interest in the teaching field. The Whole Brain® experience contributed positively and fruitfully to his teaching practice. His students recognised great change in his facilitation of learning by singling

out his use of the projector and giving individual research assignments that encouraged students to do research and learn on their own (experiential and self-regulated learning). In our last focus group meeting he acknowledged having learnt during this study that understanding the students' learning preferences helped us as lecturers to adjust our learning opportunities to meet the varying needs of the students. His teaching preference was not confined to the classroom but featured at church as well. He taught adults in our Sabbath school.

He selected *speaker* and *conservative* as descriptive of him. His pastoral and lecturing responsibilities compelled him to talk a lot; hence the descriptors *talker* and *speaker*. In his preaching and teaching all four quadrants were active in planning topics to be delivered. Sequencing or the orderly arrangement of ideas/concepts was essential. Much creativity and imagination (D) of what would be presented to the congregation and students (classroom) were apparent. The love for people, i.e. *interpersonal* (C) was the key drive in preaching and teaching. Therefore the triple dominance preference best describes the participant.

The elements he identified as preferred ones at work included *organisation, planning* and *implementation*. As a pastor, one of his duties in the church was to implement church doctrine. In the education field he implemented the ministry's policy. In this study we practised Whole Brain<sup>®</sup> Innovative ways of facilitating learning and he tried to implement the concept faithfully. His next preferred quadrant was the D, with 68 points. In this quadrant he selected *imaginative* and *holistic* as descriptive of him. These two descriptors were linked to the participant's preference for teaching preaching that involved imagination and a holistic approach. The element for work he identified was *conceptualising*. His students highlighted an aspect of conceptualising theorising or being abstract that had changed, i.e. talking without using visuals for illustration. When he started using the projector they noticed the change and they could now understand what he was teaching better. For instance, one of his students said that by introducing a projector, a visual teaching medium, they could see what they were learning and that enhanced their understanding.

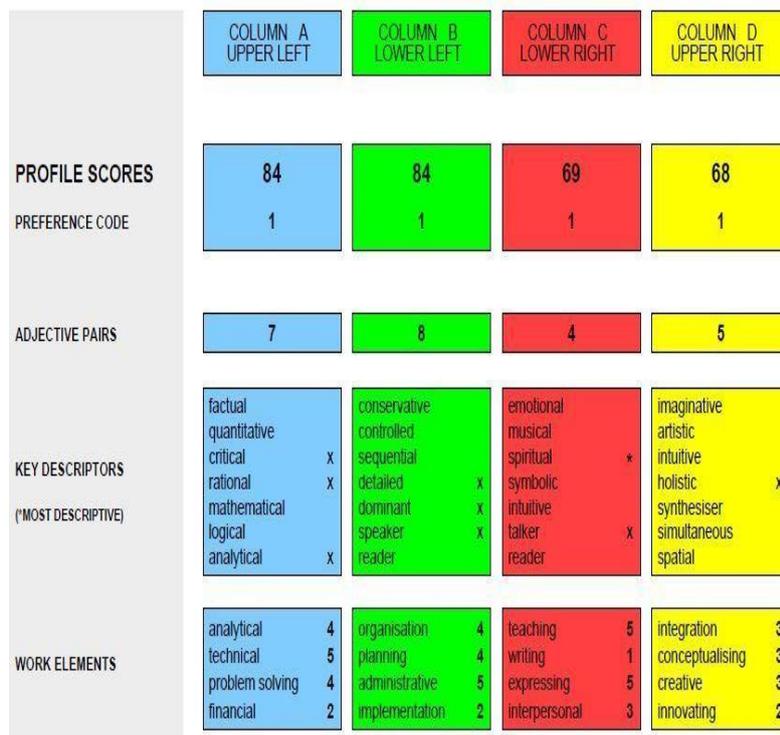
Participant 3 had taught in higher education for five years and had not yet published a paper. This research developed his teaching practice as was indicated by some of his students.

#### **4.2.6 Lecturer participant 4 (LP4)'s scores**

This participant worked in the ICT Department and we usually requested him to teach our teachers in training how to use computers. He also concurred with the Herrmann diagnosis of his thinking style. His preference code was 1111.

At work he is *analytical, technical and problem solving*. I noticed that he had an analytic and technical mind. In church I had closely worked with him as the head elder. This position is similar to that of a vice-chancellor in the academic fraternity. I worked under his leadership. Every departmental head in church acted under his leadership. He analysed every programme introduced by a department and advised after the analysis. He was not very flexible regarding change as someone had to provide strong evidence to convince him to change.

Figure 4.4 below presents LP4's graphic plot of his thinking style.



**Figure 4. 4: Visual plot of the thinking style preferences for**

**LP4**

As I reiterated above, he was a detailed person who needed enough evidence to change his stance. This somewhat rigid behaviour was aligned with his dominant preference. As a leader of the church he tended to dominate to maintain or preserve the church principles. I was yet to learn about his speaking preference because I had not heard him in debates that usually dominated our senate meetings.

He also preferred the C quadrant. He is a talker and religious too. Apart from these, he likes teaching. I cannot over-emphasise that he worked faithfully to safeguard his church's policies and doctrines. His 'love your neighbour' motto that he used in his classes to encourage his students to work together as a team, best described his spiritual values of love and sympathising with others. His weak area was pointed out by his students. He sympathised to such an extent with his students that many took advantage and did not do their assignments on time. The least preferred quadrant, based upon his survey responses, was the D, with a value of 68. In this quadrant he selected *holistic* as characteristic of him. I think his quadruple profile reflected his balanced approach to life. In the interview he talked about research in Theology too. This showed his desire to explore beyond his area of specialisation.

According to Herrmann Group (2004) quad profiles occur less than 3% of the time. The exemplar institution was fortunate to have such an employee with a highly integrated, varied mental ability.

#### **4.2.7 Lecturer participant 5 (LP5)'s scores**

This participant was another of the four lecturers from the Faculty of Business. With LP4 he belonged to the ICT Department. The interaction I had with him was through this research and at church. He acknowledged that the Herrmann report was a correct description of his thinking style.

.  
Figure 4.5 gives LP4's visual plot of his thinking style preference

	COLUMN A UPPER LEFT	COLUMN B LOWER LEFT	COLUMN C LOWER RIGHT	COLUMN D UPPER RIGHT
PROFILE SCORES	123	81	38	56
PREFERENCE CODE	1	1	2	2
ADJECTIVE PAIRS	8	8	4	4
KEY DESCRIPTORS (*MOST DESCRIPTIVE)	factual quantitative x critical x rational x mathematical x logical x analytical *	conservative x controlled sequential detailed x dominant speaker reader	emotional musical spiritual symbolic intuitive talker reader	imaginative artistic intuitive holistic synthesiser simultaneous spatial
WORK ELEMENTS	analytical 5 technical 4 problem solving 4 financial 4	organisation 3 planning 5 administrative 5 implementation 2	teaching 5 writing 2 expressing 3 interpersonal 2	integration 4 conceptualising 3 creative 2 innovating 3

**Figure 4. 5: Visual plot of the thinking style preferences for**

## LP5

Work elements he strongly related to in this quadrant included *analytical*, *technical*, *problem solving* and *financial*. These elements reflect his mental preferences at work. His descriptors aligned well with his subject of specialisation that was computers where most of the activities embraced technical skills and mathematical concepts.

By quite a margin his next preferred quadrant was the B, with 81 points. In this thinking style he selected *conservative* and *detailed* as descriptive of him. Work elements he identified included *planning* and *administrative*. He had recently obtained a PGDE to improve his facilitating of learning. He was one of the first participants who enthusiastically agreed to learn more about Whole Brain® Teaching. This attitude showed his willingness to learn how to present his lesson systematically. Planning and designing programmes is obligatory for a lecturer teaching programming with computers.

His next preferred quadrant was the D. The work element he identified was *integration*. His least preferred quadrant, based on his survey responses, was the C quadrant, with a value of 38. Again there were no descriptors in this quadrant that he thought were characteristic of him. His students who shared the A and B quadrants benefited more than those with the C and D. He was aware of the weak C and D.

When asked how he accommodated all quadrants, especially the C and D that had no descriptions. He said it was a fight and I think his response was honest.

One of his students, LP5R1, who did not share his lecturer's thinking style, said he had not witnessed any change in the way he facilitated learning. I concur with the following view by Du Toit (2014, 7) that "Most lecturers do not have a teaching style that can accommodate the learning preferences of all their students".

However, in this study his expertise in computers was significant. Together with LP4 he explained how to use Excel for quizzes and how it provides instant feedback to students. He recommended steps that we could take to prevent cheating among students who were cheating even on the application *turnitin*<sup>®</sup>. I am glad that LP5 in this study was made aware of moving out of his luxury zone and learn the importance of presenting varied learning opportunities that provided all learning styles. He acknowledged the need for creativity in our teaching practice.

#### **4.2.8 Lecturer participant 6 (LP6)'s scores**

We had worked together with LP6 in the Faculty for eight years and had published a paper together; therefore I can say I knew her better than the rest of the participants. My discussion is more detailed compared to those of other participants. She acknowledged that the Herrmann report was a true reflection of her thinking style. Her profile according to the HBDI<sup>®</sup> report was dual dominant in the same hemisphere. Her preference code was 2211. The thinking style quadrant she most favoured was the D. Descriptors she selected were *imaginative*, *artistic*, *holistic* and *intuitive*. The imaginative and artistic descriptors reflected her writing skills that she displayed in the 17 papers she had published by that time. Most of the papers were on creative writing in primary and

Figure 4.6 gives a pictorial plot for LP6's thinking preferences

	COLUMN A UPPER LEFT	COLUMN B LOWER LEFT	COLUMN C LOWER RIGHT	COLUMN D UPPER RIGHT
PROFILE SCORES	45	62	81	105
PREFERENCE CODE	2	2	1	1
ADJECTIVE PAIRS	3	5	7	9
KEY DESCRIPTORS (*MOST DESCRIPTIVE)	factual x quantitative critical rational * mathematical logical analytical	conservative controlled sequential detailed x dominant speaker reader	emotional musical spiritual x symbolic intuitive x talker reader	imaginative x artistic x intuitive x holistic x synthesiser simultaneous spatial
WORK ELEMENTS	analytical 2 technical 1 problem solving 3 financial 2	organisation 4 planning 5 administrative 3 implementation 1	teaching 5 writing 5 expressing 4 interpersonal 3	integration 4 conceptualising 3 creative 5 innovating 4

**Figure 4. 6: Visual plot of the thinking preferences for LP6**

Her areas of specialisation were drama and poetry and these commanded many imaginative skills. She directed the writing club in the Languages Department. The work elements she strongly related to in this quadrant included *integration*, *creative* and *innovating*. She was one of the first participants motivated by this research and she embraced the idea of using the Whole Brain® Model as innovative approach to our professional development. She was the one who motivated us to write a paper on the use of social media in higher education.

Her next liked quadrant was the C Quadrant, with 81 points. For this thinking style she selected *spiritual* and *intuitive* as descriptive of her. The work elements she identified included *teaching*, *writing* and *expressing*. She was an innovative teacher as has already been alluded to above. She used Moodle in her lessons and said that her students enjoyed learning with this medium. As a language teacher, the descriptors *writing* and *expressing* described her well. She used a variety of learning activities and even those students whose native language was not English confessed that she used exciting media to facilitate the learning of the subject. Her next preferred quadrant was the B quadrant with 62 points. In this quadrant she selected *detailed* as descriptive of her. Work elements she identified included *organisation* and *planning* and I concur with the description. She headed the Department of Languages and Communication and was instrumental in starting the honours programme.

In this study she assisted in arranging the venue for interviews and organised students to come for interviews despite her challenging Ph.D. work. We worked together in starting a children's chapel at our neighbouring farm, Norwood. Her least preferred quadrant was the A quadrant, with a value of 45. In this quadrant she selected *factual* with *rational* as her key descriptor. Individuals with this profile often have occupations of teaching or facilitating. Other occupations include the arts, such as writers, musicians, artists.

#### **4.2.9 Lecturer participant 7 (LP7)'s scores**

This participant is the fourth from the Faculty of Business and he works in the Accounting Department. He concurred with Herrmann's description of his thinking style. His profile was triple dominant with a reference code of 1121. The profile had two primaries in the left mode, both Upper Left A and Lower Left B, and the third primary in the Upper Right D quadrant.

The thinking style quadrant he most preferred based upon his responses to the HBDI® Survey, was the A quadrant, with a value of 92. The descriptors in this thinking style he selected were *logical*, *analytical* and *mathematical*, with *quantitative* being his key descriptor. His Accounting background was well aligned with the descriptors above. Before joining the teaching staff, he was one of the accountants at the exemplar institution. When this study was conducted he was the church clerk. The work elements he strongly related to in this quadrant included *technical* and *financial*. These work elements define his inclination accurately. He was technologyminded and encouraged us to use Moodle in our teaching practice.

Figure 4.7 shows LP7's visual of his preferred thinking style

	COLUMN A UPPER LEFT	COLUMN B LOWER LEFT	COLUMN C LOWER RIGHT	COLUMN D UPPER RIGHT
PROFILE SCORES	92	68	51	92
PREFERENCE CODE	1	1	2	1
ADJECTIVE PAIRS	10	2	4	8
KEY DESCRIPTORS (*MOST DESCRIPTIVE)	factual quantitative * critical rational mathematical x logical x analytical x	conservative controlled sequential x detailed dominant speaker reader	emotional musical spiritual x symbolic intuitive x talker reader	imaginative x artistic intuitive x holistic synthesiser simultaneous spatial
WORK ELEMENTS	analytical 3 technical 5 problem solving 3 financial 4	organisation 4 planning 3 administrative 1 implementation 4	teaching 5 writing 2 expressing 3 interpersonal 4	integration 2 conceptualising 2 creative 5 innovating 5

**Figure 4.7: Visual plot of the thinking preferences of LP7**

In the D quadrant he obtained a cumulative value of 92, suggesting an equal preference for this manner of thinking. For this thinking style he selected *imaginative* and *intuitive* as descriptors. Work elements he identified included *creative* and *innovating*. These descriptors best defined his thinking preferences. The use of Moodle in his lessons indicated both creativity and innovation. Besides using Moodle, LP7 said his students completed their quizzes online where they got immediate feedback. Like LP5, he discovered a way of catching students who were cheating even when using turnitin®.

His next preferred quadrant was the B quadrant, with 68 points. In this quadrant he selected *sequential* as descriptive of him. Work elements he identified included *organisation* and *implementation*. These were well aligned with his accounting background of balancing sheets and reconciling figures.

His least preferred quadrant, based upon his survey responses, was the C, with a value of 51. In this quadrant he selected *spiritual* and *intuitive* as characteristic of him. His spiritual side manifested in his participation in church activities. He was a deacon and a church clerk. LP7 was an introvert and not people-oriented. He rarely attended the focus group meetings and stated that he was not comfortable with being observed while teaching. I respected his concern and asked the media personnel to record his lessons. As he had a secondary preference for the C quadrant, he tried to include

questions that accommodated the quadrant in two examinations. His two students, Narzana and Silvio acknowledged a change in the way he taught.

#### 4.2.10 Lecturer participant 8 (LP8)'s scores

This participant was from the Faculty of Science. She confirmed that the diagnosis of her thinking style preferences as reported by Herrmann International 2018 was correct. The thinking style she preferred was the B quadrant, with a value of 117. The descriptors in this thinking style she selected were *sequential*, *speaker*, *conservative* and *detailed*. According to the responses she gave during the interview, LP8 was conservative in that she had been following the teaching approach she received so many years before at college. She struggled with change and set only essay-type examination questions.

Figure 4.8 below shows LP8's visual plot of her thinking style preferences



**Figure 4. 8: Visual plot of the thinking preferences for LP8**

Working elements she strongly related to included planning and administrative. These elements reflected her intellectual preferences at work. Before joining the exemplar institution, LP8 worked at a teachers' training college where planning and administrative work were part of her job description. This background influenced her planning skill even in higher education.

Her next preferred quadrant was the C quadrant, with 75 points. In this thinking style she selected *talker* and *spiritual* as descriptive of her. Like the rest of the participants in this study, she was a talker and spiritual. She displayed these elements in church discussions. She was soft-spoken but once she started talking she did not stop.

For quadrant A she scored 72 points. She selected *logical* and *factual*, with *rational* representing her key descriptor. Work elements she identified were *technical* and *financial*. As a Nutrition teacher the technical and financial descriptors best describe how she executed her work. Her least preferred quadrant, based on her survey responses, was the D quadrant, with a value of 41. There were no descriptors in this quadrant that she thought were characteristic of her. Occupations that are typical of individuals with this profile include professional and managers in a technical context.

#### **4.2.11 Lecturer participant 9 (LP9)'s scores**

When we embarked on this study, LP9 was a lecturer in the Department of Arts. We taught some language courses together. She valued communication; thus she taught the Journalism and Public Relations modules. She was promoted to the office of Public Relations before we finished gathering data. Her preference code was 2111 and she agreed on the description. It is a triple dominant profile with two primaries in the right mode, Lower Right C and Upper Right D quadrants, and the third in Lower Left B. Like most of the participants she concurred with HBDI® diagnosis of her thinking style preferences.

The thinking style quadrant she most preferred based upon her responses to the HBDI® Survey was the C quadrant, with a value of 119. Descriptors she selected in this thinking style were *talker*, *intuitive* and *reader*, with *spiritual* as her key descriptor. Work elements she strongly related were *teaching*, *writing*, *expressing* and *interpersonal*. Having had little interactive time with her in the Department of English, in this study and in church, I can vouch for the truthfulness of *talker*, *expressing*, *interpersonal* and *teaching* descriptors. She had a good command of English and as a result she had the advantage of sensitivity for words and expressing herself. She rarely lost a debate. However, she was people-oriented. She mixed well with all kinds of people, young and old, from different nationalities. In church she was very vocal and she fought against the exploitation of women and young people.

Figure 4.9 shows a graphical representation of LP9's thinking style preferences

	COLUMN A UPPER LEFT	COLUMN B LOWER LEFT	COLUMN C LOWER RIGHT	COLUMN D UPPER RIGHT
PROFILE SCORES	45	84	119	89
PREFERENCE CODE	2	1	1	1
ADJECTIVE PAIRS	4	7	9	4
KEY DESCRIPTORS (*MOST DESCRIPTIVE)	factual quantitative critical rational x mathematical logical analytical x	conservative controlled sequential detailed dominant x speaker x reader x	emotional musical spiritual * symbolic intuitive x talker x reader x	imaginative x artistic x holistic synthesiser simultaneous spatial
WORK ELEMENTS	analytical 2 technical 2 problem solving 4 financial 3	organisation 2 planning 3 administrative 5 implementation 3	teaching 4 writing 5 expressing 5 interpersonal 4	integration 4 conceptualising 5 creative 3 innovating 2

**Figure 4.9: LP9 Visual plot of the thinking style of LP9**

Her next preferred quadrant was the D quadrant, with 89 points. In this thinking style she selected *imaginative* and *intuitive* as descriptive of her. She had a passion for public relations and journalism; therefore the artistic and innovative style of thinking best described her. Work elements she identified were integration and conceptualising. Many integration and synthesising ideas form the basis of media life. She influenced the writing of the paper *Solusi Monday* that published news pertaining to the institution.

Her other preferred quadrant was the B quadrant, with 84 points. In this quadrant she selected *speaker*, *dominant* and *reader* as descriptive of her. The work element she identified was *administrative*. She could not lose a debate. She was promoted to the Public Relations Office before the end of this study, crowning her administrative preference style. Her administrative style was also obvious at church as director in the Women's Ministries Department.

Her least preferred quadrant, based on her survey responses, was the A quadrant, with a value of 45. In this quadrant she selected analytical and rational as characteristic of her. The nature of the field she worked in required analytical skills; hence the descriptors *analytical* and *rational*. Critical thinking is significant in journalism is. The profile best defines LP9's two professions. Before she joined the

teaching profession at the exemplar institution, she worked in the news industry as human resource personnel officer where the communication approaches included written communication, providing an overview of ideas and working with various people.

#### **4.2.12 Lecturer participant 10 (LP10)'s scores**

LP10 was a lecturer in the Faculty of Science, in the Mathematics Department. She was the youngest lecturer in the exemplar institution with the least experience of teaching in higher education. At the time we carried out the study, she was our PGDE student. Among the 10 participants, she was the one who, like LP2, positively embraced Whole Brain® teaching. At the end of the study she affirmed having learned many ways of accommodating her students' learning preferences. My evaluation of her depended on our interaction in this study and at church. She said the instrument partially described her preferences as the musical element was not picked as a descriptor. Figure 4.10 below shows visual plot of LP10's thinking style preferences.

Her profile was dual dominant in the same hemisphere. The thinking style quadrant she most liked was the B. In this thinking style she selected controlled as descriptive of her, with conservative being her key descriptor. From the little interaction I had had with LP10 in church and in this study I noticed that she was a young and meticulous woman. She was one of the deaconesses who maintained order in the services and saw to it that services flowed without disturbances. She was young but conservative and maintained the old style of African decorum in dressing

Figure 4.10 shows visual plot of LP10's thinking style preferences.

	COLUMN A UPPER LEFT	COLUMN B LOWER LEFT	COLUMN C LOWER RIGHT	COLUMN D UPPER RIGHT
PROFILE SCORES	83	86	66	41
PREFERENCE CODE	1	1	2	2
ADJECTIVE PAIRS	6	7	5	6
KEY DESCRIPTORS (MOST DESCRIPTIVE)	factual quantitative critical rational x mathematical x logical x analytical	conservative x controlled x sequential detailed dominant speaker reader	emotional musical x spiritual x symbolic intuitive talker reader	imaginative artistic intuitive holistic synthesiser simultaneous x spatial
WORK ELEMENTS	analytical 4 technical 2 problem solving 4 financial 3	organisation 4 planning 5 administrative 3 implementation 4	teaching 3 writing 2 expressing 3 interpersonal 5	integration 2 conceptualising 2 creative 1 innovating 1

**Figure 4. 10: Visual plot of the thinking preferences of LP10**

She strongly likes organising, planning and implementing. I observed that the descriptor *organisation* was closely related to her *controlled* descriptor. She was the second lecturer participant to be ready for lesson observation. This readiness reflected proper planning of her work. Realising her lack of teaching expertise in higher education, she enrolled for the PGDE module. When I asked her to be one of the participants in this study, she readily accepted and was one of the participants who practised what we learnt from Whole Brain® Teaching and learning. Therefore the descriptor *implementation* underscored her thinking style.

By only a slight margin, her next preferred was the A quadrant, with 83 points. In this thinking style she selected *logical*, *rational* and *mathematical* as descriptive of her. She was a Mathematics lecturer and I observed a relationship of her thinking style with her subject. Work elements she identified were *analytical* and *problem solving*.

Her next preferred was the C quadrant, with 66 points. In this quadrant she selected *musical* and *spiritual* as descriptive of her. When I asked her why she said the HBDI® partly reflected exactly who she was, she pointed out that the musical aspect was not ranked top priority. She said music inspired and motivated her. We worked collectively with her in this study and she was one of the participants who was cooperative. She

would communicate if she was not able to attend a meeting. As a deaconess in church she demonstrated her love for people through friendly chats and smiles.

Her least preferred quadrant was the D quadrant, with a value of 41. In this quadrant she selected *simultaneous* as characteristic of her. She was consistent. Throughout our study, she was the participant who was positive and would follow the advice given after her teaching. I observed her teach and after the lecture, I advised her to try using group activities to accommodate the C and D quadrants. She did implement my advice in the next lesson I observed. Her students witnessed a change in the way she taught and encouraged her to use technology in her lectures. In our last focus group meeting she confessed her lack of variety in facilitating learning. She promised to use Moodle in the upcoming semesters.

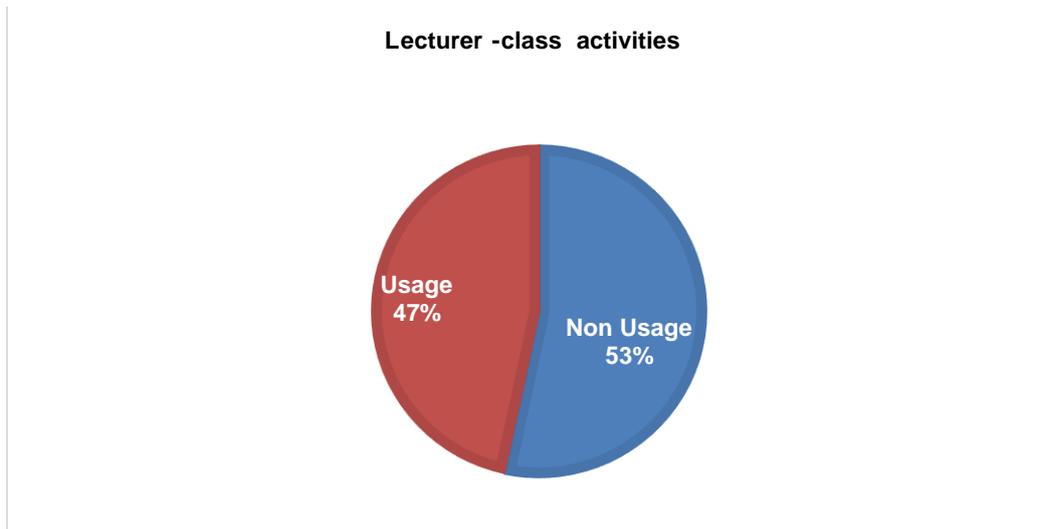
### **4.3 QUANTITATIVE DATA FROM OBSERVATION SHEETS**

The section that follows presents the results of the classroom observations conducted by the 10 participants. The results help answer one of the secondary research questions: *How can we innovatively improve and enrich our teaching practice and practitioner research through the Whole Brain® Thinking Model?*

As lecturers, in a community of practice, we scheduled how we were going to observe each one of us teach. Besides the learning activities designed, we were expected to evaluate how we inspired our students to learn in our learning opportunities. We used observation check lists and ticks to record the use of each learning activity for the six lectures we observed. The ticks were then added at the end of the two semesters and data was analysed by the exemplar institution's statistician using SPSSv23. The data is presented in pie charts and bar graphs that follow. On the pie charts, the term usage and non – usage have been used. Usage means the activity was used during the lecture and non-usage means the activity was not used.

#### **4.3.1 Lecturer-class interaction/lecture method**

Of the 60 lectures observed for the 10 participants, 28 (47%) used lecturer-class activities while 32/60 (53%) did not use the method as is shown in figure 4.11 below. The results align well with Race (2015) acknowledgement that lecturers in higher education often use the lecture method when facilitating learning.



**Figure 4. 11: Pie chart showing lecturer-class activities**

### **4.3.2 Lecturer-student activities**

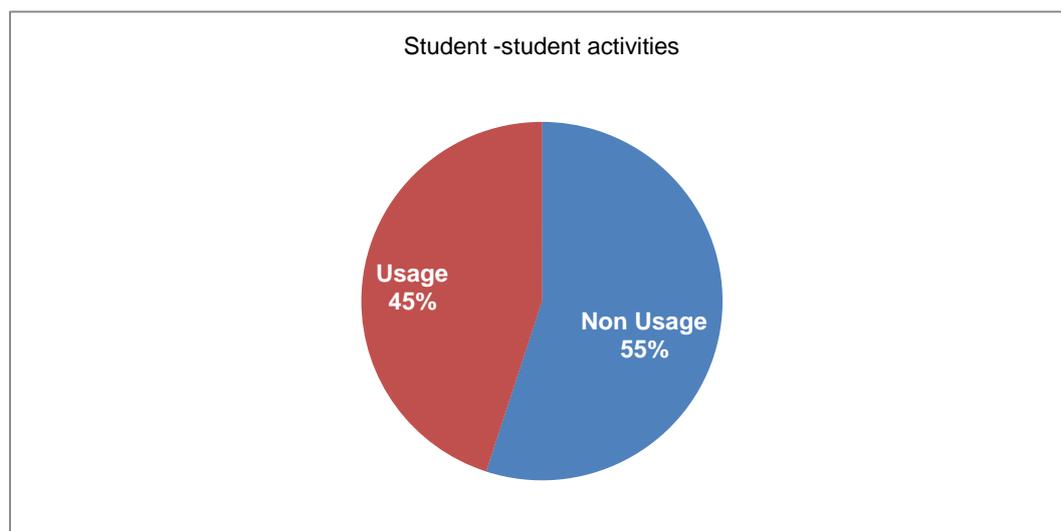
Interaction between student and lecturer supports knowledge construction, motivation, and the establishment of a social relationship (Long, Ibrahim and Kowang, 2014). In this variable we were looking at consultation schedules where lecturers met the students individually to assist them or to ask what the students expected to learn. In the 60 lectures observed no student-lecturer activities were used by all the 10 participants; therefore there is no visual representation of the results. This is an area that all the participants were not sure of.

Question 4 of the participant interview guide asked lecturers to explain how they determined what was learnt in their classes. Only one lecturer, LP9 acknowledged that she asked students what they expected to learn. From the interviews, LP2R2 and Silvio (LP7's student) noted that lecturers thought that students knew nothing. Ngozo (2011, 15) avers that lectures should be learner-centred. Learners should be "given opportunity to define both the activity and the process in the learning environment".

### **4.3.3 Student-student activities**

Whole Brain® Teaching maximises student engagement and the positive classroom interaction of classmates. Long et al. (2014, 39) expand by reiterating that, "Interaction with peer students also is considered important in improving students' performance." Student-student activities had 27/60 frequency, which means 45% of the lectures involved students working together (cooperative learning) while 33/60

(55%) did not use student – student activities as is shown in figure 4.12 below. The results show that there was a low representation of student-student interaction.

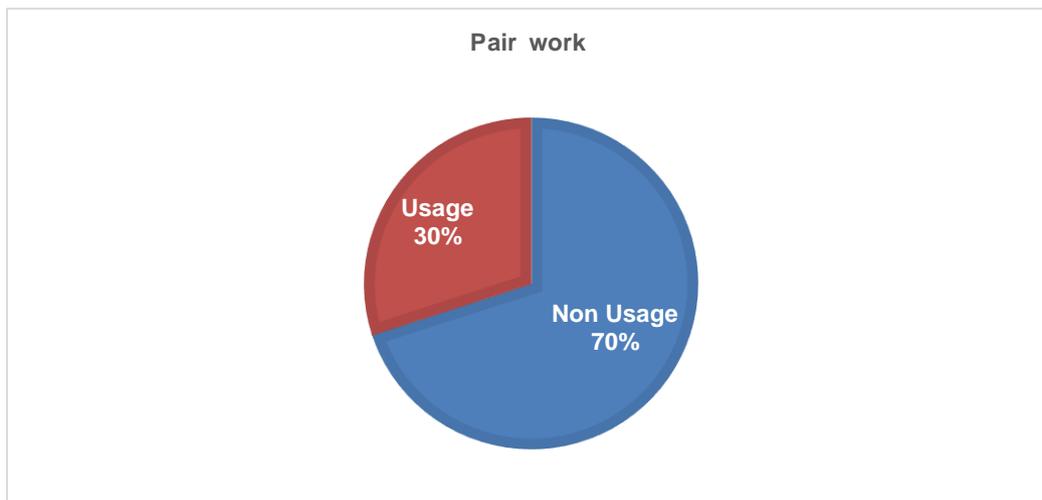


**Figure 4. 12: Pie chart showing student-student activities**

#### **4.3.4 Pairs**

Race (2015, 177) recommends pair work as a “useful way of getting students to make sense of their own thinking on a topic or an issue by explaining and articulating their views uninterrupted for a few minutes. The quieter and shy students are given the opportunity to speak and be heard in a non-threatening environment”.

Only 18/60 (30%) of the lecturers used pair work in their lectures; 42/60 (70%) did not use pair work as is shown on figure 4.13 below. Race (2015, 166-167) advises lecturers to make use of pairs as they “can allow students to embrace a range of interactive and collaborative skills. Pairs can also be useful where a stronger student can help a weaker one”. Pair work encourages cooperative learning as each member feels the need to contribute meaningfully to learning.

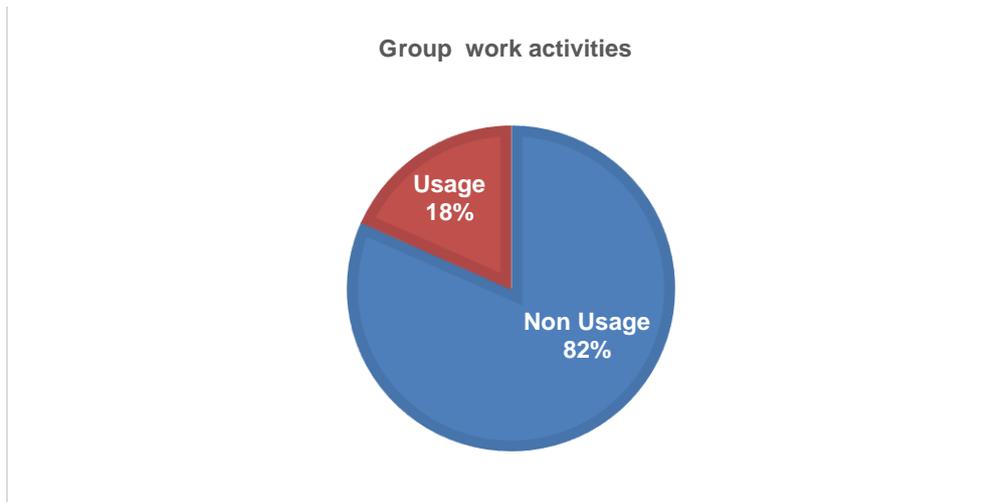


**Figure 4.13: Pie chart showing pair work**

#### **4.3.5 Group activities**

Group work or group learning activities are where students are arranged to work together in or outside the classroom. The purpose of group learning is to help students interact naturally with one another and study or learn collaboratively. Learning takes place in groups as opposed to learning in isolation. Group work is integral in classroom work because it integrates abilities, genders and cultures, encourages joint learning among learners through social interaction, creates a community of enquirers in the classroom and provides an opportunity for all learners to participate actively (Louw and du Toit, 2010).

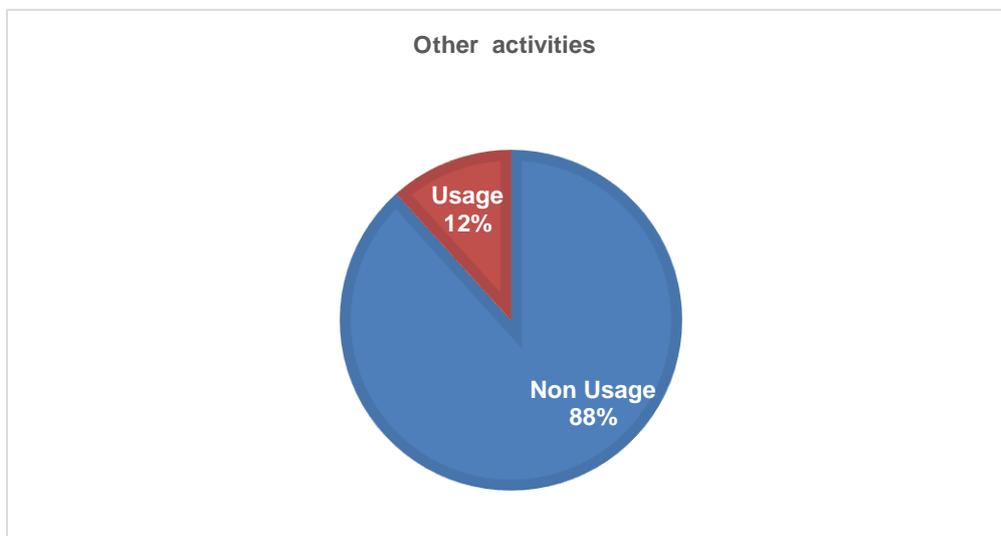
Group work was list used 11/60 (18%) as is shown in figure 4.14 below. The results related well to most of the participant and respondent responses given during the interviews. Few lecturers confirmed to have used groups in their lesson activities; for instance, LP11, LP2, LP4 and LP7 reported to have used group activities because of their interactive nature. Six did not use group work. In higher education, group work is recommended as is advocated by (Louw and du Toit, 2010).



**Figure 4. 14: Pie chart showing group work activities**

#### 4.3.6 Others

Besides the six suggested lecturer-student activities other activities were used and these appeared 7/60 times (11.7%) as is shown in figure 4.15 below. These activities were not in the list of those we had planned to use in our lectures.



**Figure 4. 15: Pie chart showing other activities**

#### 4.3.7 Questioning techniques: Bloom's Taxonomy

Asking questions is one of the most basic and effective ways of engaging students in their own learning process. Race (2015) states that the objective of classroom questioning is not to confirm whether students have grasped something as would be

the case in tests, quizzes and examinations, but to guide students to learn essential material. Questions, he further expands, should be used to teach students rather than just test students.

Therefore, for participant lecturers, learning the art of asking questions was obligatory to our professional development; hence our engagement with Bloom’s taxonomy. Bloom’s taxonomy is an important tool to use in the formulation of learning outcomes (Bloom, 1956; Lucas, Dippenaar and Du Toit, 2014; Pohl, 2000). The taxonomy arranges questions according to the level of depth/difficulty. Thus there are lower order questions and higher order questions. Bloom’s taxonomy of higher order thinking skills distinguish levels of analysis, synthesis and evaluation (Anderson and Krathwohl, 2001; Krathwohl, Bloom and Masia, 2015). Besides the taxonomy, we used probing, divergent, convergent and rhetorical questions. Our concern as participants was to make use of all the levels in our lectures so that all the learning preferences of our students were accommodated. At the same time our thinking styles accommodated different thinking preferences, so both us and students were challenged to move out of our comfort zones.

The discussion that follows presents our use of questions in enhancing learning. Table 4.1 below shows that out of the 60 lectures observed by the ten participants, knowledge level questions appeared 29 times, (48%); comprehension level questions 25 times, (42%); application level questions 21 times, (35%); analysis level questions 27 times, (45%); synthesis level questions 21 times (35%) and evaluation level questions 22 times (37%).

**Table 4.1: The frequency and level of questions asked in observed lessons**

<b>Knowledge</b>	<b>Comprehension</b>	<b>Application</b>	<b>Analysis</b>	<b>Synthesis</b>	<b>Evaluation</b>
29	25	21	27	21	22

48%

42%

35%

45%

35%

37%

The results reflect a fair distribution of questions in our learning opportunities with knowledge questions used most often, followed by analysis questions and comprehension questions. All four quadrants were represented.

#### 4.3.8 Probing questions

Probing questions are used to investigate the nature of something or to examine penetratingly. These questions challenge the student to think (Wilson, 2019).

Probing questions are asked immediately following a student's response. They require students to justify or clarify in some detail their original answer or statement. The questions require or force students to go beyond the superficial information given in the answer and demand of students to clarify, increase critical awareness and refocus (Wilson and Peterson, 2006). Probing questions are higher order questions.

Our classroom experience shows that 40% of the questions we asked were probing questions as is shown in figure 4.16 below. This is in line with the level of education our students were at where most questions are not answered from memory. Higher order questions require students to think deeply.

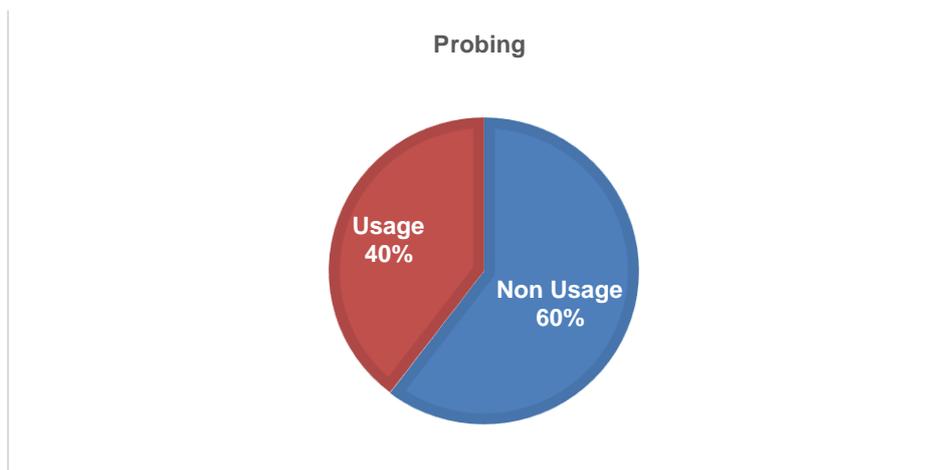
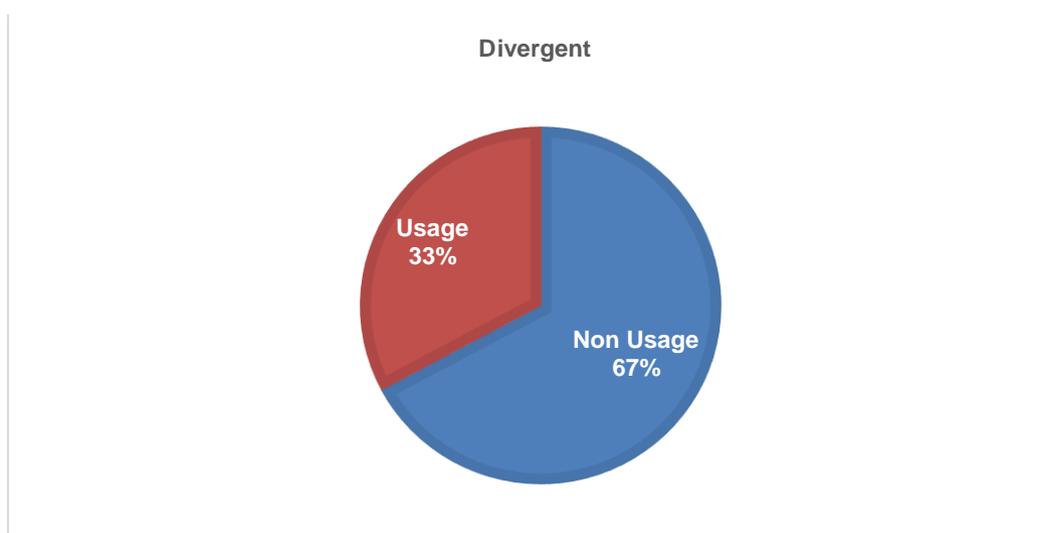


Figure 4. 16: Pie chart showing percentage of probing questions

#### 4.3.9 Divergent questions

Divergent questions are designed to encourage students to think divergently and express their own feelings about certain issues (Wilson and Peterson, 2006). They do not have single answers as they require students to think creatively (D quadrant), moving from the known to the world of the unknown. They allow students to be creative and imaginative. Kolb (1984)'s experiential learning theory defines learning as the process whereby knowledge is created through the transformation of experience. By answering divergent questions students use their experience in creating new knowledge.

Our classroom experience with divergent questions is illustrated in Figure 4.17 below. From the observed lectures 33% of the questions were divergent. Divergent questions are higher order questions, so they were supposed to have had the highest score in terms of usage considering the level of education of our students.



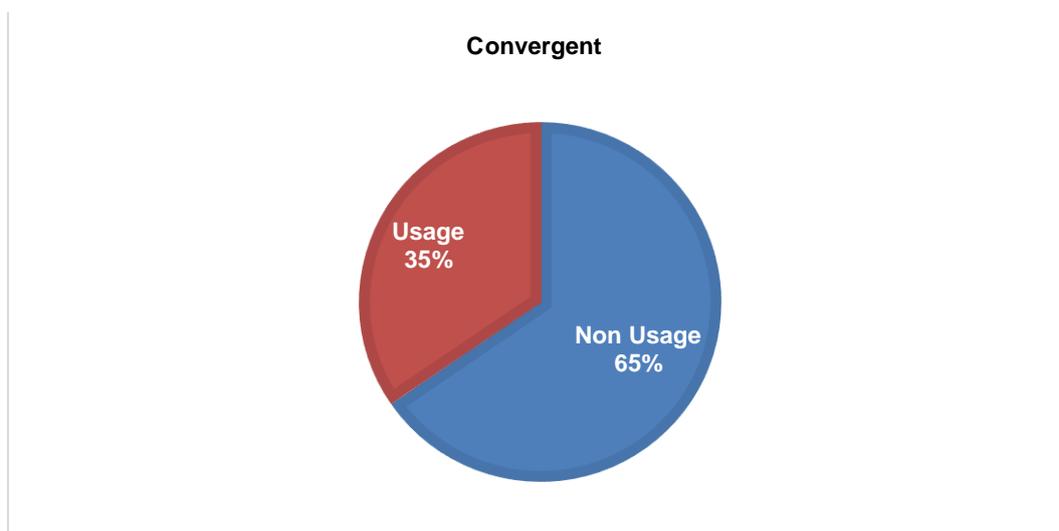
**Figure 4. 17: Pie chart showing percentage of divergent questions**

#### **4.3.10 Convergent questions**

Convergent questions usually have one correct or best answer. They are formulated to demand the selection of relevant concepts and the solving of problems. They deal with logical and complex data, abstract ideas, analogies and multiple relationships (Wilson, 2019). Quadrant A and B students benefit more when these questions are asked as the questions are rational, factual and logic orientated.

The results show that 35% of our lectures used convergent questions as is shown in figure 4.18 below. Few of us used convergent questions. This could have been

reflective of our thinking preferences. Only four participants i.e. LP4, LP7, LP8 and LP10 had the A and B preferences and these four because of their preference of factual and logical thinking might have contributed to the 35%.

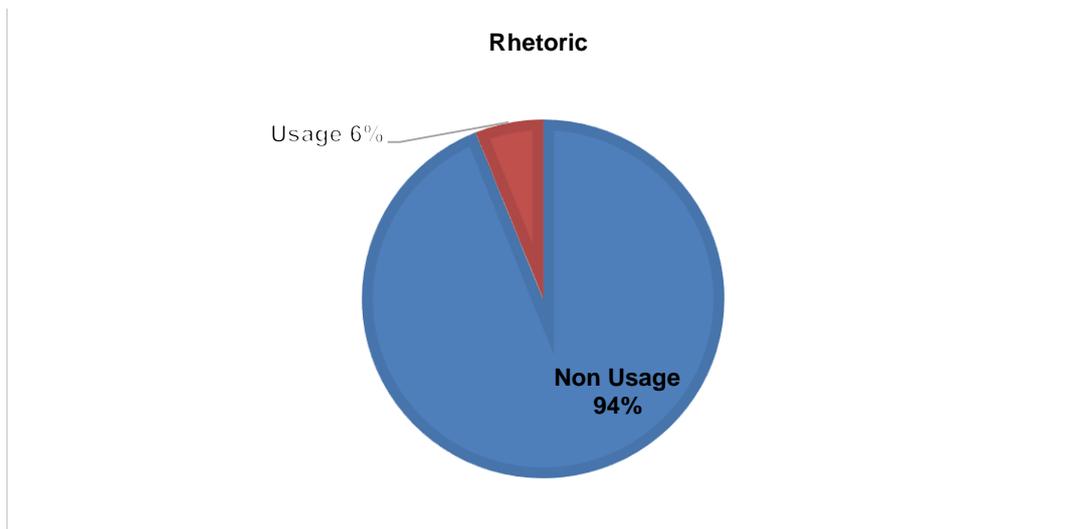


**Figure 4. 18: Pie chart showing percentage of convergent**

#### **4.3.11 Rhetorical questions**

Rhetorical questions are used to emphasise a point or to reinforce an idea or statement. It is a question with a very obvious answer, probably because it usually refers to very common facts, or the answer is already present in the context of placing the question. Such questions are often asked to underscore a particular point only (Nangla, 2018).

The results in figure 4.19 below show that 96% of the participants did not use rhetorical questions in their lectures, and only 6% reflected on their use. Rhetorical questions are higher order questions that are appropriate for higher learning. LP2 said he used rhetorical questions in his lesson on pornography to get students to contemplate the topic and to do introspection. Awareness of the disadvantages of pornography would help the students to address the problem by seeking help.



**Figure 4. 19: Pie chart showing percentage of rhetoric questions**

#### **4.3.12 Media integration**

In our zeal to accommodate all our students' learning preferences, we encouraged one another to incorporate computers, videos, PowerPoint presentations, hand-outs and textbooks in our lessons. Media integration is significant in the classroom regardless of the age of students as it engages students, aids student retention of knowledge, motivates interest in the subject matter, and illustrates the relevance of many concepts (Hill, Tomkinson, Hiley and Dobson, 2014). When media is used in learning, it appeals to the three domains; cognitive, psychomotor and affective. The use of technology is one of the attributes of the 21<sup>st</sup> century (Alazam, Bakar, Hamzah and Asimiran, 2012; Palmer, (2015 Praya, 2012).

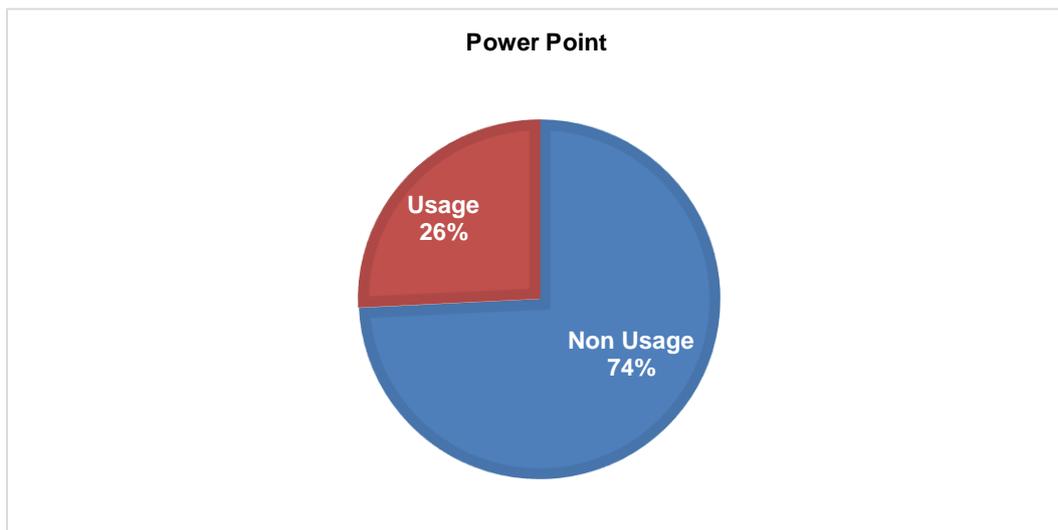
The significance of using technology in enhancing learning was acknowledged by the participants and respondents in the interviews and focus group meetings; the following paragraphs represent the results.

#### **4.3.13 PowerPoint presentations**

Literature supports the use of Power Point presentations in the classroom to enhance learning.

PowerPoint acts as a supplement to the regular oral lectures by outlining the class schedule, breaking down lectures into layers and thereby giving it a structure; note-taking becomes easy for the students and keeps the class interesting and the students attentive (Praya, 2012, 1).

The results show that the participants' learning opportunities revealed 26% PowerPoint usage in classroom presentations as is shown in figure 4.20 below.

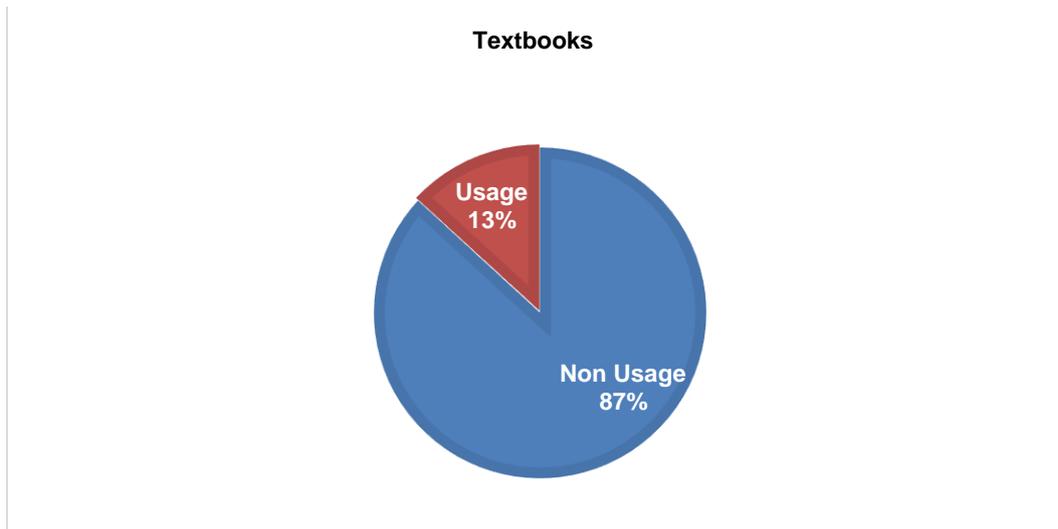


**Figure 4. 20: Pie chart showing use of PowerPoint**

Among those who did not use PowerPoint presentations in their classroom activities was LP10. Her student; LP9R2 revealed this during the interview. LP3R2 remarked that through the projected pictures and figures of the lesson, they were able to visualise and internalise what they learnt.

#### **4.3.14 Textbooks**

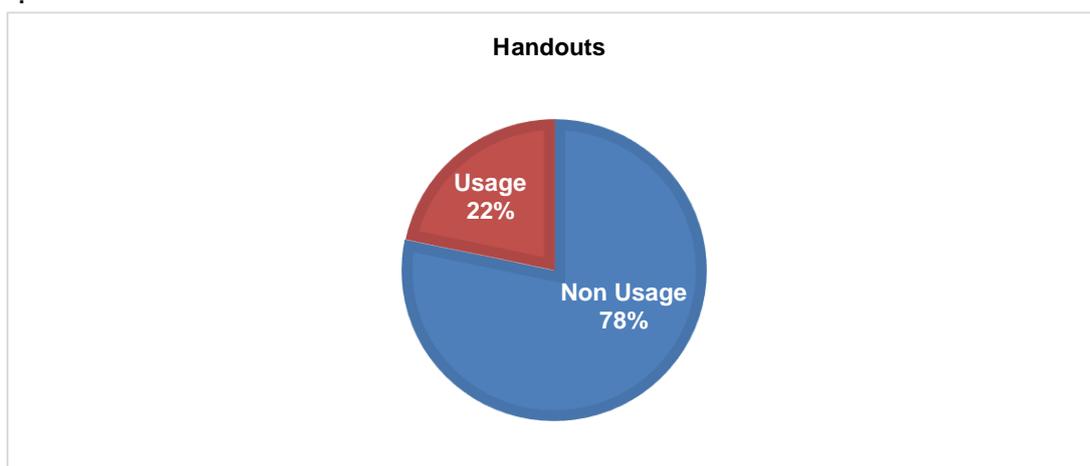
According to Palmer (2015) technology has overtaken the use of textbooks. However, textbooks still remain essential, especially in areas where the internet is not accessible. The exemplar institution, for example, faced the challenges of storms in the rainy seasons. These storms at times burnt the internet server/fibre wires and repairs took long. Textbooks become handy in such cases. The results on figure 4.21 below however show that 13% of our learning opportunities employed textbooks to enhance learning. The results are in line with Palmer (2015) above who avers that in this era textbooks have been overtaken by technology. LP2 confirmed the use of textbooks in his lessons by accepting that what he taught was primarily textbook-driven.



**Figure 4. 21: Pie chart showing the use of textbooks**

#### 4.3.15 Handouts

Brazeau (2016, 6) states that “the posting of handouts on-line employing course management systems has become, in many cases, a standard expectation by students. This has been motivated by lecturers’ unselfish intent to provide more information than can be written on a board or to make life ‘easier’ for students.” The use of handouts was not very popular in our facilitating of learning as the results in figure 4.22 below show that 22% of our lectures used handouts. In higher education, I feel that the fewer the handouts the better as these defeat the purpose of selfregulated discovery learning that we want to cultivate in our students.



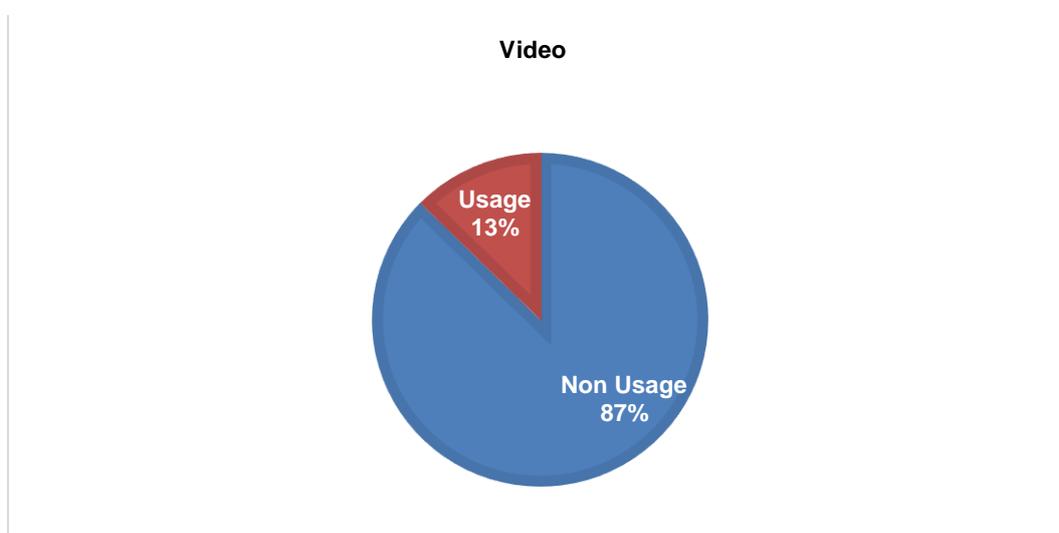
**Figure 4.22: Pie chart showing use of handouts**

#### 4.3.16 Video

Research has shown that students learn new or abstract material easily when presented in visual form. Romaniuk (2018) describes video as a powerful way to build and maintain student engagement in classrooms and to ensure that learning can take place at a deeper level. When students are able to see something in action and interact with it in more than one way, they process the information in a manner that builds lasting connections. The results in figure 2.23 show that 13 % of us used videos while only 87% did not. In the study two participants, i.e. LP1, LP2 and LP7 acknowledged to have used videos. The use of videos captivated the students and those who experienced their usage commented positively about them in the interviews. I have presented two direct responses from one participant and respondent who used videos.

When I tried to use media since I didn't use media before, I found that it was so helpful. After watching a video the students had much to say, they participated more and actually even their conception was heightened: LP2

Ok. As I have said before that she used the videos as another way of teaching us, so she would come with a projector and she would project the things that we were learning on the wall. This increased concentration. Everyone would concentrate on what she is teaching about. And she gave us assignments in the form of e-portfolio in which we were supposed to submit electronically. So she enabled students to venture out and explore and learn some other new things: LP1R1.



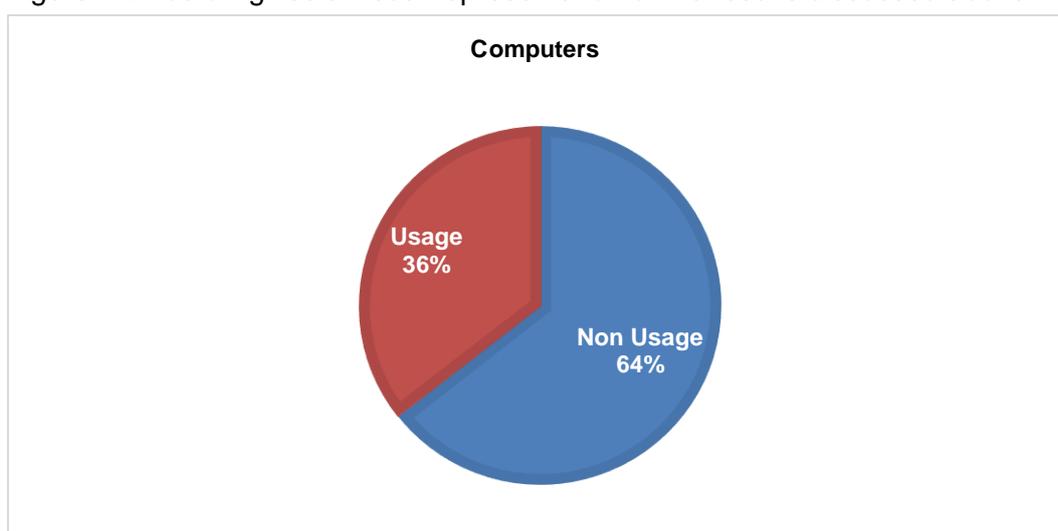
**Figure 4.23: Pie chart showing use of videos**

### 4.3.17 Computers

Lecturers should be able to incorporate computers in the 21<sup>st</sup> century classroom (Palmer, 2015). The lectures that were observed revealed that 36% of our lectures employed the computers as is shown in figure 4.24 below. The exemplar institution issued laptops to all lecturers to use as they executed their teaching duties; therefore there was no tangible reason why 64% of us did not use them. Most of the participants did not use computers to facilitate learning. LP6 and LP7, for example, used Moodle; LP1 used E-portfolios while LP3 used e-mails in facilitating learning. Silvio, (LP7R2) confirmed the use of Moodle during their lectures.

Ok he uses Moodle so it is easy for me. Umm we never use projectors in accounting but he uses it in the research course always so for me that is very efficient. He is actually one of the few lecturers who use projectors and Moodle: Silvio-LP7R2.

Figure 4.24 below gives a visual representation of the results discussed above.



**Figure 4. 24: Pie chart showing use of computers**

#### **4.4 ASSESSMENT OF STUDENT WORK: EXAMINATIONS**

(Race, 2015) emphasises the need for variety in ways of assessing students' work. We concurred with Du Toit's (2014, 7) view that "most lecturers do not have a teaching styles that can accommodate the learning preferences of all their students".

#### **4.5 MID-SEMESTER AND FINAL EXAMINATIONS**

The section that follows presents the results of the examinations set by the 10 participants.

The discussion presents data gathered in two examinations for each participant: the mid-semester and the final examination. A Whole Brain® Assessment approach encourages the lecturer to set his examinations with the students in mind (Cekiso, 2011, Cekiso et al., 2015; Hill et al., 2015; Mkonto, 2015) this is a student-focused approach. Since it is not the lecturer who writes the examinations, it is essential in Whole Brain® Assessment to consider the diverse quadrants of his students when setting the examinations.

The questions of the two examinations were analysed according to the four quadrants and equated on 100% stacked bar graphs. The colours are the colours of Herrmann's four quadrants.

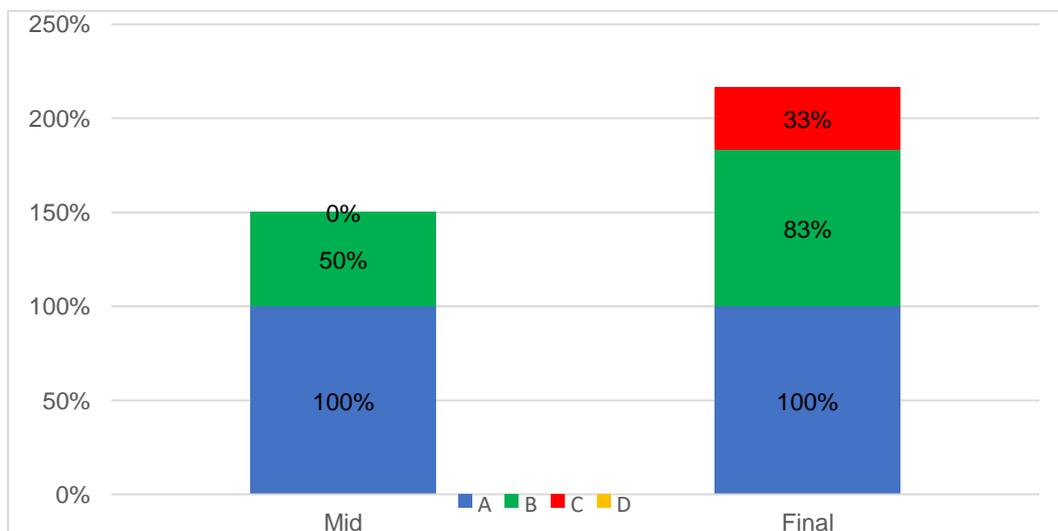
It was noted that a single question could constitute two or more quadrants. This variation explains why stacked charts were preferred. The questions or items of the examinations were analysed according to Bloom's three learning domains, the affective, intellectual and psychomotor domains. According to (Anderson and Krathwohl, 2000; Bloom 1956; Mkonto; 2010 Pohl 2000) the cognitive domain includes mental or intellectual skills and recognition of facts and procedural patterns. I classified the A, B and D quadrants under this domain because of their factual, logical, critical, analytical, data manipulation, sequential, synthesis and methodical characteristics (De Boer et al., 2013 Herrmann, 1996). Therefore all the questions in the two examinations that were aligned with intellectual abilities and skill were classified under the A, B and D quadrants.

The affective domain involves the growth of emotions such as feelings, values, appreciation, motivation, enthusiasm and attitudes. All questions that measured such emotive features were classified under the C quadrant. The psychomotor domain

includes the use of motor skills, i.e. physical or kinaesthetic movement. The domain involves precision, procedures and techniques in execution (Krathwohl, Bloom and Masia, 2015; Mkonto, 2010). I equated this domain with the C, B and D quadrants. Some questions overlapped and related to more than one quadrant, which is the reason why stacked graphs, *inter alia*, were selected. The classification of questions according to quadrants was first recorded on an Excel spreadsheet. After classifying the questions according to the quadrants the data was analysed using SPSSV23 by the exemplar institution’s statistician.

The mid-semester examination for LP1 contained both A and B quadrant questions. All the questions were cognitive, constituting 100% of the A quadrant. The B quadrant was represented by 50% of the questions. Quadrants C and D were not represented in the mid-semester examination. However, the final examination featured questions that related to the A, B and C quadrants with the percentages 100, 83 and 33 respectively. LP1 had a profile score code of 2112. She tried to incorporate the A quadrant that was her secondary preference in both examinations. The D quadrant was not included. Figure 4.25 below shows the percentages of the quadrants which were addressed by both the mid – semester and final examination questions for LP1.

#### 4.5.1 Examination data for LP1

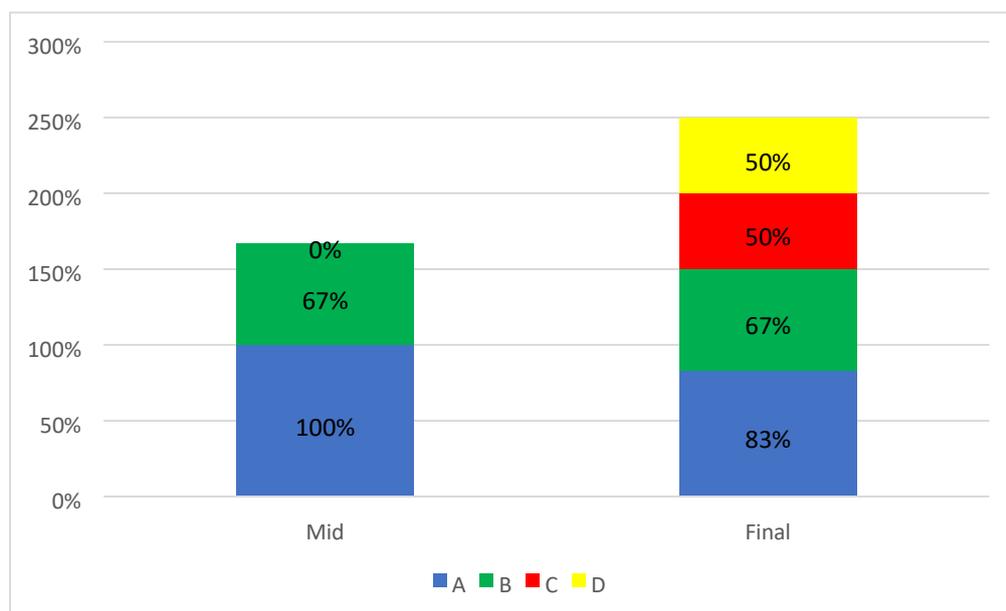


**Figure 4. 25: Distribution of examination questions for LP1**

#### 4.5.2 Examination data for LP2

LP2’s mid-semester examination papers featured questions that related to quadrants A and B only. The cognitive questions constituted 100%. Those related to the B quadrant measured 67%. His final examination incorporated all four quadrants as is

shown in figure 4.26. The participant had a triple dominance of 2111. The distribution of questions for the mid-semester examination was not balanced as quadrants C and D were omitted. However, the final examination balanced all the four quadrants. A Whole Brain® Assessment approach seemed to have been accommodated in the final examinations.



**Figure 4. 26: Distribution of examination questions for LP2**

#### 4.5.3 Examination data for LP3

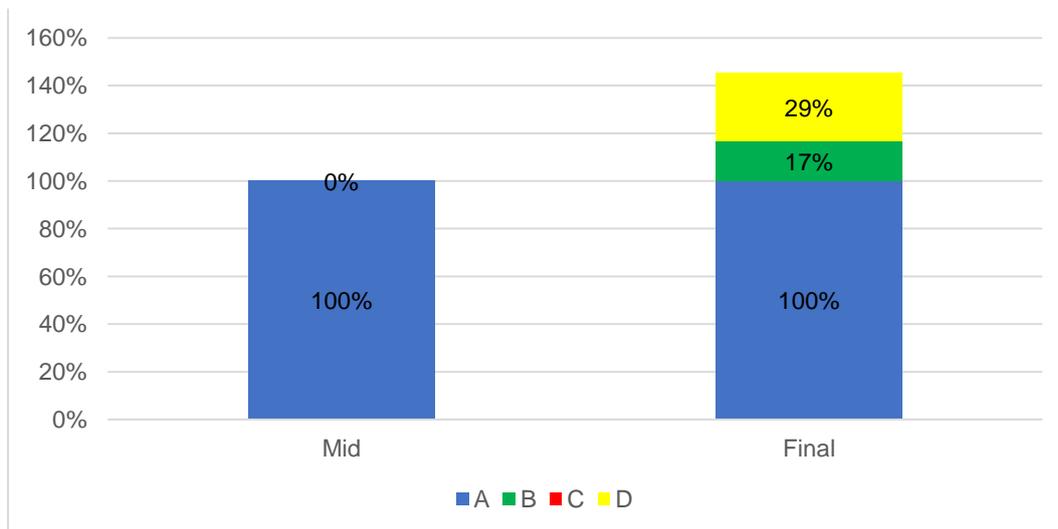
The distribution of questions for the examination was not balanced among the four quadrants for LP3 who had a triple dominance of 2111. The A, B and D quadrants were evenly distributed as is shown in figure 4.27. The C quadrant students were disadvantaged in the written examinations. A Whole Brain® Assessment approach would include questions for C quadrant students. Since the C quadrant was a primary preference in the lecturer’s profile, setting questions that accommodated the C students should not have been a challenge.



**Figure 4.27: Distribution of examination questions for LP3**

#### 4.5.4 Examination data for LP4

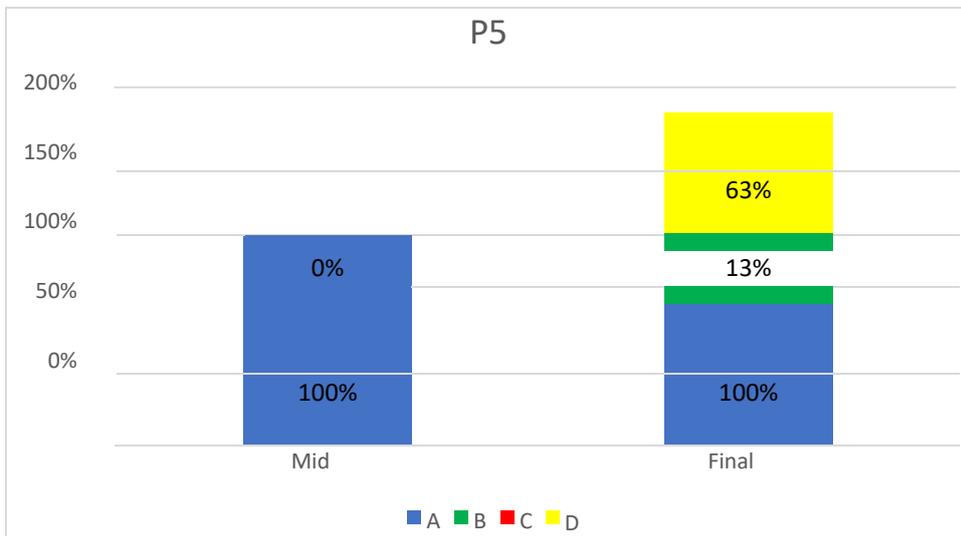
LP4 was the participant with a balanced profile with a quad preference of 1111. One would have expected his students to benefit from his profile. However, the A quadrant was dominant. Most of the questions were logical mathematical with a total of 100% in both examinations. Very few questions asked accommodated students with quadrants B (17%) and D (29%). C quadrant questions did not feature in either examination. See figure 4.28 for visual representation of results discussed above. This imbalance could mean that the lecturer, despite being a balanced person as is evidenced by his HBDI® report, still lacked an innovative approach in assessing students' work. For a balanced Whole Brain® student-focused assessment approach, practical tasks should have been added in the papers since the course he presented was technical. More practical programme drafting assessment questions could accommodate the B, C and D quadrants



**Figure 4. 28: Distribution of examination questions for LP4**

#### 4.5.5 Examination data for LP5

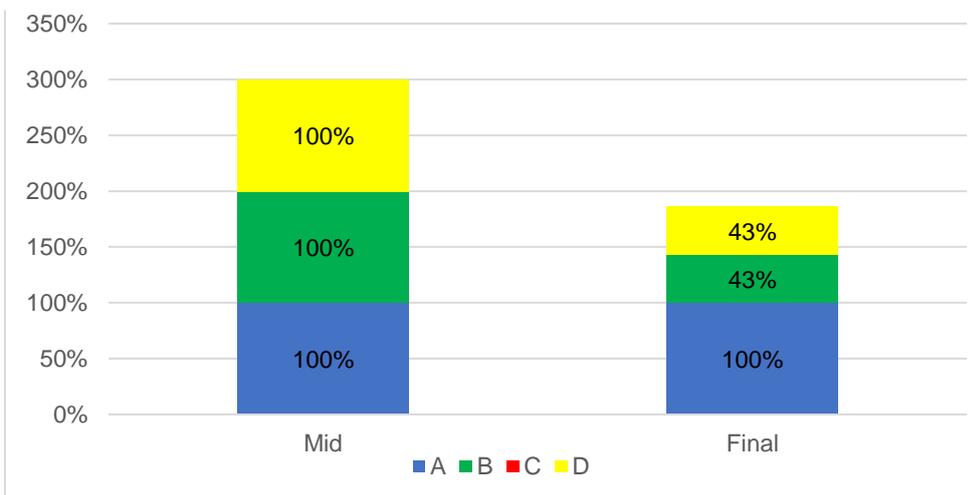
Participant 5 had a double dominant profile of 1122 and the examinations reflected his strong preference for Quadrant A; questions relating to this quadrant scored 100% in both examinations. Most of the questions in the mid-semester examinations were multiple choice test items and they required recall skills. The B quadrant was his primary preference but there were few questions that required step-by-step or systematic arrangement of concepts. Only 13% of the questions required systematic arrangement of concepts. C quadrant questions were not included in the examinations and this resulted in students with a preference for the C quadrant being disadvantaged. For this subject questions that demanded practical application of learnt concepts would have benefited these students. For instance, questions that required drafting programmes on the computer would benefit students who preferred learning, using their psychomotor skills. The D quadrant was well represented as 63% of the questions required students to be creative in applying what they had learnt to cases provided. Most questions required students to explain and justify why a certain program was better than another. Figure 4.29 the distribution of the examination questions according to the quadrants.



**Figure 4. 29: Distribution of examination questions for LP5**

#### 4.5.6 Examination data for LP6

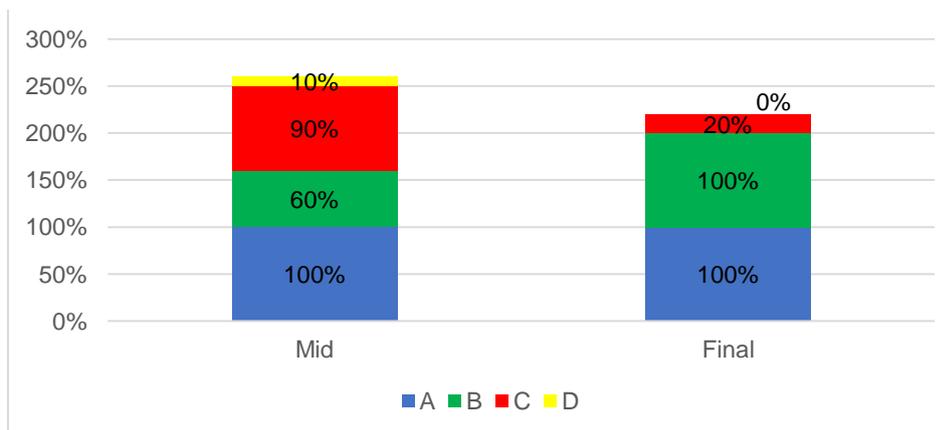
LP6 who had a profile of 2211 provided a meaningful outcome. Most of her questions covered the cognitive domain; that is why they fell under Quadrant A and the questions constituted 100% in both examinations. Quadrants B and D also had a 100% distribution in the mid-semester examination and 43% in the final examination. Figure 4.30 below shows the results discussed above. A Whole Brain® assessment approach would have accommodated the C quadrant too. C quadrant questions were omitted in both examinations. The examination questions for LP6 were quite unusual as literature courses usually demand much expression of opinion.



**Figure 4.30: Distribution of examination questions for LP6**

#### 4.5.7 Examination data for LP7

A fair distribution of questions in the A, B and C quadrants is reflected in the midsemester examination. Participant 7 had a triple dominant profile of 1121. His final examination was biased towards two of his primary preferences, namely the A and B. Quadrant D had a 10% representation in the mid-semester but none in the final. Figure 4.31 below shows the results for both examinations. A Whole Brain® Assessment approach encourages lecturers to move out of their comfort zones and to focus on the student. The participant however, tried to include Quadrant C questions in both examinations though in his profile it held a secondary position. The D quadrant was excluded in the final examination.

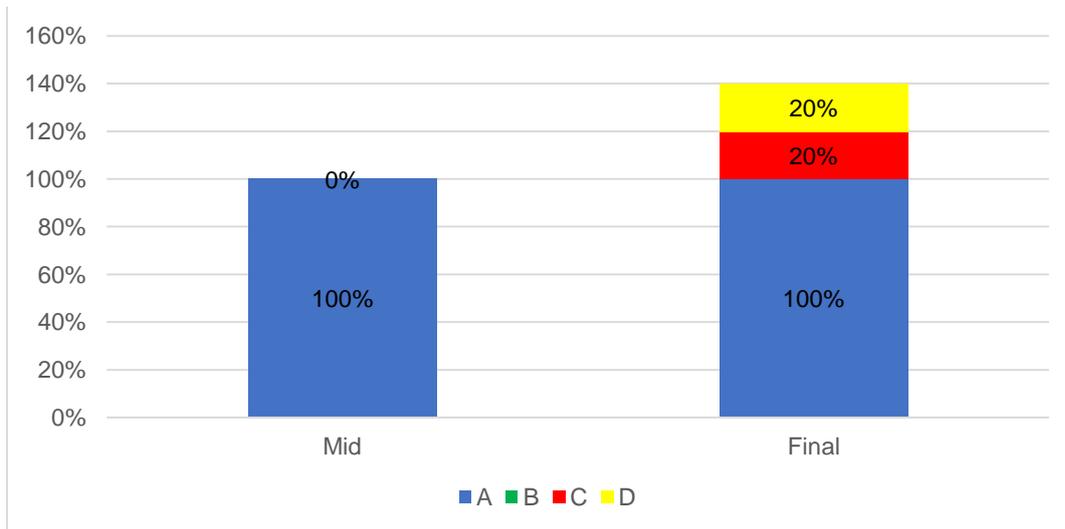


**Figure 4.31: Distribution of examination questions for LP7**

#### 4.5.8 Examination data for LP8

The profile for LP8 was triple dominant with a score of 1112. The questions set in both examinations reflected a strong preference for the A quadrant, namely 100% as is shown in figure 4.32. Very few questions covered Quadrants C and D and none covered Quadrant B. This was in conflict with her interview responses that defined her as someone who loved planning and presented her work sequentially.

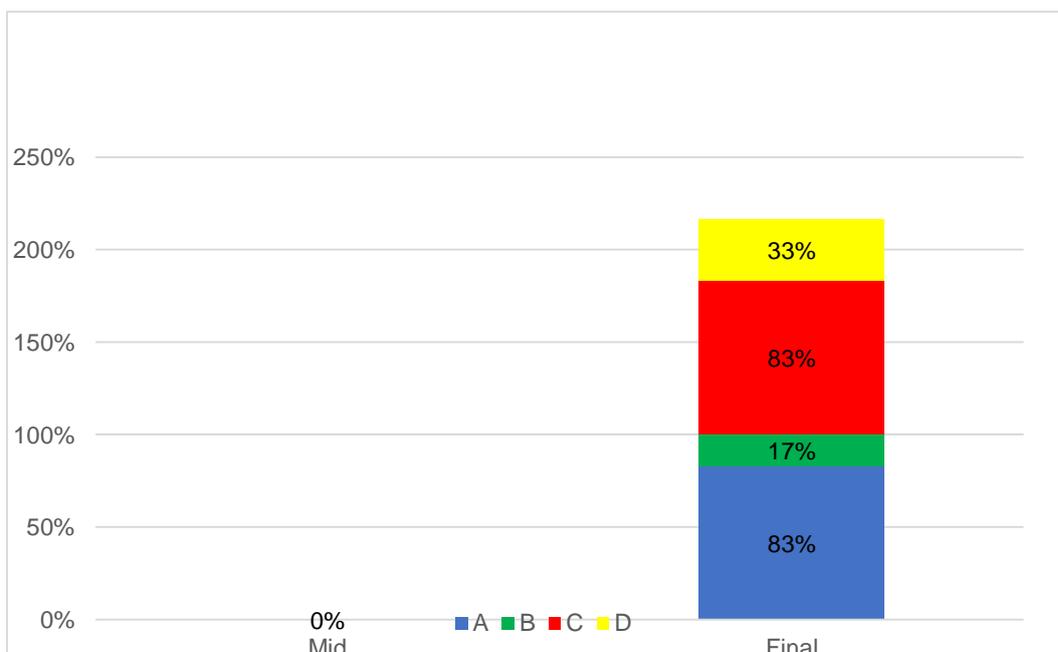
The B quadrant should have been accommodated by a Whole Brain® Lecturer.



**Figure 4.32: Distribution of examination questions for LP8**

#### 4.5.9 Examination data for LP9

LP9 had triple dominance with a score of 2111. The mid-semester examination for LP9 could not be accessed and as a result we analysed only the final examination. However, despite the missing mid-semester examination, all four quadrants were represented in the final examination, with quadrants A and C having the largest number of questions (83%), followed by D with 33% and lastly, B with 17%. Figure 4.33 shows the distribution of the questions according to the four quadrants.



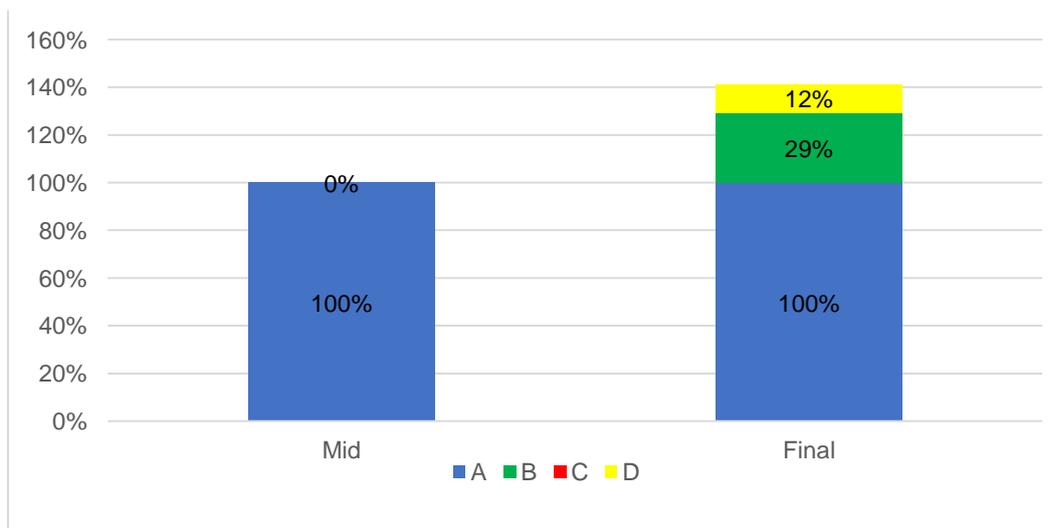
**Figure 4.33: Distributions of examination questions for LP9**

#### 4.5.10 Examination data for LP10

LP10 had a double dominant profile with a score of 1122. Questions set for both examinations reflected her primary preference, namely quadrant A. She was a Mathematics teacher, hence the 100% representation of quantitative work. Quadrants B, C and D were not accommodated in the mid-semester examination.

Quadrant C questions did not feature in the final examination.

Shey (1982, 78) posits that “If an individual/student’s dominance did not match the way the learning point was designed he would perceive it in a different way or not perceive it at all.” One of her students during the interviews said that she was not a Mathematics person but liked doing Mathematics. This comment implies that such a student who could have had a preference for the C or D quadrants might have found both examinations very difficult. Figure 4.34 shows a visual representation of the results discussed above.



**Figure 4.34: Distribution of examination questions for LP10**

A general overview of the examination questions indicates that the cognitive learning domain was dominant at the exemplar institution. Most of the examination questions measured intellectual or mental skills, aligned with the A quadrant. Of late, the two domains, the affective and psychomotor, were rarely emphasised in Zimbabwean higher education. This contrasts with Palmer (2015)’s description of 21<sup>st</sup> education prospects. He posits that the 21<sup>st</sup> century system of education promotes skills that are required for productive members of today’s society. Learning the basic

skills of numeracy, reading and writing is not enough for the learner instead skills that would help them cope with life and work in 21st century communities is all that is required. Soft skills such as; critical and creative thinking skills, problem solving, decision making, and ICT literacy are appropriate for the current world. Lecturers therefore are expected to possess these 21st century skills in order to be relevant in the 21<sup>st</sup> century classroom.

Illeris (2009) argues that cognitive psychology has not considered the place of emotion and feeling in the learning process as emotions and feelings are embodied too in the development of meaning making and in the creation of reality. As Whole Brain<sup>®</sup> practitioners in the 21<sup>st</sup> century we need to use all three domains in our facilitating of learning so that we develop the various skills of our students.

#### **4.6 STUDENT FEEDBACK QUESTIONNAIRE**

Whole Brain<sup>®</sup> facilitating of learning is supposed to benefit both the lecturer and student as both are supposed to contribute to their learning in a constructivist and self-regulated way; hence the questionnaire was divided into two sections: Section A that describes the lecturer's contribution to student learning and section B, the student's contribution to their learning. Section A had three categories:

Category 1: The lecturer inspired me by ...

Category 11: The lecturer initiated learning by ...

Category 111: The lecturer maintained learning by ...

Section B also had three categories:

Category 1: As a student I contributed to my own and others' ...

Category 11: As a student I co-created ...

Category 111: As a student I took part ...

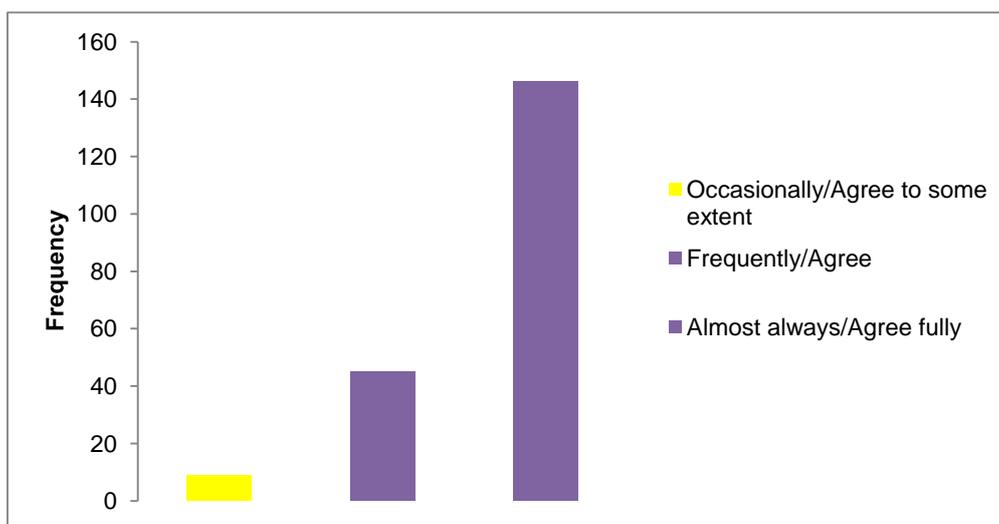
The section that follows presents the results of the questionnaire. The responses helped answer one of the secondary research questions: *What is the relationship between our thinking preferences and our styles of facilitating learning?*

#### **4.7 SECTION A: STUDENTS' RESPONSES TO LECTURERS' FACILITATING OF LEARNING**

#### 4.7.1 Category I. The lecturers inspired learners:

- By their enthusiasm for their work

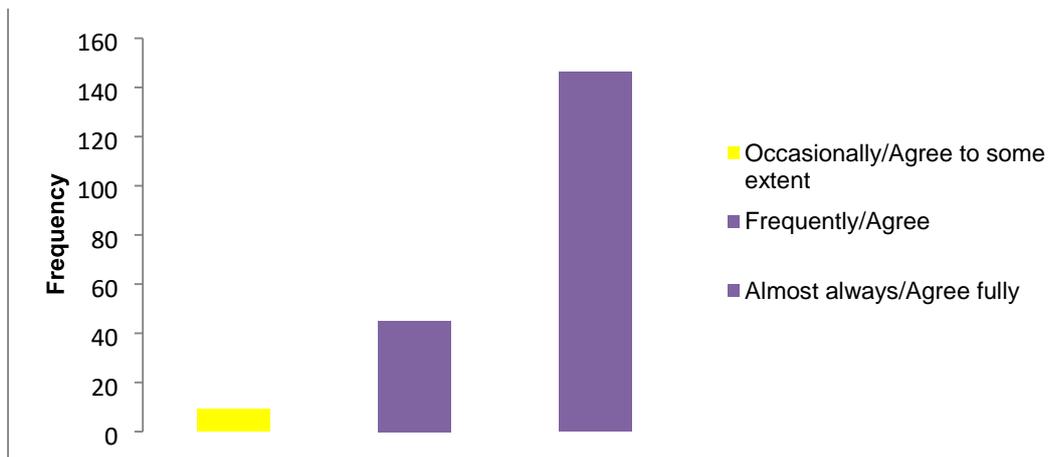
The results in figure 4.35 reflect that 146 of the 200 respondents (73%) almost always/fully agreed that the lecturers showed enthusiasm for their teaching practice. Of the 200 respondents, 45 (22.5%) agreed; they were virtually in agreement and 9/200 (4.5%) occasionally/agreed to some extent. The students, who were interviewed, consented that they enjoyed their lectures because the lecturers knew their subject matter, were punctual and the methods of facilitating learning and assessing varied. Silvio, LP7R2 acknowledged that his lecturer cracked jokes to liven up the lectures.



**Figure 4.35: Students' comments on our enthusiasm for our work**

- By expressing themselves well using variety in tone of voice

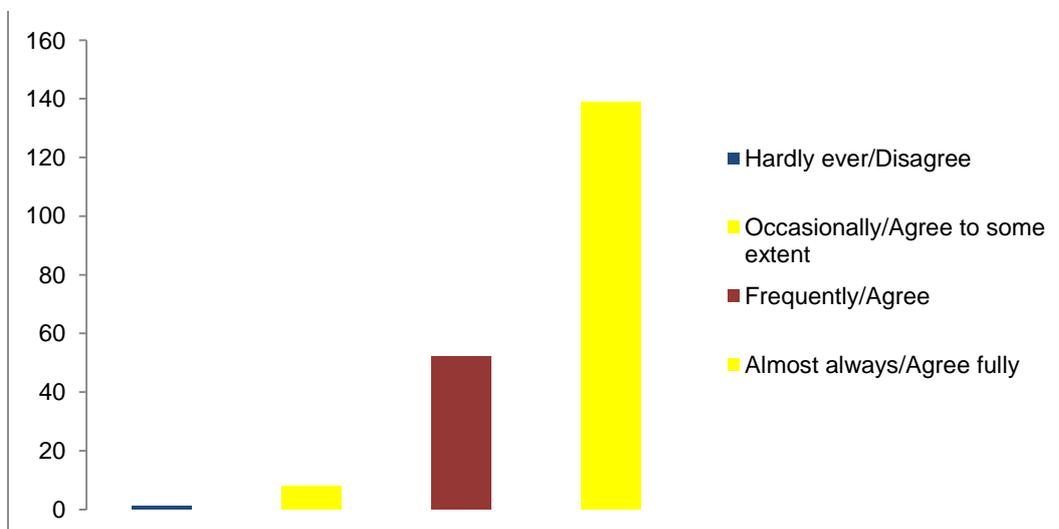
For this variable 139/200 (69.5%) students almost always agreed that lecturers expressed themselves in a variety of tones. Out of the 200 students, 52 (26%) agreed, eight (4%) agree to some extent and one (0.5%) disagreed. Figure 4.36 below shows the visual representation of the results. Since Whole Brain® teaching encourages use of a variety of learning opportunities (Cekiso, 2015; De Boer et al, 2013; Herrmann International, 2017; Mkonto, 2015) it follows then that voice variation is part of a lecturer's construct to solicit student attention. Nazrana- LP7R1 and Silvio-LP7R2 reported that the lecturer was unfriendly at first but later towards the end of the semester he had changed his scary and intimidating disposition.



**Figure 4. 36: How we expressed ourselves well (variety in tone of voice)**

- Promoting insight into the importance and significance of subject matter and related problems

For this variable, figure 4.37 below shows the following results: 135/200 respondents (67.5%) agreed fully that lecturers promoted insight into the importance and significance of the disciplines they taught. Those who frequently agreed were 51 (25.5%) while those who agreed to some extent were 14 (7%). Ultinir, (2012, 195) posits that lecturers should present authentic learning opportunities that provide learners with skills of ‘problem solving, analysis, synthesis, critical thinking and deep understanding’.

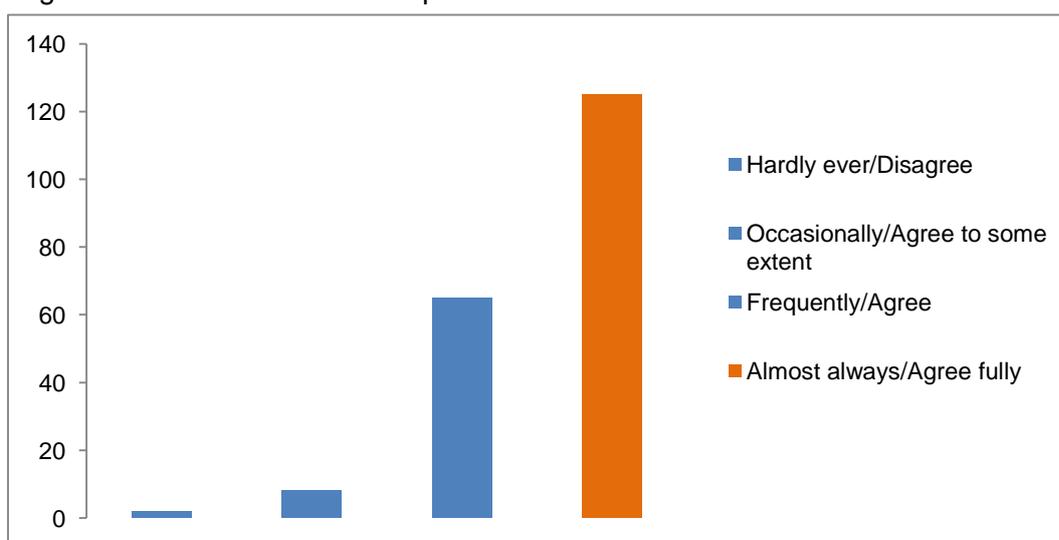


**Figure 4. 37: How we promoted insight into subject matter and related problems**

- By providing learning opportunities for students

For this item 125/200 (62%) respondents almost always agreed that lecturers provided learning opportunities, while 66 (33%) agreed, eight (4%) agreed to some extent and two (1%) disagreed. In the interviews most students expressed their appreciation for individual presentations that they said prepared them to be good researchers and responsible learners. Shey (1982) posits that the lecturer must provide learning opportunities that reach each student's learning preference as Whole Brain® Learning involves accommodating students according to their thinking preferences" (De Boer *et al.* 2013; Du Toit 2013; Du Toit, (2016).

Figure 4.38 shows the visual representation of the results discussed above.



**Figure 4. 38: How we provided learning opportunities for students**

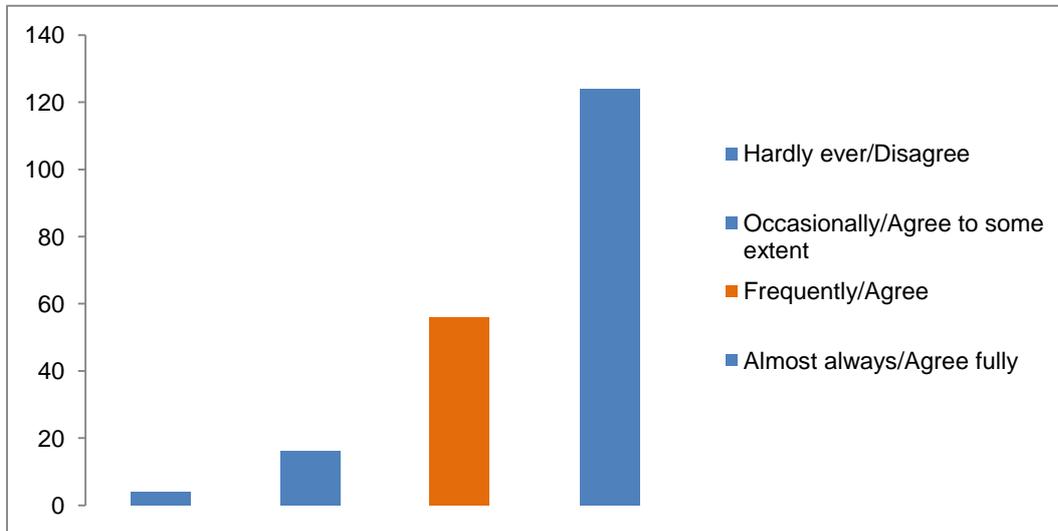
#### 4.7.2 Category 11: The lecturer initiated learning:

- By creating a climate conducive to deep learning

Schlicht and Klauser, (2014, 1020) suggest that to “enhance the students’ abilities in meta-cognition they should be given the opportunity to control and evaluate their own thinking, learning and acting in the process of problem-solving”. Van Deventer and Kruger, (2003) state that lecturers should create learning environments that “maximise opportunities to learn, where learners are well-managed and motivated to learn”.

Of the 200 respondents, 124 (62%) agreed fully that lecturers created a climate conducive to deep learning, while 56 (28%) agreed, 16 (8%) agreed to some extent,

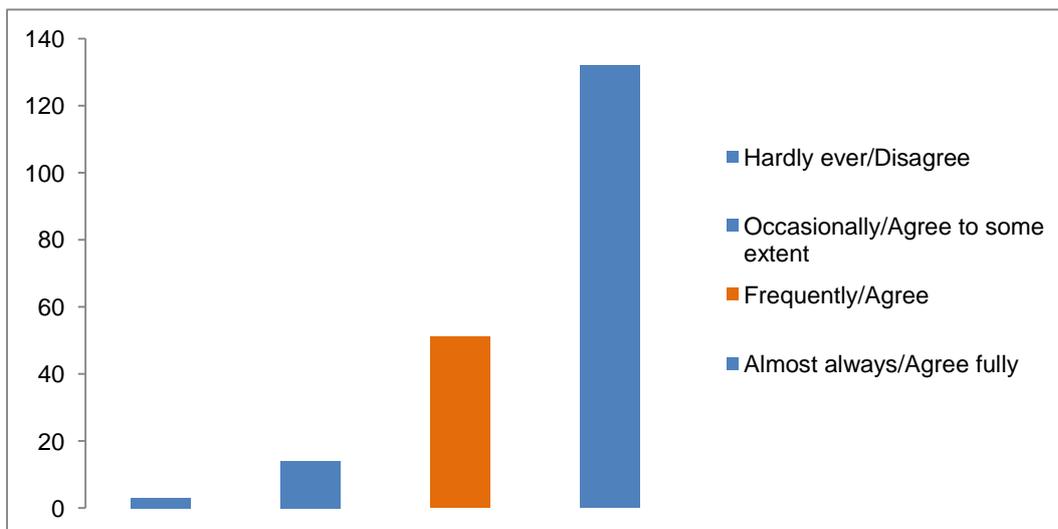
and four (2%) disagreed. Figure 4.39 shows the visual representation of the results above. During the interviews some students confirmed the above results by stating that some lecturers created an atmosphere that required students to think outside the box.



**Figure 4. 39: How we created a climate conducive to deep learning**

- By clearly stating the purpose and learning outcome in the course outline

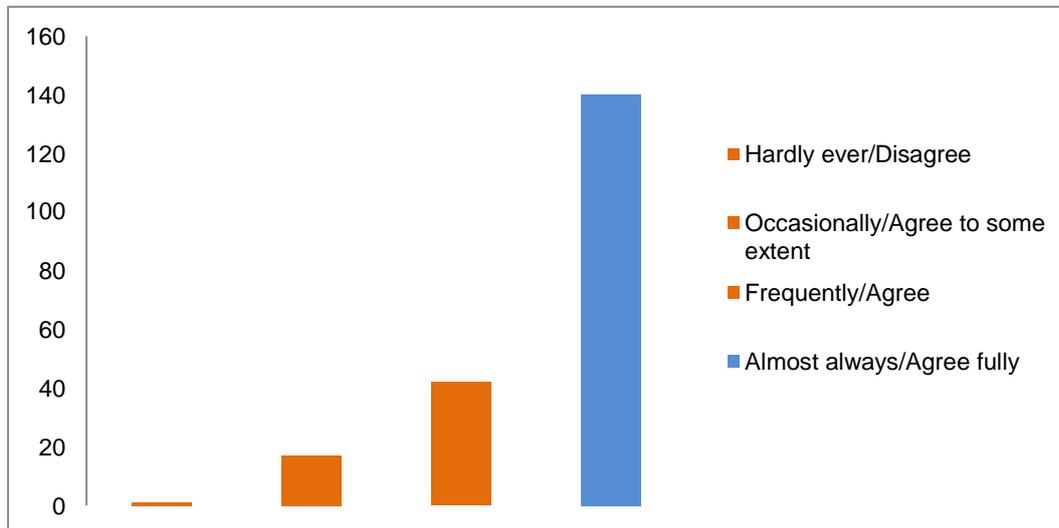
The respondents showed that 132/200 (66%) fully agreed that the course outlines stated the purpose of the learning outcomes, while 51 (25.5%) agreed, 14 (7%) agreed to some extent, and three (1.5%) disagreed. Figure 4.40 below shows a visual plot of the results. Some respondents' responses during the interviews expressed that lecturers stated the purpose of their learning outcomes.



**Figure 4. 40: How we clearly stated the purpose and learning outcomes**

- By linking learning to real-life situations

Shaw (2014) claims that lecturers should include current global issues/concerns, in learning opportunities. The respondents who agreed that lectures acknowledged real-life situations were 140 (70%), while 42 (21%) agreed, 17 (8.5%) agreed to some extent, and one (0.5%) disagreed as is shown in figure 4.41 below. Ultanir (2012) avers that meaningful learning should take place when there are 'real-world-related' realistic tasks for the students. In the interviews the public relations students for LP9 confirmed they equated what they were taught with what was in the market during the field trips. However, the Accounting students for LP7 said that they wished their lecturers could take them on field trips to experience what was expected of them in the real job market.



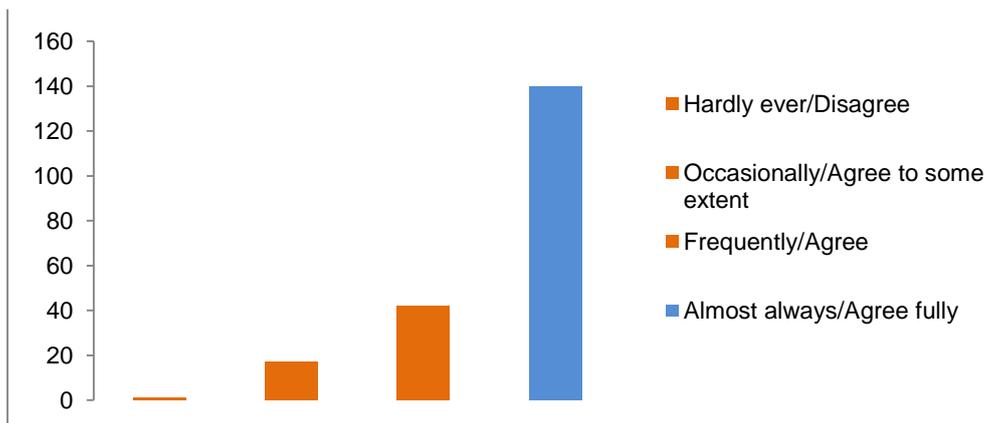
**Figure 4.41: How we linked learning to real-life situations**

#### **4.7.3 Category 111: The lecturers maintained learning:**

- by promoting lecturer-student discussions to allow students to develop enquiring minds

Respondents who fully agreed that lecturers promoted lecturer-students discussions were 134 (67%), while 36 (18%) agreed, 25(12.5%) agreed to some extent, and five (2.5%) disagreed. Figure 4.42 shows the visual plot of the results. From the lesson observation data, lecturers testified that 47% of their lessons promoted

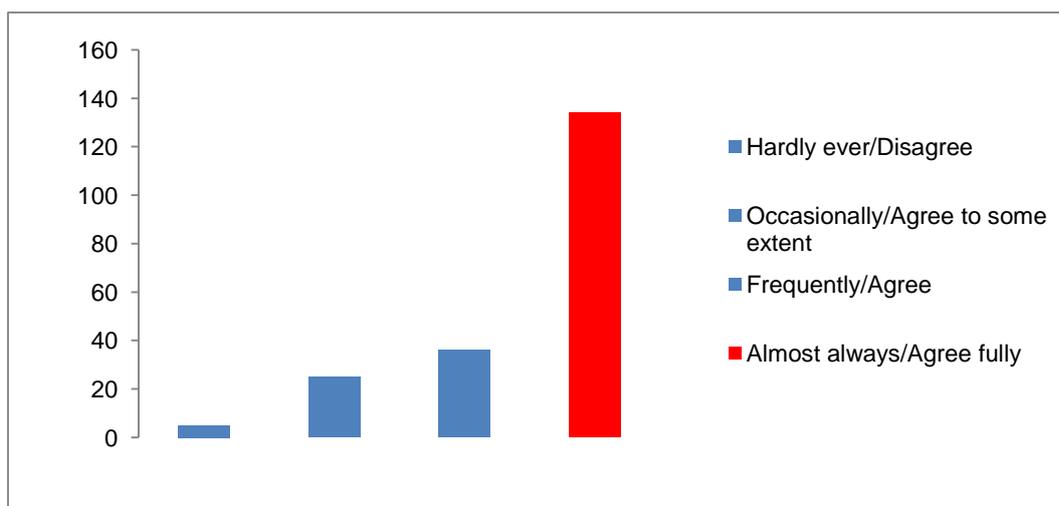
lecturer-student interaction. A focus on students' learning is a priority in the 21<sup>st</sup> century attributes (Shaw 2014).



**Figure 4. 42: How we promoted lecturer-student discussions**

- **By encouraging students to construct their own understanding**

The respondents who fully agreed that lecturers encouraged students to construct their own understanding were 125 (62.5%), 61 (30.5%) agreed, 12 (6%) agreed to some extent and 2 (1%) disagreed. Figure 4.43 below shows a visual representation of the results. The results from interviews and lecture observations harmonize with the above results. Lecturers engaged students in individual, pair and group activities. When students are allowed to learn the way they desire, they own their learning and they strengthen an inherent drive to learn, and apply concerted effort to understand what they learn (Palmer, 2015).



**Figure 4. 43: How we encouraged students to construct their own understanding**

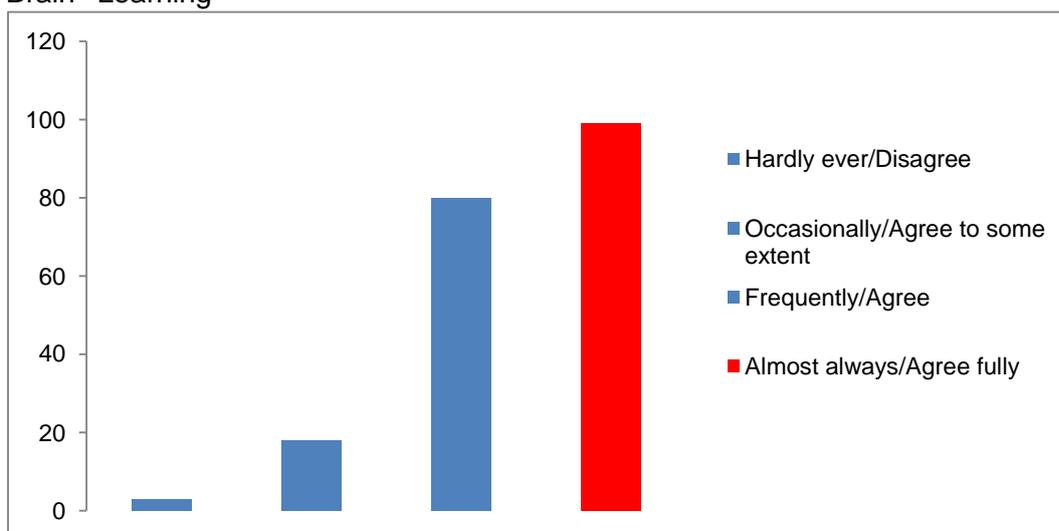
- Providing for learning style flexibility: Whole Brain<sup>®</sup> learning

When lecturers plan their learning opportunities, they should recognise that learners are different and have diverse learning styles. This knowledge will help them avoid creating repetitive and boring learning environments (UNISA, 2006; Coetzee and co-researchers, 2015).

The results in figure 4.44 below show that 99 (49.5%) of respondents fully agreed that learning style flexibility was provided, 80 (40%) agreed, 18 (9%) agreed to some extent, and three (1.5%) disagreed. The results are a true reflection of what took place in our classrooms. Most lecturers agreed that they were not aware of the various learning styles before this study; the Whole Brain® Theory assisted them in accommodating diverse learning preferences. The following response from one of the participants authenticates the results:

ok , now the Whole Brain® Thinking model has helped me to understand my own thinking preferences and it has also helped me to understand the different thinking preferences and so because of that I have realised that my teaching strategies need to cater for each learner in the classroom , use a variety of teaching methods that will meet the needs of the different learners and also make use of teaching materials that will help those who learn through seeing; those who learn through touching and so on and so on so my teaching strategies have really improved after the whole brain: LP9

Figure 4.44 shows how the lectures provided for learning style flexibility-Whole Brain® Learning

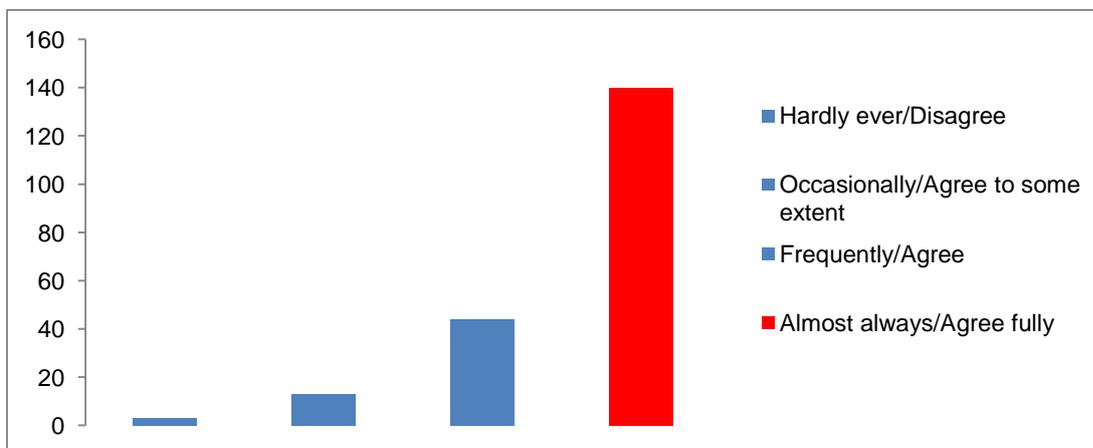


**Figure 4.44: How we provided for learning style flexibility: Whole Brain® learning**

- By encouraging students to express themselves freely and openly

One of the critical 21<sup>st</sup> century teaching attributes is that lecturers should be facilitators of learning (Shaw (2014). The results below confirm that lecturers facilitated learning by allowing students to work in a free environment.

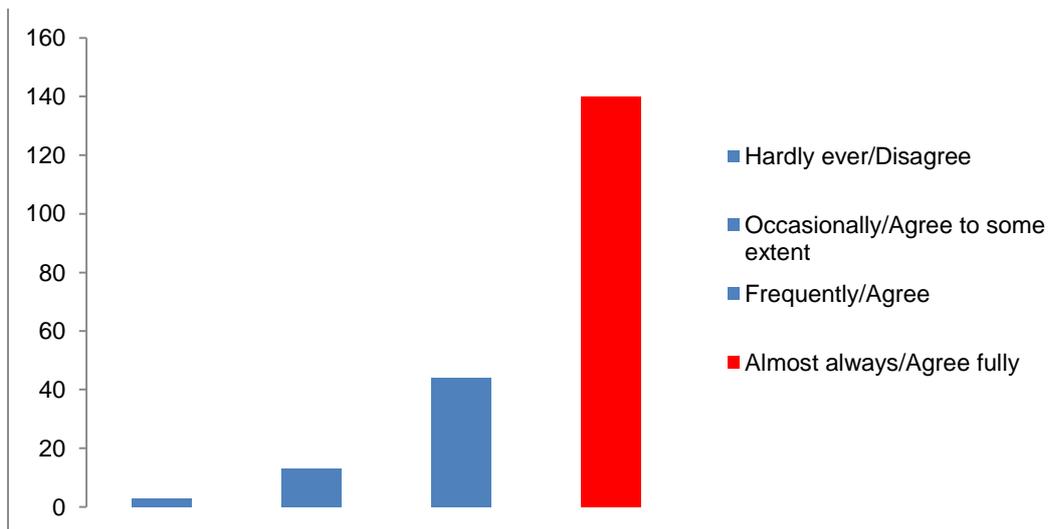
The results show that 140 (70%) of the respondents fully agreed being encouraged to express themselves freely, while 44 (22%) agreed, 13 (6.5%) agreed to some extent, and three (1.5%) disagreed. Figure 4.45 below shows a visual plot of the results. From the respondents' interviews it was noted that few students felt intimidated by their lecturers' dispositions most of them testified that they learnt in a friendly environment.



**Figure 4. 45: How we encouraged students to express themselves freely**

- By inculcating self-reflection and critical thinking in students

The respondents who fully agreed that lectures inculcated critical thinking and selfreflection in them were 128 (64%); 57 (28.5%) frequently agreed, 13 (6.5%) occasionally agreed and two (1%) disagreed. Table 4.46 gives a visual plot of the results. Creating a critical thinking environment is constructivist teaching that declares that lecturers should create an environment where the students generate their own knowledge in the process of solving problems (Piaget 2013; Vygotsky, 1980)



**Figure 4. 46: How we inculcated self-reflection and critical thinking**

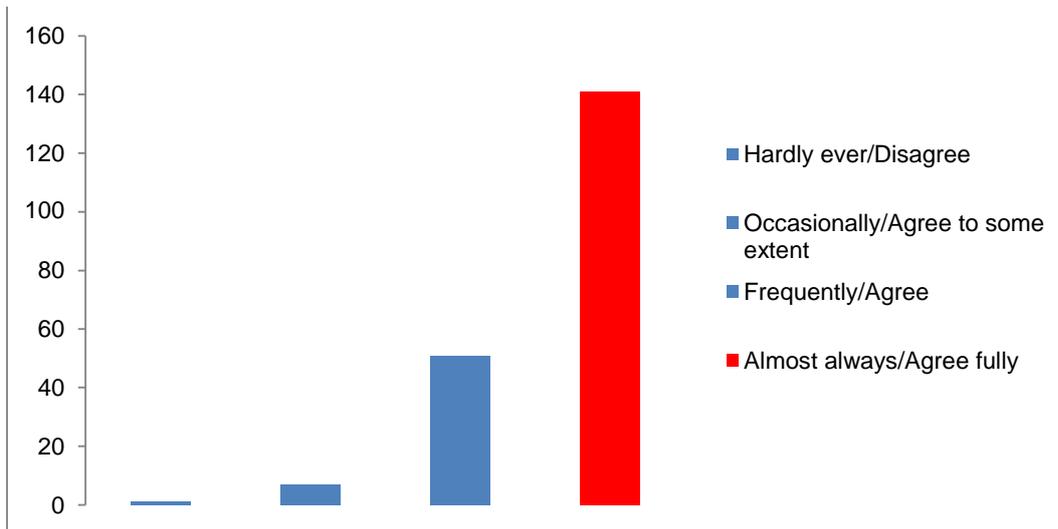
- By promoting co-operative learning

Cooperative learning is defined by Coetzee et al. (2015, 125) as a “team approach to learning where each member of the group is dependent on the other members to accomplish a specific learning task or assignment”. The results revealed that 141 (70.5%) of the respondents fully agreed on the promotion of co-operative learning, while 51 (25.5%) agreed, 7 (3.5) agreed to some extent, and one (0.5%) disagreed.

LP4 and LP8 promoted cooperative learning in the following manner.

There are those who are very good; always use them as part of the resource questions. I normally use the what we call Jesus says love one another, so those who know must help their neighbour, those slow thinkers or slow learners are helped both from the teacher’s side and from other students side and as a result there is no one in my class who will come out saying I was left behind or I am isolated: LP4.

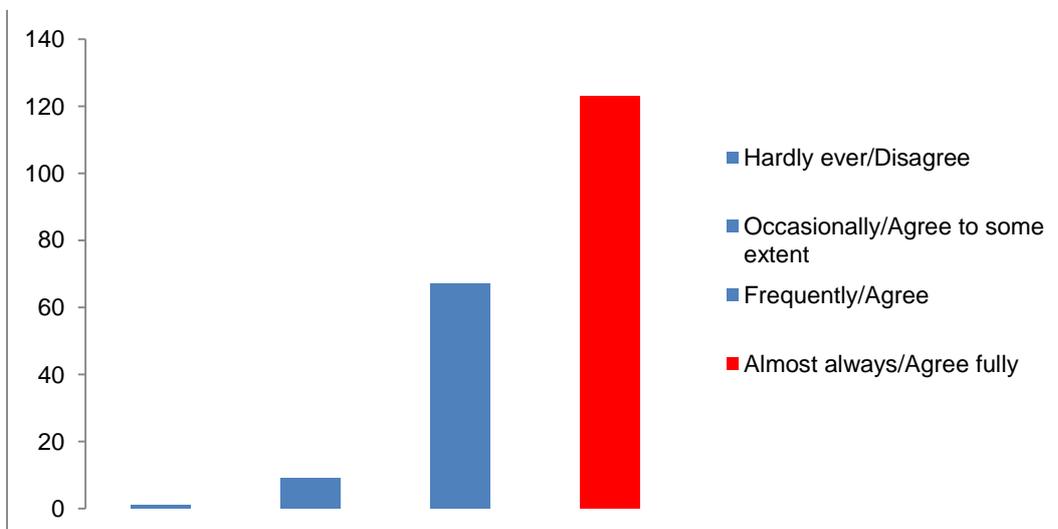
My teaching also allows the students to be part and parcel of the learning process so I allow the students to participate, maybe allow them to work in pairs, allow them to work in groups so that their different needs are met: LP8 Figure 4.47 below shows a visual plot of the results on cooperative learning.



**Figure 4. 47: How we promoted co-operative learning**

- By promoting self-regulated learning among students

Respondents who fully agreed that lectures promoted self-regulated learning were 123 (61.5%), 67 (33.5%) agreed, nine (4.5%) agreed to some extent, and one (0.5%) disagreed. Figure 4.48 shows the visual representation of the results. Most of the students testified to the significance of self-regulated learning. However, some lecturers were not encouraging self-regulated learning. As self-regulated learners ourselves, we should cultivate in our students a self-directed approach to learning and involve them in community projects. By encouraging student active learning, we will be preparing our students for the global academic market that expects learning projects conducted outside the classroom Shaw (2014). Knowles et al. (2015) underscore the fact that learners are self-directing, therefore they want to take responsibility for their lives.



**Figure 4. 48: How we promoted self-regulated learning**

#### **4.8 SECTION B: STUDENTS' CONTRIBUTION**

In the student questionnaire, the students' contributions were guided by the following request:

Describe your contribution to your learning in terms of each of the aspects addressed in the items below.

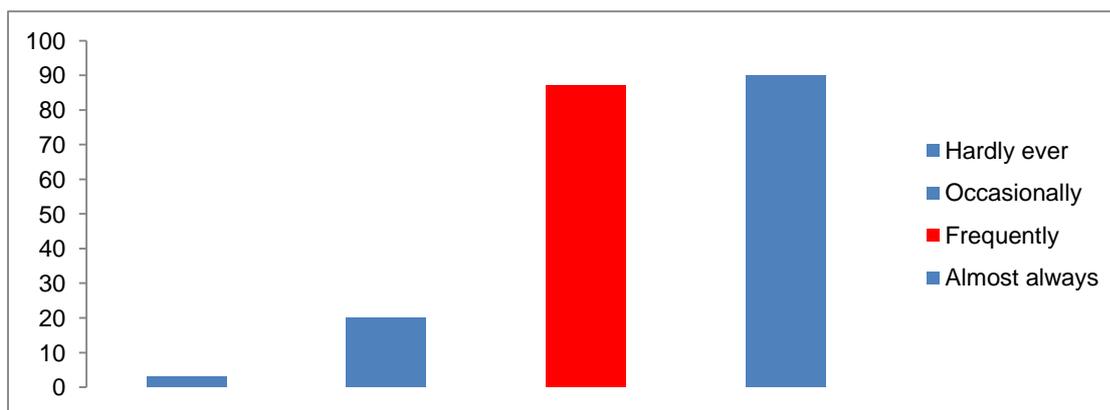
The section discusses the students' evaluation of themselves, stating whether there were noticeable changes influenced by the way their lecturers taught.

##### **4.8.1 CATEGORY 1: AS A STUDENT I CONTRIBUTED:**

- By showing enthusiasm for the subject matter and learning activities

Figure 4.49 below shows results that: 90 (45%) of the respondents fully agreed/almost always agreed that lecturers showed enthusiasm for the subject matter and learning activities, 87 (43.5%) frequently agreed, 20 (10%) occasionally agreed and three (1.5%) hardly ever agreed.

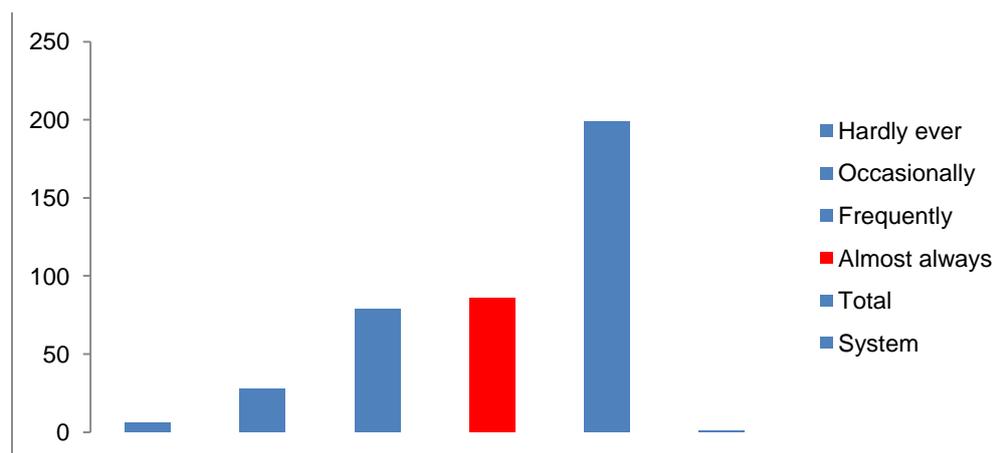
The results also reflect the positive effects of Whole Brain® learning. Whole Brain® teaching encourages lecturers to provide learning opportunities that are interesting (Shey, 1982). Most of the students acknowledged in the interviews having enjoyed their lectures. Some lecturers cracked jokes. Only one student, LP2R2 complained about tiresome lectures that did not give students time to relax.



**Figure 4. 49: Student enthusiasm for the subject matter and learning activities**

- By expressing myself in a variety of tones

The results show that 86 (43%) of the respondents almost always agreed that they could express themselves in a variety of tones, while 79 (40 %) frequently agreed, 28 (14%) occasionally agreed, and six (3%) hardly ever agreed. Figure 4.50 below is a visual plot of the results. LP6's students mentioned that there were some international students who started the semester with difficulties in speaking and writing English, but the lecturer's learning opportunities made it easy for them to learn English fast. Now they were able communicate in English. Shey (1982) avers that a lecturer should find ways of reaching each student in his classroom in order for the content to be understood.



**Figure 4.50: Students expressed themselves in a variety of tones**

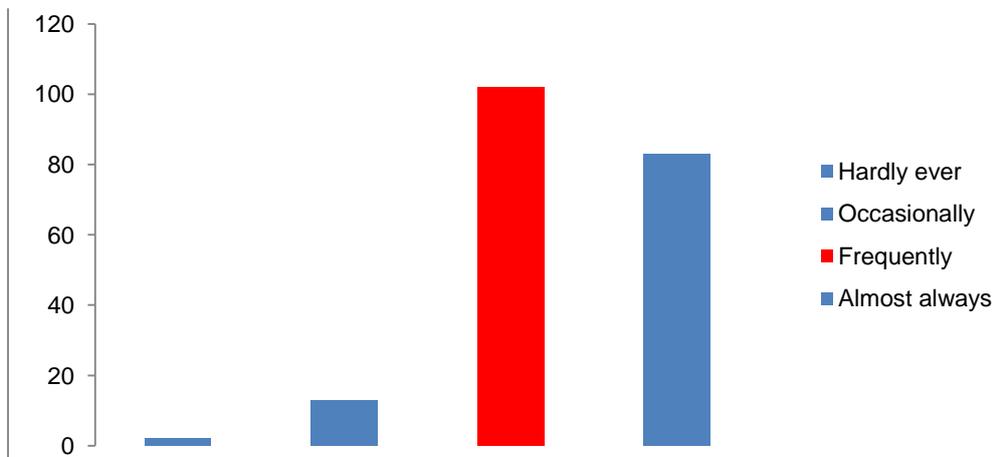
- By promoting insight into the importance and significance of subject matter related to challenging problems

Since our students were adult learners, Knowles et al. (2015) advise that lecturers should be cognisant that adult learners' learning is "around life situations that are task-, issue- or problem-centred for which they seek solutions," (307). We were cognisant of what Knowles et al. advised as is shown by the following results. Of the 200 respondents, 83 (41.5%) almost always agreed that they could promote insight into the importance and significance of subject matter, 102 (51%) frequently agreed, 13 (6.5%) occasionally agreed and two (1%) hardly ever agreed. The interview responses of the students corresponded with the results as most students, especially from the Faculties of Arts Business and Education acknowledged the importance of their subjects in their lives. One student from the faculty of education had this to say:

My lecturer has definitely helped me as a student who is aspiring to take a minor in education next semester. I have learnt that as teacher or lecturer you are supposed to be time conscious, you are supposed to make sure that what you

bring to students is the content that is understandable. As a lecturer or teacher you are supposed to have many teaching methods that would be like effective to students LP1R1.

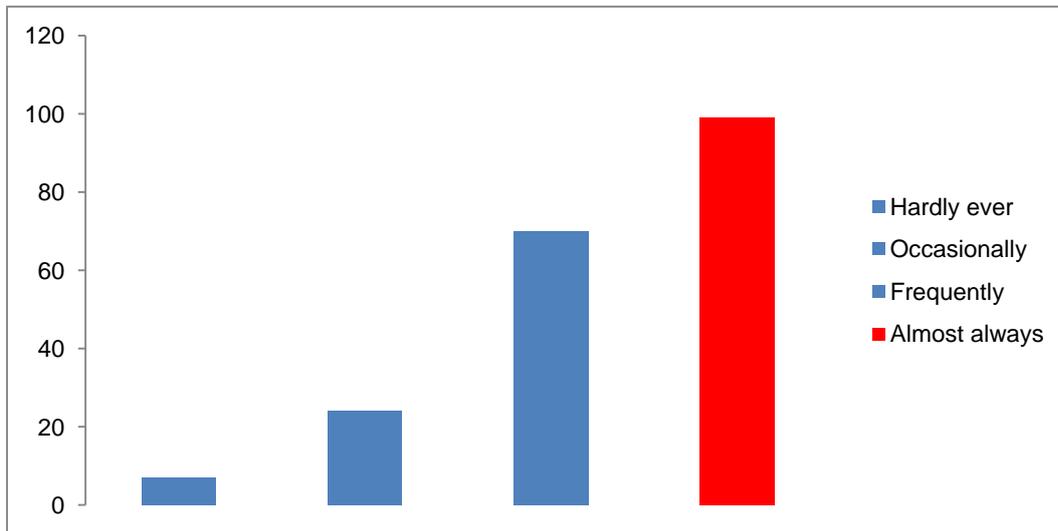
Figure 4.51 below shows a visual representation of the above results.



**Figure 4.51: How students promoted insight into subject matter**

- By participating in such a way that the learning opportunities (sessions) became lively and encouraging

The results reflect that 99 (49.5%) almost always agreed to participating in their classes, while 70 (35%) frequently agreed, 24 (12%) occasionally agreed and 7 (3.5%) hardly ever agreed. In the interviews the lecturers acknowledged that using technology, especially videos, created exciting learning opportunities. Students concurred that they actively participated in lectures. Herrmann (1996) asserts that diversity in learning opportunities is mandatory in order to increase student engagement in the learning process. LP1R1 and LP9R2 and LP4R2 were some of the respondents who enjoyed the learning opportunities. Figure 4.52 below indicates in a graph how students participated lively in learning opportunities.

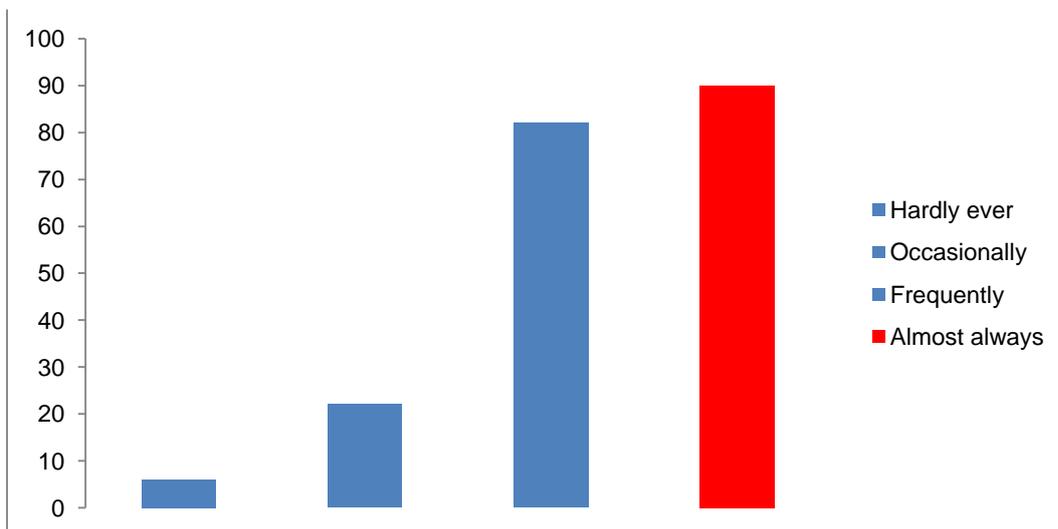


**Figure 4. 52: How students participated in learning opportunities**

**4.8.2 Category 11: As a student I co-created:**

- By creating a climate conducive to deep learning

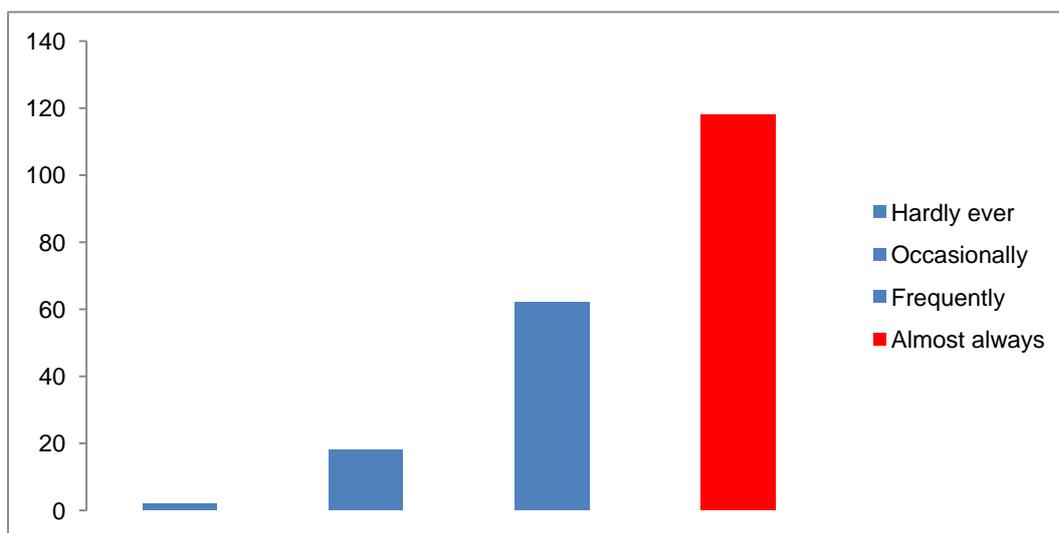
On creating a climate conducive to deep learning, 90 (45%) of the respondents almost always agreed, while 82 (41%) frequently agreed, 22 (11%). In the interviews LP4, LP5, LP8 and LP9 mentioned that they asked their students challenging questions that propagated critical thinking.



**Figure 4.53: How students co-created a climate conducive to deep learning**

- By continuously linking my learning to real-life situations

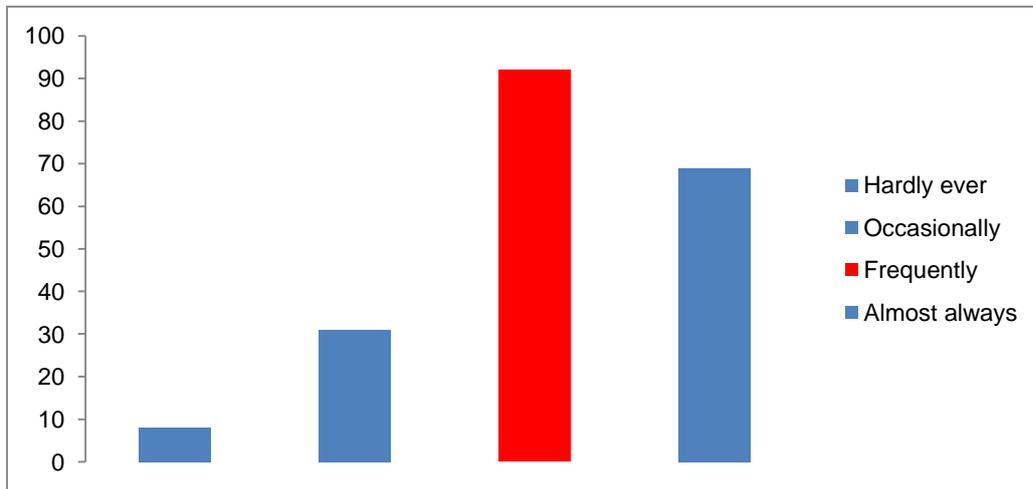
In showing how students related learning to real-life situations, 118 (59%) almost always agreed, 62 (31%) frequently agreed, 18 (9%) occasionally agreed, and two (1%) hardly ever agreed. Figure 4.54 below shows the results in visual form. Schwartz, Branford and Sears, (2005) aver that specific methods of teaching prepare students to use previous learning to interpret the situation and develop an approach for future learning. The Higher Education Academy (2014) spells out clearly that university students should be responsible for their own learning by being more self-directed and by being able to make decisions in and outside the classroom.



**Figure 4.54: How students related their learning to real-life situations**

- By constructing a big picture of the multidimensional nature of learning sessions

The results show that 69 (34.5%) almost always agreed that they did construct a big picture of the learning sessions, while 92 (46%) frequently agreed, 31 (15.5%) occasionally agreed and eight (4%) hardly ever agreed. Figure 4.55 below indicates in visual form how students constructed a big picture of the multidimensional nature of learning sessions. Ultanir, (2012) posits that the learner should construct his own knowledge and find his own solutions to problems in the real complex world. During the interviews the respondents acknowledged that they constructed meaning out of their learning opportunities.



**Figure 4.7: How students construct a big picture of the multidimensional nature of learning sessions**

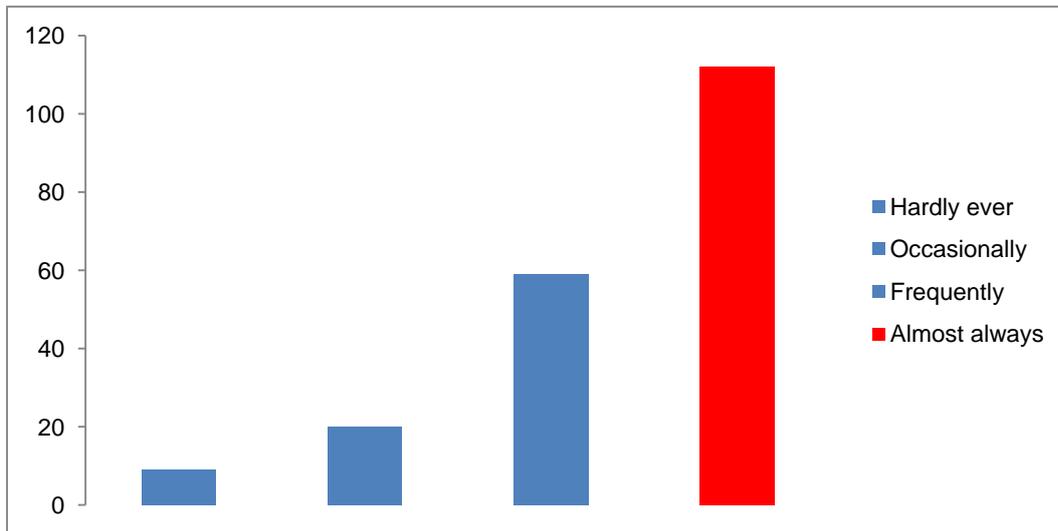
#### 4.8.3 Category 111: As a student I took part:

- In lecturer-student discussions to allow me to develop an enquiring mind

The results show that 112 (56%) of the respondents almost always agreed to have taken part in developing an enquiring mind, while 59 (29.5%) frequently agreed, 20 (10%) occasionally agreed, and nine (4.5%) hardly ever agreed. Figure 4.56 below shows the results in a visual form. The lecturers' responses during the interview sessions echoed that the learning opportunities promoted an enquiring mind on the students. For instance, LP8 uttered the following statement in response to the construct:

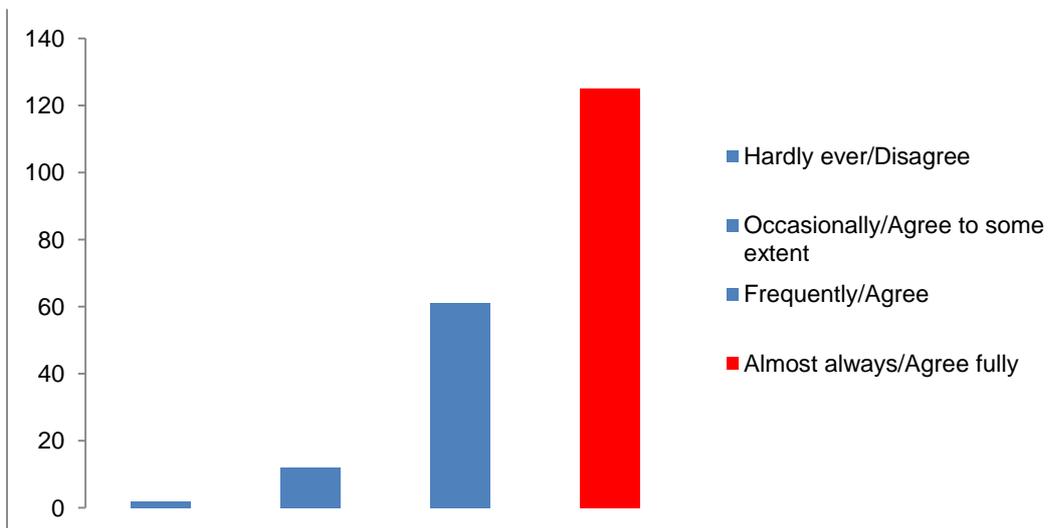
I prefer strategies that will develop critical thinking skills in my students, strategies that will help them to be analytic in whatever concepts they come across.

This in line with the constructivist view that stipulates that lecturers should provide students with opportunities and incentives to diagnose their learning needs and formulate their learning goals (Knowles, 1975; Glaserfeld, 2005).



**Figure 4.56: How students took part in lecturer-student discussions**

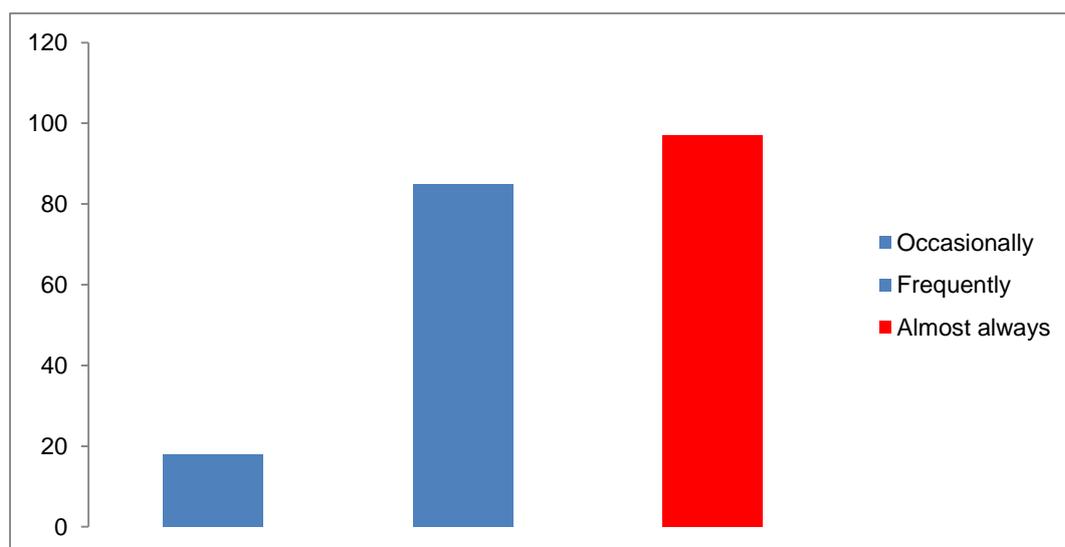
The results show that 120 (60%) agreed that they constructed their own understanding, while 60 (30%) frequently agreed, 15 (7.5%) occasionally agreed, and three (2.5%) hardly agreed. A visual representation of the results is shown in figure 4.57. The constructivist theory encourages learners to construct their own meaning and understanding (Piaget, 2011; Vygotsky, 1980). Ultanir (2012, 205) confirms that the learner should “construct own designs and finds own solutions to problems and behaves autonomous and independent”. The larger percentage of students agreed to have constructed their own understanding from their lectures.



**Figure 4.57: How students constructed their own understanding**

- In seeking opportunities for developing learning style flexibility/Whole Brain® learning.

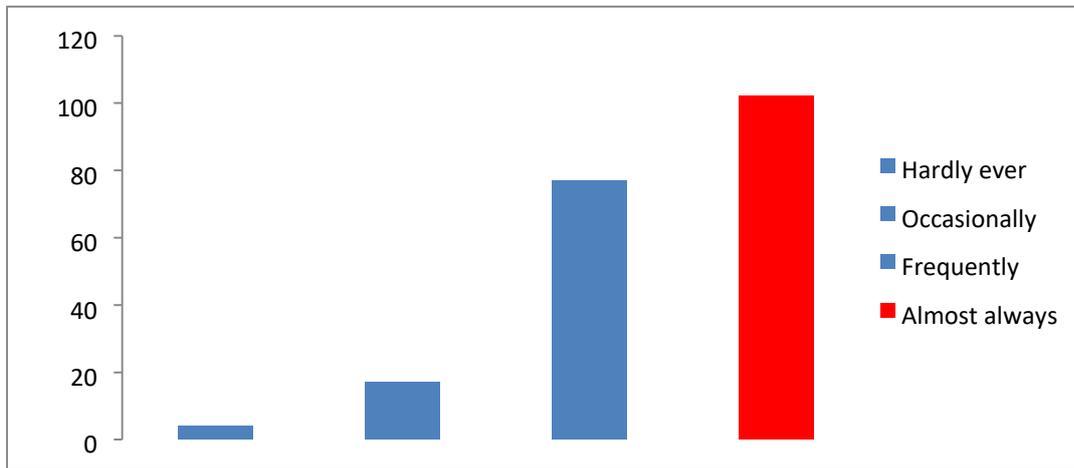
The respondents who almost always agreed that the lectures influenced them to seek opportunities for developing their own learning style flexibility were 97 (48.5%); those who frequently agreed were 85 (42.5%), and those who occasionally agreed were 18 (9%). The results agree with the interview responses. Respondents overwhelmingly agreed that the learning opportunities helped them to develop or realise their own learning styles. LP10R2 among others shared his preferred learning style. He said he preferred learning using technology Figure 4.58 shows the results in a visual form.



**Figure 4.58: How students sought opportunities for developing learning style flexibility**

- In making use of opportunities to express myself freely and openly

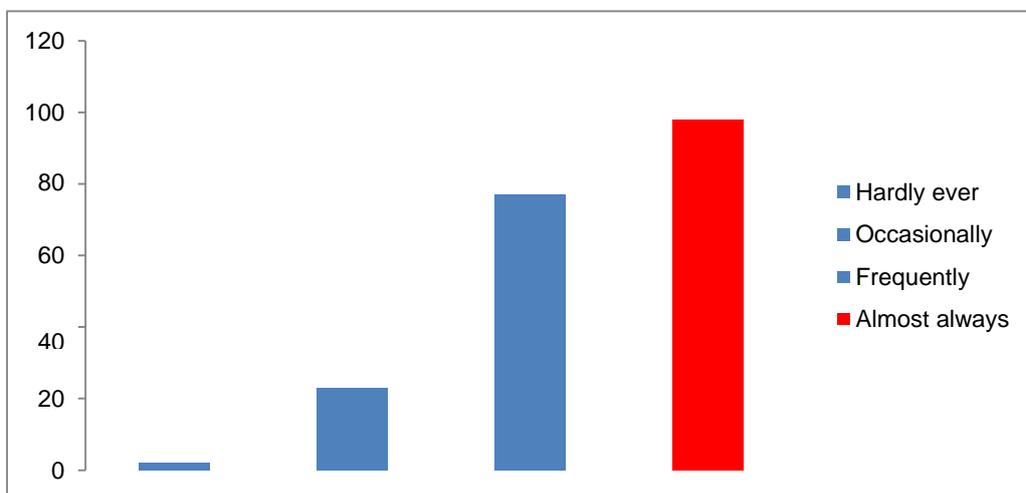
The results show that 102 (51%) of the respondents almost always agreed that they made use of opportunities to express themselves freely and openly, while 77 (38.5%) frequently agreed. Those who occasionally agreed were 17 (8.5%) and four (2%) hardly ever agreed. Figure 4.59 below indicates the results in a graph. Lecturers stated that they used diverse learning opportunities to accommodate all learning styles. Students agreed that they were free to interact with one another.



**Figure 4.59 How students made use of opportunities to express themselves freely**

- In reconsidering many of my former attitudes and values

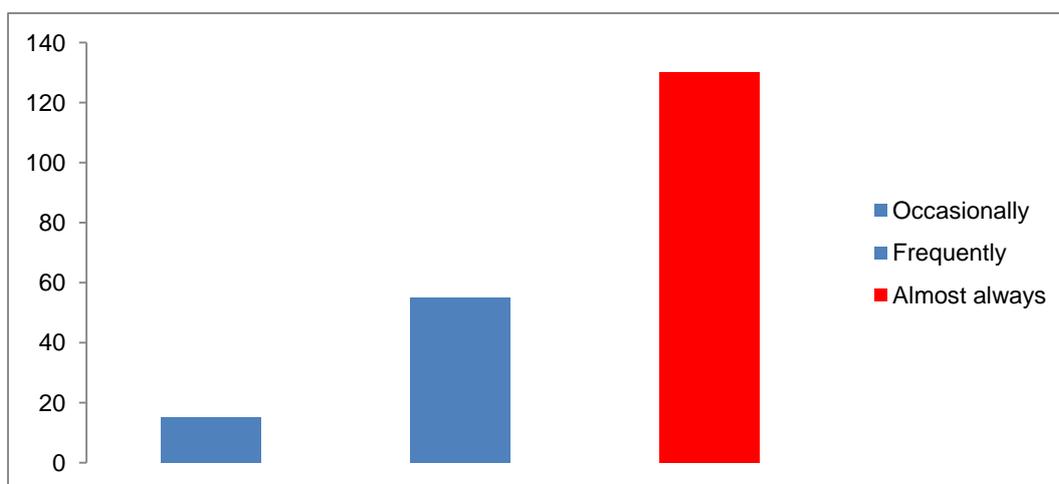
The results on figure 4.60 below show that 98 (49%) of the respondents almost always agreed that they reconsidered their former attitudes and values, while 77 (38.5%) frequently agreed, 23 (11.5%) occasionally agreed, and two (1%) hardly ever agreed. Some students acknowledged that they had changed their attitudes towards some subjects due to the lecturers' way of facilitating learning. Among these were Silvio, LP7's student and LP10.



**Figure 4.60: How students reconsidered many of their former attitudes and values**

- In gaining a better understanding of myself

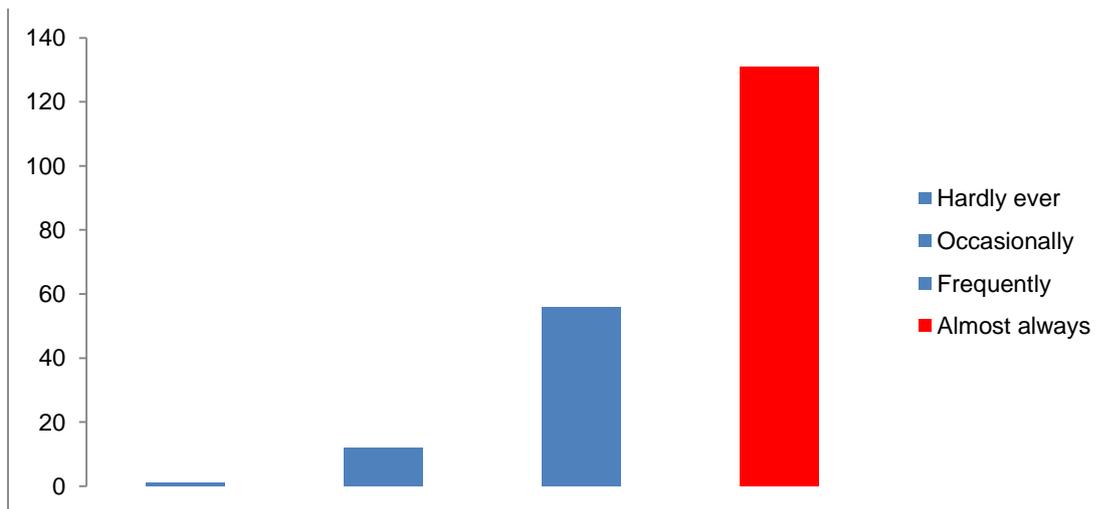
Results on figure 4.61 below indicate that 130 (65%) of the respondents almost always agreed that they gained a better understanding of themselves, while 55 (27.5%) frequently agreed and 15 (7.5%) occasionally agreed. “Self-concept may be understood as a perception every human has of himself or herself. It is a component of personality development and indicates who we are and how we fit into the world” (Brew, 2010, 2). Considering the correlation between academic performance and understanding oneself as a lecturer, we addressed the issue of self-concept among our students. Whole Brain® Learning has laid a good foundation for our teaching practice. The idea of knowing our students and accommodating them in our facilitating of learning cannot be over-emphasised.



**Figure 4.61: How students gained a better understanding of themselves**

- In developing a greater sense of my responsibility

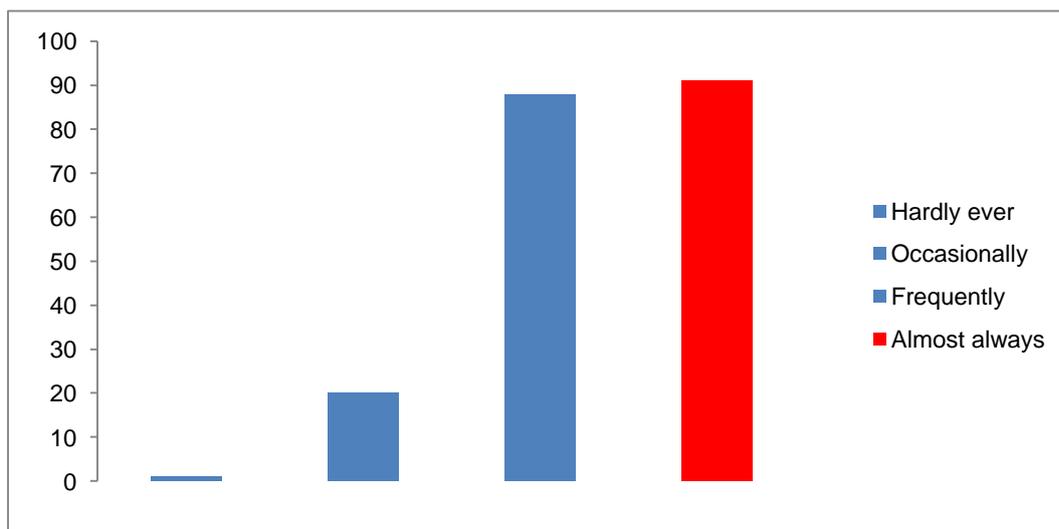
The figure 4.62 below shows that 131 (65.5%) almost always agreed that they developed a greater sense of responsibility, while 56 (28%) frequently agreed, 12 (6%) occasionally agreed and one (0.5%) hardly ever agreed. The results reflect that students were self-directed. Knowles et al. (2015, 171) call it self-directed learning, “self-autonomy which means taking control of the goals and purposes of learning and assuming ownership”. Students should be able to teach themselves. Dewey, Piaget and Montessori in Ultanir, (2012) postulate that the goal of education is to provide students with a sense of responsibility.



**Figure 4.62: How students developed a greater sense of their responsibility**

- In contributing to my peers' learning (helping them find solutions/answers)

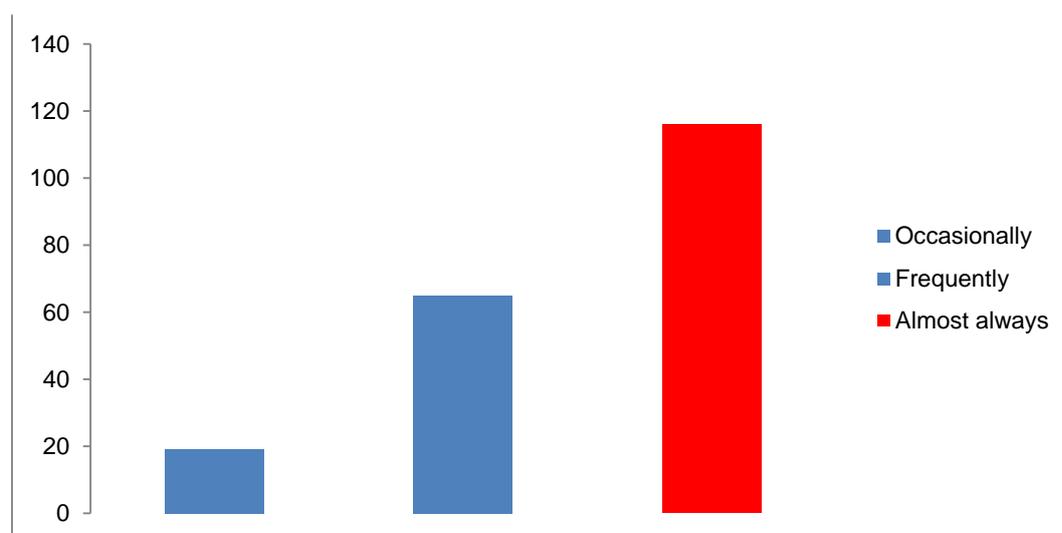
The respondents who almost always agreed that they contributed to their peers' learning were 91 (45.5%), while those who frequently agreed were 88 (44%), those who occasionally agreed were 20 (10%) and one (0.5%) hardly ever agreed. Figure 4.63 below shows the results in a visual form. To encourage lecturers to help students to work together and help one another, Race (2015, 166) advises that "students should be encouraged to work together with fellow learners and build on others' existing work". The 91% above reflects good interactive skills among the students. LP4's love your neighbour method presented in session 4 was the practical example of peer learning.



**Figure 4.64: How students contributed to their peers' learning**

- **In seeking ways of inculcating critical thinking and self-reflection**

Figure 4.65 below indicates that that respondents who sought to inculcate critical thinking and self-reflection were 116 (58%), while those who frequently agreed were 65 (32.5%), and those who occasionally agreed were 19 (9.5%). Social constructivism learning avers that students make their own meaning and reflect upon it through critical thinking Piaget (2013). Constructivists further reiterate that lecturers should facilitate learning so that students may engage and critique the education they are understanding (Monterssori, 1997). During the interviews respondents reflected independent thinking when they indicated their change of attitudes towards their work as well as towards their lecturers' ways of facilitating learning.



**Figure 4.65: How students sought to inculcate critical thinking**

In conclusion, basing my observation on the students' feedback, I can to a greater extent close by saying our facilitating of learning developed. Through Whole Brain® Learning, we added knowledge and skills to our teaching practice.

The following section presents the qualitative data that was collected concurrently with the quantitative as is stated in Chapter 3. Cohen, Manion & Morrison (2011) advocate the most common method of analysing qualitative data as thematic content analysis. Thematic content analysis starts with converting recorded data into a text so that it is analysed to search for categories and themes as is affirmed by Berg and Lune (2012) and Patton (2014).

#### **4.9 THEMES DRAWN FROM PARTICIPANTS' INTERVIEWS**

The discussion that follows presents the data gathered from participants' interviews. Data was analysed through deductive thematic analysis. Themes were identified guided by the research questions.

Table 4.2 below shows the research questions, interview questions and themes drawn from the participants' responses.

**Table 4.2: Research questions, interview questions and themes**

<b>Research Question</b>	<b>Interview Question</b>	<b>Theme (s)</b>
What constitutes Whole Brain® Thinking?	Briefly explain what you understand the Whole Brain® Model to be. Comment on Whole Brain® Theory and its relationship to student learning	Participants' perception of the Whole Brain® Theory
What are the thinking preferences of participants?	Do you mind sharing your thinking preferences as determined by the HBDI®?	Participants' thinking preferences of the HBDI®
Did the instrument reflect the HBDI® preferences?	Evaluating the prediction your correct thinking of the HBDI® preferences?	
What is the relationship between our thinking preferences and our in your classes?	How do you accommodate the different learning styles of facilitating and assessing learning? Discuss the assessment strategies you use to evaluate students' assessing their work progress.	Accommodating students' learning styles in: evaluate students' assessing their work progress
How can we innovatively and enrich our what should be taught in your class? practitioner-research through the Whole Brain® Thinking Model?	How do you determine Deciding on the curriculum improve and your teaching practice and your class? An experienced lecturer in higher education advises the students you that you need to command the respect of your adult students. What respect do you think he means by this advice? How do you evaluate yourself in terms of: teaching methods, teaching strategies, assessment of students' work, growth in research?	Deciding on the curriculum improve and your teaching practice and your class? Recognising the status of higher education advises the students you that you need to Commanding students' students' work and growth in research

#### **4.9.1 Theme 1: Participants' perceptions of Whole Brain® Theory**

Generally our responses showed our understanding of Whole Brain® Theory. The responses reflected that participants realised that the brain functions as a whole. The four quadrants represent different thinking and learning styles. We found that the

Whole Brain<sup>®</sup> Model helped us understand that people are different; therefore they think or learn in a variety of ways, depending on how they prefer doing things.

The model was instrumental as it helped us understand our students' diverse learning preferences. Knowing their preferences helped us accommodate their learning styles in our teaching practice and assessment. This realisation is in line with Herrmann's explanation of the importance of the model to teachers (lecturers) and learners (students):

If an individual's dominance did not match the way the learning point was designed and delivered, he or she would perceive it in a different way or not perceive it at all. Since the typical group of learners represents an array of unique human brains, each with its own unique set of dominance characteristics, the trainer must, by the process of design and delivery, find ways to reach each person so that the substance of the learning is received consistently with the intent of its original design (Herrmann, 1982, 80).

De Boer et al., (2011) postulate that implementing the Whole Brain<sup>®</sup> Model in tertiary level studies enhances the quality of lecturers' facilitation of learning as they will be conscious of their peculiar thinking preferences and the implication these have for their teaching practice.

Recurring answers from the interviews revealed that the Whole Brain<sup>®</sup> Model concerns itself, *inter alia*, with human diversity; how people think differently and how they prefer doing certain things in certain ways as is symbolised in the four different quadrants A, B, C, and D. As lecturers we understood that Whole Brain<sup>®</sup> learning entailed understanding the diverse learning preferences of our students, so when facilitating learning we needed to accommodate the four quadrants. We concur with Lucas, Dippenaar and Du Toit, (2014, 1) who suggest that "the principles of the Herrmann Whole Brain<sup>®</sup> Model need to be used to accommodate learning style diversity".

#### **4.9.2 Theme 2: Whole Brain<sup>®</sup> Theory's relationship with student learning**

All our comments reflected that there is a correlation between Whole Brain<sup>®</sup> Theory and students' learning. All of us experienced that Whole Brain<sup>®</sup> Theory helped us to understand that we are different and we prefer thinking and doing things differently. Our students in like manner are different too. This awareness of diversity guided us in planning learning opportunities that would accommodate the diverse learning styles of our students. Once the learning opportunities address the students' learning preferences or needs learning will be enjoyable and meaningful. Literature confirms

the relationship between Whole Brain® Theory and student learning (Cekiso et al., 2015; De Boer, 2013; Du Toit, 2016; Herrmann, 1995; Herrmann International, 2017; Shey, 1982; Van Oordt and Du Toit, 2014).

#### **4.9.3 Theme 3: Participants' thinking preferences as determined by the HBDI® and its predictions**

Five of us knew our profile score codes: LP1, LP5, LP6 and LP7 and LP10. We were able to explain what each score meant. The other five could not really state the exact numerical scores; for instance, LP2 said his was 2112 instead of 2111; LP3 stated that he was a 211 person; LP4 said he was profile 4, and LP8 just said that she loved planning and presenting her work sequentially, while LP9 mentioned that she was a rational person who was expressive and creative. Though the participants did not clearly state the exact statistics on their profiles further probing showed that they knew what their profiles meant. For instance, LP2 stated that he was not mathematically inclined in the A quadrant where he scored a 2 (secondary preference). He was more interested in the arts; he was talkative and loved music (C and D quadrants). The participants were somewhat confused by the terminology.

#### **4.9.4 Theme 4: Evaluating the prediction of the HBDI®**

Of the 10 lecturer participants in the study, eight LP1, LP2, LP4, LP5, LP6, LP7, LP8 and LP9 affirmed the correct diagnosis of their thinking preferences by means of the HBDI®. The diagnosis concurs with the evaluation given by Herrmann in the following statement: "One of the strengths of the HBDI® is its ability to measure any specialization specifically" (Herrmann, 1982, 70). LP3 said it reflected his thinking preferences fairly, while LP2 said it partially did. Herrmann Group (2004, 7) gives an explanation on the inconsistency given by the two participants: "If the spread of adjective pairs is significantly different, it indicates that, when filling out the survey, you were somewhat inconsistent. This usually means that you have a slightly different backup style, or shift thinking patterns in tense situations."

#### **4.9.5 Theme 5: Accommodating students' learning preferences in teaching and assessment**

All of us as a community of practice, understood what the Whole Brain® Model meant by stating that our thinking preferences impacted our preferred facilitation of learning (Sugahara and Boland, 2010; Van Oordt et al., 2014). We therefore needed to work hard on our secondary preferences to provide learning opportunities that

accommodated our diverse students. Du Toit (2014) clarifies the need for lecturer professional development interventions to learn how to accommodate the various learning preferences of their students:

Through this prolonged Whole Brain<sup>®</sup> Action research we can conclude as participants that we underwent professional learning. We learnt through our novice experience with Whole Brain<sup>®</sup> Theory how to vary our teaching and learning opportunities. The learning opportunities observed reflected that student-centred learning activities dominated lecturer-centred ones. This proved we were aware of the importance of understanding the thinking and learning preferences of students. The dominant learning activities that were mentioned in most of the participants' responses were group work, pair work, and individual and class presentations. Media integration created free but enjoyable learning activities; for instance, the use of PowerPoint, videos and projectors was appreciated by the students. Videos, charts, diagrams and maps were some of the visual media used both during the teaching and examination sessions but they did not propagate intuitive, perceptive or hands-on learning. As reiterated by some students, field trips were lacking in our teaching schedules. Field trips are learning opportunities that introduce reality into the job market. They accommodate mostly the C and D quadrant students who are insightful, kinaesthetic and creative.

Accommodating all the quadrants in our classrooms was not easy but it was a positive step towards moving out of our comfort zones. LP5 declared openly that it was indeed a struggle. The struggle is qualified by the student feedback survey results in Section 4.2.4 that shows that 49.5% of our teaching practice accommodated students' learning style flexibility. The percentage is low, but since action research is a learning process Wolvaardt and Du Toit, (2012) there is room for further learning opportunities. Despite the struggle, Moodle emerged as an effective teaching medium that best fits the 21<sup>st</sup> century student. We did not have Moodle as part of the media we integrated in our lessons. Therefore those who used it like, LP6 and LP7 were indeed innovative.

#### **4.9.6 Sub-theme: Assessment of students' work**

Du Toit (2014) emphasises the importance of accommodating students' learning styles in the learning opportunities as it makes students enjoy learning and work hard to improve even the areas of lesser preference; as such they will become *multiple intelligent*. With this advice I analysed the examinations to determine how the

questions were distributed according to a Whole Brain® Assessment approach. I observed the following concerns: most questions, especially in the mid-semester examinations were factual and required recall of knowledge. These questions were classified as cognitive because they appealed to facts. Quadrants A and B benefited more than the C and D quadrants. I also observed that LP1, LP2 and LP3's asked only essay type questions that favoured mostly the B, C and D quadrants, but disregarded the A quadrant. I observed with concern that there were some questions, like the questions set by LP3, LP6 and LP7 that were very long; these disregarded quadrants A and B that are logical, numerical and sequential. I noticed that all of us were inexperienced in Whole Brain® Assessment. I concur with Du Toit's observation that most lecturers need to "undergo some professional development interventions to adjust their teaching style, do extensive planning of learning opportunities to implement the adjusted teaching style and practise this adjusted teaching style over an extended period" (Du Toit, 2014, 7).

It was interesting to note that the two examinations that were selected for the study were skewed towards the A and B quadrants, i.e. the cognitive and psychomotor levels (Consult Section 4.2.14). The affective C quadrant and the creative D were not well represented. The observation regarding this theme is that the skill of setting Whole Brain® Examinations is still lacking and participants should continue seeking innovative ways of improving this component. Race (2015) proposes sixteen innovative ways of assessing students' work in higher education.

Besides the two examinations that were used as samples to measure our Whole Brain® Assessment strategies, the interview responses revealed that most lecturer participants used quizzes, tests and assignments to assess students' work. The types of question asked varied from true or false, multiple choice test items, short answers and essay type questions. LP2 and LP8 confessed their bias toward the essay type question. They believed essays were the only question type that measured the higher order levels of learning and were therefore suitable for higher education. Race (2015, 64) declares that essays benefit those students who are expressive – quadrant C students.

#### **4.9.7 Theme 6: Determining the curriculum for students**

In response to the interview question on student curricula the recurring answer was that they were given old ones that had been used before; the lecturers would review them at times so that they were relevant. Besides *inheriting* course outlines, individual

lecturers designed their own syllabuses guided by academic and professional governing bodies like: Zimbabwe Council of Higher Education (ZIMCHE); Zimbabwe School Examinations Council (ZIMSEC); Adventist Accrediting Association (AAA); Association of Chartered Certified Accountants (ACCA). Benchmarking with local, regional and international institutions of higher learning was another method used to design syllabuses. Students completed internships and supervisory industries, companies or institutions wrote reports on the students' strengths and weaknesses. These reports were then used by the faculties to draft their syllabuses.

From the responses above, I noticed the exclusion of the learner in the design of curricula; yet the student in higher education is an adult who should know what he wants. The constructivist learning theory that influenced the study promotes learnercenteredness by assuming that the student should construct his own knowledge that he can use to solve problems as an individual or as a collective.

The Whole Brain® Model in collaboration with 21<sup>st</sup> century educational attributes emphasises learner-centeredness. Student-centeredness entails recognising the learning preferences of students. Once we are aware of who they are we will respect their preferences. The lecturer then becomes a promotor or facilitator of learning as is underscored in the following quotation: "Educators (lecturers) are expected to be mediators or facilitators of learning, interpreters and designers of learning programmes that accommodate learning styles of learners (Du Toit, 2014).

The 21<sup>st</sup> century attributes pertaining to higher education students' curricula state the following:

University study requires students to take responsibility for their own learning, to be more self-directed, to make decisions about what they will focus on and how much time they will spend on learning both inside and outside the classroom. Find out their expectations of the course – how are they expecting to be taught, assessed and how do they expect to facilitate their own learning (The Higher Education Academy, 2014).

Of the 10 participants in this study, only LP9 consulted the students and asked them about their life plans, their vision and mission. They were asked to collect information on what they wanted to achieve and report back in writing. We applaud this innovation that is in line with our professional growth.

#### **4.9.8 Theme 5: Impact of the study on participants in terms of teaching strategies**

All the participants confessed prior lack of knowledge in accommodating the various learning style preferences emphasised by the Whole Brain® Model; therefore the

study was an eye opener. The study has helped us to understand our own thinking preferences and those of our students. The Whole Brain® Model has taught us to prepare our lessons in good time to accommodate the four quadrants in our classes. Whole Brain® Learning has taught us to respect our students, thereby helping us understand our students' needs. We all agreed to have improved in our teaching practice and that we will continue to learn and remain abreast of the 21<sup>st</sup> century attributes. Besides us having experienced change in our teaching practice, Ngozo (2011) confirms having developed his ways of facilitating learning:

I can confirm this finding because since I started using the Herrmann Brain Dominance Instrument® (HBDI®) to identify my learning style; my facilitating of learning has changed positively. I prepare learning activities with a view to accommodating learners' learning styles and different profiles in the class and almost always inspire learners by creating a climate conducive to deep learning (81).

#### **4.9.9 Theme 8: Impact of the study on participants in terms of growth in research**

Most of us were novice researchers as is reflected in Section 4.1. Only one participant (LP6) had published extensively. All of us underscored a need to grow in research. Three of the participants, LP2, LP4 and LP9 complained about the work load in higher education. A lecturer is expected to teach five to seven modules and do administrative work. The load is just too much for a lecturer who is supposed to research lest he perish. However, besides the pressure, as lecturer participants we appreciate this study as it has revealed diverse approaches to research writing and research topics.

The following section outlines the responses to the interview questions. The interview questions helped answer the research questions of the study. Themes and sub-themes were identified in the responses that were grouped according to their similarity and difference.

#### **4.10 Themes drawn from respondents' interviews**

The discussion that follows presents the data gathered from the respondents' interviews as they evaluated their lecturers' learning activities. Table 4.3 below shows the research questions, interview questions and themes drawn from the respondents' responses.

**Table 4.3 Research questions, interview questions and themes**

<b>Research Question</b>	<b>Interview</b>	<b>Theme (s)</b>	<b>Sub-themes</b>
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### Question

How can we innovatively Do you enjoy your Students' Course improve and enrich our lectures? attitude to the appreciation teaching practice and lecturer's assessment of students course work through the Whole Brain® Thinking Model?

Are you satisfied Students' Time of  
with your perception management  
lecturer's teaching lecturer's in Lesson  
terms of: teaching preparation  
management, practice Content  
lesson presentation  
preparation,  
presentation of  
content, clarity of  
explanations,  
clarity of  
questions, style of  
setting quizzes  
and examinations?

Describe the kind Students' Rating of  
of teaching That perceptions of lecturers'  
you have lecturers' teaching experienced in  
facilitating of methods your lecturer in learning  
Use of ICT  
terms of his/her use of media.  
Do you think the  
use of media is  
crucial in  
enhancing learning?

Explain whether Students' Improvements  
there is/are any perceptions of noted  
significant lecturers' improvement(s) in  
improvement in the way he methods of  
delivered his facilitating lectures before  
learning and the way he/is

teaching now.

As a student, how Effects of Student  
did the evaluation student motivation of your  
lecturer involvement in impact your lecturer  
learning? evaluation

All but one respondent said they enjoyed their lectures. They enjoyed learning because the lecturers employed varied learning opportunities and materials for learning. For instance, they used videos, PowerPoint presentations, text books, projectors, email, WhatsApp and Moodle. The lecturers respected students and allowed lecturer-student and student-

**4.10.2 Theme 2: Students' perceptions of lecturers' teaching practice** This theme is divided into sub-themes because the interview question had sub-questions. Generally the students expressed satisfaction about their lecturers' teaching practice with the following evidence:

**Sub-theme:1 Time management:** The general response was that lecturers were punctual. Most of them arrived before students; those who came late apologised for lateness. They used time properly in that they did not exceed lecture time. However, one lecturer was singled out as one who did not keep time and also did not usually attend lectures.

**Sub- theme: 2 Lecture preparations:** The students reported that the lecturers were prepared for their lectures, and some did impromptu teaching. Learning opportunities were sequential; one could follow the flow of ideas.

**Sub-theme:3 Clarity of explanations:** Respondents reported that the concepts that were taught were explained clearly and simplified though there were some lecturers who needed to improve.

**Sub-theme:4 Clarity of questions:** The respondents stated that the questions were clear. The quizzes and examination questions varied in level of difficulty.

**Sub-theme:5 Style in setting quizzes and examination papers:** Both lower and higher levels of questions were asked. Some lecturers announced when quizzes would be written and this helped students to prepare for the quizzes.

**4.10.3 Theme 3: Students' perceptions of lecturers' methods of facilitating learning:**

To a less extent lecturers varied the teaching media and students' learning activities. They used PowerPoint presentations, videos, projectors, WhatsApp, e-portfolios, email and Moodle. They also employed individual, pair and group work though to a lesser extent. LP10 did not use media in her lessons; her student LP10R1 confirmed this. Lecturers acknowledged that the use of media enhanced the quality of learning

and that technology helped students to understand some concepts and motivated them to learn.

#### **4.10.4 Theme 4: Students' perceptions of lecturers' assessment of students' work**

Guskey (2002) emphasises that professional development should bring about change in the way the lecturer facilitates learning and in the way students learn. Students perceived that there were noticeable and significant improvements in the way some, but not all lecturers taught. Only LP9R2 noted deterioration in the way her lecturer taught.

To justify the improvements noticed in the lecturers' teaching practice the respondents quoted the use of PowerPoint presentations, projectors, videos, eportfolios, Moodle, individual assignments, movies and jokes that had not been used before.

Some respondents suggested learning opportunities that lecturers could use to improve their teaching practice. For instance lecturer LP7R2, Silvio, suggested that the lecturer should engage the students in community projects while lecturer participant 10 respondent1 (LP10R1) suggested that the lecturer make use of technology, especially Moodle – a facility that the university already had. The lecturer confessed that she did not use media in her lessons. The student further explained that Moodle can help students who would have missed lessons in that they could always access the lessons from Moodle.

Students commented that some lecturers improved in the way they assessed students' work but in some there were no changes. Significant improvement was noted in the following: Quizzes and tests were announced, giving students ample time to prepare. Questions asked varied from simple to complex, enabling even the slow student's chances to get some answers correct. There was variety in the type of test questions; lecturers mixed multiple choice test items, short answer and essay type questions. Some lecturers used online quizzes and tests that provided immediate feedback. One student noted that his lecturer did not change his method of assessment.

#### **4.10.5 Theme 4: Effects of students' perceptions of lecturers' facilitating of learning**

This question was not understood by most students nor by interviewers (lecturer participants) to some extent. Some of the responses were that the evaluation of lectures inspired them to emulate their lecturers in terms of how they would execute

their future duties. Some said they had developed deeper understanding of the teaching and lecturing requisites while others said they were inspired by the way the lecturers dressed. However, there was one response worth recording:

I think it is beneficial and my duty (right) as a student to evaluate the performance of my lecturer because as students we will have the platform to express how we feel about the content we will have received from our lecturer and how he gives the information (LP5R1).

Knowles et al. (2015) summarises the student's response by explaining that learners want to take responsibility for their learning through "planning, implementing and evaluating their learning activities," (276).

In conclusion, it must be noted that most of the students' responses, both from the feedback questionnaire and interviews, were aligned with our responses in Section 4.3.1. The responses were to a large extent a true reflection of the experiences we, as participants had on our journey to professional development. Chapter 5 presents the conclusions drawn from our research. Action research is a continuous process of learning; therefore there is no final conclusion to the process of learning. Our professional development process continues as we are still engaged in the field of education and research. Therefore conclusions will continue to be "used for ongoing and continuous reflective planning" (Hendricks, 2013, 169). Of all the aspects of our professional development, sustaining change (Guskey, 2002) is perhaps the most cherished development for us as lecturer-learners. Professional development must be regarded as a process, not an event (Loucks-Horsley et al. in De Jager, 2011); with this advice we will continue to explore new ways of transforming our practice as individuals and as a community.

## **4.5 CONCLUSION**

The purpose of our teaching practice and assessment of students' work was to accommodate all the four quadrants in the learning opportunities. Furthermore, we wanted to consider the effect the Whole Brain® Approach and participatory action research would have on our professional development as novice lecturers in terms of enhancing the quality of our students' learning (Smit and Du Toit, 2016). It was our intention to move out of our comfort zones by accommodating the quadrants that were secondary to us. In the process of applying the diverse teaching strategies we discovered new ways of enhancing our practice, thereby constructing our living teaching theory (Wolvaardt and Du Toit, 2012). One way of enhancing our facilitation

of learning was the integration of technology. Alazam, Bakar, Hamazah and Asimiran, (2012) and Palmer, (2015) inform facilitators of learning that the vital element of present technology impacting learning is the computer in its various forms. Some of us tried to use various forms of technology to make our learning opportunities interesting and relevant to the 21<sup>st</sup> century learner.

Regarding the various assessment tools used in accommodating all four quadrants as a collective, we concur with other Whole Brain<sup>®</sup> Researchers that there is no one ideal assessment in contemporary teaching. Our experience with Whole Brain<sup>®</sup> Thinking helped us change our traditional approach to assessment to employing diverse but effective ways of assessment. Mkonto, (2010, 181) advises that “lecturers need to understand and embrace students’ diversity by using different teaching approaches, depending on individual differences”.

#### □ 4.6 **SUMMARY OF THE CHAPTER**

The chapter presented a detailed discussion of our thinking preferences as reported by the HBDI. The report presented detailed scores and narratives about our thinking preferences. The chapter also presented how our thinking styles related to our teaching practice and assessment of students’ work. Data collected from feedback questionnaire were presented through pie charts, stacked charts, and bar graphs, while that collected from interviews were presented through tables. The results were also related to research questions and insights gained from the literature review. The results showed positive effects of Whole Brain Participatory Action Research on professional development. Our teaching practice and assessment of students’ work accommodated all the four quadrants.

## CHAPTER 5

### CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 INTRODUCTION

Albert Einstein says “it is simply madness to keep doing the same things, and expect different results” Race, (2015, 254). My professional development journey was shared by novice lecturer participants in a community of practice seeking constructivist Whole Brain® Scholarly ways of facilitating learning in higher education. The journey we embarked on was a professional detour from the routine of using the same traditional and seemingly comfortable ways of facilitating learning, expecting our students to learn and flourish in the 21<sup>st</sup> century world of innovation. By continuously planning, acting and reflecting on our teaching practice as novice lecturers we came to concluding and recommending new Whole Brain® Thinking and learning opportunities in our practice that every practitioner can use.

This chapter presents the conclusions drawn from the analysis of the empirical data Triangulating of the multiple sources of data increased the validity and accuracy of the results of this study (Hendricks, 2013). To corroborate data sources, according to Hendricks, is to ‘compare the results from one data source with those from another source’ (168). In the study baseline data was collected through the HBDI®, lesson observations, structured interviews, feedback questionnaires and two examinations from the five faculties of the exemplar institution.

As the principal researcher, I present the findings guided by reflection on the methodology, the four research questions of the study and then end by outlining the implications of the study guided by the reflective question of Hendricks (2013, 169) that I have contextualised: *How can we use what we learnt in our study [our results and conclusions] to inform our practice as practitioners in higher education?*

#### 5.2 REFLECTIONS ON THE HERRMANN BRAIN DOMINANCE INSTRUMENT® (HBDI®)

As facilitators of learning in higher education, we were cognisant of the multiplicity and complexity of our teaching practice; hence we chose a theoretical framework that would address this complexity. To understand our students well and to produce innovative learning opportunities for them, we needed to know ourselves first. The HBDI® identified our thinking styles. The results of the HBDI® then guided the planning of learning opportunities.

### **5.3 REFLECTIONS ON THE METHODOLOGY OF THE STUDY**

In this study we embraced the Whole Brain® Participatory Action Research Design. As an academic mentor, I am accountable for the academic growth of myself and that of my colleagues (Du Toit, 2013, 1). We tried out the innovative Whole Brain® Model – a new approach to facilitating learning in higher education to develop ourselves as professionally novice lecturers. Participatory action research is practitioner research carried out in the context of living theory. It compelled us to take responsibility for monitoring our practice and professional learning. Through it we, as a collective, were offered the opportunity to investigate or learn about ourselves as professionals and finally develop practice theory (Du Toit, 2016).

As part of our lived theory, and our experience with Whole Brain® Theory we described our participatory action research as Whole Brain® Participatory Action Research (WBPARG) (Smit and Du Toit, 2016). Through WBPARG we were able to recognise the extent to which we as lecturers needed to promote learning style flexibility in our classrooms. Whole Brain® Participatory Action Research proved and will continue to be significant and pivotal in our facilitating of learning as our thinking and learning styles are directly linked to the way in which we enact all our roles. Knowing the students' diverse learning styles helped and will continue to guide us in accommodating their preferences in the learning opportunities, thereby, creating a conducive, friendly learning environment where students realise their full potential (Bunderson, 1982; Coffield et al., 2004; De Boer, Du Toit & Bothma, 2015; Dobozy, 2012; Lucas, Dippenaar and Du Toit, 2014; May and May, 2012; Margaryan, Littlejohn and Vojt, 2011); Mkonto, 2010; 2015.

In a nutshell I can confirm that Whole Brain® Participatory Action Research is significant for professional transformation. As a community of practice, we conclude by saying we successfully worked according to our educational values and our efforts to bring about change in our teaching practice. But we are also careful to say we have not stopped learning. Action research is a continuous process of learning (Kolb and Kolb, 2005). We will continue to learn as constructivist professional learners. Our action research will go a long way in creating what Singh (2015, 114) calls "a domino of effect on educator professional development by invoking other education practitioners to review systematically their methods of facilitating learning in order to enhance the performance of their learners." Together in a community of practice, we have become lecturers that are self-critical, lecturers who nurture an attitude of continuous learning.

### **5.4 MAIN FINDINGS**

The study's aim was to promote a scholarship of teaching and learning in the higher education setting with constructivist and self-directed experiential thinking through the Whole Brain® Model. What we found is that a good scholarly practice of facilitating learning encourages lecturerlearner interaction. Diverse learning opportunities made learning fun and meaningful. The HBDI® report encouraged professional accountability, flexibility and commitment to our practice and practitioner research. A critical reflection of our teaching practice and practitioner research exposed our deficiencies in facilitating learning and therefore encouraged each one of us to reevaluate our practice.

The findings in Chapter 4 reflect great change in our teaching practice; Guskey (2002) advocates that professional development should bring change to both the lecturer who is the facilitator of learning and the student, who is the outcome of the learning opportunities designed by the lecturer. The conclusions of the study are outlined next.

#### **5.4.1 What constitutes Whole Brain® Thinking?**

To answer this research question, two sources helped us with information. The first source was the literature review that provided a wide range of scholarly views, opinions and experiences with the Whole Brain® Model. The literature review in Chapter 2 validated the significance of the Whole Brain® Model in professional development. The model is innovative and can be used to transform teaching practice. The structured interviews with the lecturer participants and students were the second source of information. The responses from both the participants and students affirmed the model is innovative and transformative. In the next section I outline what I deduced from these sources.

The Herrmann Group itself has published an array of printed books, audios and videos explaining what the Whole Brain® Model is concerned with (Herrmann Group 2004; Herrmann International, 2017; Herrmann 1995). The overarching communication is that it is an innovative and transformative model for change that can be adopted by anyone who wants to better understand the self. It can be used for self-study; it encourages us to understand our strengths and weaknesses and avoidances so that we can seek strategies to master competencies in those areas of weakness. The model improves communication; it can be used for personal, family and organisation development. The Whole Brain® Model celebrates diversity and advocates respect for diversity, thereby emphasising the uniqueness of every person (Herrmann Group, 2004; Herrmann International, 2017, 2018).

The determination of the study was to seek creative ways of improving our practice. The results in Chapter 4 reflect noticeable change from the traditional way of teaching to the modern innovative methods of presenting content. Some participants averred to have used varied learning opportunities that included diverse questioning techniques, such as probing, convergent, divergent and rhetorical questions; varied teaching and learning activities that comprised lecturerclass, lecturer-student, student-lecturer, student-student, pair work, and group work and media integration that included PowerPoint presentations, text books, handouts, videos and computers. The model does not measure ability but one's preference to do something in a certain manner or way. The other key element of the model is that it encourages thinking out of the box. Accommodating and embracing diversity helps one to explore other ways of solving professional problems. Whole Brain® Research has shown that there is a strong correlation between job satisfaction and one's profile. Lecturer participants' responses showed that they enjoyed the ways they facilitated learning using different thinking styles. Validation studies regarding the HBDI® have been underway for 15 years and Ned Herrmann, the founder has so far carried more than 5 000 studies. Key sources for the above discussion are: Bunderson, 1982; Coffield et al., 2004; De Boer, Du Toit and Bothma, 2015; Dobozy, 2012; Herrmann, 1995; 1996; Herrmann Group, 2004; Lucas, Dippenaar and Du Toit, 2014; May and May, 2012).

Regarding the lecturer participant interviews, I have drawn the following conclusions: Firstly, I noted recurring elements aligned with the ones from the literature review. Lecturers need the theory to facilitate diverse learning opportunities that accommodate the various learning preferences of their students (Du Toit, 2014, 2).

#### **5.4.2 What are the thinking preferences of the participants?**

This question was answered by the HBDI® assessment tool. All of us filled in the HBDI® and a detailed report was sent for each of the participant's brain dominance thinking style. Diversity in thinking styles was reflected by the assessment. The authenticity of the instrument was confirmed by eight of the participants who agreed about the results of the assessment that they were a correct reflection of what they prefer doing. Two (2) of the participants said the assessment was not hundred percent correct. I understood that the two participants did not understand what was meant by primary and the secondary preferences. Research carried out by Herrmann International, (2017) found that 3% of the population has a quadruple dominance; 5% has a single dominance; 34% has a triple dominance and 58% has a double dominance. In our small sample 1 had quadruple dominance; 4 had a triple and 5 had a double.

### **5.4.3 What is the relationship between our thinking preferences and our styles of facilitating and assessing learning?**

This question requires confirmation of a correlation between the lecturers' thinking preference and their facilitating learning. Literature confirms the correlation; there are lecturers who have a preference for the A and B quadrants that prefer lecturer-centred teaching and those with a preference for the C and D quadrants that are student-centred.

The study focused on lecturer learning as the objective of the study was to develop teaching practice; therefore lecturers were provided with guides that helped them design effective learning opportunities for the classroom. Orientation on the Whole Brain® Model was done prior to the study and learning activities were provided through observation sheets. A feedback respondent questionnaire was used to reflect on lecturers' facilitating of learning. Data was analysed by SPSSv23. These were the deductions made: There were five lecturers with an A and B preference and five a C and D preference. However, the lecturer-focused approaches had 46.6% frequency and the student-focused ones an 80% frequency.

Concerning the assessment of students' work, two examinations were selected for each participant and the questions were aligned with the four quadrants. Results showed that most questions required recall, factual answers, and critical analysis. Only a few questions covered expressive, personal evaluation aspects. Generally the examinations portrayed our deficiencies regarding setting examinations in higher education. Both examinations, i.e. the mid-semester and the final, were not balanced if we consider the learning styles of our learners. The other observation I made was that when we embarked on the research, the examinations had already been set and moderated by the faculties; therefore even if the participant wanted to apply the Whole Brain® assessment strategy the faculty policies did not permit it.

### **5.4.4 How can we innovatively improve and enrich our teaching practice and practitioner-research through the Whole Brain® Model?**

I find that this question covering all the research objectives also combines most of the learning theories guiding the study. Lecturers are professional adult learners who are motivated (selfregulatory) to construct new knowledge based upon their previous experience (Du Toit, 2016; Kolb, 1984; Roux, 2011; Zimmerman, 2002).

## **5.5 SIGNIFICANCE OF THE STUDY**

I state that this study was successful to a very large extent as is reflected in the interview responses for both lecturer participants and student respondents in Chapter 4. Complete change has not been achieved yet as Whole Brain® assessment and varied learning opportunities have not yet been realised as is outlined in Chapter 4. Research is a continuous process of learning; therefore, there is no final conclusion to the process. The findings of the study contribute significantly to the relevant body of knowledge in the following ways:

1. Whole Brain® Theory is not commonly acknowledged in the Zimbabwean higher education fraternity; therefore the theory's innovative ways can be utilised by any institute of higher learning or any industry with human personnel. Research on the Whole Brain® Model was lacking in Zimbabwean higher education; I found out that there was only one research paper on Whole Brain® by a lecturer at NUST.
2. At the exemplar institution there is no centre for learning where professional development programmes are founded. The findings in this study can provide the curriculum for professional development, not only for novice lecturers but for in-service professionals as well.
3. Professional excellence can be achieved through participatory action research that is a valid theoretical framework. Participatory Action Research (PAR) aims at improving practice.

## **5.6 RECOMMENDATIONS**

I stated in Chapter 3 that the exemplar institution is a private higher education institution; therefore the findings may be generalizable to all private universities or even to all universities since it is an institution of higher education. I therefore take this opportunity to make some recommendations based on my findings to the exemplar institution first and to all institutions of higher learning.

### **5.6.1 Curriculum design**

When I look back on our professional journey, I can confidently say we achieved our objectives as lecturer participants because we have grasped the Whole Brain® concepts of facilitating learning. The exemplar institution can create a platform where we design curriculum for our teaching practice that will include the assessment of students' work. We can present seminars on learning style flexibility and how we as lecturers can accommodate diverse thinking styles. The institution can subscribe to the Whole Brain® Group and have its workers and students complete the HBDI®.

### **5.6.2 A mixed methods approach**

Participatory action research and a mixed methods approach are not common in the exemplar institution. It would help other lecturers to be exposed to current scholarly approaches to research.

I had a difficult time in trying to keep the nine participants focused on our research; we had not been exposed to this kind of research. Yet it is through collaboration with fellow lecturers that we developed and improved our practice. The challenges I faced in this study with mixed methods research compelled me to recommend it to our institution. I recommend that seminars, workshops and conferences be conducted to expose lecturers to such research approaches.

### **5.6.3 Inductive thematic analysis**

This study used deductive thematic analysis where themes were derived from the research questions as discussed in Chapter 3. Deductive analysis informed our analysis of qualitative data because we aimed at using Whole Brain® Theory to develop our teaching practice. Therefore we organised the data through research questions so that all the relevant data for facilitating learning and developing practitioner research would be available (Cohen et al, 2011, 552). However, another study could use inductive thematic analysis where emerging themes are drawn from participants' responses (Braun and Clarke, 2006; Clark, 2005).

### **5.6.4 Summary of the chapter**

This chapter presented the conclusions drawn from the entire study, the analysis of data collected through the quantitative and qualitative instruments. It makes some recommendations that can be considered by the exemplar institution to incorporate higher education methods of facilitating learning. However, though the study has been concluded, it is but a temporary lay bye to the professional journey of novice lecturers. It is a temporary resting point because learning does not end. As our action research is in cycles, (Kolb, 2005) we are continuing to the next cycle of our prolonged lifelong learning. The andragogic model by Knowles and co-workers (2015) shows that adults are motivated to continue to learn throughout life if they experience a need for learning. Internal factors echoed by Knowles et al. (2015) such as better professional quality of life and greater self-confidence in facilitating learning are the professional needs that motivate us as lecturer learners to continue learning.

## **META-REFLECTION ON THE ACTION**

### **6.1 INTRODUCTION**

In this chapter I focus on meta-reflections on my academic and professional journey. I reflect on how this study has contributed both to my professional development and teaching practice. Du Toit (2018, 426) considers “self-regulated professionalism as the driving force for becoming a scholar of higher education in general and academic staff development in particular”. I now consider myself a self-regulated lecturer who is motivated to implement innovative ways of facilitating learning in higher education. The success of this study depended on my zeal to develop my teaching practice and practitioner research as well as of my fellow-lecturers. Whole Brain® Theory has assisted my colleagues and me to realise our professional dream. The following lines entail reflecting on my professional development as principal researcher in these four years of study.

### **6.2 MY EXPERIENCE WITH THE WHOLE BRAIN® MODEL**

The overarching Whole Brain® Theory that motivated my study taught me to look at myself and understand who I am as well as know others. The underlying construct is that our professional practice should be viewed through the lenses of the four quadrants (HerrmannNedhi, 2010). The more I reflect on this study, the more I take cognisance of my rich social and professional growth. In Whole Brain® terminology, I am a 2112. The reader, I am sure, by now understands the Whole Brain® lexis. The C quadrant thinker prefers “internalising, moving, feeling and involving” (Du Toit, 2016, 60). I repeat I am a people-orientated passionate Christian. I have discovered that I love to work with people and for people as well.

The following events authenticate my strong C quadrant dominance.

The study is participatory meaning that it involved more than one person. I used 10 participants and we collectively worked together to the end of the study. Were there any problems? A plethora of them were faced but it took the strength of my C thinking style to encourage all lecturer participants to work for our own professional development. I am indebted to my fellow-lecturers’ contribution. My spiritual descriptor indicates that I am my brother’s keeper. I have been a shepherd to them by encouraging and persuading all nine participants not to fall on the way but to persevere until we finished. I will continue doing so until we have written and published papers on our research.

As a self-sponsored learner lecturer from a country with perennial economic doldrums, studying was the major challenge. The HBDI® instrument was not acquired for free. It needed a subscription fee from every participant. This is where my interpersonal and spiritual elements dominated. All 10 were paid for by me as I was passionate to serve my community. As a C quadrant thinker, I struggled with too much work; a C quadrant thinker and learner struggles with “too much data and analysis, lack of interaction and lack of time for relationships” (Du Toit, 2016, 60). The study took up much of my social time and this has impacted my social life negatively. The other challenge I have faced was with the large amounts of data that I had to organise in the mixed methods approach. My Chapter 4 analysis took long to complete and affected my health.

The B quadrant preference heavily relies on planning, and being conservative and controlled. I would like to believe that the endurance and composed stance I took in this study relied heavily on these descriptors. If I had not planned the schedule for our lesson observations carefully, filling in the respondent questionnaire and interviews, the study would not have progressed the way it did. The D quadrant that describes me as *imaginative, integrative, creative and innovative* contributed much to the success on my teaching practice. I could not have received the comment that my lectures valued my students had there been little creativity and innovation in my methods of facilitating learning. Although the A quadrant is my least preferred quadrant, the selected *analytical and factual* descriptors were instrumental in the success of this study. I had to study my fellow participants’ likes and dislikes and their profiles to encourage them to participate fully in the research. I discovered that calling for a meeting through email was not effective; therefore I decided to call on their mobile phones or walk to their offices and have a one-on-one conversation. In conclusion I can testify that the HBDI® correctly described my thinking preferences and I subscribe to the notion of using all four quadrants in solving problems.

### **6.3 MY TEACHING PRACTICE**

When I reflect on my experience with the Whole Brain® Model, I do not regret having accepted this theory to guide my research. Chapter 4 has shown that our teaching practice and practitioner research as lecturer learners has successfully improved. My classroom experiences as principal researcher have shown that I can no longer go to class without prior preparation to accommodate learning style preferences. My own diverse thinking preferences will always remind me of my students’ diverse learning styles. Because of this awareness I

can no longer design the same learning opportunities all the time and expect my students to excel. As an interpersonal lecturer who has a preference for the C quadrant I did not find it difficult to incorporate diverse learning activities for diverse students. As an innovative, creative facilitator of learning, I embrace new ways of creating learning opportunities that are promoted by the Whole Brain® Model. I created a conducive learning environment that inspired learners to contribute to their learning. My experiences with constructivism, multiple intelligences and experiential learning theories taught me that learners should be encouraged to accept responsibility for their learning experiences.

Through my experience with Whole Brain® learning, I learnt that good teaching practice encourages cooperative learning. I discovered, like Singh, (2015, 114) that “cooperative learning augments the learning process”. This study’s collaborative approach taught me that there is strength in diversity. The 10 of us collectively shared our diverse ways of facilitating learning that we applied in our classrooms.

The next phase includes writing papers and publishing. I need to share what I have learnt with my fellow lecturers in higher education. I have learnt that in research there is no one-size-fits-all approach to scholarly learning. I have utilised a mixed methods approach and this difficult but scholarly approach should be shared by other scholarly researchers. I also realised the need for meta-reflection in action research. Consequently I have embraced the scholarly approach that my supervisor advocates in the following quotation:

“I have now become an advocate of meta-reflection as I expect all my postgraduate students using an action research design for their doctoral or master’s studies to include metareflection as a last chapter” (Du Toit, 2018, 427).

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## **ADDENDA**

### **Addendum A: Ethical clearance**

#### **Ethics Committee**

**19 April 2017**

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Ms C Dlamini

**REFERENCE: HU 17/02/01**

This letter serves to confirm that your application was carefully considered by the Faculty of Education Ethics Committee. The final decision of the Ethics Committee is that your application has been **approved** and you may now start with your data collection. The decision covers the entire research process, until completion of the study report, and not only the days that data will be collected.

The approval by the Ethics Committee is subject to the following conditions being met:

1. The research will be conducted as stipulated on the application form submitted to the Ethics Committee with the supporting documents.
2. Proof of how you adhered to the Department of Basic Education (DBE) policy for research must be submitted.
3. In the event that the research protocol changed for whatever reason the Ethics Committee must be notified thereof by submitting an amendment to the application (Section E), together with all the supporting documentation that will be used for data collection namely; questionnaires, interview schedules and observation schedules, for further approval before data can be collected. Non-compliance implies that the Committee's approval is null and void.

The changes may include the following but are not limited to:

- Change of investigator,
- Research methods any other aspect therefore and,
- Participants.

The Ethics Committee of the Faculty of Education does not accept any liability for research misconduct, of whatsoever nature, committed by the researcher(s) in the implementation of the approved protocol.

Upon completion of your research you will need to submit the following documentations to the Ethics Committee for your Clearance Certificate:  Integrated Declaration Form (Form D08),

- Initial Ethics Approval letter and,
- Approval of Title.

Please quote the reference number **HU 17/02/01** in any communication with the Ethics Committee.

Best wishes

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**Prof. Liesel Ebersöhn**

Chair: Ethics Committee



**Addendum B: Letter to the exemplar institution asking for permission to carry out research**

**The Solusi ADBOARD**

**Re: Request for permission to use students in your faculty in my research**

I request permission to carry out my doctoral research at the institution. The topic for my research is:

**Whole Brain® participatory action research to enhance the professional development of academic staff in higher education**

I request not only to use the institution facilities but 10 faculty members from the five faculties and 200 students from the faculties. Twenty students for each lecturer- participant will be expected to answer structured interview questions and fill in a feedback questionnaire. The students will be asked to give their perceptions of their lecturers' facilitating of learning and assessment of student work.

If you agree that they participate in the research study, they will be asked to participate in the following expected schedules: Attend a 30-minute interview session based on their lecturers' style of teaching and assessment. The interviews will be conducted after the May-August session in order not to interfere with their learning schedule. The interviews will be held in the boardroom as no lectures will be presented at this time. The interviews will be videorecorded.

Participating in this study is completely voluntary. Even if they decide to participate now, they are free to change their minds and stop at any time during the course of the research. They may also choose not to answer an interview question for any reason best known to them. The research study involves no foreseeable risks or harm to them.

Thank you for considering my request.

Dlamini, C.

**Addendum C: Letter of permission to carry out research from the exemplar institution**



**SOLUSI UNIVERSITY**

A CHARTERED SEVENTH-DAY ADVENTIST  
INSTITUTION OF HIGHER LEARNING

P.O. SOLUSI  
BUL. 09-1140  
ZIMBABWE

Telephone:  
Within Zimbabwe 09-885457/63345  
Outside Zimbabwe (263)9-885457/885484  
Telegrams: 'SOLUSI'

Fax Numbers:  
Within Zimbabwe 09-883982  
Outside Zimbabwe  
(24 hour delay)

2 February 2017

Christinah Dlamini  
Solusi University  
Bulawayo, Zimbabwe

Dear Mrs Mrs Dlamini,

**Request to Conduct a Study at Solusi University**

The Administration Board met and voted to allow you to conduct a study titled "Promoting Whole Brain educational professional learning of academic staff of a private higher education institution in Zimbabwe: An action research study," on condition that at the completion of the study Solusi University will be availed with a copy of your research.

Thank you.

Sophie Masuku (PhD)  
ORIP



Room 4 17, Level 4, Building  
University of Pretoria, Private Bag X20  
Hatfield 0028, South Africa  
Tel +27 (0)12 420 8234

Faculty of Education  
Fakulteit Opvoedkunde  
Lefapha la Thuto

**Addendum D: Letter to faculty deans asking permission to use lecturers and students**

Deans of Faculties

**Re: Request for permission to use students in your faculty in my research**

I request 20 students; 10 females and 10 males from your faculty to participate in my doctoral research. The topic for my research is:

## **Whole Brain® participatory action research to enhance the professional development of academic staff in higher education**

The students will be expected to answer structured interview questions. The students will be asked to evaluate their lecturers' teaching styles and assessment practices.

If they agree to be part of the research study, they will be asked to participate in the following expected schedules: Attend a thirty-minute interview session based on their lecturers' style of teaching and assessment. The interviews will be conducted after the May-August session in order not to interfere with their learning schedule. The interviews will be held in the boardroom as no lectures will be conducted at this time. The interviews will be videorecorded.

**Confidentiality:** As the principal researcher, I have sought permission to conduct this research from the following bodies: The Institutional Review Board (IRB), the Ethics Research Committee provided by the Faculty of Education of the University of Pretoria, the Solusi University Research Office and Adboard. I plan to publish the results of this study, but will not include any information that would identify their names as respondents. To keep their information safe and confidential, the videotape of the interviews will be placed in a locked file cabinet in the office of research at Solusi University until a written word-for-word copy of the discussion has been created. I will enter study data on a computer that is passwordprotected and that uses special coding to protect the information. I intend to keep this study data and the videotapes for future research.

**Voluntary nature of the study:** Participating in this study is completely voluntary. Even if they decide to participate now, they are free to change their minds and stop at any time during the course of the research. They may also choose not to answer an interview question for any reason best known to them. The research study involves no foreseeable risks or harm to them.

### **Addendum E: Consent letter for participants**

#### **Consent to Participate in a Research Study**

#### **Invitation to participate in a research study**

My name is Christinah Dlamini, a PhD student at the University of Pretoria in the Department of Humanities education. I invite you to be part of a research project that I will conduct in order to complete requirements for a doctorate degree. I am supervised by Professor Pieter du Toit.

The project looks at the **Whole Brain® participatory action research to enhance the professional development of academic staff higher education**

The purpose of the study is to: promote the implementation of Whole Brain® Thinking and Learning Model by 10 novice lecturers of Solusi University which I assume you could be one of them; Determine lecturers' thinking preferences through Herrmann's Brain Dominance Instrument® (HBDI®®); Establish whether there is a relationship between the lecturers' thinking preferences and their styles of facilitating and assessing learning; Apply innovative strategies of improving and enhancing our practice and practitioner- research through the Whole Brain® Thinking and Learning Model. The study is self-funded. I am asking you to participate because I assume you will be interested in transforming your teaching practice and research and are aware of the challenges of shortage of skilled and experienced teaching staff in higher education in Zimbabwe which was created by the economic and political factors witnessed in the past ten or so years (UNESCO, 2013-2015) report.

**Description of your involvement:** If you agree to be part of the research study, you will be asked to participate in the following expected schedules: Attend a two day research seminar on Whole Brain® to be held on campus during the first week of August 2017. The seminar will be facilitated by my supervisor and myself; engage in a two 30 minutes on-line session to fill in the HBDI®® on-line questionnaire in 2017; attend a two hour focus group session to be held in 2017 in the Board room to discuss the HBDI®® results and their impact on teaching and research. In 2018, observe three lectures throughout the year; one during each block release session. We will conduct three – two hour long focus group interview sessions throughout the year. The venue will be the Board room. The interview sessions are meant for review and reflection on the teaching experiences. We will also discuss observations made by each participant during our informal interaction with each other. All our meetings and lectures will be video recorded in order to capture even the non-verbal cues and all elements that might have slipped in the writing of observation notes written during the lectures and during the focus group interviews.

We will meet at the end of every block release session for our focus group interviews so that we do not interfere with our busy teaching schedule. A moderator will assist by pointing out our biases and also direct our study.

The study also purports improving our practitioner research. I assume that our experience in this research will motivate us to share our findings and new knowledge discovered. We will therefore write and publish two papers in recognized professional journals one of which is the

Solusi journal. We are also going to present one of the papers at a conference in or outside Zimbabwe.

Since this is a self-sponsored research, I might not be able to sponsor the presenters; therefore I suggest we save something towards this activity. We can decide to sponsor two of our participants to go present the paper on our behalf, I have seen this effective with other researchers.

**Benefits:** Valuable teaching and research experience will benefit you as a professional. I hope that this study will contribute to the body of knowledge and transform all human empowerment organizations.

**Risks and discomforts:** Answering questions or talking with others about yourself, your thinking preferences and teaching style can be difficult as it is time consuming and other people may label you as showing off. Such task and comments may demotivate you and can stop your participation in the study at any time.

While unlikely, there is a chance that another participant could reveal something about you that they learned in the discussions and observations. All participants are asked to respect the privacy of other participants. You may share with others about what you observed during the lecture observations or what you heard during the interviews but actual names of other participants should not be mentioned.

**Confidentiality:** As the principal researcher, I have sought permission to carry out this research from the Institution Review Board (IRB), the Ethics and Research Committee provided by the Faculty of Education of the University of Pretoria, Solusi University Research Office and the Faculty Deans of Solusi University. I plan to publish the results of this study, but will not include any information that would identify your name as a participant or any personal characteristics that might identify you. However, if you decide on your own to forego this confidentiality, and request that your name be disclosed, please sign at the bottom of this letter if in agreement. To keep our information safe and confidential, the videotape of the focus group interviews and lecture observations will be placed in a locked file cabinet in the office of research at Solusi University until a written word-for-word copy of the discussion has been created. I will enter study data on a computer that is password-protected and uses special coding to protect the information. I intend to keep this study data, and the videotapes for future research.

Other researchers may request information you provided as part of the study and these include; other universities, government research departments and the two ministries of education in Zimbabwe. Because this study explores the innovative strategies of enriching the teaching practice and practitioner - research, I may report that information to the requesting bodies.

**Voluntary nature of the study:** Participating in this study is completely voluntary. Even if you decide to participate now, you are free to change your mind and stop at any time during the course of the research. You may also choose not to answer a focus group question for any reason best known to you.

**Contact information:** If you have further questions about this research, including questions about participating, you can contact me, at [dlaminic@solusi.ac.zw](mailto:dlaminic@solusi.ac.zw), + 263 772 591 575 or my promoter Pieter Du Toit at [pieter.dutoit@up.ac.za](mailto:pieter.dutoit@up.ac.za), +27 845010400

If you have questions about your rights as a research participant, or wish to obtain information, ask questions or discuss any concerns about this study with someone other than the researcher and promoter, please contact the University of Pretoria, Faculty of Education, Ethics Office , at [edu.ethicsadmin@up.ac.za](mailto:edu.ethicsadmin@up.ac.za), 012 420 5656 or [Tanya.Smat@up.ac.za](mailto:Tanya.Smat@up.ac.za), 012 420 5544.

**Consent:** By signing this document, you are agreeing to be engaged in the study. A copy of this document will be given to you for your records and one copy will be kept with the study records. Ensure that any questions you have about the study have been answered and that you understand what you are being asked to do. You may contact the researcher if you think of a question later.

*I agree to participate in the study. As part of my consent, I agree to be videotaped.*

Signature\_\_\_\_\_ Date

I agree to forego confidentiality requirements based on full disclosure of my name due to possible intended or unintended consequences and risks.

**Addendum F: Consent letter for respondents**

**Consent letter for respondents**

**Invitation to participate in a research study**

My name is Christinah Dlamini, a PhD student at the University of Pretoria in the Department of Education. I invite you to be part of a research study that I will conduct in order to complete requirements for a doctorate degree. Professor Pieter du Toit is my promoter. The study looks at the **Whole Brain® participatory action research to enhance the professional development of academic staff in higher education**. The purpose of the study is to: promote the implementation of Whole Brain® Thinking and Learning Model by 10 novice lecturers of Solusi University; Determine lecturers' thinking preferences through Herrmann's Brain Dominance Instrument® (HBDI®®); Establish whether there is a relationship between the lecturers' thinking preferences and their styles of facilitating and assessing learning; Apply innovative strategies of improving and enhancing our practice and practitioner- research through the Whole Brain® Thinking and Learning Model. The study is self-funded. I am asking you to participate because I assume you will be interested in the transformation your lecturers' teaching practice and research as their effective teaching has a positive direct impact on your assessment and learning in higher education. As an education student, I assume you will also be motivated to learn innovative teaching strategies which you can also use in your high school classroom as well.

### **Description of your involvement**

If you agree to be part of the research study, you will be asked to participate in the following expected schedules: Attend a thirty minute interview session based on your lecturers' style of teaching and assessment. The interviews will be conducted after every block session in order not to interfere with you learning schedule. The interviews will be held in the business room as no lectures will be conducted at this venue by then. Two volunteer lecturers from your department who have taught you in your first or second year and are currently teaching you will be the participants in this study. Ten lecturers from the five faculties of Solusi University, two from each faculty will be the participants in this study. The interviews will be conducted after the lecturers have gone through a seminar on Whole Brain® Thinking and Learning Model and have discovered their thinking preferences. Your role in the study is to assess through the interviews if there are noticeable changes in the lecturers' teaching styles. The interviews will be video recorded in order to capture both the verbal and non- verbal cues which are relevant for the study. Note that you are not going to be interviewed by the very lecturer who teaches you; instead a lecturer from another department will interview you as you evaluate the lecturer who teaches you in your department.

**Benefits:** Valuable teaching and research experience will benefit you as a teacher. I assume that the lecturers' innovative teaching strategies will contribute positively to their teaching and

that you as a student will receive highly satisfactory learning and assessment. Their improved teaching styles may also impact positively on your own teaching styles too.

**Risks and discomforts:** Answering questions that evaluate your lecturers' assessment and teaching can be difficult as you might think that the lecturers will bring that to class and your grades will be affected negatively. You may be demotivated and can stop your participation in the study at any time.

**Confidentiality:** As the principal researcher, I have sought permission to conduct this research from the following bodies: The Institutional Review Board (IRB), the Ethics Research Committee in the Faculty of Education of the University of Pretoria, The Solusi University Research Office and the Faculty Deans of Solusi University. I plan to publish the results of this study, but will not include any information that would identify your name as a participant. However, if you decide to forego this confidentiality and request that your name be disclosed you may have to sign at the bottom of this letter for consent. In order to keep your information safe and confidential, the videotape of the interviews will be placed in a locked file cabinet in the office of research at Solusi University until a written word-for-word copy of the discussion has been created. I will enter study data on a computer that is password-protected and uses special coding to protect the information. I intend to keep this study data, and the videotapes for future research.

Other researchers may request information you provided as part of the study and these include; other universities, government research departments and the two ministries of education in Zimbabwe. Because this study explores the innovative strategies of enriching the teaching practice and practitioner - research, I may report that information to the requesting bodies.

**Voluntary nature of the study:** Participating in this study is completely voluntary. Even if you decide to participate now, you are free to change your mind and stop at any time during the course of the research. You may also choose not to answer an interview question for any reason best known to you.

#### **Contact information**

If you have further questions about this research, including questions about participating, you can contact me at [dlaminic@solusi.ac.zw](mailto:dlaminic@solusi.ac.zw), +263 772 591 575 or my promoter; Pieter Du Toit at [pieter.dutoit@up.ac.za](mailto:pieter.dutoit@up.ac.za), +27 845010400

If you have questions about your rights as a research participant, or wish to obtain information, ask questions or discuss any concerns about this study with someone other than the

researcher and promoter, please contact the University of Pretoria, Faculty of Education, Ethics Office , at [edu.ethicsadmin@up.ac.za](mailto:edu.ethicsadmin@up.ac.za) , 012 420 5656 or [Tanya.Smat@up.ac.za](mailto:Tanya.Smat@up.ac.za), 012 420 5544.

**Consent:** By signing this document, you are agreeing to be engaged in the study. A copy of this document will be given to you for your records and one copy will be kept with the study records. Ensure that any questions you have about the study have been answered and that you understand what you are being asked to do. You may contact the researcher if you think of a question later.

*I agree to participate in the study. As part of my consent, I agree to be videotaped.*

Signature

Date

*I agree to forego confidentiality requirements based on full disclosure of my name to possible intended and unintended consequences and risks*

Signature

**Addendum G:        HBDI®**

**HBDI®**



## Herrmann Brain Dominance Instrument®

### Thinking Styles Assessment

This 120-question survey form results in a profile of your preferred thinking styles. By understanding your thinking style preferences you can achieve greater appreciation how you learn, make decisions, solve problems, and communicate, and why you do these things—and others—the way you do. The survey measures preferences rather than skills. It is not a test; there are no wrong answers. You will gain the greatest understanding by answering the questions frankly and sincerely

#### *BIOGRAPHICAL INFORMATION*

Please complete **every** question according to the directions given. Each response, including answers to questions 1, 2, 3 and 4, provide important data. When directions are not followed or data is incomplete we are unable to process your survey, and must return it to you.

**1. Educational focus or  
major subject(s)**

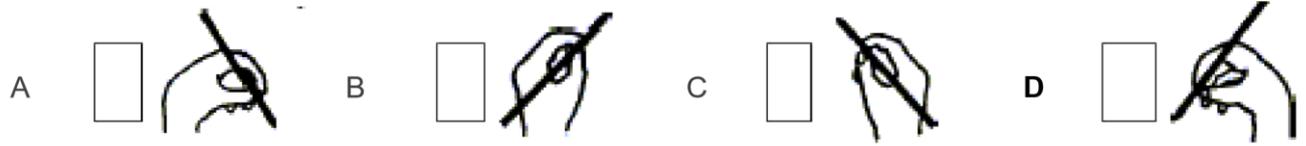
**2. Occupation or job title**

- 1. Narrowly describe your work (please be as specific as possible)**
- 2. Describe your work (please be as specific as possible)**
- 3. Describe your work (please be as specific as possible)**

**4.**

#### *HANDEDNESS*

5. Which picture most closely resembles the way you hold a pencil? Mark box A, B, C or D.



6. What is the strength and direction of your handedness? Mark box A, B, C, D or E.

<b>A</b>	<input type="checkbox"/>	Primary left	<b>B</b>	<input type="checkbox"/>	Primary left Some right	<b>C</b>	<input type="checkbox"/>	Both hands equal	<b>D</b>	<input type="checkbox"/>	Primary right, some left	<b>E</b>	<input type="checkbox"/>	Primary right
----------	--------------------------	--------------	----------	--------------------------	-------------------------	----------	--------------------------	------------------	----------	--------------------------	--------------------------	----------	--------------------------	---------------

*SCHOOL SUBJECTS*

**best.** Order all three subjects on the basis

elementary and/or secondary school subjects identified below.

**1 = best; 2 = second best; 3 = third best**

**Mathematics 8  
language**

**Foreign**

**Native language or mother tongue**

7

check that no number is duplicate  
**correct if necessary**

**: The numbers 1, 2, and 3 must be used once and only**

once

For each paired item below, check the word or phrase, which is more descriptive of you. Mark box A or B for each pair, even if the choice is a difficult one. Do not omit any pairs.

<b>76</b>	Conservative			Empathetic	<b>88</b>	Imaginative			Sequential
<b>77</b>	Analyst			Synthesizer	<b>89</b>	Original Reliable			
<b>78</b>	Quantitative			Musical	<b>90</b>	Creative Logical			
<b>79</b>	Problem-solver			Planner	<b>91</b>	Controlled Emotional			
<b>80</b>	Controlled			Creative	<b>92</b>	Musical Detailed			
<b>81</b>	Original Empathetic			Emotional	<b>93</b>	Simultaneous			
<b>82</b>	Feeling			Thinking Conceptualise	<b>94</b>	Communicator			
<b>83</b>	Interpersonal			Organiser	<b>95</b>	Technical things oriented			People-
<b>84</b>	Spiritual Creative			<b>96</b>	Well-organised Logical				
<b>85</b>	Detailed Holistic			<b>97</b>	Thinking Thinking				Rigorous Metaphorical
<b>86</b>	Originate Test Ideas Ideas			<b>98</b>	and Prove Like Things Like Things	Planned Mathematical			
<b>87</b>	Warm, Friendly Analytical			<b>99</b>	Technical Dominant				

Please review: **Did you mark one and only one of each pair? Correct if necessary.**

		<i>INTROVERSION</i>						<i>EXTROVERTION</i>	
		<i>EXTROVERTION</i>						<i>INTROVERSION</i>	
<b>100. Mark one box to place yourself on this scale from introvert to extrovert:</b>									
<b>Introvert</b>								<b>Extrovert</b>	
		<i>INTROVERSION</i>						<i>EXTROVERTION</i>	
		<i>EXTROVERTION</i>						<i>INTROVERSION</i>	

100. Mark one box to place yourself on this scale from introvert to extrovert:								
Introvert								Extrovert

TWENTY QUESTIONS					
Respond to each statement by marking the box in the appropriate column	Strongly ▼ agree	Agree ▼	In ▼ between	Disagree ▼	Strongly ▼ disagree
101 I feel that a step-by-step method is best for solving problems.					
102 Daydreaming has provided the impetus for the solution of many of my more important problems.					
103 I like people who are most sure of their conclusions.					
104 I would rather be known as a reliable than an imaginative person.					
105 I often get my best ideas when doing nothing in particular.					
106 I rely on hunches and the feeling of "rightness" or "wrongness" when moving toward the solution to a problem					
107 I sometimes get a kick out of breaking the rules and doing things I'm not supposed to do.					
108 Much of what is most important in life cannot be expressed in words.					
109 I'm basically more competitive with others than self competitive					
110 I would enjoy spending an entire day "alone with my thoughts."					
111 I dislike things being uncertain and unpredictable.					

<p>I prefer to work with others in a team effort 112 rather than solo.</p>					
<p>113 It is important for me to have a place for everything and everything in its place. Unusual ideas and daring concepts interest 114 and intrigue me.</p>					
<p>115 I prefer specific teachings to those which leave many details optional Know-why is more important than know116 how.</p>					
<p>117 Thorough planning and organisation of time are mandatory for solving difficult problems. I can frequently anticipate the solutions to 118 my problems.</p>					
<p>I tend to rely more on my first impressions 119 and feelings when making judgments than on a careful analysis of the situation. I feel that laws should be strictly enforced. 120</p>					
<p>Please review to make sure you have answered all</p>					

**Addendum H: Classroom observation sheets**  
**Teacher-student activities**

Participant	Lecturer-	class	Lecturer-	student	Student-	lecturer	Student-	Pairs	Group	Other	Comments/Notes
Lesson											
1											
2											
3											
4											
5											

6								
Total								

**Observation sheet: Questioning technique – WBL**

P	Question				Probing				Divergent				Convergent				Rhetoric				Notes
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	
Lesson																					
1																					
2																					
3																					
4																					
5																					
6																					
Total																					

**Questioning techniques- Bloom**

Participant	Question					Probing					Divergent					Convergent					Rhetoric					Notes					
	K	C	A	A	S	E	K	C	A	A	S	E	K	C	A	A	S	E	K	C	A	A	S	E	K		C	A	A	S	E
Less on																															
1																															
2																															
3																															
4																															
5																															
6																															
Total																															

**Key**

**Bloom- Bloom Taxonomy**

**WBL: Whole Brain® Learning**

**K- Knowledge**

**A- Quadrant**

**C- Comprehension**

**B- Quadrant**

**A- Analysis**

**C- Quadrant**

**A- Application**

**D- Quadrant**

**S- Synthesis**

**E- Evaluation**



1. Briefly explain what you understand the Whole Brain® Thinking Model to be.
2. Comment about the Whole Brain® theory and its relationship to student learning.
3. Do you mind sharing your thinking preferences as determined by the HBDI®®?
4. What are your comments about the assessment? Did the instruments reflect the correct thinking preferences of you?
5. How do you accommodate the different learning styles in your classes?
6. Discuss the assessment strategies you use to evaluate students' progress?
7. How do you decide what should be taught in your class?
8. An experienced lecturer in higher education advises you that you need to command the respect of your adult students. What do you think he/she means by this advice?
9. How do you evaluate yourself in terms of
  - a. Teaching strategies
  - b. Assessment of students' work
  - c. Growth in research

**Addendum J: Interview schedule for respondents**

**The purpose of the interview is to establish if there is a relationship between lecturers' thinking preferences and their teaching styles. The student now evaluates the lecturer after the assessment of thinking preferences.**

1. Do you enjoy your lectures now? Explain your answer.
2. Are you satisfied with your lecturer's teaching in terms of :
  - a. Time- management
  - b. Lesson preparation
  - c. Presentation of content

- d. Clarity of explanations
3. Describe the quality of teaching (if any) which you have experienced in your lectures. Explain in terms of aids/ technology used to enhance learning, student- student interaction/ activities etc.
  4. How would you rate your lecturer's teaching style? Explain if there is/ are any significant improvement(s) from the way he/she taught before and the way he /she is teaching now.
  5. Is there any noticeable change in his/her assessment methods? Explain your answer in terms of quizzes, tests, assignments and examinations.
  6. As a student how did the evaluation of your lecturers' teaching and assessment styles impact on your academic work

**Addendum K: Student feedback questionnaire**

**Student Feedback Questionnaire**

**(Source: Du Toit, 2011)**

Effective learning is considered a collaborative effort between you as learner, your peers and your lecturer. The design of this questionnaire is based on the principles of learning - centeredness. Your thoughtful answers to the following items will provide helpful information to your lecturer that can help to enhance your learning experience, and that of future students.

**Describe your lecturer's contribution to your learning in terms of each of the items below, using the following scale:**

- 1. Hardly ever/disagree      2. Occasionally/agree to some extent**

**3. Frequently/agree**

**4. Almost always/agree fully**

	NA	1	2	3	4
<b>Category I</b> The lecturer inspired me by:					
a. showing enthusiasm about the subject matter and learning activities					
b. expressing him/ herself well (variety in tone of voice)					
c. promoting insight in the importance and significance of the subject matter and related problems/innovations					
d. providing learning opportunities					
<b>Category II</b> The lecturer initiated learning by:					
a. Creating a climate conducive to deep learning					
b. Clearly stating the purpose and learning outcomes (in the course outline )					
c. Linking learning to real life situations					
<b>Category III</b> The lecturer maintained learning by:					
a. Promoting lecturer- student discussions to allow me to develop an enquiring mind					
b. Encouraging me to construct my own understanding					
c. Providing for learning style flexibility / Whole Brain@learning					
d. Encouraging me to express myself freely and openly					
e. ;9Inculcating critical thinking and self- reflection					
f. Promoting co-operative learning					
g. Promoting self-regulated learning					

**General comments**

**Section B: Student's Contribution**

**Describe your own contribution to your learning in terms of each of the aspects addressed in the items below, using the following scale:**

**1. Hardly ever 2. Occasionally 3. Frequently 4. Almost always**

	NA	1	2	3	4
<b>Category I</b> As student I contributed to my own and others' learning by:					
a. showing enthusiasm about the matter and learning activities					
b. expressing myself well (variety in tone of voice and with confidence)					
c. gaining insight in the importance and significance of the subject matter and related problems/innovations					

d. participating in such a way that the learning opportunities (sessions) became lively and encouraging					
<b>Category II</b> As student I:					
a. co-created a climate conducive to deep learning					
b. continuously attempted linking my learning to real-life situations					
c. attempted to construct a big picture of the multidimensional nature of sessions/my teaching practice					
<b>Category III</b> As student I:					
a. took part in lecturer-student discussions to allow me to develop an enquiring mind					
b. constructed my own understanding					
c. sought opportunities for developing learning style flexibility/Whole Brain@learning					
d. made use of opportunities to express myself freely and openly					
e. reconsidered many of my former attitudes and values					
f. gained a better understanding of myself					
g. developed a greater sense of my own responsibility					
h. contributed to my peers' learning( helping them find solutions/answers)					
i. sought to inculcate critical thinking and self-reflection					

**Addendum L: Topic Approval**

23 August 2019

**Student no:** 14181194

E-mail address: dlaminic@solusi.ac.zw

Dear Mrs C Dlamini

**APPROVED TITLE AND SUPERVISOR**

I have pleasure in informing you that your approved title and supervisor for the PhD is: **Title:** Whole Brain@ participatory action research to enhance professional development of academic staff in higher education

**Supervisor:** Prof PH du Toit

**Contact details:** (012) 420 2817, Pieter.dutoit@up.ac.za

You are advised to acquaint yourself with Regulations in the publication 'General

Regulations and information’.

Your registration as a student must be renewed annually before 28 February until you have complied with all the requirements for the degree. You will only be entitled to the guidance of your supervisor if annual proof of registration is submitted

Yours sincerely

*Lucky Masehla*

Mr Masehla