



UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG

**Investigating the epistemic beliefs of first-gen
eration and continuing generation students in a South African
university**

by Judith Mahlangu

(Student number:1406760)

Master of Education (in Educational Psychology)

Supervisor: Dr Michael Pitman

Submitted to the Department of Psychology

School of Human and Community Development

University of the Witwatersrand

June 2025

Declaration

I declare that this research report is my own unaided work. It is submitted for the degree of Master of Education in Educational Psychology by Coursework and Research Report at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any other degree or examination at any other university.

Judith Fikile Mahlangu



Ethics clearance: MEd/23/08

___30th___ day of ___June___, 2025

Dedication

This report is dedicated to my grandmother, Nomgqibelo Evelyn Mahlangu. Gogo, this report represents a culmination of your sacrifices, support, love and guidance throughout my life. Although you never finished school, I will always be grateful that you instilled in me a love and a desire for education. During the difficult moments when I felt like giving up, thinking of you and drawing from your resilience motivated me to keep going. Thank you for being the best example and parent I could ever have.

*“Strength and honour are her clothing; and she shall rejoice in time to come.
She openeth her mouth with wisdom; and in her tongue is the law of kindness.
Her children arise up, and call her blessed...
Many daughters have done virtuously, but thou excellest them all.” – Proverbs 31: 25-29*

*“[I] had been taught by [my] mother, that if [I] did not doubt, God would deliver [me].” – Alma
56:47*

Acknowledgements

There have been countless miracles throughout my academic journey that I can only attribute to a loving Heavenly Father. I am grateful to God for the answered and unanswered prayers that taught me gratitude and patience. I do not take for granted the blessing and opportunity to pursue and obtain an education, which was only possible through divine providence.

To my husband, Orion, I am grateful for your unwavering support during this journey. Not only were you my biggest cheerleader, but you also constantly found ways to take care of me physically, emotionally, spiritually, and mentally. Your presence is a constant source of comfort, joy, and safety that I am truly blessed to have.

I am grateful to my supervisor, Dr Michael Pitman, who patiently guided me throughout the process by allowing me to learn some things on my own, but also offered support and invaluable insights that pushed me to do better.

I am grateful to my colleagues-turned-friends, who made the experience bearable and an adventure to remember. I am grateful for all the online research sessions with Lindi, Naledi, Matimba and Michelle, where many laughs and cries were shared. I am also grateful to many other colleagues along the way who would offer a listening ear or offer encouragement when I needed it.

To my family and many friends, I am grateful for all your prayers, check-ins, and words of encouragement that are forever etched in my heart. I am especially grateful to my childhood best friend, Mmakgotso, who experienced many peaks and valleys of the process with me, even though she was in a different time zone.

I am grateful to the National Research Foundation (NRF) for funding my studies and making it possible for me to undertake this research project.

Finally, I would like to acknowledge my primary school English teacher, Ms Shireen Govender, who passed away in 2023. I will never forget her care, her standard of excellence, and her mentorship, which had a huge impact on me. May her soul rest in eternal and perfect peace.

Table of contents

Declaration.....	i
Dedication.....	ii
Acknowledgements.....	iii
List of tables.....	vii
List of figures.....	viii
Abstract.....	1
Chapter One: Introduction.....	2
1.1. Introduction and background.....	2
1.2. Rationale.....	5
1.3. Aims.....	6
1.4. Research questions and hypotheses.....	6
1.4.1. Primary research question.....	7
1.4.2. Secondary research question.....	7
1.5. Conclusion and overview of the research report.....	7
Chapter 2: Literature review.....	9
2.1. Introduction and background.....	9
2.2. Epistemic beliefs and academic achievement.....	15
2.3. First-generation university students.....	17
2.4. Socioeconomic influence on cultural capital and education.....	20
2.5. Theoretical framework.....	24
2.5.1. More Knowledgeable Other.....	26
2.5.2. Zone of Proximal Development.....	27
2.6. Conclusion.....	28
Chapter Three: Method.....	29
3.1. Research Design.....	29
3.2. Sampling.....	30
3.2.1. Sample characteristics/demographics.....	31
3.3. Measures.....	32
3.3.2. Living Standards Measure – Revised.....	33
3.3.3. Discipline-focused epistemological beliefs questionnaire.....	34
3.3.4. Connotative aspects of epistemological beliefs.....	36

3.3.5. Exposure to information technology questionnaire.....	37
3.4. Procedure.....	38
3.5. Preparation of the data for analysis.....	39
3.5.1. Stage 1	39
3.5.2. Stage 2	40
3.6. Data analysis.....	40
3.7. Ethical considerations	41
3.8. Conclusion.....	42
Chapter Four: Results.....	44
4.1. Descriptive Statistics	44
4.2. Exploratory Factor Analysis.....	48
4.2.1. General and discipline-focused epistemic beliefs.....	48
4.2.2. Connotative aspects of epistemic beliefs.....	57
4.3. Reliability analyses.....	61
4.4 Epistemic beliefs of first-year psychology university students.....	63
4.4.1 Research question 1 - Are there differences in epistemic beliefs between first-generation and continuing-generation university students?	63
4.4.2. Research question 2 - Does socioeconomic status moderate the effects of generational status on epistemic beliefs?.....	70
4.5. Conclusion.....	73
Chapter Five: Discussion.....	75
5.1. Sample characteristics	75
5.2 Descriptive trends and key observations.....	77
5.3. Evaluation of the DFEBQ and CAEB measures in a South African university sample (EFA).....	82
5.4. Insights from the inferential statistics	85
5.5. Limitations of the study.....	90
5.6. Conclusion.....	91
References.....	94
Appendices	107
Appendix A: Participant information sheet	107
Appendix B: Epistemic Cognition Survey	109
Appendix C: Living Standards Measure (Revised).....	115
Appendix D: Access to Technology Survey	119

Appendix E: Ethics clearance and permission letters	121
Appendix F: Exploratory factor analyses.....	124
Appendix G: Independent samples t-test for question 1.	129
Appendix H: Two-way ANOVA for research question 2	134

List of tables

Table 1. English fluency among non-English home language participants	44
Table 2. Descriptive statistics for schooling background.....	45
Table 3. Frequency table for access to technological devices and online resources.....	46
Table 4. Factor loadings for DFEBQ	51
Table 5. Comparison of current factor loadings with Hofer's factor analysis.....	52
Table 6. Factor analysis results of the DFEBQ	56
Table 7. Factor loadings for CAEB.....	59
Table 8. Factor analysis results of the CAEB.....	61
Table 9. Reliability of the DFEBQ and CAEB.....	62
Table 10. Descriptive statistics for epistemic belief subscales by generational status.....	63
Table 11. Independent samples t-test results for epistemic beliefs subscales.....	65
Table 12. Item means and confidence intervals for CAEB (Texture)	66
Table 13. Item means and confidence intervals of the DFEBQ.....	68
Table 14. Descriptive statistics for epistemic beliefs subscales by generation status and SES level.....	71
Table 15. Results of the 2-way ANOVA for epistemic beliefs subscales by generation status and SES level	71

List of figures

Figure 1. Distribution of use of online resources in high school.....	47
Figure 2. Scree plot for DFEBQ	49
Figure 3. Scree plot for CAEB.....	58
Figure 4. Distribution graphs of the DFEBQ.....	64

Abstract

Epistemic beliefs, or beliefs about the nature of knowledge and learning, play a crucial role in students' academic performance and how they believe knowledge is acquired. Despite extensive research on personal epistemology, there is a notable limitation in studies investigating whether family educational history/background influences the development of epistemic beliefs and how this subsequently affects adjusting to tertiary education. For this reason, this report investigated the epistemic beliefs of first-generation and continuing-generation university students using a quantitative non-experimental, cross-sectional, ex post facto design. The sample was taken from first-year undergraduate students enrolled in Psychology at the University of the Witwatersrand. The students were given an online survey, which consisted of four sections that collected information about demographics, socio-economic status, and epistemic beliefs. The study yielded a total of 309 responses, which were adjusted to $N = 244$ after the exclusion criterion was applied. Factor analyses were conducted on the DFEBQ and the CAEB, which confirmed the underlying structure of the measures as proposed in previous studies, with slightly different item loadings. The main research objective was to investigate if there was a difference in epistemic beliefs between first-generation and continuing generation students, and the second objective was to investigate if socio-economic status moderated the relationship between generational status and epistemic beliefs. Results indicated that there was no statistically significant difference between first-generation and continuing generation students' epistemic beliefs. Furthermore, socio-economic status did not significantly influence the relationship between generational status and epistemic beliefs. However, an ANOVA analysis showed that there was a statistically significant main effect between socio-economic status and generational status on one dimension of the DFEBQ, Certainty/ Simplicity of knowledge. The absence of a statistically significant difference in epistemic beliefs between the two groups suggests that students from different family educational backgrounds may enter higher education with broadly similar conceptions about knowledge and knowing. One significant main effect highlights that socio-economic status is associated with epistemic beliefs without involving generation status. Limitations and recommendations for future research are offered.

Keywords: epistemic beliefs, higher education, South Africa, socio-cultural influence

Chapter One: Introduction

1.1. Introduction and background

Epistemic beliefs, also known as personal epistemology, refer to the beliefs that individuals hold about knowledge; how it is conceptualised, acquired, and justified. This has been an area of interest primarily because, whether we are looking at common everyday knowledge or engaged in formal education, our beliefs about knowledge influence how we process all information. Epistemic beliefs have been investigated within the fields of education and psychology, as studies have shown that the beliefs that students have about knowledge and how it is acquired are closely associated with the process of learning and academic achievement (Greene et al., 2018; Hofer, 2002; Lonka et al., 2021). However, most of this research has been conducted in the Global North and has largely looked at students in general, with very little focus on the diverse identities and experiences within the student population.

In the case of South Africa, the political landscape provided a unique opportunity for scholars to consider how contextual factors play a role in academic achievement. Many scholars considered how this interaction manifests in a country that was transitioning to a democratic state (Department of Education, 1997; Jansen, 2001). For this reason, there was increased discourse in the field of academic development in the 80s and 90s that focused on epistemologies to address the challenges presented by this transition from apartheid to a more inclusive higher education system. Through a series of essays written from the 1980's to the early 2000's, Waly Morrow in particular focused on the concept of "epistemological access" and highlighted the importance of ensuring that students, particularly those from historically disadvantaged backgrounds, gain meaningful access to the ways of thinking, reasoning, and learning essential in higher education (Morrow, 2009, p. 134). These essays underscore that increasing physical access to institutions of higher learning is only one side of the effort if the epistemic beliefs that individuals bring into these institutions are not considered. This was an important point to raise since it had been observed that personal epistemology can either facilitate academic success or hinder it. A central theme that became clear in Morrow's essays is that epistemic beliefs do not exist in a vacuum as

they are shaped by one's context, which includes educational background, culture, societal norms, socioeconomic status, and access to resources.

Existing literature thus far has broadly considered the influence of the abovementioned contextual factors on the development of epistemic beliefs among different students to a degree. However, it would be insightful to observe what the current epistemological trends are in South Africa's 31-year-old democracy. Specifically, it would be interesting to investigate the epistemic beliefs of students who come from families who are the first to attend university (first-generation) and those who come from families where their parents or immediate family have attended university (continuing generation) before. Although there are different definitions of what constitutes a 'first generation university student', the most common conceptualisation in the literature refers to students whose parents have not attained a bachelor's degree (Hottinger & Rose, 2006), and thus the inverse (continuing generation) refers to students whose parents have successfully attained at least one university qualification. However, traditional nuclear families are not always the norm in the contextual landscape of South Africa. Thus, the current study applied the expanded definition of first-generation status as students whose immediate family members (parents/stepparents/ sibling/stepsibling/guardian) have not obtained a university degree (Aspelmeier et al., 2012, p.762). A lack of exploration between first-generation and continuing generation students can lead to a homogenised view of students' university experience, whereas perhaps their contextual background is associated with how knowledge is conceptualised and, subsequently, how each group approaches learning at university.

Although there have been numerous studies that have investigated the relationship between epistemic beliefs and academic achievement, there are several research gaps that exist in the field, such as the investigation of contextual factors that may influence one to develop certain epistemic beliefs (Tabak & Weinstock, 2008). The literature has noted the relation between epistemic beliefs and factors such as the quality and experience of students' pre-university education, as well as the characteristics of their home environment (Paulsen & Wells, 1998; Tabak & Weinstock, 2008). However, this has not been explored extensively among students coming from different sides of educational opportunity with families of different educational backgrounds. There is very little research/literature investigating the experiences of first-

generation and continuing-generation students, as the majority of studies have largely grouped all students (e.g. a study focusing on first-year students as a group) or have investigated discipline differences (Hofer, 2000).

Briefly mentioned above, another facet to the dearth of available literature concerning contextual factors is the added issue of dominant theories and models of epistemic beliefs emanating from research conducted in the Global North. Particularly, most research comes from Western countries like the United States, Canada, and parts of Europe, with less research about epistemic beliefs in non-Western contexts. Essentially, these theories are developed and based on studies that have been conducted in WEIRD countries (Western, Educated, Industrialised, Rich and Democratic) (Hofer, 2000; Hofer & Pintrich, 1997; King & Kitchener, 2004; Schommer, 1990a; Schommer-Aikins, 2004). This necessitates investigating epistemic beliefs and specific contextual factors within the Global South, as this can potentially contribute to the body of knowledge.

By extension of the work that has already been done in South Africa related to personal epistemology (Antia & Dyers, 2016; Higgs, 2007; Morrow, 2009; van der Merwe & and Nell, 2013), a new factor that must be considered in our digital age is the implications of the increasing exposure to technology, media, and the internet, which have created a new landscape for knowledge acquisition and dissemination. In an internet space offering a myriad of information, epistemic cognition plays a critical role in deciphering which information is true and which is not (Cartiff et al., 2021). It is therefore relevant to consider exposure to IT in relation to the epistemic beliefs of university students since they are required to use the internet in many academic activities. Socioeconomic status plays a huge role in providing access to resources such as information technology, as well as the level and type of education one attains (APA Dictionary of Psychology, 2023), and these are few of the contextual factors that will be investigated in this study.

1.2. Rationale

In a study conducted by Schommer (1990, p. 503), results showed that home and educational background significantly impact the development of an individual's epistemic beliefs. Building from these findings, this study seeks to investigate the epistemic beliefs of students based on their educational background and that of their immediate family members. Specifically, the study will investigate the epistemic beliefs of first-generation and continuing-generation university students and explore if these differences in generational education are associated with differences in epistemological beliefs.

There have been a few studies that have explored the epistemic beliefs of students across different levels of education (Lonka et al., 2021; Maclellan & Soden, 2004; Schommer, 1990b; Shoaib et al., 2021). However, there is very little research that explores the possible influence of parental or close family members' educational experience on the development of students' epistemic beliefs. This study is valuable, specifically within the South African context, because although students may gain access to an institution of higher learning, it is necessary to investigate if different educational backgrounds and other contextual factors influence the epistemic beliefs that shape their learning process in significantly different ways. For instance, in the early studies conducted by Schommer (1990), findings showed that parents who received more education tended to foster an independent environment that encouraged responsibility at home and for one's thinking. According to Schommer (1990, p. 503), this type of environment is said to lead to such children developing more "sophisticated" epistemic beliefs. However, finding literature that further expands on this through group comparisons between students of different educational backgrounds has been difficult to find. Most studies that have looked at potential differences between groups have investigated epistemological dimensions among different disciplines, such as psychology and science (Hofer, 2000). It would be interesting to see how the dimensional model and well-known findings in the field apply to the epistemic beliefs of first-generation and continuing generation university students.

A view of first-generation university students within the existing literature emanating from studies conducted predominantly in the USA mentions that often these students come from

underrepresented and marginalised populations (Checkoway, 2018). These students are described as being disadvantaged in terms of their knowledge about university procedures. They tend to struggle to transition well from high school to university in comparison to students who are not the first in their families to attend university (Pascarella et al., 2004). Demographic characteristics vary from one context to another; thus, an investigation within the South African context, where apartheid greatly affected the schooling experience, will provide more insight into the first-generation university experience. Historically, institutionalised segregation led to the Black majority being underrepresented and marginalised within institutions of higher learning (Higgs, 2007; Robinson et al., 2024). This study then seeks to investigate whether previous apartheid policies have impacted how students of different educational backgrounds view knowledge and the process of knowing in their first year of university.

This study will explore the associations of contextual factors such as family educational history and socio-economic status with first-generation and continuing generation students in the development of their epistemic beliefs. This can provide more information on factors that may support or impede their academic success and provide insight into how contextual factors shape epistemic beliefs and subsequently affect the learning process. An understanding of epistemic beliefs can also help in the formulation of academic material that is sensitive to their needs and development to succeed in their academic journey.

1.3. Aims

This study aims to explore the contextual factors that may have an impact on the development of epistemic beliefs by investigating if there are differences in epistemic beliefs between first-generation and multi-generation students.

1.4. Research questions and hypotheses

In this study, the development of epistemic beliefs was examined by investigating background factors such as educational history within one's family, socioeconomic status, and

exposure to information technology. As noted above, previous research has investigated trends of epistemic beliefs among undergraduate students; however, most of this research has been conducted in Western countries, with little research on the development of epistemic beliefs between students of different educational backgrounds. Taking this gap into consideration, this study sought to investigate the following questions:

1.4.1. Primary research question

Are there differences in epistemic beliefs between first-generation university students and continuing-generation students?

1.4.2. Secondary research question

Does socioeconomic status moderate the effects of generation status on epistemic beliefs?

This study hypothesises that there is a difference in epistemic beliefs between first-generation and multi-generation students. It further hypothesises that these differences will be moderated by contextual factors, viz., socio-economic status.

1.5. Conclusion and overview of the research report

This chapter has introduced the research report by briefly outlining the background on epistemic beliefs and highlighting the rationale, research aims, and research questions. It discussed the significance of investigating epistemic beliefs among students emanating from different backgrounds of educational opportunity within their families. The research aims and questions presented highlight the need to better understand how individuals' interpretations of knowledge and knowing differ across contexts and educational backgrounds. In doing so, the chapter established the foundation to expand on the theoretical and practical relevance of examining epistemic beliefs, especially within the South African context, which is further discussed in the following chapters.

Thus, Chapter 2 presents a review of the relevant literature, focusing on the conceptualisation and development of epistemic beliefs enquiry. The chapter also discusses the possible link between epistemic beliefs and academic achievement, as well as the socioeconomic

impact on the attainment of cultural capital and quality education. Vygotsky's socio-cultural theory of cognitive development is also briefly discussed. These subsections are discussed in relation to seminal literature while expanding upon and briefly providing practical examples from the South African context. Chapter 3 details the research design, including the participants, instruments, procedures, and pertinent ethical considerations. Chapter 4 reports the results of the data analysis, which included an exploratory factor analysis of the instruments (Discipline-Focused Epistemic Beliefs Questionnaire and the Connotative Aspects of Epistemic Beliefs Questionnaire) and the inferential statistics. Finally, Chapter 5 discusses the findings in relation to existing literature, highlights the implications and limitations of the study and offers recommendations for future research.

Chapter 2: Literature review

2.1. Introduction and background

Epistemology is a branch of philosophy that focuses on the nature of knowledge and how it is justified (Schommer, 1990). However, this concept has also been of interest in other fields such as education and psychology, with a particular focus on personal epistemology due to the implications for cognitive processes and learning within the school setting. As epistemology continued to be a topic of interest among scholars across different fields, an umbrella term called epistemic cognition was developed, which encompasses different categories/features related to epistemology, such as beliefs, theories, and the process of how knowledge is defined and acquired (Lonka et al., 2021, p. 776). Within this umbrella term, many scholars have had an interest in the category of epistemic beliefs in particular, which has been and continues to be a subject of investigation.

Hofer and Pintrich (1997, p. 89) highlight that inquiry into students' epistemological beliefs was pioneered by Perry in 1970, who had an interest in the diverse forms of adjustment to the social and academic environment of first-year undergraduate students at Harvard University. His exploratory research provided new insights into the role of epistemic beliefs in students' academic experience, which led him to postulate a developmental model with four primary categories/positions, namely dualism, multiplicity, relativism, and commitment within relativism. Perry's developmental model which was added upon by a few scholars after him posited that individuals progress sequentially, but gradually from 'naïve' to more 'sophisticated' beliefs when they are faced with novel problems beyond their current epistemological beliefs and also when they advance in education (Madjar et al., 2017; Peter et al., 2016) explain that the use of the term 'developmental' does not imply that the progression of epistemic beliefs has defined stages of natural developmental pattern among all people but rather that the positions represent a general global pattern of how epistemic beliefs tend to develop.

However, much of this early theorising emerged from studies conducted among white, male, elite university students in the United States. This raises questions about the cultural and

contextual applicability of such developmental trajectories in non-Western or postcolonial settings such as South Africa. The assumptions embedded in developmental models privilege individual autonomy (innate progress from naïve to sophisticated beliefs). While Makhathini et al. (2020) do not directly critique developmental models, their findings show that the majority of students in their study based in South Africa viewed lecturers as the main source of knowledge. This highlights that authority-based epistemic orientations may co-exist or even dominate over the autonomous inquiry emphasised in Western developmental frameworks.

The developmental model, however, is just one approach in conceptualising epistemic beliefs, as other models offer alternative perspectives. Other scholars, such as Schommer (1990) adapted Perry's work and formulated 'dimensions' of epistemic beliefs instead (e.g. certainty of knowledge, source of knowledge, simplicity of knowledge, justification of knowledge, etc) based on the abovementioned positions that Perry proposed, thus introducing a dimensional model of epistemic beliefs. The nature of epistemic beliefs is often described as elusive due to the complexity involved in defining, measuring, and interpreting them. The perceived elusive nature of epistemic beliefs has led to enquiry of this topic being approached from different perspectives, such as gender differences, attitudes, reflexive practices, and reasoning abilities. Scholars have thus developed and approached epistemic beliefs from different theoretical perspectives, which underscores a lack of consensus on their structure and function (Greene et al., 2018; Hofer & Pintrich, 1997). Furthermore, epistemic beliefs are abstract and often implicit, making them difficult to quantify or observe directly (Schiefer et al., 2022, p. 1542). This has not only led to ongoing debates about their dimensionality, developmental trajectory, and contextual stability, but it has also led to the development of a variety of measures/instruments that accompany the various proposed theories/models.

However, despite the diverse modes of inquiry, there was a consistent pattern of inquiry in many of the approaches at the time that viewed epistemological beliefs from the developmental perspective, which is unidimensional in nature. Duell and Schommer-Aikins (2001) explain that unidimensional models view the positions/dimensions as a collective where development in one dimension (e.g. dualism) automatically leads to development in the other dimensions (e.g. multiplicity, relativism, etc). This perspective prompted a form of inquiry in the

field from the dimensional perspective, which gave rise to the multidimensional model where dimensions are seen as related but separated aspects of epistemic beliefs. This approach is particularly valuable in contexts marked by social and educational heterogeneity, such as South Africa, where students' beliefs about knowledge may not align neatly with a single developmental trajectory.

Schommer (1990) was the first to highlight a pattern of the unidimensional conceptualisation of epistemic beliefs after looking at the conflicting results that arose from previous studies and subsequently challenged the view by proposing a multidimensional model. As opposed to viewing epistemic beliefs as an aggregate, Schommer (1990) argued that the complex nature of epistemic beliefs could be best understood as a system of individual dimensions where the development of one dimension does not necessarily imply the development of all dimensions (Duell & Schommer-Aikins, 2001). The model includes five dimensions, namely: Simple knowledge (knowledge is simple not complex); Certain knowledge (knowledge is certain, not tentative); Omniscient authority (knowledge is handed down by authority); Innate ability (knowledge is innate, not acquired); and Quick learning (learning is quick or not at all). All these dimensions are seen on a continuum from 'naïve' to 'sophisticated' (Greene et al., 2018; Schommer, 1990a). Dimensional models allow for independent variation in beliefs, making them more suitable for capturing the complex, sometimes contradictory epistemic positions that arise from diverse educational and cultural experiences. Studies in South African universities have found that students may simultaneously endorse both authority-based and constructivist beliefs (Makhathini et al., 2020), suggesting that epistemic belief systems in this context are hybrid rather than linearly progressive.

Hofer and Pintrich (1997) built upon Schommer's dimensional model and initially concurred that the proposed dimensions of Simple knowledge and Certain knowledge were indeed separate dimensions. Hofer (2000) eventually introduced a new dimensional model with four dimensions instead. The model included the two aforementioned dimensions (Simple and Certain knowledge), as well as Source of knowledge, which is akin to the Omniscient authority dimension but considers that knowledge can either emerge from authority or that knowledge can be constructed by oneself. The final dimension is Justification of knowing, which looks at how

individuals evaluate knowledge using evidence and consideration of experts' evaluation or personal experience and opinion. Hofer (2000) ran an exploratory factor analysis, which led to the modification of the model, where there were still four dimensions; however, they were slightly different. Simple and Certain knowledge emerged as one factor, whilst Source of knowledge and Justification of knowledge remained, but were adjusted so that Source of knowledge (authority) relied on authority, while the Justification of knowledge (personal) relied on first-hand experience as a source of knowledge. A new dimension called Attainability of truth emerged as the fourth dimension, which looks at the degree to which individuals believe truth or correct answers will be attained (Karimi, 2014).

In both versions of the model proposed by Hofer (2000), higher scores on the developed instrument (DFEBQ) indicated agreement with 'less sophisticated' epistemic beliefs. Both Schommer (1990) and Hofer (2000) use the terms 'naïve' and 'sophisticated' to explain the range between epistemic beliefs; thus, the current study employs the same terms to be consistent with existing literature. Although the DFEBQ scale applies the original range terms, Kuhn and Weinstock (2002) use the terms 'absolutist' and 'evaluativist' in their instrument, which match the scale direction of the commonly used 'naïve' and 'sophisticated' scale range. The terms used by Kuhn and Weinstock (2002) are added in parentheses in the current study to aid in the interpretation of the DFEBQ scale in an attempt to avoid framing epistemic beliefs in terms of sophistication (or lack thereof) only.

Nevertheless, epistemic beliefs have evolved from being seen as linear developmental stages to more complex and interdependent multi-dimensional constructs (Hofer & Pintrich, 1997). The current study draws on the multi-dimensional model as presented by Hofer (2000), which will be discussed in detail in the theoretical framework. Nevertheless, despite the decision to utilise the multi-dimensional model, it must be noted that it is not without its limitations. Several studies have struggled to replicate the original five-factor structure proposed by Schommer (1990) and the four-factor structure proposed by Hofer (2000), especially in contexts outside of North America where the models were developed (Stahl & Bromme, 2007).

Thus, despite the strength of the dimensional model in accommodating variability, much of the empirical work applying this framework has still largely been conducted in Western or high-income contexts. This has left a gap in understanding how epistemic beliefs manifest in post-colonial, multilingual, and unequal societies. In South Africa, for instance, historical inequities in access to quality education, linguistic diversity, and socio-economic stratification shape not only what students believe about knowledge, but also the kinds of epistemic practices they encounter and can engage in (Gumede, 2020; Hoadley, 2023; Mathebula, 2019). As Mathebula (2019) argues, recognising students from marginalised communities as epistemic agents challenges dominant deficit narratives and underscores the need to situate epistemic belief research within the realities of the Global South.

To understand and explore some of the inconsistencies and gaps in epistemic belief research, Stahl and Bromme (2007) suggested that perhaps the differences in findings could also be attributed to how students make sense of the items contained within the instrument subscales. They highlighted that students' responses to the questionnaires could either be based on their explicit-denotative assumptions (their knowledge about the definition of a particular subject or discipline) or their associative-connotative knowledge (the implied meaning based on their emotions or personal perspective). They proposed that there should be a distinction between the connotative and denotative aspects of epistemic beliefs to better understand why students respond in a particular way. In that regard, they developed the Connotative Aspects of Epistemological Beliefs (CAEB) scale as a supplement to existing instruments, which is a semantic differential designed to measure the associative-connotative epistemic beliefs of participants. While they initially planned to utilise the dimensions used by Schommer (1990) and Hofer (2000) – Simplicity, Certainty, and Source of knowledge, their empirical testing yielded a stable two-factor structure which they labelled as Texture (beliefs about the structure and accuracy of knowledge) and Variability (beliefs about the stability and dynamics of knowledge) (Stahl & Bromme, 2007).

In developing the CAEB, Stahl and Bromme (2007) provided a scale that could offer insights into the richness and flexibility of participants' beliefs about knowledge and knowing to capture the emotional and contextual nuances of epistemic beliefs that may not be accounted for

in previous instruments such as the DFEBQ. Despite the scale being a semantic differential, the scores are typically interpreted in terms of sophistication, where higher scores indicate more sophisticated beliefs (Beenen et al., 2017; Bientzle et al., 2014). However, while the CAEB aligns with the concept of sophistication, the scale captures the associative evaluation rather than the explicit reasoning or denotative understanding of the scale items.

Although the connotative approach of the CAEB provides richer insights into the emotional and evaluative aspects of epistemic beliefs that may not be accounted for in other measures, this instrument presents some limitations. The CAEB's reliance on nuanced linguistic distinctions poses potential challenges in a multi-lingual country where English is not the home language for all students. In South Africa, connotative meaning of epistemic terms may not translate uniformly, potentially affecting both construct validity and interpretive depth. Research on linguistic capital suggests that access to the dominant academic language (English in this case) confers epistemic advantage, shaping how students interpret and communicate knowledge or epistemic concepts (Mathebula, 2019; Zimmerman, 2017). Consequently, while the CAEB offers a valuable framework for examining implicit epistemic beliefs, its application in the South African context must be accompanied by sensitivity to linguistic diversity.

Nevertheless, despite differences in theories and dimensional conceptualisations, it is evident that Perry's pioneering research into epistemic beliefs has continually evolved and yielded valuable results (Hofer & Pintrich, 1997). The influence of epistemic beliefs on students' educational experience may be subtle, but it is consistently present nonetheless (Schommer-Aikins, 2004). For instance, it was found that the more students viewed knowledge as certain and not tentative, the more they came to absolute conclusions even when presented with more complex and uncertain texts (Schommer, 1990). The more students believed in simple or quick learning, the less likely they were to comprehend texts well and achieve high scores in high school and university (Schommer-Aikins, 2004). For this reason, the impact of epistemic beliefs on education continues to be explored and investigated.

2.2. Epistemic beliefs and academic achievement

Considering that the work of Perry had led to a continuous investigation of epistemic beliefs and academic performance, a meta-analysis by Greene et al. (2018) sought to review literature that explored the relationship between personal epistemology and academic achievement because, up until that time, no quantitative meta-analysis on the literature had been. The review included 132 non-experimental studies with approximately 55,418 participants looking at domain-general, domain-specific, and topic-specific conceptualisations of epistemic beliefs.

The results of the meta-analysis indicated that the effect sizes were largest for studies that used domain-specific measurements (Greene et al., 2018, p. 1096, 1098) such as the Discipline-Focused Epistemological Beliefs Questionnaire (DFEBQ) developed by Hofer (2000). The results also showed that although it was a small effect, there was a correlation between the two variables, epistemic beliefs and academic achievement. However, since epistemic beliefs are not conceptualised as a single dimension, the meta-analysis included the various constructs for epistemic beliefs found in different theories/models. Although theories differ, the meta-analysis highlighted the dimensional aspect of epistemic beliefs, where constructs are interrelated but independent and can range from ‘naïve’ (absolutist) to ‘sophisticated’ (evaluative). The results showed that the Development of knowledge construct by Conley et al. (2004) had the highest effect size out of all the analysed constructs. The results also showed that many of the dimensions proposed by Schommer (1990) and Hofer (2000) were also statistically significant, such as Justification of knowledge - Personal, Source of knowledge, Simple knowledge, Simple and Certain knowledge, and Certain knowledge. The Attainability of truth construct of the DFEBQ is the only dimension proposed by Hofer (2000) that did not show a significant effect size estimate. Additionally, the results also showed that there is a statistically significant relationship between epistemic beliefs and different academic disciplines. For instance, although both disciplines had statistically significant results, the domain of science reflected the highest estimated effect sizes, whereas psychology had the lowest (Greene et al., 2018). In this meta-analysis, higher scores on both the epistemic belief and academic achievement instruments indicated “better “or “sophisticated” performance. The review; however, did not include all the

research conducted on epistemic beliefs and academic achievement and thus the results are to be interpreted tentatively. Nevertheless, the results highlight the importance of continually investigating the relationship between epistemic beliefs and academic performance, as this provides insights into which factors facilitate the development of epistemic beliefs required at university.

Understanding students' epistemic beliefs is not only relevant to understanding current academic trends but "researchers have argued that epistemic cognition is a key predictor of many 21st century learning outcomes including critical thinking, scientific literacy, and historical thinking, among others" (Greene et al., 2008, p. 1084). University institutions aim to provide an academic setting that allows students to develop "generic skills" such as problem solving, critical thinking, interpersonal skills, independence and communication, which are useful in settings beyond the academic context such as the workplace (Badcock et al., 2010). Using Bloom's taxonomy as a reference, it is clear that remembering and understanding content is good, but it is considered the most basic form of learning and thinking. The goal of education is to surpass the basic stage and extend the understanding of information to the extent that students develop the skills of application, analysis, evaluation, and eventually create knowledge (Forehand 2005). Thus, without an understanding of personal epistemology, which focuses on how individuals conceptualise and justify knowledge, our understanding of what kind of teaching and learning approaches should be implemented to best facilitate the development of higher-order reasoning skills that are necessary for the rising generation is limited.

As the interest in personal epistemology continued to rise, there was an increased use of quantitative measures such as Likert scales to quantify epistemic beliefs (Lonka et al. 2021). In observing the patterns, Lonka et al. (2021) highlight that there was a link between epistemic beliefs and how students subsequently viewed and approached certain tasks. Lonka et al. (2021) explain that when students were asked to evaluate how they learn from text, it was observed that students who were classified as 'dualists', who viewed knowledge as either right/wrong or who are more fact-oriented (Hofer, 2000; Schommer. 1990) tended to view learning according to how much one knows. Conversely, students who were classified as 'relativists' viewed knowledge as contextual (Schommer, 1990) and considered learning according to how much one understood

information. Perhaps these differences in epistemic beliefs account in part for one of the reasons why some students may perform better than others. Although there is not much literature refuting the link between epistemic beliefs and academic outcomes, there is literature that cites concerns about the use of quantitative measures to understand a concept so broad and complex as epistemic beliefs (Sandoval, 2005; Sandoval et al., 2016).

Some of the theorists who have introduced models of epistemic beliefs such as Perry (1968), Kitchener and King (1994), Schommer (1990), Schraw et al. (1995) among many others have developed quantitative instruments to measure the dimensions proposed in their relevant theories (Duell & Schommer-Aikins, 2001). However, this approach raises concerns over the reliability of self-report measures where the participants may be reporting based on what they think may be expected of them as opposed to citing practices or perspectives that reflect their reality (Sandoval, 2005). Moreover, the predominance of quantitative, self-report measures in this area restricts the ability to capture the situated, relational, and culturally mediated nature of epistemic beliefs. This is an issue that is particularly salient in South African higher education, where linguistic diversity and educational inequality shape how students engage with academic knowledge (Mathebula, 2019). Indeed, it is an elusive task to quantify the complexity and nuance of one's beliefs, especially in the case of personal epistemology, where there are a variety of factors that may be confounded with the construct. There is therefore a need for further analysis and improvement of the instruments. Future research would benefit from mixed-methods approaches that can account for contextual variation. Despite these concerns, there is still value in using current quantitative measures in some cases, depending on the logic of inquiry, because the information they provide about general patterns and trends can inform which specific factors to focus on and account for in the process of addressing this methodological issue.

2.3. First-generation university students

In the current literature investigating epistemic beliefs in relation to academic achievement, there are studies that have looked at the experience of university students, particularly undergraduate students. Some of these studies have investigated the developmental

nature of their epistemic beliefs (Peter et al., 2016; Rollnick et al., 2008), explored multidimensional models of epistemology (Hofer, 2000; Madjar et al., 2017; Schommer, 1990) and looked at disciplinary differences (Hofer, 2000; Paulsen & Wells, 1998) among these students. These studies have been valuable in the field and have provided additional information about epistemic beliefs that have sparked further research. However, in addition to enquiry that looks at epistemic beliefs as a concept, it is also important to consider the background factors of the student population that is being investigated and the influence these factors may have on their epistemic beliefs. Some studies have investigated the experience of first-generation students in university, which highlights the experience this specific group of students have in comparison to other, more experienced and seasoned students.

There is a relatively consistent trend that indicates that background factors such as a family's educational experience, play a role in how students adjust within institutions of higher learning. In the literature, first-generation students are most popularly defined as students whose parents do not have a university bachelor's degree or have not attended university (although some studies have developed slightly varying definitions) (Peralta & Klonowski, 2017). For instance, Aspelmeier et al. (2012, p.762) defined first-generation status as students whose immediate family members (parents/stepparents/ sibling/stepsibling/guardian) have not obtained a university degree. This definition is better suited for a context like South Africa, where traditional nuclear families are not always the norm, while also accounting for the rise in blended families, cohabitation, and intimate couples who live in separate households Adeyemi (2017). Nevertheless, despite the varying definitions, first-generation students are considered to be the first in their families to attend university.

In a study based in the USA, Pascarella et al. (2004) highlights that there is evidence which indicates that first-generation university students face significant challenges in adjusting to the higher education environment due to limited financial and emotional support from family, limited knowledge about the basic procedures at university (application fees, costs involved in securing residence if required, choosing courses etc), and limited exposure to degree expectations. In general, the majority of students experience some measure of anxiety when transitioning into the university environment; however, first-generation students also experience

a sociocultural and academic shock, which adds another layer of discomfort that they often have to navigate alone. Checkoway (2018) mentions that for students who are the first to attend university in their family, they cross into a world that is new and unknown to their family members. Thus, this experience may lead these students to question whether they belong in this new world, as they are exposed to other students of different backgrounds that they may not fully relate to with very little guidance from family.

Another study conducted in the USA looked at the longitudinal persistence of first-generation students in completing their studies and found that those who come from lower-income families are less likely to finish their degree or finish in time in comparison to those who come from higher-income families and schools (Ishitani, 2006, p. 880). For students who are the first to attend university and come from lower-income families, there is the added emotional burden of wondering if attending university is the right decision as opposed to finding a job, as they consider the financial implications of attending university on their family (Checkoway, 2018). From this, it can also be deduced that parents who have attended university are more aware of the costs involved in university education and are likely to be in higher-income employment (based on their qualifications). They are thus better prepared to support their children or know which resources to look for to support their children's studies. Families of first-generation students are not privy to this knowledge, which may heighten students' levels of stress as they have to consider these important factors in addition to academic expectations.

Nevertheless, despite the various challenges cited in the literature about the experience of first-generation university students, a significant number of them do complete their degrees within the stipulated timeframe. This has motivated some scholars to consider the assets these first-generation students may possess that helped facilitate their success. These students' ability to adapt to the university environment and its demands may be linked to personal assets such as proactivity, goal-direction, optimism and reflexivity that encourage them to persist amidst adversity (Garrison & Gardner, 2015, p. 25-26). When considering some of the experiences of first-generation students, it then becomes interesting to consider how their background influences other aspects of their academic journey, such as how they conceptualise and justify knowledge. Thus far, there has been little to no literature specifically investigating the epistemic beliefs of

first-generation students and whether these might differ from the epistemic beliefs of students who come from families whose parents or immediate family members have attained a university degree. Exploring the epistemic beliefs of first-generation university students is useful not only to identify possible disadvantages they experience in university, but also important in identifying possible strengths that may often go unnoticed. A better understanding of students' experiences has the potential to help universities sufficiently prepare to welcome and support students' academic journey and maximise their learning experience in a way that considers the history of education in their family and their socioeconomic status.

2.4. Socioeconomic influence on cultural capital and education

Over the years, research on the influence of epistemic beliefs on learning experiences has included other factors that are hypothesized to be closely related to one's personal views of knowledge, such as learning styles and strategic learning approaches (Rollnick et al., 2008), disciplinary differences (Hofer, 2000), reflexive judgement and reasoning processes (King & Kitchener, 2004), achievement goal orientation (Madjar et al., 2017), application of constructivist principles (MacLellan & Soden, 2004), metacognition (Lonka et al., 2021), and motivation (Lee & Chan, 2018) among many others. However, there is little empirical research that has investigated the influence of socioeconomic status (SES) and the role it plays in the development of epistemic beliefs.

Using the framework provided by Bourdieu (1986) SES can be seen as an accumulation of labour that includes both material capital as well as non-material capital. Material capital is well known and refers to economic assets such as income, property, and investments. Non-material capital; however, is less considered and can be seen in three types, which includes: the embodied state, which refers to an individual's mental and physical state; the objectified state, with items such as books, machines, dictionaries, etc that an individual has access to; and the institutionalized state, which refers to an individual's educational accolades and qualifications. Bourdieu (1986) views these types of capital as cultural capital that form a set of norms that tend to pass on within families, thus reproducing social inequalities within society. For instance, Bourdieu and Passeron (1990, p. 73) highlight the reality of linguistic capital, an asset that is

passed within families of different socio-economic backgrounds, that can either provide a rich or poor vocabulary that university students use to approach their academic assessments. For students coming from higher socio-economic backgrounds and whose parents have attended university, they are familiar with the linguistic style and format of communication and assessments, whereas students from working-class or middle-class families have to acculturate first to decipher the work.

When considering the role of culture in education, cultural capital as explained by Bourdieu (1986) can also be applied in the context of understanding epistemic beliefs. The manner in which individuals view the nature of knowledge and the process of knowing can be seen as a crucial component and outcome of embodied cultural capital. Bourdieu and Passeron (1990, p. 31) explain that an embodied state can be seen as a habitus, which is a system of dispositions formed by internalising the unspoken rules and values of the groups one belongs to. It guides practices and perceptions that persist over time that shape how individuals perceive, value, and interact with culture and intellectual processes. This ingrained manner of interaction forms the basis upon which epistemic beliefs are built. Whether an individual acquires their cultural capital through implicit familiarisation (through the family) or explicit study, their habitus can predispose them to certain ways of thinking and beliefs about how knowledge is gained and validated. For instance, an individual that may appear to be ‘naturally gifted’ in school may in fact be espousing a habitus that is already familiar with that culture of learning which can influence beliefs about the nature of intelligence and learning (e.g. innate ability vs effort) (Bourdieu & Passeron, 1990, p. 208). While an investigation of epistemic beliefs can provide insight about the habitus or implicit attitudes of students, an investigation of socio-economic background can offer insight about the explicit factors that have an impact on learning and education.

When looking at the objectified state (resources) and institutionalised state (education) of cultural capital, Zimmerman (2017, p. 14) draws from the work of Bourdieu and highlights that socio-economic status affects the quality of schooling and resources available to an individual, which has helped students from higher socio-economic to be better prepared for university education. Zimmerman (2017, p. 15) highlights two studies that show that (1) there is a positive

correlation between socio-economic status and academic achievement and (2) that students from low-income households are likely to be alienated from university culture and resources. This alienation was linked to Lareau's theory of sense of constraint, where students who come from lower-income households are less likely to question authority or the social norms dominant in an institutional setting, which contrasts with students from middle-class households who are often raised to negotiate and engage confidently with adults and institutions. These studies were conducted in Taiwan and New South Wales, respectively; thus, it is important to investigate if these findings are present in the South African context. This is an important avenue to investigate, as it would be interesting to explore if SES-related experiences lead to the development of certain epistemic beliefs that are specific to those particular socio-economic groups. First-generation university students thus become a subject of interest because, assuming that the majority of these students come from marginalised and underrepresented populations (Checkoway, 2018), an exploration of the association of SES on their epistemic beliefs may provide useful insight for this population group and how this influences their academic experience.

Drawing attention to first-generation students in South Africa who have managed to enter an institution of higher learning despite the highly unequal context is necessary on two accounts. First, it pluralises the experience of African childhoods. As Abebe and Ofosu-Kusi (2016) explained, African childhoods are often framed as "crisis childhoods" because of the various challenges and vulnerabilities that affect the majority of the African population. Thus, the motivation for investigating the epistemic beliefs of university students is not to contribute to the deficit or Afro-pessimistic view of African students (Abebe & Ofosu-Kusi, 2016) but to evaluate the landscape of South African education from the experiences of students who were born post-apartheid. Ndlovu (2020) highlights that South Africa's post-apartheid policies have focused on expanding opportunities to the previously disadvantaged Black population, which has led to a rise in "new" Black middle-class families. According to two South African Black authors who have written about their transition from working class to middle class, they both stated that middle-class membership is preceded by the attainment of tertiary-level education (Ndlovu, 2020, p. 573). This is an important point to consider, as the intersection between the rise in Black middle-class families and the study's consideration of students' educational history highlights

the changing dynamics of South Africa's educational landscape. Historically, Black South Africans were systematically excluded from quality tertiary education; however, presently, the rise in new Black middle-class households is an indicator of increased tertiary access (Badat, 2010). This also indicates that the current student population reflects both first-generation and continuing-generation Black students. This then offers a pluralistic view of the African experience that not only focuses on the deficit or the challenges, but also the progress and improvement of the socio-economic circumstances in the lives of some.

Second, the desire to provide a pluralistic perspective does not discredit the reality that, despite progress in some areas, South Africa has a long way to go as there are still major inequalities and socio-economic challenges, especially in primary and secondary education (Hoadley, 2023; Spaull, 2012). These challenges continue to divide the population and hinder the socio-economic transformation that was envisioned for a "Rainbow Nation" at the dawn of democracy (Gumede, 2020). Thus, an investigation of first-year university experience that considers the cultural capital of generational education becomes an academic contribution towards the continuing call for social justice and transformation in the country. The positive correlation between SES and academic achievement (Chen et al., 2018; Zimmerman, 2017) highlights the importance of constantly evaluating the impact that socio-economic inequality has on students' development and how this gap can be bridged.

An elusive concept such as epistemic beliefs may be harder to identify, unlike material lack, but it has relevance to students' academic success. Chen et al. (2018) mention that several longitudinal studies conducted in North America found that lower SES was correlated with lower academic achievement. A closer understanding of epistemic belief patterns in South Africa could inform how universities structure their programs to mitigate disadvantages that students from low-SES households experience at university. The relevance of this current study thus seeks to highlight both the strengths and the weaknesses of South Africa's current educational system and what still needs to be done to sufficiently bridge the gap and equip students for the Fourth Industrial Revolution.

2.5. Theoretical framework

Looking at theories and models within the research of epistemic beliefs, Ferguson (2014) mentions that Schommer's multi-dimensional model has been the most used by educational psychologists investigating epistemic beliefs. In the literature, the multidimensional model is often cited as significantly different to the developmental model; however, they merely differ in the focus of inquiry. Both consider epistemic beliefs in terms of dimensions; however, the developmental model looks at the aggregate developmental pattern of dimensions while the multi-dimensional model looks at development within each dimension more closely (Duell & Schommer-Aikins, 2001, p. 421). The dimensions of certainty of knowledge, simplicity of knowledge, source of knowledge, and Justification of knowledge - Personal have been used across several different multi-dimensional theories. Duell & Schommer-Aikins (2001) include in their review that theorists such as Schommer (1990), Jehng et al. (1993), Schraw et al. (1995), Kuhn et al. (2000) and Hofer (2000) tested these dimensions on North American samples using new instruments they developed.

One of the developed instruments is the Discipline-focused Epistemological Beliefs Questionnaire (DFEBQ) developed by Hofer (2000) mentioned earlier in the introduction, which was not only based on the multi-dimensional model, but it was also developed to be sensitive to disciplinary differences in beliefs. After conducting an exploratory factor analysis on the abovementioned well-tested dimensions, Hofer (2000) presented a four-factor structure, the dimensions of certainty/simplicity of knowledge, source of knowledge, justification of knowledge, and attainment of truth, which then became the basis of the DFEBQ. The Certainty/Simplicity dimension considers the extent to which knowledge is viewed as fixed or tentative (e.g. truth is unchanging in Psychology) as well as whether knowledge is viewed as simple or complex (e.g. most words have one clear meaning) (Cazan, 2013; Muis et al., 2011). The Source of knowledge: authority dimension looks at the degree to which knowledge is seen as coming from an external authority (e.g. if you read something in a textbook for Psychology, you can be sure it's true) (Hofer, 2000; Karimi, 2014). The Justification of knowledge: personal dimension looks at the extent to which one views first-hand experience or personal evaluation to justify knowing/knowledge (e.g. First-hand experience is the best way of knowing something in

Psychology) (Karimi, 2014). Then finally, the Attainment of truth dimension looks at the degree to which a person believes the final answer or truth about a subject can be attained (e.g. experts in Psychology can ultimately get to the truth) (Karimi, 2014; Muis et al., 2011). All these dimensions range on a scale from 'naïve' to 'sophisticated' where beliefs about knowledge/knowing that are fixed, simple, dependent on authority, and based on attainable truth are seen as 'naïve' or absolutist beliefs. Conversely, beliefs that are tentative, complex, combine both authority and personal experience, and are based on the unattainability of ultimate truth reflect more 'sophisticated' or evaluativist beliefs (Hofer, 2000; Hofer & Pintrich, 1997; Muis et al., 2006).

While some scholars focused on developing new instruments, others used the already developed measures to investigate the multi-dimensional model in a few other countries, such as Chile, Korea, and Romania (Cazan, 2013; Choi & Kwon, 2012; Leal-Soto & Ferrer-Urbina, 2017). Thus, the dimensions seen in multi-dimensional studies have been evaluated and re-evaluated in samples consisting of high school students, university students and adults (Duell & Schommer-Aikins, 2001) across different countries. The premises of the multi-dimensional model will be further investigated within a South African context.

Considering that there is little literature available investigating epistemic beliefs of first-generation and continuing-generation university students, Schommer's multidimensional model is useful in providing information and data about each dimension within this context. 'First-generation' and 'continuing generation' are group categories that can offer useful insights about epistemic belief patterns of the population group in South Africa. However, within these categories, there is a variety in the level of educational and resource accessibility (cultural capital); thus, focusing solely on the aggregate development of epistemic beliefs may leave a lot of important contextual information unaccounted for.

Additionally, the possible risk of using the developmental model in this study is that if any group exhibits a pattern of having an aggregate of more "naïve" epistemic beliefs in comparison to the other group, then it might lead to a view that indirectly marginalises that group's epistemic beliefs. The 'less sophisticated' aggregational view may lead to viewing the

epistemic beliefs of that particular group as a general deficit across all dimensions concerning what is needed for university studies. Although both the developmental and multi-dimensional models consider epistemic beliefs from the perspective of ‘naïve’ and ‘sophisticated’, the interrelated but independent nature of the multi-dimensional model allows for relative distinction between the dimensions. The use of the multi-dimensional model over the developmental model allows for a closer understanding of the individual dimensions, which can account for both the potential weaknesses and the potential strengths in both groups, instead of a global aggregational perspective of their epistemic beliefs. This is of importance, especially in the South African context, where psychological research has historically been used for oppressive social engineering (Seedat & Lazarus, 2011). Although the possibility of this study leading to that outcome is highly unlikely, it is very important to be sensitive when exploring socioeconomic and educational factors in this population.

A theory that accounts for the broader contextual factors, such as SES and education, that are relevant in this study is Vygotsky’s sociocultural theory, which considers the role of social and cultural factors in the development of mental abilities. Mahn and John-Steiner (2012) highlights the main tenets of Vygotsky’s theory, which focuses on the dynamic interaction of individuals with their sociocultural environment. The theory emphasises the role of language, the role of the more knowledgeable other and the zone of proximal development. The theory emphasises sociocultural tools that lead to learning and development, which may vary across different cultures. The manner in which a few of the basic tenets of his theory provide a framework for this study will be outlined below.

2.5.1. More Knowledgeable Other

Vygotsky viewed cognitive development in terms of the communication a child has with what is viewed as a human mediator, which refers to an adult who has skills and knowledge that can be taught or shared with the child through language (Alkhudiry, 2022; Cherry, 2023; Mahn & John-Steiner, 2012). Vygotsky argued that “development always starts between people (i.e. on the inter-mental plane) and then moves into the individual's mind (i.e., the intra-mental plane)” (Alkhudiry, 2022, p. 2118), which also aligns with the perspective shared by Bourdieu and

Passeron (1990) about the habitus. This concept considers the knowledgeable people around the child who play a role in their cognitive development, including the development of epistemic beliefs as investigated in this study. Parents/ legal guardians/ more capable family members are the first ‘knowledgeable others’ with whom a child interacts and communicates as they begin to engage with their sociocultural world. The groups under investigation in this study are not only considered for their individual characteristics but also in relation to the history of education in their families. The quality and duration of education can influence how human mediators (e.g. parents/ guardians/ siblings) use mental tools such as language that are acquired in the mediated process of learning to communicate. Essentially, the study highlights socio-cultural factors, specifically the potential role of ‘knowledgeable others,’ in the development of students’ learning and beliefs about knowledge.

Parents/ guardians/ siblings are not the only knowledgeable others a child is exposed to, as teachers also play a role in the instructional process. Studies show that there is a link between teachers’ epistemic beliefs and their understanding of learning, which influences their teaching approach (Letina, 2022; Lunn Brownlee et al., 2017). Although this study does not specifically focus on the influence of teachers on students’ epistemic beliefs, it is important to recognise that students’ personal epistemologies are influenced by their dynamic interactions with several knowledgeable influences that guide their learning through the zone of proximal development.

2.5.2. Zone of Proximal Development

Vygotsky introduced the concept of the zone of proximal development, which is defined as the difference between the capabilities that can be achieved by the individual on their own and the potential of what they can achieve with the assistance of a more knowledgeable other (J. Lantolf, 2000). Referring to the relevant ease with which young people can use ICT devices, Ferguson (2014) explains that the abilities that young people acquire for themselves do not necessarily mean that they have all the skills required to critically analyse and engage with complex information. This then highlights the importance of education and appropriate interventions to help students reach their academic potential through collaborating with a ‘mediator’ for better cognitive development. Without an understanding of students’ epistemic

beliefs, which influence their learning approaches and subsequently their academic achievement, the ‘more knowledgeable other’ (which in this study can be represented by university teachers) might employ strategies that are not compatible with students’ developmental needs.

2.6. Conclusion

Inquiry into the relationship between epistemic beliefs and academic experience has been ongoing for many years, which has yielded a plethora of work. Among the various studies, it has become clear that there is a correlation between epistemic beliefs and academic achievement, which makes it an important topic to further investigate within the fields of education and psychology. Various theories and instruments have been developed to conceptualise and investigate these variables, which have provided important but varying insights. Although there are notable methodological issues that have been cited as a cause for concern in validating the claims made by many researchers, it is useful to continually make use of the current frameworks to further understand epistemic belief patterns, especially in different contexts, for better construct and methodological improvement. The dimensional model of epistemic beliefs is a relevant framework to use in the South African context in a study investigating possible differences between first-generation and continuing-generation students. The chosen model has the potential to offer in-depth insights into the possible strengths and weaknesses that each group might espouse to contextualise their educational experience. The sociocultural background factors of these students thus have to be considered, especially in South Africa, where systemic racism was institutionalised, to better identify epistemic belief patterns and the needs of the student populace within the university context.

With the literature highlighting the link between epistemic beliefs and academic experience, this research report proceeded to quantitatively apply the dimensional model. The next chapter will outline how this report investigated the epistemic beliefs of first-year undergraduate Psychology students using questionnaires at a South African university.

Chapter Three: Method

3.1. Research Design

This study was conducted using a quantitative methodology to identify patterns of epistemic beliefs among a group of first-year undergraduate students. Considering that the study collected information such as gender, race, and socio-economic status, a quantitative methodology is beneficial in identifying differences and similarities within these intersectional identities and how trends developed over time have contributed to current outcomes (Else-Quest & Hyde, 2016).

The purpose of this research study is to investigate whether background factors are associated with the type of epistemic beliefs one has. The primary independent variable under investigation is students' educational status (whether a participant is the first in their family to attend university or not). Another background factor that was investigated was the possibility of a moderating variable of family socio-economic status.

The nature of the study is a non-experimental cross-sectional design, as there was no manipulation of the independent variable, there was no random assignment, and the information was only collected once. The rationale behind this kind of design is to investigate the epistemic beliefs of first-year undergraduate students at the time of data collection and before they have progressed further in their university studies. Hunziker & Blankenagel (2024) explain the characteristics of cross-sectional research design which align with this study because this type of research design allows for the investigation of multiple variables of the students and the potential relationships these variables have with their current epistemic beliefs. Additionally, they further explain that cross-sectional design provides an opportunity to test the hypothesised theories about these relationships which was a focus of this study.

3.2. Sampling

This study was conducted in the South African context, where the epistemic beliefs of first-generation and continuing-generation students have not yet been directly or empirically explored. The sample consisted of first-year psychology undergraduate students from the University of the Witwatersrand, and this specific sample is chosen based on two potential points emanating from current literature. First, earlier studies of epistemic beliefs indicated that the more students took more classes and spent more time in university, the more their epistemic beliefs developed (Lonka et al., 2021; Schommer, 1990). Thus, to ensure that there is no variation in higher education experience and to decrease the chances of this becoming a confounding variable, the sample will only include first-year students. Secondly, some studies have explored epistemic beliefs across different disciplines and have found that there were some discipline-related differences (Hofer, 2000, p.394). Although this evidence is interesting to note, disciplinary differences will not be a factor of investigation in this study; thus, the sample will only consist of students from one discipline. It thus becomes necessary to acknowledge that this then becomes a limitation in the study because psychology students (the targeted population) may have different epistemic beliefs from physics students, for instance, as some research has established. Perhaps an opportunity for further research may include replication of this study on students of different disciplines or other variables of interest.

This study employed a purposive non-probability sampling strategy because selection was purposely limited to first-year psychology students for reasons stated above and the selection was non-random (Obilor, 2023). This sampling strategy was preferred because, aside from obtaining permission from the university to reach out to their students, there were fewer obstacles in obtaining the data, which saved a lot of time.

A sample taken from a university context provides access to individuals coming from diverse backgrounds, thus making it possible to find participants from different socio-economic circumstances, an important factor that was considered in this study.

3.2.1. Sample characteristics/demographics

First-year undergraduate Psychology students enrolled at the University of the Witwatersrand volunteered to participate in this study. The final sample was a total of 244 participants with a mean age of 21.01. Out of the total participants, 78.3% were female, 19.3% were male, 1.6% chose 'Other/Self-identification', and 0.8% stated they 'Prefer not to say'. In terms of population groups, 62.3% identified as Black, 15.2% as White, 12.7% as Indian, 5.3% as Coloured, 2.5% as Other, 1.2% as Asian, and 0.8% stated they prefer not to say. In terms of living arrangements at the time of filling out the survey, the top three highest frequencies included 38.9% who indicated they were living at home, 25.8% were living in an off-campus private student-accredited accommodation, and 23.4% were living on an on-campus residence. A higher percentage indicated they were not funded by NSFAS (67.6%), while 32% stated that the scheme funded them.

Considering that the study is interested in participants' educational status, we collected information about past and current education-related factors. For current educational status, 28.7% indicated they are first-generation university students, whereas 71.3% indicated they were not. There were some participants who indicated that they were not first-generation university students (continuing generation); however, they also indicated that none of their parents/guardians went to university. These responses were not recoded based on the question "Are you the first in your immediate family to study at university?" that was asked, which did not only focus on parental/guardian education but rather, any immediate family. Although the literature operationalises "first-generation university student" as students whose parents have not obtained bachelor's degrees, the responses of those select participants who indicated that they were not first-generation despite their guardians not having university education were kept as they are under the premise that they had other immediate family members who have obtained university education. For previous educational information, 62.3% indicated they matriculated from a government school, and 33.6% from a private school. The response rate was identical for both home-schooled and 'Other' groups, at 0.8%, and 2.5% did not indicate the type of school.

South Africa is a multilingual country where there are 11 official languages and thus the survey collected information about the level of proficiency across the different South African languages. For home language, 42.6% selected English, 18.0% selected isiZulu, 7.8% selected isiXhosa, 6.1% for Setswana, 5.7% for Sepedi and Sesotho respectively, 4.5% selected Xitsonga, 3.7% for Afrikaans, 3.3% for Tshivenda, 2.5% for Siswati, 1.2% for isiNdebele and the remaining 3.3% selected 'Other'. In terms of fluency, 52% stated they are fluent in English which is the language of instruction at the university.

3.3. Measures

This study used four data collection methods in the form of questionnaires that were combined into one survey, with all the sections flowing into the next. The entire survey took approximately 20-30 minutes to complete, depending on the pace of the participant.

3.3.1. Demographical questionnaire

The first section was a demographic questionnaire (see Appendix B), which was used to collect background information about the participants. Participants had to indicate their age, gender, home language, whether they are the first to attend university or not, their parents'/guardians' highest education level, the type of high school they attended (government, private, home school, or other) and the location of their school (urban, suburban, or rural) to capture diverse educational contexts. This section also collected information about current university experience such as participants' current residence (living at home, on-campus residence, off-campus private student accommodation, renting an apartment/flat etc.) and whether participants are recipients of the National Student Financial Aid Scheme (NSFAS) which is a government program that provides financial assistance to eligible students from low-income households to help cover the costs of higher education at public universities.

3.3.2. *Living Standards Measure – Revised*

The second section included questions about participants' socio-economic status (SES), which was measured using the Living Standards Measure Revised (LSM – Appendix C), a measurement of societal status based on a set of marketing differentiators that divide people according to their living standards. The original LSM instrument divides people across 10 LSM groups, where ten is the highest living standard level and one is the lowest level (South African Audience Research Foundation, 2001). However, to match current developments in technology and services, some of the items of the questionnaire were adjusted to reflect modern options. The LSM-R questionnaire had three subsections, namely a) household items, b) living standards and c) an SES ladder. For household items, participants had to indicate whether they had access to particular items/services (yes/no) in their home during their matric year. This included items such as a TV set, an electric stove, a fridge or services such as a satellite dish and home Wi-Fi internet connection. For living standards, participants had to indicate their level of access to basic needs such as clothing, food, healthcare, and schooling, rated on a scale (1 representing 'it was less than adequate for our needs' and 6 representing 'it was more than adequate for our needs'). Finally, the last subsection included a ladder representing people's socioeconomic standing in South Africa. At the top of this ladder are the people who are the best off, who have the most money, the most education and the most respected jobs. At the bottom are the people who are the worst off, those who have the least money, the least education, and the least respected jobs or no jobs. Participants were required to indicate where they would place their household on the ladder between 0 – 10.

There were a few missing values within each of the subsections; however, instead of removing the participants with missing values, the minor gaps were imputed with the mode. Given that the proportion of missing data was low (less than 10%), mode imputation was unlikely to introduce significant bias (Jadhav et al., 2019). Although the SES measure consisted of multiple subsections using both binary (household items) and scaled responses (standards of living and self-reported ranking), SES is commonly seen as an asset-based categorical indicator (McKenzie, 2005, p. 232) thus the mode imputation preserved the most representative socioeconomic patterns within this sample and is more robust in the possibility of skewed data

(Alam et al., 2023, p. 4; Jadhav et al., 2019, p. 917). The three subsections were each individually totalled and then subsequently standardised to ensure that each subsection had equal contribution/weight in the final SES score. Since the subsections had different measurement units/ranges, standardising each subsection placed them on the same scale, where they all had a mean of 0 and a standard deviation of 1. These standardised scores were then summed to create one total SES score, which was ranked according to the 33rd and 66th percentiles to create 3 SES levels. The three levels were named Low SES (below 33rd percentile), Middle SES (between 33rd and 66th percentile) and High SES (above 66th percentile).

3.3.3. Discipline-focused epistemological beliefs questionnaire

Epistemic beliefs were measured in the third section titled “Epistemic Beliefs Survey” (see Appendix B), which included two epistemic beliefs questionnaires to gain a better understanding of epistemic belief patterns within these two target student groups. The first measure was the Discipline-Focused Epistemological Beliefs Questionnaire (DFEBQ) developed by Hofer (2000), which is based on outcomes in their research indicating disciplinary differences among students’ epistemic beliefs.

The DFEBQ includes items that were adapted from existing instruments, such as Schommer’s General Epistemological Beliefs Questionnaire (1990) and concepts from previous personal epistemological theories, such as the work of Perry and developmental theorists such as King and Kitchener (Hofer, 2000). The DFEBQ focuses on four discrete but interrelated dimensions, which were not only developed to represent the dimensionality of epistemic beliefs but also to focus on domain-specific knowledge. These dimensions include (a) Certainty of knowledge which refers to whether an individual views knowledge as fixed/certain or fluid/tentative, (b) Simplicity of knowledge refers to viewing knowledge either as isolated facts or interrelated concepts, (c) Source of knowledge – Authority refers to beliefs about authority, where experts and texts are seen as the source of knowledge and (d) Justification of knowing – Personal refers to how knowledge is evaluated through personal inquiry and integration of expert opinions (Hofer, 2000; Muis et al., 2016). This instrument is rated on a 5-point Likert scale with 1 representing ‘Strongly disagree’ and 5 representing ‘Strongly agree’, and the items are phrased

in a manner where higher scores indicate agreement with “less sophisticated” beliefs. This means that higher scores reflect a belief in absolute truth and objectivist views with certainty (Karimi, 2014, p.96; Muis et al., 2016, p. 270). The inclusion of the general epistemic belief items (11 items) and the discipline-focused items (18 items) was chosen based on their relevance to the four abovementioned dimensions.

In the development of the DFEBQ instrument, Hofer (2000) used exploratory factor analysis to further examine the four proposed dimensions of epistemological beliefs as suggested in existing literature. A four-factor solution was forced with a principal components procedure and varimax rotation. In the results shared by Hofer (2000), items that were hypothesised under Certainty and Simplicity of knowledge loaded onto one factor and thus emerged as one dimension (a reliability result of $\alpha = 0.66$ for this merged dimension was reported). Conversely, Justification for knowing and Source of knowledge – Authority still emerged as separate dimensions. Additionally, a new factor, Attainability of truth, which refers to individuals’ beliefs about the attainment of ultimate truth, emerged as the fourth dimension. The factor analysis conducted by Hofer (2000) highlighted that there is validity in the four-factor dimensional structure of epistemic beliefs, which is also supported in other studies that either ran reliability tests on the proposed dimensions or replicated the varimax rotation analysis (Cazan, 2013; Karimi, 2014; Päuler-Kuppinger & Jucks, 2017). However, it is difficult to track the consistency of dimensions since some scholars utilised the primary dimensions (certainty, simplicity, source, and justification), whereas others used the dimensions that emerged from the factor analysis (certainty/simplicity, source, justification, and attainability of truth) conducted by Hofer (2000). Although it was mentioned earlier that these dimensions are interrelated, it seemed appropriate to replicate the exploratory factor analysis to observe which factors would emerge as important for this particular sample. Item 12 (answers to questions in this field change as experts gather more information) and item 14 (in Psychology, it is good to question the ideas presented) were reverse-scored as indicated in the factor analysis by Hofer (2000). However, when running principal component analysis in the current study, both of these items had no correlations greater than 0.3 and were thus subsequently removed from further analysis. Thus, the subscales used in this study were subject to factor analysis and subsequent reliability analyses, which are reported in the Results section.

3.3.4. *Connotative aspects of epistemological beliefs*

The second questionnaire was the Connotative Aspects of Epistemological Beliefs (CAEB) (See Appendix B) developed by Stahl and Bromme (2007), which looks at individuals' implicit attitudes, emotions, and subjective associations related to their beliefs about the nature of knowledge and learning. Considering the inconsistent findings that exist in studies investigating the epistemic beliefs of students, Stahl and Bromme (2007) highlighted that students' responses depend on whether they draw from their explicit or implicit understanding when answering items in epistemic belief questionnaires. Thus, they propose that there should be a distinction between explicit-denotative (what students know about the standards and practices of knowledge generation) and implicit-connotative (students' personal associations and experiences with knowledge generation) aspects when investigating epistemic beliefs. Thus, they developed an instrument that focuses on the associative/connotative aspects to be used in combination with other instruments to gain a broader understanding of students' epistemological beliefs.

In this measure, 24 semantic differential adjective pairs were developed using 3 of the epistemological dimensions used in the development of the DFEBQ (Hofer, 2000; Schommer, 1990b) namely, Simplicity of knowledge, Certainty of knowledge, and Source of knowledge. The adjective pairs were selected in three phases and subsequently classified under the relevant dimensions accordingly (e.g. “simple – complex” under Simplicity, “stable – unstable” under Certainty, and “objective – subjective” under Source), with each dimension having 8 adjective pairs each (Stahl & Bromme, 2007). These opposing adjective pairs are rated on a 7-point semantic differential scale. Unlike other measures, such as the DFEBQ, which looks at scores as a rough aggregate of “naïve” or “sophisticated” epistemic beliefs, the CAEB emphasises context-dependent views of knowledge. This means that rather than assuming a strict progression of beliefs, the CAEB acknowledges that individuals' epistemic beliefs may shift depending on the domain or context. For instance, a student might view knowledge as fixed and certain in one area but complex and evolving in another. Thus, the adjective pairs are constructed in a way to capture students' connotative beliefs.

To investigate the factor structure of the instrument, Stahl and Bromme (2007) conducted a varimax factor analysis on 21 adjective pairs after excluding three items that were reported to be problematic for the participants, which yielded a three-factor solution. Cronbach's alpha for the third dimension was low across three data sets (the range was between $\alpha = 0.44 - 0.47$), leading to a forced two-factor solution comprising 17 items. The factor items were different from the initial theoretical assumptions; thus, the factors were given new labels, namely, Texture, which refers to the accuracy and structure of knowledge and Variability, which refers to the stability and dynamics of knowledge. There was good reliability for the two new factors, with Cronbach's alpha values reported between 0.77 and 0.84 across three data sets. However, in a different study, a reliability test showed that only the Texture dimension had good internal consistency across two subjects ($\alpha = 0.75$ for both) whilst the Variability dimension had poor reliability ($\alpha = 0.57$ and 0.56) (Bientzle et al., 2014). Thus, a factor analysis and subsequent reliability analysis were also conducted to observe which factors would emerge as important for this particular sample, which are reported in the Results section.

3.3.5. Exposure to information technology questionnaire

The final section looked at exposure to information technology, which was measured using a previously developed questionnaire by Pitman and Thatcher (see Appendix D) which looked at students' previous experiences with information technology prior to entering university. The original instrument contains 24 items which look at access to technological devices in high school, the extent of technological skills, parents/guardians' access to technological devices and current use of online resources for university studies. After careful consideration, only 5 items of the questionnaire were included in the analysis of this study to descriptively understand participants' exposure to information technology prior to starting university. The selected items were divided into two subsections: firstly, Technological access in high school which included 4 items asking about access to devices such as a home computer. These items were rated on a 4-point Likert scale with 1 representing "No access" and 4 representing "On-demand access", which means they could use the device whenever they needed to. Secondly, one question that required participants to indicate how frequently they made use of

online information and resources in their schoolwork was rated on a 5-point Likert-scale with 1 representing ‘Not at all’ and 5 representing ‘Very frequently’.

The Technology access items were weighted differently because ‘Adequate access’ to Own computer is more stable and consistent than, for instance, ‘On-demand access’ to a school computer. To ensure that ‘Adequate access’ to a personal computer had a greater influence on the total technology access score, weighting was applied in SPSS to specific response options. Specifically, responses of ‘Adequate access’ for own computer were assigned a higher score than their original scale value, while other responses retained their original values. This adjustment ensured that the ‘Adequate access’ to a personal computer had more impact on the total score than ‘On-demand access’ to school computers, for instance. The online frequency question was not recoded to match the 4-point access scale because conceptually, the two subscales seem to be measuring different types of access. Although access to technology does not mean much without online connectivity in our time, access to a computer offers far more resources such as internet connectivity and programs like Word, PowerPoint etc that might offer different type of access to someone who frequently used online resources in their school work but primary used their phone to search on Google but is not proficient in other computer-related activities.

3.4. Procedure

The nature of all the questionnaires was self-report; thus, students were able to fill out the questionnaires at a time convenient for them within a stipulated deadline. A link leading to the online platform where all the questionnaires were available was sent via the University’s learning management system (Ulwazi) to first-year undergraduate Psychology students. The duration of the online survey was approximately 20-30 minutes, depending on the individuals’ reading and response speed.

Following the opening of the link, students were presented with a Participant Information Sheet (Appendix) that outlined the purpose, aim, and the associated benefits/risks of the study. Students then had to grant consent that they understood the nature of the study before proceeding. The survey proceeded to the first section, the Epistemic Beliefs Survey (Appendix B) which collected demographic information to obtain relevant background details and epistemic

beliefs, which included the DFEBQ Likert-scale and the CAEB semantic differential. The second section included questions from LSM-Revised (Appendix C), which captured the socioeconomic status of the participants and their parents. The final section was the Exposure to Information Technology Questionnaire (Appendix D), which asked questions about access and frequency of using online resources.

Following the completion of the questionnaires necessary for the study, students were directed to a separate final page that required their student numbers. As mentioned above that there was a 1% course credit for students who participated in the study, and the final page collected their student numbers so they could be sent to the course facilitator for mark allocation. This page remained separate from the main survey, and no identifying information was used in the clean-up and analyses.

3.5. Preparation of the data for analysis

3.5.1. Stage 1

REDCap (Research Electronic Data Capture) is a secure, web-based platform that was used to design and administer the survey completed by participants. Response data was then exported from REDCap as a Microsoft Excel file, where the initial clean-up process was done. The total number of responses was 309, which was adjusted as different stages of the clean-up progressed. First, 15 participants who did not complete the consent section of the survey were removed. Secondly, 19 participants who did not indicate their educational status (whether they were first-generation students or not) and did not complete any of the subsequent questions were also removed. Third, 30 participants who had more than 20% missing values were also removed. Participants with more than 20% missing data were excluded from the analysis to ensure the reliability and validity of the results. High proportions of missing values can bias parameter estimates and reduce the accuracy of statistical inferences (Tabachnick & Fidell, 2019). The 20% threshold is commonly used as a conservative criterion to retain data quality while maintaining an adequate sample size. This left a total of 244 remaining participants in the dataset. Any other

field deemed unnecessary for data analysis was also deleted. Only the demographic information and the subscale responses for each of the questionnaires were retained.

3.5.2. Stage 2

Following the initial stage of cleaning up, the dataset was then imported into IBM SPSS Statistics version 29 to prepare for analysis. Some items needed to be recoded to ensure that SPSS processed the values correctly. For instance, one of the demographic questions included collecting information about participants' proficiency across 11 official South African languages. The instruction on the survey stated that "any languages with no response recorded will be coded as 'none'". Thus, all blank spaces that were coded as "system missing" on SPSS were recoded as 0 for 'none'. Then, the epistemic belief subscales were individually examined to identify items that needed reverse scoring. The DFEBQ had two items that needed to be reversed according to Hofer (2000); thus, a new variable column was added to reverse-score each of these items.

3.6. Data analysis

The IBM SPSS Statistics 29 software was used to carry out the statistical analysis. An exploratory factor analysis (EFA) was conducted on both the DFEBQ and the CAEB to identify underlying dimensions specific to this sample or to validate the construct structure of the survey instrument.

The suitability of the data for factor analysis was assessed using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity. Items with factor loadings below 0.30 were considered insignificant, and cross-loadings on multiple factors exceeding 0.30 were retained; however, the decision on which factor to interpret was made based on which items had the highest loading and the second loadings were put in parentheses for transparency.

Reliability of the scales was assessed using Cronbach's alpha. Considering that the scales/questionnaires have multiple dimensions, reliability analyses were run for each of the

dimensions/constructs. Descriptive statistics were then calculated to summarise the sample characteristics.

Since the primary research questions focus on investigating if there's a difference in epistemic beliefs between first-generation and continuing-generation students, an independent-samples t-test was used to determine if a difference exists between the means of two independent groups. Assumptions of normality and homogeneity of variances were checked using the Shapiro-Wilks and Levene's test for equality of variances.

Finally, a two-way ANOVA was conducted to examine the possible moderating effect of socioeconomic status (SES) on the relationship between student generation status (first-generation vs. continuing-generation) and epistemic beliefs. The ANOVA was used to test for main effects and interactions between the independent variable (generation status) and the moderating variable (SES) on the dependent variable (epistemic beliefs).

3.7. Ethical considerations

Bless et al. (2013) highlight the importance of the social researcher adhering to ethical practice when conducting research. The researcher holds more power than those who participate in the study, and thus, the researcher must ensure that they protect the participants as much as possible to avoid any direct or indirect harm that may come to them as a result of their participation in the study. Research has the potential to generate information that can truly be representative of existing phenomena, and thus it does hold social power based on personal information that participants share. This is important to consider in the South African context, where the nature of this research investigates educational and social aspects of the sample that may or may not lead to a generalised view of the demographic groups involved. This study obtained ethical clearance from the Human Research Ethics Committee (HREC – Non-medical) under clearance number (MEd/23/08) and followed the recommended ethical criteria by the committee to conduct the research.

Participation was strictly voluntary, and interested students who followed the link from the invitation first saw the landing page of the survey, which consisted of the Participant

Information Sheet. The PIS explained the purpose of the study, the duration of the online survey, and outlined important information about what they can expect from participating. The PIS also outlined their rights in relation to the study, such as the right to discontinue or withdraw their participation from the study before submitting their responses of the survey. For all submitted responses, only the researcher and the research supervisor had access to participants' information. Participants' responses were kept anonymous as the page collecting their student numbers was kept separate from the data collected for the research and was deleted after submission to the course coordinator for credit allocation. Thus, anonymity in this case was guaranteed because participants' responses cannot be linked as belonging to them since all identifying information was not included in the procedure, analysis and write-up of this final research report. The PIS also contained relevant contact details of the researcher, supervisor, and ethics committee if participants had any questions or concerns.

Immediately after the landing page, participants were asked to confirm their consent to participate, as well as to confirm that they are 18 years or older. Any participants who did not complete the consent form were excluded from the study. In granting consent, participants agree that the data obtained to be used as part of this research report or for further analysis required within the scope of the topic covered in the research. The findings will be disseminated through the submission of this research report to the University of the Witwatersrand as part of the requirements for the Master's degree. The final report will be stored in the university repository and may be accessed for academic reference. In line with the ethical principle of non-maleficence, participants were made aware that the results would in no way be used to infer intellectual performance but rather to understand their epistemic beliefs for better understanding and to contribute to knowledge production. The data collected was kept confidential at all times using a password-protected file system on the researcher's and supervisor's personal computers.

3.8. Conclusion

This chapter outlined the methodological approach used to investigate epistemic beliefs among first-year Psychology undergraduate students. It described the research design, sampling

procedures, and data collection process, including the collection of demographic information and the use of the LSM-Revised, DFEBQ, and CAEB questionnaires. These questionnaires were used to capture participants' educational history, first-generation status, socio-economic status, and epistemic beliefs. As a matter of interest, information about the exposure to information technology in high school was collected using the IT Survey. The chapter detailed the procedures used, as well as the statistical analyses employed to explore relationships among these variables. Ethical considerations were also included.

The next chapter presents the results obtained from these analyses. It reports the outcomes of the factor analyses conducted on epistemic belief measures, reliability scores, and inferential statistics of epistemic beliefs of first-generation and continuing-generation students.

Chapter Four: Results

4.1. Descriptive Statistics

The following section contains the demographic characteristics of the sample and descriptive statistics for key study variables. A total of 244 participants were included in the study, which consisted predominantly of females (78.3%) as indicated in the sample characteristics (section 3.2.1 of Chapter 3). Within the sample, the study looked at two educational subgroups, namely, first-generation students and continuing-generation students. Over half of the participants indicated that they were not the first in their immediate family to attend university (71.3%), whereas a smaller percentage indicated they were first-generation students (28.7%), thus making the group sizes uneven. The sample characteristics in section 3.2.1 also included the distribution of home language across the sample, which showed that 42.6% indicated English as their home language. Of the participants who did not report English as their home language ($n = 140$, 57.38%), the majority rated themselves as fluent in English (90.7%), indicating bilingualism and that most non-native English speakers were comfortable with the language of the questionnaires.

Table 1. *English fluency among non-English home language participants*

Fluency Rating	n	%
0 - None	3	2.1%
1 – Beginner	1	0.7%
2 - Intermediate	9	6.4%
3 – Fluent	127	90.7%

Note. Percentages may not total 100% due to rounding.

In addition, the study collected information about students' educational background. Table 2 provides a summary of participants' schooling background, such as the type and location

of the high school they attended. These questions are demographic variables of interest that can function as some indicators of socioeconomic status and exposure to information technology.

Table 2. *Descriptive statistics for schooling background*

Question	N	%
Are you the first in your immediate family to study at university?		
No	174	71.3%
Yes	70	28.7%
What is the type of high school you matriculated at?		
Government school	152	62.3%
Private school	82	33.6%
Home school	2	0.8%
Other	2	0.8%
Missing values	6	2.5%
What is/was the location of your high school at which you matriculated?		
Suburb	124	50.8%
City	48	19.7%
Township	37	15.2%
Rural	27	11.1%
Other	5	2.0%
Missing values	3	1.2%

The results showed that over half of the sample (50.8%) attended a school in a Suburb; however, this was populated by students who attended both government and private schools. More than 60% of the participants stated that they completed their final year of high school at a government school. Among the students who attended a government school, the largest proportion was in schools located in a Suburb (44.7%), followed by schools in a Township (22.7%). Fewer students were in government schools located in a City (16.7%) and others in a Rural area (14.7%). The location of the government schools is important to consider, as South

Africa uses a system of five quintiles to classify different public schools based on socioeconomic status.

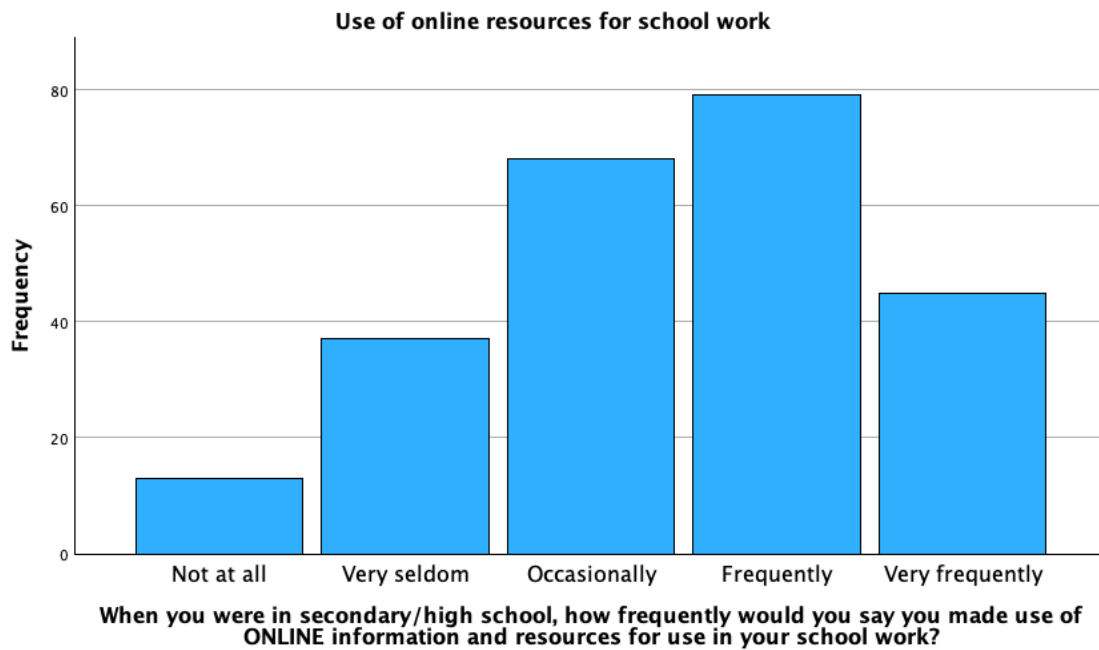
Additionally, the study also looked at participants' exposure to information technology, such as access to technology devices (rated on a 4-point Likert scale) and online resources (rated on a 5-point Likert scale). Table 3 below shows the frequencies, which indicate the typical access level in the sample.

Table 3. *Frequency table for access to technological devices and online resources*

Tech access in high school	No access		Limited access		Adequate access		On-demand access		Missing	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
School computer	61	25	56	23	73	29.9	53	21.7	1	0.4
Home computer	83	34	35	14.3	62	25.4	61	25	3	1.2
(not your own)										
Computer of friend/family	101	41.8	53	21.7	56	23	31	12.7	2	0.8
Your own computer	98	40.2	11	4.5	33	13.5	98	40.2	4	1.6

Table 3 shows participants' reported access to various types of computers during high school. Notably, access to personal computers was polarised, with 40.2% reporting they had on-demand access and an equal percentage reported having no access. While school computers were more consistently available, only 21.7% had on-demand access. These findings highlight significant disparities in digital access during high school, particularly in personal ownership. Nevertheless, despite the various types of access, more than half (55.3%) of the participants indicated that they matriculated in 2022, which means many students were in their senior years of schooling during the COVID-19 pandemic. Due to lockdown restrictions, many schools resorted to remote learning, which required learners to use online resources in their school work (Hoadley, 2023). Figure 1 below shows the use of online resources for school work when participants were still in high school.

Figure 1. *Distribution of use of online resources in high school*



The distribution shows that regardless of the type of access, many participants used online information and resources frequently in their school work, which also coincides with the system of remote learning that was prevalent during COVID-19.

All these sample characteristics are important to consider in this study, which is investigating the epistemic beliefs of students coming from different educational, socio-economic, and technological backgrounds. In preparation to conduct analyses and investigate if there were differences in epistemic beliefs between first-generation and continuing generation students, the obstacle of missing values within the epistemic beliefs scales was considered. To address missing data in the CAEB and DFEBQ scales, mean imputation was applied based on the mean item response across the sample for each scale, respectively. This decision was based on the observation that missing values were few and appeared to be missing at random. Imputing the mean item response per scale preserved the sample size and prevented listwise deletion in

SPSS. However, before analysing group differences, a series of exploratory factor analyses were conducted on the epistemic beliefs instruments first to gain a better understanding of the factors/dimensions that are important for this sample.

4.2. Exploratory Factor Analysis

4.2.1. General and discipline-focused epistemic beliefs

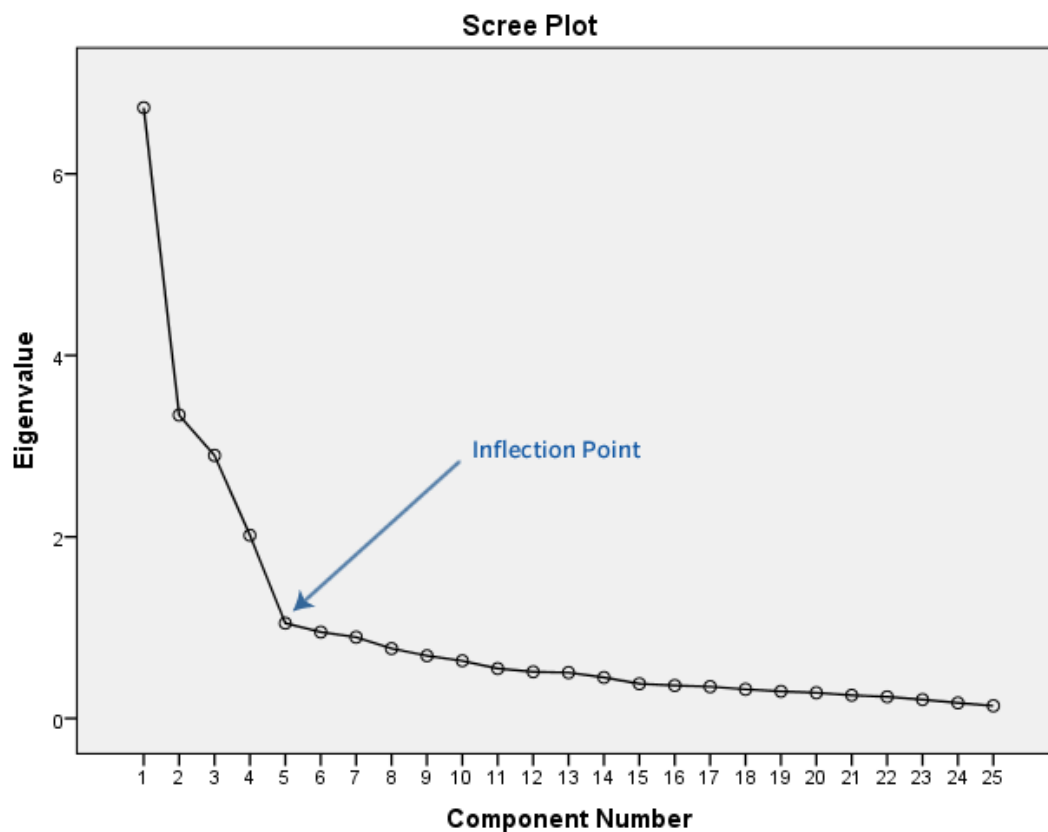
The DFEBQ is an instrument that has been utilised in various studies to investigate epistemic beliefs, which contains items about general and discipline-focused statements. However, there have been variations in how this measure has been used, making it difficult to standardise the dimensions. For instance, Cazan (2013) as well as Choi & Kwon (2012) used the original dimensions initially proposed by Hofer (2000), namely Certainty of knowledge, Simplicity of knowledge, Source of knowledge - Authority, and Justification of knowledge – Personal. Conversely, other authors such as Kalman et al. (2015), Karimi (2014), Muis et al. (2016) and Pauler-Kuppinger & Jucks (2017) used the dimensions that emerged as a result of the exploratory factor analysis (EFA) that Hofer (2000) conducted in the same study (i.e. Certainty/simplicity of knowledge, Source of knowledge - Authority, Justification of knowledge - Personal, and Attainment of truth). Out of the abovementioned studies, only Cazan (2013) and Karimi (2014) conducted an exploratory factor analysis that supported the dimensions that emerged in the factor analysis by Hofer (2000). In light of these variations, a factor analysis was conducted in the current study to examine which dimensions would emerge for this sample. Unlike Hofer (2000), who conducted a factor analysis on the discipline-focused items only, the current study ran an exploratory factor analysis on both the general and discipline-focused items. Consequently, the results of this EFA differ from the original factor structure, which limits comparability; however, this allowed for the analysis of more items and an understanding of how they function in the DFEBQ.

A principal components analysis (PCA) was run on the 29-question DFEBQ (Discipline-Focused Epistemic Beliefs Questionnaire) that measured general epistemic beliefs and discipline-focused epistemic beliefs. The suitability of PCA was assessed prior to analysis. Inspection of the correlation matrix showed that all items had at least one correlation coefficient

greater than 0.3, aside from five items, which were subsequently excluded from the factor analysis. The analysis proceeded with 24 items from the original questionnaire. The overall Kaiser-Meyer-Olkin measure was $KMO = 0.78$, with individual KMO measures all greater than 0.5, with classifications ranging from 'miserable' ($0.5 \leq KMO < 0.6$) to 'meritorious' ($0.8 \leq KMO < 0.9$) according to Kaiser (1974). Bartlett's test of sphericity was statistically significant $\chi^2(276) = 1469.55$, $p < 0.001$, indicating that the data was appropriate for factor analysis.

PCA revealed six components that had eigenvalues greater than one, which explained 20.5%, 9.6%, 8.7%, 5.8%, 5.6% and 4.5% of the total variance, respectively. Visual inspection of the scree plot (Table 3 below) indicated that four components should be retained (Cattell, 1966). In addition, a six-component solution reflected a “complex structure” on the interpretability criterion, which prompted an adjustment to evaluate if the four components would yield a simpler structure.

Figure 2. *Scree plot for DFEBQ*



The adjusted four-component solution had eigenvalues greater than one, which explained 20.5%, 9.6%, 8.7%, and 5.8% of the total variance, respectively. Principal Component Analysis with varimax orthogonal rotation was employed to explore the underlying factor structure. The extracted communalities for the DFEBQ items ranged between 0.22 and 0.7. While some items had low communalities, indicating that a small proportion of their variance was captured by the factor solution, all items were retained in the present analysis. This decision was made to preserve the content coverage of the scales; however, items with very low communalities should be interpreted with caution.

The rotated solution still exhibited a complex structure where some variables loaded on more than one component (Thurstone, 1947). Despite not receiving a “simple structure” result as preferred, items that cross-loaded were retained if they were $> .30$. Although not ideal, the cross-loaded items were retained based on two reasons. First, theoretical discussions suggest that there may be an overlap with some dimensions of epistemic beliefs. For example, beliefs about the certainty of knowledge may overlap with beliefs about the simplicity of knowledge in certain disciplinary contexts (Hofer, 2000). Secondly, the cross-loaded items demonstrated conceptual relevance to the constructs under investigation and contributed meaningfully to the overall interpretation of the factors. Removing them would risk omitting valuable content that reflects the complex nature of epistemic beliefs. Thus, despite the complex structure, a four-factor solution was forced with a principal components procedure and varimax rotation. Generally, the results of this factor analysis are discussed in relation to the exploratory factor analysis results presented by Hofer (2000), which were used to develop the instrument; however, they will not be directly compared.

Despite yielding a similar dimensional structure, the results of the current factor analysis showed slight differences as some items loaded onto different dimensions than what was initially proposed. This was expected due to the inclusion of the general items in the analysis; however, some discipline-focused items also loaded onto different factors in the current study, which are not observed in the factor analysis run by Hofer (2000). Component loadings of the rotated

solution are presented in Table 4 below, followed by a discussion of the factors and item loadings.

Table 4. *Factor loadings for DFEBQ*

Rotated Component Matrix ^a				
Variables	Component 1 (cert/simpl.)	Component 2 (attainment)	Component 3 (justif: personal)	Component 4 (source: authority)
All professors in Psychology would probably come up to the same answers to questions in the field. (dfebq_17)	.734	.023	.094	.114
In Psychology, most work has only one right answer. (dfebq_15)	.731	.017	.106	-.087
Truth is unchanging in Psychology. (dfebq_14)	.692	.080	.057	-.082
Principles in Psychology are unchanging. (dfebq_16)	.678	-.105	-.075	.093
All experts in Psychology understand the field in the same way. (dfebq_13)	.609	.118	.122	-.060
If my personal experience conflicts with ideas in the textbook, the book is probably right. (dfebq_26)	.582	.059	-.071	.226
If you read something in a textbook for Psychology, you can be sure it's true. (dfebq_25)	.516	.190	-.097	.267
Sometimes you just have to accept answers from the experts in Psychology, even if you don't understand them. (dfebq_24)	.499	.152	-.011	.252
Most of what is true in Psychology is already known. (dfebq_19)	.428	.062	.227	(.374)
Most words have one clear meaning. (dfebq_4)	.397	.241	.178	-.135
If lecturers would stick more to the facts and talk less about ideas, one could get more out of university. (dfebq_8)	.357	.232	(.356)	-.245
Scientists can ultimately get to the truth. (dfebq_7)	.128	.828	-.014	.031
If scientists try hard enough, they can find the truth to almost anything. (dfebq_5)	.083	.817	.148	-.078
If scholars try hard enough, they can find answers to almost anything. (dfebq_29)	.056	.627	-.065	(.435)

Experts in Psychology can ultimately get to the truth. (dfebq_28)	.091	.597	-.164	(.441)
I am more likely to accept ideas of someone with first-hand experience than ideas of researchers in Psychology. (dfebq_21)	-.259	.114	.621	.203
Correct answers in Psychology are more a matter of opinion than fact. (dfebq_22)	-.022	-.023	.598	.020
If a person tries too hard to understand a problem, he or she will most likely end up being confused. (dfebq_11)	.211	-.049	.564	.033
It's a waste of time to work on problems which have no possibility of coming out with a clear-cut and unambiguous answer. (dfebq_6)	.254	.152	.476	-.141
If you are ever going to be able to understand something, it will make sense to you the first time you hear it. (dfebq_10)	(.342)	.038	.446	(.337)
Almost all the information you can learn from a textbook you will get during the first reading. (dfebq_9)	(.357)	-.092	.433	.197
There is really no way to determine whether someone has the right answer in Psychology. (dfebq_23)	-.090	-.073	.431	-.134
I am most confident that I know something when I know what the experts think. (dfebq_27)	.124	.046	-.072	.696
First-hand experience is the best way of knowing something in Psychology. (dfebq_20)	-.060	.150	(.386)	.498

Note. Major loadings for each items are bolded.

Numbers in parentheses indicate multiple loadings above .30.

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

The results of this factor analysis support the four-factor structure proposed by Hofer (2000) in the development of the DFEBQ. Based on the content of the item loadings, the factor structure in the current study emerged as (1) Certainty/simplicity of knowledge, (2) Attainment of truth, (3) Justification of knowledge: Personal, and (4) Source of knowledge: Authority. A comparison of the current study's factor loadings with the results of Hofer (2000) can be seen in Table 5 below.

Table 5. *Comparison of current factor loadings with Hofer's factor analysis*

Factor/dimensions	Hofer (2000)	Current study
Certainty/simplicity of knowledge	dfebq 12	*dfebq 4
	dfebq 13	*dfebq 8
	dfebq 14	dfebq 13
	dfebq 15	dfebq 14
	dfebq 16	dfebq 15
	dfebq 17	dfebq 16
	dfebq 18	dfebq 17
	dfebq 19	dfebq 19
		dfebq 24
		dfebq 25
Attainment of truth		dfebq 26
	dfebq 28	*dfebq 5
	dfebq 29	*dfebq 7
		dfebq 28
Justification of knowledge - Personal		dfebq 29
	dfebq 20	*dfebq 6
	dfebq 21	*dfebq 9
	dfebq 22	*dfebq 10
	dfebq 23	*dfebq 11
		dfebq 21
		dfebq 22
Source of knowledge - Authority		dfebq 23
	dfebq 24	dfebq 27
	dfebq 25	dfebq 20
	dfebq 26	
	dfebq 27	

Note. Items marked with * are general items in the questionnaire.

Component 1 (Certainty/simplicity of knowledge) emerged as one factor and was the most stable factor with item loadings that are present in the original instrument (items 13, 14, 15, 16, 17, 19). There were three discipline-focused items (items 24, 25, 26) that loaded under this factor in the current study and two general items (items 4 and 8) that were not observed in the results provided by Hofer (2000). Similarly, with Component 2 (Attainment of truth), both of the items that loaded under this factor for Hofer (2000) also appeared in the current analysis (items 28 and 29). Item 5 (if scientists try hard enough, they can find the truth to almost anything) and item 7 (scientists can ultimately get to the truth), which were originally in the general questionnaire, loaded under this factor in the current study, which aligns with the conceptual understanding of this dimension. Component 3 (Justification of knowledge - Personal) showed three discipline-focused items that were present in the original structure (items 21, 22, 23) and four new general items (items 6, 9, 10, 11). Finally, Component 4 (Source of knowledge - Authority) only had one item (item 27) matching the results of Hofer (2000) and one other discipline-focused item that was not reflected in the original structure. Overall, the content of the item loadings indicates a factor structure that aligns with the theoretical underpinnings of the dimensions proposed by Hofer (2000), which are discussed later.

Cazan (2013) and Karimi (2014) also conducted factor analyses, which yielded a similar four-factor structure with similar but slightly different dimensions. Similar to the factor analysis conducted by Hofer (2000) and Karimi (2014), the current study also revealed that Certainty of knowledge and Simplicity of knowledge emerged as one factor as opposed to two distinct dimensions, as suggested by the literature and shown in the factor analysis results of Cazan (2013). The dimensions that emerged from this study are the same as the dimensions proposed by Hofer (2000) and Karimi (2014), with differences observed in the order of the factor structure and the loading patterns of select items.

The complex structure of the current factor analysis revealed that there is an overlap with seven items (items 8, 9, 10, 19, 20, 28, 29) that reflected cross-loadings across two or three dimensions. Additionally, as mentioned above, some discipline-focused items loaded onto different dimensions in this sample when compared to the results presented by Hofer (2000). In

both of these cases, factor items were interpreted and decided based on the strongest loading and/or the theoretical definition of the dimensions.

For items that loaded onto different dimensions than previously proposed, they were left unchanged if there was only one factor loading. For instance, items 24, 25, and 26 all loaded under Source of knowledge – Authority in the analysis by Hofer (2000), but for this sample, all these items loaded on the Certainty/simplicity dimension. These items were left unchanged in the “new” factor/dimension they loaded under, since there was only one factor loading per item, and the content of the items matched what the Certainty/simplicity dimension assesses.

In the case of items that cross-loaded, some items were considered for each factor based on the highest loading combined with the theoretical background of the dimensions. For instance, item 19 (most of what is true in Psychology is already known) loaded both under Certainty/ simplicity of knowledge and Source of knowledge – Authority, showing a potential overlap with the underlying construct of these two dimensions. Muis et al. (2016) explains that the Certainty/ simplicity of knowledge dimension evaluates beliefs regarding the nature of knowledge, whether it is viewed as fixed and simple or as tentative and complex. Conversely, the Source of knowledge – Authority dimension reflects beliefs that knowledge originates outside oneself and resides in external authorities such as textbooks and experts. When looking at item 19’s cross-loading, the loading under Certainty/ simplicity of knowledge (.428) was higher than Source of knowledge - Authority- Authority (.374). Taking the highest loading into account, looking at the definition of the dimensions as well as the results from Hofer (2000), item 19 fits better under Factor 1, Certainty/simplicity of knowledge. The item reflects a belief about the nature of knowledge, evaluating the extent of its certainty and simplicity in the field of Psychology, not an authority as a source of knowledge. The same principle of interpretation, theoretical consideration, and decision-making was applied to items 8, 9, 10, 28, and 29, which also loaded on more than one factor.

However, one cross-loaded item was considered according to which factor theoretically best fitted the content of the item. This was the case with item 20 (First-hand experience is the best way of knowing something in Psychology), which loaded both under the Source of

knowledge – Authority and the Justification of knowledge - Personal dimensions. The loading was higher under the Source of knowledge – Authority dimension (.498); however, theoretically it fits better under the third factor, Justification of knowledge – Personal, even though the loading was lower (.386). Whilst Source of knowledge – Authority looks at external authority as a source of knowledge, the Justification of knowledge - Personal dimension explores how individuals determine the validity of knowledge claims, the extent to which they rely on first-hand experience/logical reasoning to justify knowledge (Muis, 2016). The wording of the item and the underlying construct it assesses match the definition of the Justification of knowledge - Personal dimension by positioning first-hand experience as the best way to attain knowledge. This is also supported by the results of Hofer (2000), where the item also loaded under Justification of knowledge - Personal. Table 6 below shows the results of the factor analysis with the dimensions and adjusted theoretically appropriate loadings.

Table 6. *Factor analysis results of the DFEBQ*

Dimensions	N	Factor loadings
Certainty/simplicity of knowledge	11	
dfebq 4		.397
dfebq 8		.357
dfebq 13		.609
dfebq 14		.692
dfebq 15		.731
dfebq 16		.582
dfebq 17		.734
dfebq 19		.428
dfebq 24		.499
dfebq 25		.516
dfebq 26		.582
Attainment of truth	4	
dfebq 5		.817
dfebq 7		.828
dfebq 28		.597
dfebq 29		.627
Justification of knowledge - Personal	8	
dfebq 6		.476
dfebq 9		.433
dfebq 10		.446
dfebq 11		.564
dfebq 20		.386

dfebq 21		.621
dfebq 22		.598
dfebq 23		.431
Source of knowledge - Authority	1	
dfebq 27		.696

Note. This table excludes cross-loadings.

Following the adjustment which led to item 20 being placed under the Justification of knowledge - Personal dimension for theoretical consistency, this left only one item under the Source of knowledge – Authority dimension. This dimension thus had to be excluded from the analysis as a single item does not provide sufficient evidence of a latent variable. The purpose of a factor analysis is to identify underlying constructs across multiple variables (items) (Sellbom & Tellegen, 2019) and a factor should have at least three loaded items (Samuels, 2016).

4.2.2. Connotative aspects of epistemic beliefs

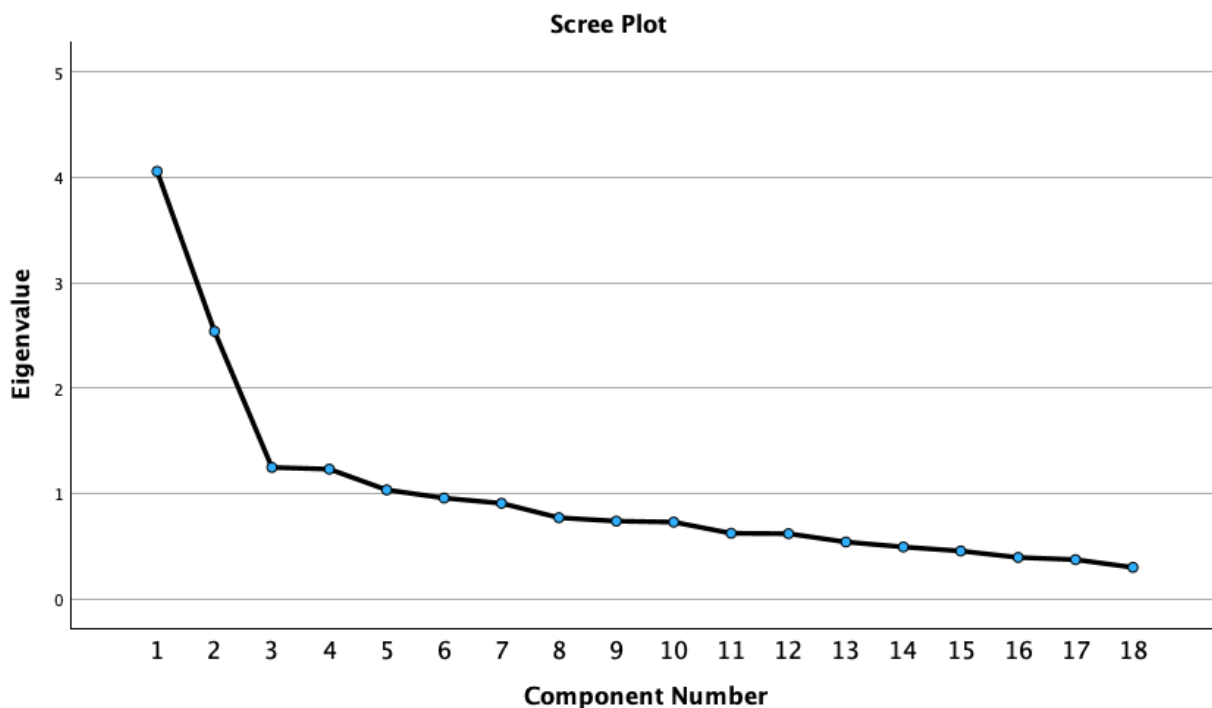
Similar to the DFEBQ, the factor structure of the CAEB also varies across different studies. Stahl and Bromme (2007) proposed two factors for this semantic differential instrument, which is supported in the factor analyses conducted by Beenen et al. (2017) and Kienhues et al. (2008). However, other studies had different factor structures, such as Schreck et al. (2024) that found a three-factor structure and Bientzle et al. (2014) that proceeded with one factor (used only Texture following a low reliability score for the Variability dimension). An exploratory factor analysis was thus conducted in this study to examine which dimensions would emerge for this sample.

A principal components analysis (PCA) was run on a 24-question CAEB questionnaire that measured individuals' implicit attitudes and beliefs about knowledge and knowing on 240 students (4 participants were excluded from this analysis based on exceeding the threshold of missing responses). The suitability of PCA was assessed before analysis. Inspection of the correlation matrix showed that 18 out of the 24 variables had at least one correlation coefficient greater than 0.3, and the remaining 6 variables were eliminated from the analysis. The overall Kaiser-Meyer-Olkin measure was $KMO = 0.76$, with individual KMO measures all greater than

0.5, classifications ranging from 'miserable' to 'meritorious' according to Kaiser (1974). Bartlett's test of sphericity was statistically significant $\chi^2(153) = 930.81, p < 0.001$, indicating that the data were factorizable.

PCA revealed five components that had eigenvalues greater than one and which explained 22.5%, 14.1%, 6.9%, 6.8% and 5.7% of the total variance, respectively. Visual inspection of the scree plot (Figure 3 below) indicated that two components should be retained (Cattell, 1966). However, a two-component solution reflected a complex structure on the interpretability criterion. Nonetheless, two factors were retained based on the analysis and theoretical development of the instrument (Stahl & Bromme, 2007).

Figure 3. *Scree plot for CAEB*



The two-component solution explained 22.5% and 14.1% of the total variance, respectively. A Principal Component Analysis with varimax orthogonal rotation was employed to aid interpretability. The extracted communalities for the CAEB items ranged between 0.48 and 0.77. While some items had low communalities, indicating that a small proportion of their

variance was captured by the factor solution, all items were also retained in the present analysis. This decision was made to preserve the content coverage of the scales; however, items with very low communalities should be interpreted with caution.

The rotated solution still exhibited 'complex structure' (Thurstone, 1947) with a few items that cross-loaded; however, a two-factor solution was forced with a principal components procedure and varimax rotation. Component loadings of the rotated solution are presented in Table 7 below.

Table 7. *Factor loadings for CAEB*

Rotated Component Matrix ^a		
Variables	Texture (1)	Variability (2)
Certain – Uncertain (caeb_22)	.695	
Definite – Ambiguous (caeb_14)	.650	
Exact – Vague (caeb_9)	.614	
Completed – Uncompleted (caeb_17)	.568	
Precise – Imprecise (caeb_12)	.549	(.404)
Stable – Unstable (caeb_2)	.535	
Confirmable – Unconfirmed (caeb_5)	.493	(.332)
Absolute – Relative (caeb_10)	.453	(-.350)
Structured – Unstructured (caeb_16)	.453	(.437)
Accepted – Disputed (caeb_21)	.443	
Objective – Subjective (caeb_3)	.399	
Temporary – Everlasting (caeb_8)	.372	(.314)
Open – Closed (caeb_19)		-.727
Connected – Divided (caeb_20)		.658
Flexible – Inflexible (caeb_13)		-.655
Refutable – Irrefutable (caeb_18)		-.554
Integrated – Separated (caeb_4)		.500
Sorted - Unsorted (caeb_11)	.480	(.480)

Note. Major loadings for each items are bolded.

Numbers in parentheses indicate multiple loadings above .30.

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

The forced two-factor solution as conducted by Stahl and Bromme (2007) was replicated in this study, which yielded the same factor structure and similar loadings as the original instrument, with slight differences. Firstly, unlike the results for the current sample, the factor analysis by Stahl and Bromme (2007) reflected a simple structure with each of the items emerging on one factor only. Secondly, the current study had some items that loaded onto different dimensions compared to what was initially proposed. For instance, item 2 (stable-unstable) and item 17 (completed-uncompleted) loaded under the Texture dimension in this sample, whereas both items loaded on the Variability dimension in the findings of Stahl and Bromme (2007).

However, for items that cross-loaded, more consideration had to be taken to evaluate which factor matched the items best, based on the theoretical definitions of the dimensions. When developing the instrument, Stahl and Bromme (2007) explain that the Texture dimension refers to beliefs about the structure and accuracy of knowledge (beliefs range between viewing knowledge as exact and structured to vague and unstructured) while the Variability dimension refers to beliefs about the stability and dynamics of knowledge (beliefs range between viewing knowledge as static and stable to dynamic and unstable). Items 5 (confirmable-unconfirmable), 10 (absolute-relative), 12 (precise-imprecise), and 16 (structured-unstructured) loaded onto both factors; however, the loadings for each item were higher under the Texture dimension. Considering the theoretical background of the dimensions and the underlying construct that each of these items is evaluating, it was evident that these items fit best under Texture, the dimension which looks at beliefs about the structure and accuracy of knowledge by evaluating if students view knowledge as exact or vague.

Item 8 (temporary - everlasting) also loaded higher on the Texture dimension compared to the loading for Variability. However, by applying the same process of considering the theoretical background and the results of the seminal study, this item fitted better under the Variability dimension instead which looks at the stability of knowledge. Item 11 (sorted – unsorted) had the same loading for both factors; however, theoretically, it is evaluating the

structure of knowledge, thus matching best with the Texture dimension. The results of the factor analysis for the CAEB can be found in Table 8 below.

Table 8. *Factor analysis results of the CAEB*

Dimensions	N	Factor loadings
Texture	12	
caeb 2		.535
caeb 3		.399
caeb 5		.493
caeb 9		.614
caeb 10		.453
caeb 11		.480
caeb 12		.549
caeb 14		.650
caeb 16		.453
caeb 17		.568
caeb 21		.443
caeb 22		.695
Variability	6	
caeb 4		.500
caeb 8		.314
caeb 13		.655
caeb 18		.554
caeb 19		.727
caeb 20		.658

Note. This table excludes cross-loadings.

4.3. Reliability analyses

The exploratory factor analysis helped to identify which loaded items were correlated with the relevant factors/dimensions proposed in the instruments assessing epistemic beliefs within this sample. Although the factor results of both the scales were similar to the seminal work of Hofer (2000) as well as Stahl and Bromme (2007), who developed the DFEBQ and the CAEB, respectively, a few of the items loaded onto different factors in this sample compared to the seminal studies. For this reason, reliability analyses were run to evaluate if the items within the subscales still had good internal consistency. Table 9 contains a summary of the Cronbach's alpha results for the subscales.

Table 9. *Reliability of the DFEBQ and CAEB*

Variables	Cronbach's alpha	N of items
DFEBQ		
Certainty/simplicity of knowledge	.807	11
Attainment of truth	.761	4
Justification of knowledge – Personal	.630	8
CAEB		
Texture	.780	12
Variability	.507	6

As mentioned above, the Source of knowledge – Authority dimension of the DFEBQ was not included in further analysis since internal consistency cannot be examined when there is only one item in the subscale (Lucas & Donnellan, 2012). This dimension seemed to overlap with other dimensions and may require further analysis in the South African context. For the remaining dimensions, the results showed mixed levels of internal consistency.

Certainty/simplicity of knowledge reflected good reliability ($\alpha = 0.807$), and it was higher than what Hofer (2000) and Karimi (2014) reported for Psychology ($\alpha = .74$ and $\alpha = .71$), respectively. Attainment of truth showed acceptable reliability ($\alpha = 0.761$) in this sample which is slightly lower than what Karimi (2014) ($\alpha = .80$) reported but higher than the result reported by Hofer (2000) (.60). Justification of knowledge - Personal reflected questionable reliability ($\alpha = 0.63$) which is similar to Cazan (2013) and Hofer (2000) who also reported low results ($\alpha = .55$ and $\alpha = .56$ respectively) but opposite to Karimi (2014) who reported acceptable reliability ($\alpha = .78$) for the same subscale.

The results of the CAEB show that the Texture dimension has good internal consistency ($\alpha = 0.78$), which is in line with what Beenan et al. (2017) ($\alpha = .70$), Kienhues et al. (2008) ($\alpha = .80$) and Stahl and Bromme (2007) reported (between $\alpha = .78$ and $\alpha = .83$ across three disciplines). However, the Variability dimension showed poor reliability ($\alpha = 0.507$) and had to be excluded from further analysis, similar to the result in the study by Bientzle et al. (2014) ($\alpha = .57$).

4.4 Epistemic beliefs of first-year psychology university students

4.4.1 Research question 1 - Are there differences in epistemic beliefs between first-generation and continuing-generation university students?

Students' epistemic beliefs were investigated using the DFEBQ Likert scale and the CAEB semantic differential questionnaires. Subscale scores were computed by grouping and averaging the relevant items, ensuring consistency across participants' responses. Mean scores were computed for each subscale of the questionnaires, respectively, with higher scores reflecting less "sophisticated" epistemic beliefs for the DFEBQ and more "sophisticated" beliefs for the CAEB.

Table 10. *Descriptive statistics for epistemic belief subscales by generational status*

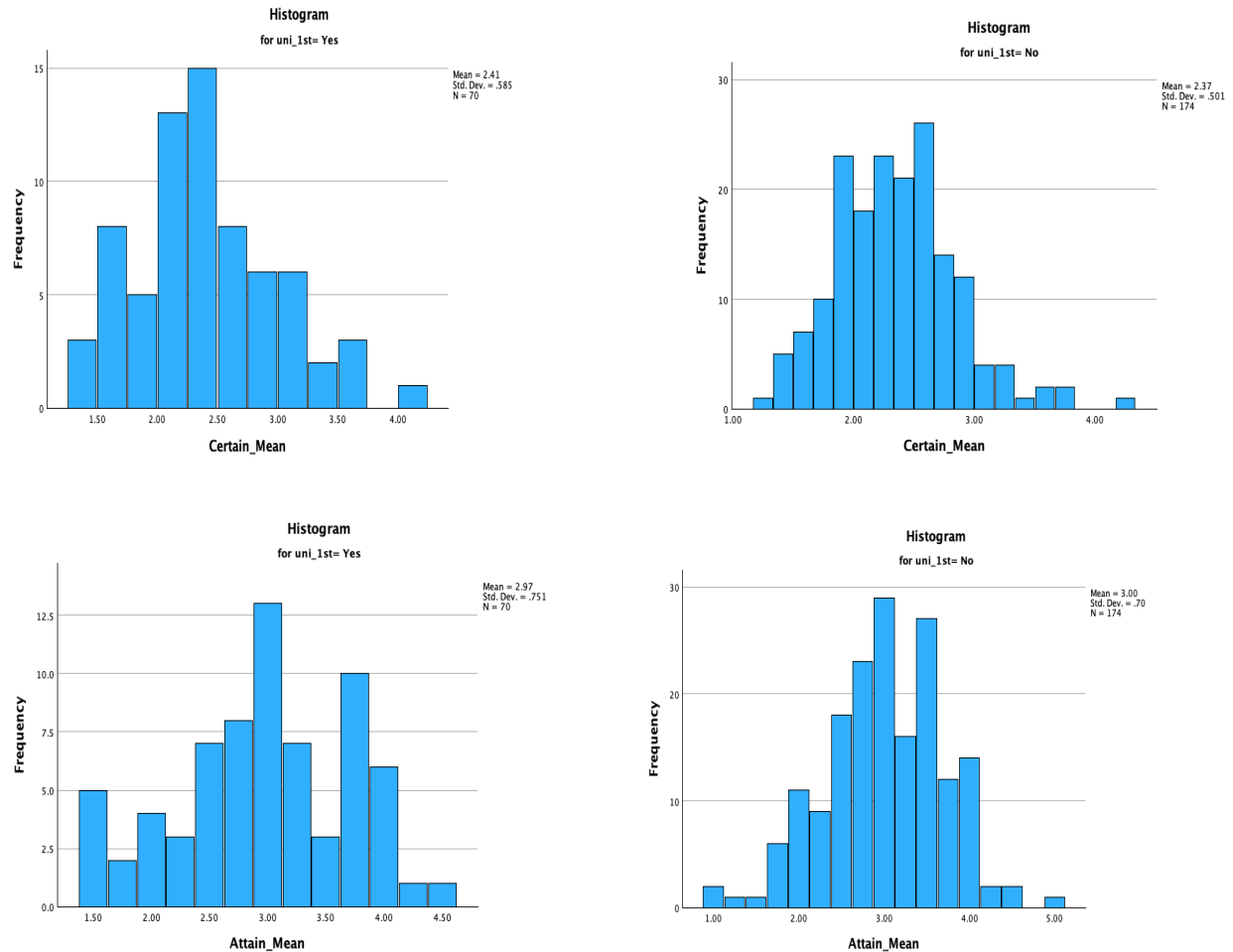
Variable	First generation ($n = 70$)	Continuing generation ($n = 174$)
	Mean (SD)	Mean (SD)
DFEBQ		
Certainty/ Simplicity of knowledge	2.405 (.584)	2.3656 (.501)
Attainment of knowledge	2.967 (.750)	3.004 (.700)
Justification of knowledge - Personal	2.807 (.534)	2.806 (.482)
CAEB		
Texture	3.737 (.438)	3.743 (.399)

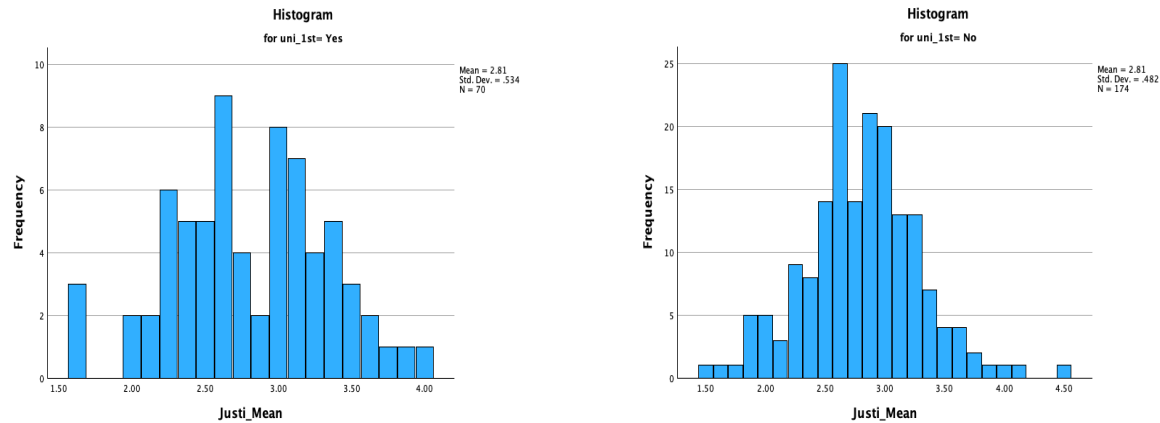
Note. DFEBQ subscales: 5-point scale where higher scores indicate agreement with less sophisticated epistemic beliefs. CAEB subscale: 7-point scale where higher scores indicate more sophisticated epistemic beliefs.

Visual inspection of the plots (Figure 4 below) showed that both groups were positively skewed in the Certainty/ simplicity of knowledge dimension. Attainment of truth appeared approximately normal, indicating more neutral responses for both groups, although the first-generation group shows varied responses on both sides. The Justification of knowledge -

Personal dimension appeared approximately normal for continuing-generation students; however, the first-generation group showed a bimodal distribution.

Figure 4. *Distribution graphs of the DFEBQ*





The primary research question looks at group comparison where generation status (first or continuing generation student) is the independent variable and epistemic beliefs are the dependent variable. This study hypothesised that a difference in epistemic beliefs between the two groups of generation status would be present, and thus, an independent samples t-test was an appropriate statistical analysis to use. An independent samples t-test helps to determine if a difference exists between the means of two independent groups on a continuous dependent variable. The t-test analyses were run for the CAEB and the DFEBQ subscales, respectively, as seen below (Table 11).

Table 11. *Independent samples t-test results for epistemic beliefs subscales*

	<i>t</i> (242)	<i>p</i>	Cohen's <i>d</i>
DFEBQ			
Certainty/Simplicity of knowledge	.537	.592	.076
Attainment of truth	-.360	.719	-.051
Justification of knowledge - Personal	.006	.996	.001
CAEB			

Texture	-.092	.927	-.013
---------	-------	------	-------

Note. Cohen's d represents the effect size. No comparisons were statistically significant ($p > .05$).

An independent-samples t-test was first run on the Texture subscale of the CAEB (see Table 11) to determine if there were differences in epistemic beliefs between first-generation and continuing-generation students. However, before conducting the independent t-test, tests of parametric assumptions had to be run. First, it was important to test for outliers by inspecting the boxplot. The results showed that there were some outliers in the data within 1.5 box lengths; however, these were retained in the analysis. Simulation studies have demonstrated that with sufficiently large sample sizes, the t-test maintains control over Type I error rates even in the presence of outliers (Widerberg, 2019). Furthermore, the removal of outliers can inflate Type I error rates (Bakker & Wicherts, 2014). Therefore, all data points were retained to preserve the integrity of the analysis. Second, the data had to be checked to determine whether it was normally distributed. The Shapiro-Wilk result was used for this sample ($n > 50$) which showed that epistemic beliefs for both first generation ($p = .262$) and continuing generation ($p = .089$) students was normally distributed ($p > .05$). Finally, the assumption for homogeneity of variance was met which indicated that the population variance of both groups was equal as assessed by Levene's test for equality of variances ($p = .621$, $p > .05$). Following these results, the analysis proceeded to the independent samples t-test.

An independent samples t-test was conducted to compare Texture scores between first-generation and continuing-generation students. First-generation students ($M = 3.737$, $SD = .347$) scored slightly lower than continuing-generation students ($M = 3.743$, $SD = .399$), though this difference was not statistically significant, $t(242) = -.092$, $p = .927$, 95% CI $[-.119, .109]$. This null result may reflect limited variance in the measure or the sample rather than the absence of a true difference. To explore the epistemic belief patterns in more depth, item means and 95% confidence intervals (see Table 12 below) were examined across the total sample.

Table 12. *Item means and confidence intervals for CAEB (Texture)*

Items	Mean	SD	95% Low CI	95% High CI
-------	------	----	------------	-------------

caeb 2	3.85	1.415	3.67	4.02
caeb 3	4.44	1.370	4.27	4.61
caeb 5	3.21	1.229	3.06	3.37
caeb 9	3.68	1.251	3.52	3.83
caeb 10	4.94	1.237	4.79	5.10
caeb 11	3.21	1.285	3.05	3.38
caeb 12	3.40	1.260	3.24	3.56
caeb 14	4.05	1.319	3.88	4.21
caeb 16	2.99	1.243	2.83	3.14
caeb 17	4.70	1.493	4.52	4.89
caeb 21	3.71	1.383	3.54	3.88
caeb 22	3.76	1.242	3.60	3.92

Of the 12 CAEB Texture items, only 2 had confidence intervals that included the scale midpoint (4.00), indicating a neutral/undecided stance on those items (items 2 and 14). The majority of the items suggest that participants were largely non-neutral in their responses. For example, Item 10 (absolute - relative) showed a mean of 4.94 with a 95% CI [4.79, 5.10], indicating a higher score, while Item 16 (structured – unstructured) showed a mean of 2.99 with a 95% CI [2.83, 3.14], reflecting a strong tendency toward the opposite epistemic pole. For the CAEB, higher scores are associated with more “sophisticated” epistemic beliefs (Bientzle, 2014).

An independent samples t-test was run on the three subscales of the DFEBQ (see Table 11), namely Certainty/ Simplicity of knowledge, Attainment of truth, and Justification of knowledge – Personal. Tests of parametric assumptions were evaluated prior as per the requirement of the independent samples t-test. Inspection of the boxplot indicated that Certainty/ Simplicity and Justification subscales had a few outliers within 1.5 box lengths; however, all data points were retained in the analysis based on the same reasons cited in the CAEB analysis. Normality of the DFEBQ subscales was assessed using the Shapiro-Wilk test. The Certainty/ Simplicity of knowledge subscale had one group meeting the normality assumption, while the other did not. Attainment of truth showed deviations from normality in both groups, and Justification of knowledge - Personal met the normality assumption in both groups. Despite these violations, independent samples t-tests were conducted for all subscales. This decision was based

on the relatively large sample size ($n = 244$), which, according to the Central Limit Theorem, allows the sampling distribution of the mean to approximate normality, rendering the t-test robust to minor deviations from normality (Kwak & Kim, 2017). The assumption for homogeneity of variance was met for all three subscales using Levene's test of equality of variances ($p = .163$, $p = .453$, $p = .110$, $p > .05$), respectively.

The mean scores for both groups across the three subscales of the DFEBQ are similar, with very minor differences. First-generation students scored slightly higher both in the Certainty/ Simplicity ($M = 2.405$, $SD = .584$) and Justification ($M = 2.807$, $SD = .534$) subscales compared to Continuing generation students, who scored ($M = 2.365$, $SD = .501$) and ($M = 2.806$, $SD = .482$) respectively. Conversely, the Continuing generation students had a slightly higher result in the Attainment of truth subscale ($M = 2.967$, $SD = 3.004$) compared to First-generation students ($M = 2.967$, $SD = .700$). The independent samples t-tests showed that there were no statistical differences for all three subscales: Certainty/ Simplicity $t(242) = .537$, $p = .592$, $d = .076$), Attainment of truth $t(242) = -.360$, $p = .719$, $d = -.051$, and Justification of knowledge - Personal $t(242) = .006$, $p = .996$, $d = -.001$. This null result might have occurred due to low statistical power, measurement insensitivity, limited variance, and contextual factors such as compensatory support.

Item means and 95% confidence intervals (see Table 13 below) were examined across the total sample for further exploration of discipline-focused epistemic beliefs.

Table 13. *Item means and confidence intervals of the DFEBQ*

Items	Mean	SD	95% Low CI	95% High CI
dfebq 4 (C/S)	2.791	1.0664	2.657	2.925
dfebq 5 (A)	2.778	1.0224	2.649	2.907
dfebq 6 (J)	2.422	.9286	2.305	2.422
dfebq 7 (A)	2.918	.8851	2.918	3.029
dfebq 8 (C/S)	2.578	1.0414	2.447	2.709
dfebq 9 (J)	2.385	.9597	2.264	2.506
dfebq 10 (J)	2.398	.9394	2.398	2.279

dfebq 11 (J)	2.730	1.0387	2.599	2.860
dfebq 13 (C/S)	1.881	.7632	1.785	1.977
dfebq 14 (C/S)	2.189	.8248	2.085	2.293
dfebq 15 (C/S)	1.885	.7665	1.788	1.981
dfebq 16 (C/S)	2.259	.9087	2.145	2.374
dfebq 17 (C/S)	1.996	.8190	1.893	2.099
dfebq 19 (C/S)	2.811	.8827	2.700	2.923
dfebq 20 (J)	3.358	.9159	3.243	3.474
dfebq 21 (J)	3.176	.9194	3.060	3.291
dfebq 22 (J)	2.840	.9269	2.723	2.957
dfebq 23 (J)	3.148	.8951	3.035	3.260
dfebq 24 (C/S)	2.671	.9764	2.548	2.794
dfebq 25 (C/S)	2.734	.8882	2.622	2.846
dfebq 26 (C/S)	2.340	.8134	2.238	2.443
dfebq 28 (A)	3.123	.8173	3.020	3.226
dfebq 29 (A)	3.156	1.0022	3.030	2.283

Note. Letters in parentheses represent the dimensions each item belongs to (Certainty/Simplicity, Attainment of truth, Justification – Personal).

Of the 23 DFEBQ items, only 1 had a confidence interval that included the scale midpoint (3.00), indicating a neutral/undecided stance on that item (item 7 under the Attainment of truth subscale). Similar to the CAEB, the majority of the items suggest that participants were largely non-neutral in their responses. For example, Item 20 (First-hand experience is the best way of knowing something in Psychology) had a mean of 3.358 with a 95% CI [3,243, 3.474], indicating a higher score, while Item 13 (All experts in Psychology understand the field in the same way) had a mean of 1.881 with a 95% CI [1.785, 1.977], reflecting a strong tendency toward the lower epistemic pole. Higher scores in the DFEBQ indicate agreement with less sophisticated/absolutist epistemic beliefs (Hofer, 2000; Karimi, 2014). The subscale mean scores and item total scores suggest that participants' epistemic beliefs are positioned close to the middle of the continuum, where beliefs are not fully naïve/absolutistic but not fully relativistic either.

4.4.2. Research question 2 - Does socioeconomic status moderate the effects of generational status on epistemic beliefs?

Four separate two-way ANOVA analyses were conducted to examine the main and interaction effects of generational status and socio-economic status on each of the four epistemic belief subscales, namely, Texture (CAEB), Certainty of knowledge, Attainment of truth, and Justification of knowledge - Personal (DFEBQ). Residual analyses were performed to test for the assumptions of the two-way ANOVA, and parametric assumptions are reported below for the subscales.

For all four subscales, a few outliers were assessed by inspection of their respective boxplots, which indicated the presence of mild outliers within 1.5 box lengths. Analyses were conducted with and without these outliers, which showed that there was no substantial difference in the results of the two-way ANOVA. Thus, the outliers were retained in the analyses, as these results suggest that the presence of outliers did not affect or alter the conclusions. Although outliers are not ideal, they do appear in real-world data and do not necessarily need to be removed unless they are extreme or significantly distort the analysis (Hair et al., 2014). Normality was assessed using the Shapiro-Wilks normality test for each cell of the design for all subscales. Most groups were normally distributed ($p > .05$); however the Texture, Certainty/Simplicity of knowledge and Attainment of truth subscales each had one group combination that deviated from normality (.005, .009, .023 respectively, $p < .05$). The decision was made to continue with the analyses regardless due to the fairly robust nature of ANOVAs (Laerd Statistics, 2021) when sample size per group is sufficient (> 20) (Field, 2018). Levene's test showed that Texture (.212), Attainment of truth (.777), and Justification of knowledge - Personal (.201) met the assumption of homogeneity of variance ($p > .05$). However, Certainty/Simplicity violated the assumption for homogeneity of variance with a Levene's test result of (.028). In the absence of an obvious non-parametric alternative, the decision was made to proceed with the originally proposed analysis and to interpret the results with caution, given the importance of this factor in the DFEBQ and the robust nature of the 2-way ANOVA to violations of normality and homogeneity of variance (Laerd Statistics, 2021).

Table 14. *Descriptive statistics for epistemic beliefs subscales by generation status and SES level*

Generation status	SES Level	<i>n</i>	Texture	Certainty /Simplicity	Attainment of truth	Justification of knowledge
			Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
First-generation	Low	39	3.822 (.466)	2.497 (.611)	2.949 (.705)	2.897 (.448)
	Middle	16	3.628 (.411)	2.445 (.609)	3.234 (.703)	2.703 (.646)
	High	15	3.637 (.356)	2.127 (.403)	2.733 (.868)	2.683 (.597)
Continuing generation	Low	42	3.720 (.476)	2.437 (.497)	2.827 (.727)	2.771 (.474)
	Middle	66	3.776 (.424)	2.413 (.586)	3.057 (.684)	2.854 (.526)
	High	66	3.725 (.315)	2.273 (.392)	3.064 (.689)	2.782 (.441)

Note. CAEB Texture subscale: 7-point scale where higher scores indicate more sophisticated epistemic beliefs. DFEBQ subscales: 5-point scale where higher scores indicate agreement with less sophisticated epistemic beliefs.

From the descriptive statistics, it is shown that Low SES had the highest proportion of students within the first-generation group, which contrasts with the continuing generation, which had the least proportion of students in the group. Across all subscales, first-generation students within the Low SES level had slightly higher mean scores than those in the continuing generation group. The highest number of continuing generation students was within the Middle and High SES levels. However, mean scores between these levels were mixed when compared to first-generation students. The results of the ANOVA analyses (see Table 15 below) showed that there was no interaction effect between generational status and SES level across all three subscales of epistemic beliefs.

Table 15. *Results of the 2-way ANOVA analyses for epistemic beliefs subscales by generation status and SES level*

Dependent Variable: Certainty/ simplicity of knowledge (DFEBQ)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Generation status	.014	1	.014	.052	.820	.000
SES	2.314	2	1.157	4.262	.015	.035
Gen status * SES	.342	2	.171	.630	.533	.005
Error	64.616	238	.271			

Dependent Variable: Attainment of truth (DFEBQ)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Generation status	.005	1	.005	.010	.921	.000
SES	2.373	2	1.186	2.354	.097	.019
Gen status * SES	2.033	2	1.016	2.016	.135	.017
Error	119.964	238	.504			

Dependent Variable: Justification of knowledge – Personal (DFEBQ)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Generation status	.073	1	.073	.294	.588	.001
SES	.324	2	.162	.655	.520	.005
Gen status * SES	.730	2	.365	1.474	.231	.012
Error	58.888	238	.247			

Dependent Variable: Texture (CAEB)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Generation status	.087	1	.087	.514	.474	.002
SES	.292	2	.146	.865	.422	.007

Gen status * SES	.568	2	.284	1.685	.188	.014
Error	40.113	238	.169			

The results of the interaction effects are reported along with the main effects for each subscale, respectively. The interaction effect between generation status and SES level on the Texture subscale of epistemic beliefs was not statistically significant $p = .188$ ($p > .05$). An analysis of the main effects for generation status $F(1, 238) = 0.514$, $p = .474$, partial $\eta^2 = .002$ and SES level were performed $F(2, 238) = 0.865$, $p = .422$, partial $\eta^2 = .007$ which also were not statistically significant. These null results may reflect limited variance in the measure or the sample rather than the absence of a true difference.

Two-way ANOVA analyses were also run on the DFEBQ dimensions (Certainty/ simplicity of knowledge, Attainment of truth, and Justification of knowledge - Personal). The interaction effect between generation status and SES levels on discipline-focused epistemic beliefs was not statistically significant ($p > .05$) for all dimensions, $p = .533$, $p = .135$, and $p = .231$, respectively. Analysis of the main effects was performed, which indicated that the main effects were not statistically significant for two of the dimensions. The main effect results for Attainment of truth by generation status were $F(1, 238) = .010$, $p = .921$, partial $\eta^2 = .000$ and SES level $F(2, 238) = 2.354$, $p = .097$, partial $\eta^2 = .019$. The main effect results for Justification of knowledge - Personal by generation status $F(1, 238) = .294$, $p = .588$, partial $\eta^2 = .001$ and SES Level $F(2, 238) = .655$, $p = .520$, partial $\eta^2 = .005$. Conversely, the Certainty/ simplicity dimension had one significant main effect. Although there was no significant main effect for generation status $F(1, 238) = .052$, $p = .820$, $\eta^2 = .000$, there was a significant main effect for SES level $F(2, 238) = 4.262$, $p = .015$, $\eta^2 = .035$, indicating that SES may be associated with differences in how students view the Certainty/ simplicity of knowledge. The effect sizes for all the subscales yielded small effect sizes for both main effects (generation status and SES) and their interactions. Partial eta squared (η^2_p) values ranged from .000 to .019. Effect sizes were classified based on Cohen's conventions (Maher et al., 2013).

4.5. Conclusion

This chapter presented the results of the statistical analyses conducted to examine the epistemic beliefs across first-generation and continuing-generation students. The factor analyses provided support for the underlying structure of the Discipline-Focused Epistemological Beliefs Questionnaire (DFEBQ) and Connotative Aspects of Epistemic Beliefs (CAEB). However, despite the similarities, there were slight differences in the factor structures and the item loadings of both measures. Subsequent analyses explored whether there were any differences in epistemic beliefs between the generation groups. Results showed that there was no notable difference in epistemic beliefs between first-generation and continuing-generation students. However, there was one statistically significant result for the Certainty/simplicity dimension of the DFEBQ, where there was a main effect between generation status and socio-economic status.

In the following chapter, the results are discussed in relation to existing literature. The findings are interpreted within the broader theoretical and empirical context of epistemic beliefs research and consider their implications for educational experience and future research.

Chapter Five: Discussion

5.1. Sample characteristics

This study sought to investigate if there are any differences in epistemic beliefs between first-generation and continuing-generation students. A review of the demographic data revealed that the sample ($n = 244$) was not evenly divided, as continuing generation students represented over 70% of the participants, indicating a predominance of this group in the study. Nevertheless, the study provided insightful and useful results. Although previous literature highlighted the role of educational background and socio-economic status in shaping epistemic beliefs, the analysis revealed that there was no statistically significant difference between the two groups. This suggests that the generational status of students may not play a significant role in shaping epistemic beliefs within this specific sample of undergraduate first-year Psychology students. The absence of a significant difference may instead reflect parity in the way students engage with knowledge, particularly at the beginning of university.

In an attempt to understand the sample's characteristics and skill set, information about students' accessibility to technological devices and use of online resources was collected (see Table 3). This is particularly relevant due to the prevalence of ICT use in universities (Bagarukayo & Kalema, 2015) in performing most academic activities. The descriptive statistics highlighted a digital divide among the students, especially concerning access to an on-demand personal computer, where 40.2% had access to one and 40.2% did not. School computers were more consistently available, with 29.9% indicating they had adequate access and 21.7% indicating they had on-demand access. Conversely, 25% stated they had no access to school computers. Considering that 62.3% of the participants attended government schools, these results also allude to the bimodal public school system that is characterised by persistent historical inequalities where some public schools have better infrastructure and digital access, and others lack access to useful resources (Spaull, 2012).

It is worth considering; however, that since the majority of the students were in their senior years of high school during the COVID-19 period, the lockdown restrictions that led to school closures may have impacted on-demand access to school computers. Needless to say, this period necessitated the urgency for many learners to access web-based or virtual classes in an attempt to bridge the loss of learning time (Hoadley, 2023). The use of online resources for school work was quite high in this sample as the results showed that 32.4% of students used online resources in high school ‘Frequently’ and 18.4% used them “Very frequently”. Although the disparities in digital access are evident and should be a constant priority for schools, the role of COVID-19 in accelerating reliance on digital devices and online resources has to be considered in relation to participants’ epistemic beliefs.

The widespread use of technology and the internet has created a new landscape for knowledge acquisition and dissemination, which makes it possible for students to access multiple sources of information. Current literature indicates that there is a link between epistemic beliefs and learning with digital technologies (Bråten, 2008) because how individuals view knowledge influences how they validate the information they find on the internet and how they critically engage with it (Ferguson, 2014). The inverse is also true, as constant exposure to technology shapes and modifies how individuals acquire and engage with information in non-digital experiences. Prensky (2001) draws attention to the term “digital natives”, which refers to young people growing up within the digital age, where the use of digital resources such as the Internet, smartphones and smart devices, instant messaging, and gaming is contributing to the development of different information-processing strategies in comparison to the generations preceding them. It is quite possible that the role of digital exposure due to COVID-19 contributed to the two-generation groups exhibiting similar epistemic beliefs. This could perhaps also add another layer to Vygotsky’s theory of cognitive development to determine whether ICT qualifies to be seen as a “More Knowledgeable Other” figure, similar to the ‘mediator’ that shares knowledge with a developing child (Alkhudiry, 2022). However, this would have to be further investigated, especially in light of the differences in digital access.

Although epistemic beliefs are similarly developed in this sample, the discrepancies in access must still be factored in when considering the various socio-economic and access

backgrounds that students come from. Ståhl et al. (2021) mention that ICT skills fall under a continuum between “digital natives” and “digital immigrants” and that unfortunately, young people who have engaged with ICT only as a form of leisure are closer to the latter and usually do not have the digital skills required in institutions of higher learning. This is important because at first glance, students may seem equally capable of keeping up with the digital-related tasks required of them and may espouse similar beliefs about knowing, but may lack the necessary skills to showcase the full extent of their views and knowledge in academic tasks due to a lack of in-depth digital familiarity. This can easily go undetected due to the large classes, which create a challenge for teaching staff to gain insight into the difficulties faced by students, leading those who are not familiar with ICT or online resources to learn the systems on their own, which may cause them to fall behind (Bagarukayo & Kalema, 2015; Moonasamy & Naidoo, 2022). Nevertheless, the current study sought to investigate and understand the epistemic beliefs patterns of students coming from different educational and socio-economic backgrounds, specifically where the similarities and differences were found.

5.2 Descriptive trends and key observations

Hofer (2000) explains on the 5-point Likert scale of the DFEBQ, higher scores indicate agreement with less sophisticated epistemic beliefs. Across all three dimensions of the DFEBQ, mean scores (see Table 10) indicated that both first-generation and continuing generation students displayed moderate to sophisticated/evaluativist epistemic beliefs, with scores falling below or near the scale midpoint of 3. For the Certainty/ Simplicity of Knowledge dimension, first-generation students had a mean score of 2.41 (SD = .584), while continuing generation students had a similar mean score of 2.37 (SD = .501), suggesting comparable levels of sophisticated/evaluativist epistemic beliefs. This means on average, both first-generation and continuing generation students view knowledge in Psychology as tentative and complex (Hofer, 2000; Karimi, 2014). For the Attainment of truth dimension, the mean scores were 2.97 (SD = .750) for first-generation students and 3.00 (SD = .700) for continuing generation students, indicating more neutral beliefs for the latter, though the difference was minimal. This means, for the most part, students either lean towards the belief that not every question has a correct answer or “ultimate truth” in Psychology (Muis et al., 2011) or that they are generally unsure if the

ultimate truth is attainable or not. The neutral responses may also be attributed to the fact that they were enrolled in their first year of Psychology, thus they were still in the process of learning about how knowledge or truth is acquired in the field. The mean scores were identical for the Justification of knowledge - Personal dimension across both groups, first generation ($M = 2.81$, $SD = .534$) vs continuing generation ($M = 2.81$, $SD = .482$), showing little to no meaningful difference. This suggests that both groups believe that knowledge cannot be justified primarily through personal opinion or first-hand experience but rather through rules of inquiry and critical evaluation of experts' views (Greene et al., 2018; Hofer, 2000).

Together, these results suggest that students held moderately sophisticated epistemic beliefs, with a fair degree of variation in responses. The standard deviations, ranging from .534 to .750, suggest that while some students shared similar beliefs, others differed more substantially. Visual inspection of the distribution for Certainty/Simplicity of knowledge showed a positively skewed distribution for both groups, supporting the conclusion that both groups had similar evaluativist beliefs. The distribution for Attainment of truth appeared approximately normal, indicating more neutral responses for both groups, although the first-generation group shows varied responses on both sides. The Justification of knowledge - Personal dimension also showed a bell-shaped curve consistent with a normal distribution for continuing-generation; however, the first-generation group showed a bimodal pattern that may suggest the presence of two subgroups where some rely solely on authority-driven absolutist justifications while others espouse a more evaluative stance. Nevertheless, the standard deviations show that there was more variability in the Attainment of truth dimension ($SD = .750$ and $.700$, respectively) compared to the other two subscales.

When looking at the individual items within the Attainment of truth subscale, item 29 (if scholars try hard enough, they can find the answers to almost anything) had the highest mean score of 3.16 ($SD = 1.00$), which shows a small tendency toward agreement with less sophisticated/absolutist beliefs but was closer to the midpoint that indicates neutral beliefs. Item 5 (if scientists try hard enough, they can find the truth to almost anything) had the lowest mean score of 2.78 ($SD = 1.022$), which reflected more sophisticated or evaluativist beliefs. The high standard deviations for both items ($SD > 1$) indicate a wide range of responses. The difference

between the items was the use of the words “scientist” and “scholars”, which might imply that perhaps some students believe that the ultimate truth is attainable in theoretical or academic work in comparison to experimental or scientific work.

This small difference in wording and outcome matches the argument made by Stahl and Bromme (2007), who highlight that there is an implicit and explicit process that needs to be considered when investigating epistemic beliefs. For instance, when students read items on epistemic belief questionnaires, they can make decisions about the statements either based on their associative-connotative knowledge (contextual and personal views) or on their explicit-denotative knowledge (i.e. what they know about truth in science), which may cause inconsistencies in findings. This slight difference highlights the multifaceted nature of epistemic beliefs within the sample, especially since the overall results are not consistent with findings in some previously conducted studies on first-year undergraduate students. Some studies have found that first-year students tend to hold less sophisticated or “naïve” beliefs (i.e. they view knowledge as certain and transmitted by figures of authority) and that their beliefs gradually change (i.e. knowledge is seen as tentative and based on evidence) the more they advance in their studies (Lonka et al., 2021; Schommer, 1990a; Walker et al., 2009).

Conversely, the CAEB focused on the implicit, emotional, and subjective dimensions that people associate with their beliefs about knowledge and knowing. As opposed to looking at epistemic beliefs on the continuum of “naïve” and “sophisticated”, Stahl and Bromme (2007) highlighted the importance of considering the context-dependent perspective in which students personally understand/conceptualise questions on epistemic beliefs in the first place. These aspects assess the implicit attitudes, values, and affective responses toward epistemic beliefs, such as how appealing or comfortable certain beliefs about knowledge might feel to the individual. On the 7-point semantic differential of the CAEB, higher scores indicate more sophisticated epistemic beliefs (Bientzle et al., 2014). The mean scores for the Texture dimension (see Table 9) show that there is little to no difference between first-generation ($M = 3.74$, $SD = .438$) and continuing generation ($M = 3.74$, $SD = .40$) students. For both generation groups, the scores falling slightly below the midpoint of 4 indicated a slight lean toward more ‘naïve’ epistemic beliefs – that is, students’ beliefs were closer to the view that knowledge is

more structured, precise, exact and absolute (Bientzle et al., 2014; Stahl & Bromme, 2007). The standard deviations (.347 and .399) have low variability ($SD < 0.4$), meaning most students gave similar responses within the groups. Visual inspection of the distribution for Texture showed a bell-shaped curve consistent with a normal distribution for first-generation and a negatively skewed distribution for continuing generation, indicating that many students in this group endorsed more sophisticated beliefs, but a smaller number of lower scores decreased the mean. Therefore, while the mean score reflects views that lean more towards the belief that knowledge is structured and absolute, the distribution shows that most continuing generation students tended to have beliefs that knowledge in Psychology is unstructured, vague and imprecise.

When looking at the individual items within the Texture subscale, item 10 (absolute - relative) was the most endorsed item with the highest mean score of 4.946 ($SD = 1.237$), which reflected a belief that knowledge in Psychology is not absolute or fixed but depends on context and individual experience. Item 16 (structured - unstructured) had the lowest mean score of 2.991 ($SD = 1.243$), which reflected that students also believe that knowledge in Psychology is more structured and organised. The high standard deviations for both items ($SD > 1$) indicate that there was a wide range of responses within these items. Although identifying the most and least endorsed items on the scale is a descriptive approach, the contrast between the ‘relative’ and ‘structured’ results offers insight into students’ epistemic beliefs within this South African sample. While the items may initially appear contradictory, the Texture results capture students’ connotative/associative views of the structure and accuracy of knowledge (Schreck et al., 2024). Specifically, it implies that students may see knowledge in Psychology as relative in terms of meaning and application, where it can vary according to context or culture, while still believing it follows a structured and organised system. This pattern reflects a rather ‘sophisticated’ or balanced perspective where knowledge can be both logically organised, even if it is evolving or interpreted differently in different contexts.

When the descriptive results of both scales are considered together, the different trends between the DFEBQ (moderately sophisticated/evaluativist views) and the CAEB (slightly more naïve/absolutist views) suggest a discrepancy between explicit and implicit epistemic beliefs. The DFEBQ can be seen as primarily capturing explicit, cognitive aspects of epistemic beliefs.

These include students' consciously held, rationalised perspectives on knowledge and knowing (e.g., whether knowledge is simple or complex, certain or uncertain), which in this case, are explicitly reflected as moderately sophisticated beliefs on the DFEBQ. The CAEB, on the other hand, examines implicit, emotional, and connotative dimensions of epistemic beliefs. These reflect participants' subjective and affective orientations toward knowledge. The trend on the CAEB (slightly naïve/absolutist beliefs) generally indicates that, at a more intuitive or emotional level, students may perceive knowledge as definite and structured. However, on close inspection of the results from both scales, there is a more layered trend where seemingly similar items can yield opposite responses.

This finding highlights the multidimensionality and nuanced aspect of epistemic beliefs that can sometimes be overlooked if the focus is on aggregate scores that only focus on sophistication or the lack thereof (Duell & Schommer-Aikins, 2001). The discrepancy aligns with dual-process theories, which are traditionally associated with the process of decision-making (Kahneman, 2011, p. 6). The theory can also be linked to epistemic beliefs in this case, due to the use of Likert-type questionnaires that required students to make decisions about statements on pre-determined scales. The theory suggests that decisions in System 1 are automatic, intuitive, and characterised by affective processes (such as the beliefs captured by the CAEB) while decisions under System 2 are characterised by slow, conscious and deliberate reasoning (explicit beliefs captured by the DFEBQ) (Evans & Stanovich, 2013, p. 225). The DFEBQ has a variety of different statements that had to be read and understood before students could rate their level of agreement/disagreement. On the other hand, the CAEB had an identical statement for all items (i.e. "Knowledge in Psychology is...") where the scale had opposing adjectives as a differential. Thus, the discrepant results of the two scales highlight the possible decision-making process behind the two scales that produced seemingly different results. This supports the proposal made by Stahl and Bromme (2007) for a distinction between denotative and connotative scales.

Nevertheless, the dual-process theories highlight that students may consciously espouse more evaluativist views about knowledge while implicitly viewing knowledge from an initially absolutist but complex stance (Kahneman, 2011, p. 15). Since the DFEBQ had statements that

required more conscious and deliberate reasoning, the results suggest that students in both groups were able to reason about knowledge in a sophisticated way. From a developmental perspective, this could be viewed positively as students' results in the DFEBQ indicated that they were beginning to engage critically with ideas about knowledge and knowing, even if their implicit emotional beliefs, captured in the CAEB, reflected more naïve/absolutist beliefs. Badcock et al (2010) highlight that the development of skills such as critical thinking is one of the key priority areas for university institutions that can help students beyond the academic setting. The explicit and implicit differences highlight the multi-layered nature of epistemic beliefs, where sophistication at the denotative level can co-occur with developing connotative beliefs.

While the explicit/implicit discrepancy between the DFEBQ and CAEB is also present in a study conducted by (Kienhues et al., 2008), their results were in the inverse as the DFEBQ showed more naïve/evaluativist views and vice versa. These differences once again highlight the context-sensitive nature of these instruments. With an understanding of the complex and often varied results of epistemic belief questionnaires among different samples, it was important to explore both of these instruments within this South African sample first before conducting inferential statistics.

5.3. Evaluation of the DFEBQ and CAEB measures in a South African university sample (EFA)

An exploratory factor analysis was carried out for both the DFEBQ and the CAEB to examine which items and dimensions would emerge as significant in this sample. Unlike Hofer (2000), who conducted an exploratory factor analysis on the discipline-focused items only, the factor analysis conducted in this study included both the general and the discipline-focused items. Given that some studies have raised concerns about the replicability and dimensional clarity of epistemic belief measures (Greene et al., 2018; Muis et al., 2006), conducting factor analysis on all the items allowed for more data to explore the construct structure of the measure within this specific sample. Moreover, this approach ensured that any overlap or divergence between the general and domain-specific beliefs was captured rather than proceeding based on prior assumptions.

The factor analysis conducted on both measures revealed factor structures consistent with the literature, with four factors emerging for the DFEBQ and two for the CAEB (Green et al., 2018; Hofer, 2000; Karimi, 2014; Stahl & Bromme, 2007). The emergence of a similar factor structure aligns with prior research, suggesting the validity of the theoretical constructs underpinning the DFEBQ and CAEB even within the South African context. However, the results of the DFEBQ showed an overlap between the general and discipline-focused epistemic beliefs, as some of the general items loaded under the dimensions that were developed using only the discipline-focused items. Both the DFEBQ and the CAEB analyses showcased notable deviations, including cross-loadings and items loading onto factors different from previous studies which warranted closer examination.

Cross-loadings may indicate that participants interpreted the items differently or that certain items have similar underlying constructs (Field, 2018). Using the theoretical definitions of the dimensions, all items that loaded under the factors were evaluated to check for common themes and construct patterns. For the DFEBQ, the four factors emerged as (1) Certainty/Simplicity of knowledge, (2) Attainment of truth, (3) Justification of knowledge, and (4) Source of knowledge – Authority in the current study. The results of the factor analysis showed that there are items under Certainty/Simplicity of knowledge that cross-loaded with both Source of knowledge – Authority and Justification of knowledge. For instance, Item 19 (most of what is true in Psychology is already known) cross-loaded for both Certainty/ Simplicity (whether knowledge is fixed or tentative) and Source (knowledge comes from an authority figure). However, the wording of the item reflects a belief about certainty as also seen in the factor analysis by Hofer (2000) and makes no mention of authority or external source. This might imply that some students in this sample understood that the underlying construct of the item was intended to evaluate the certainty/ simplicity of knowledge, while others understood it differently to how it was conceptualised in the literature.

Similarly, item 8 (if lecturers would stick more to the facts and talk less about ideas, one could get more out of university) cross-loaded for both Certainty/ Simplicity and Justification of knowledge – Personal, suggesting that beliefs about the nature of knowledge might be

intertwined with the process of knowing (Greene et al., 2018; Hofer, 2000; Hofer & Pintrich, 1997). The cross-loading of this item was surprising, considering that this comes from the general section of the questionnaire. This might highlight that although Hofer (2000) treated the general and discipline-focused items as distinct, participants may be responding to the general items in the context of the discipline that they are expected to consider when answering non-general items. Nevertheless, a similar pattern of overlapping concepts was observed in other cross-loadings as well, such as the possible similarity between Attainment of truth and Source of knowledge – Authority, indicating a link between views on whether ultimate truth is attainable or not and authority figures as seekers of truth/knowledge.

The same logic of evaluation was applied when inspecting the cross-loadings on the CAEB as well. While the core two factors emerged in the current study and are frequently observed, the precise dimensionality varies depending on the sample and context of study. Although this aligns with the purpose of the scale which is to measure the personal and contextual aspects of epistemic beliefs, there is a challenge in understanding the conceptual constructs of the dimensions. The current study revealed that although some items were consistent within the intended subscales, other items loaded onto different factors than theoretically suggested, a result that is consistent with the findings of Beenen et al. (2017). For instance, items 2, 8, and 17 were theorised to be under Variability (stability and dynamics of knowledge) according to Stahl and Bromme (2007); however, they loaded under Texture (structure and accuracy of knowledge). All these results highlight conceptual overlap between scale items that are possibly tapping into multiple constructs, which is consistent with previous findings (Beenen et al., 2017; Hofer, 2000; Schreck et al., 2024) and supports the concern around using quantitative instruments to adequately measure all the theoretical dimensions (Lonka et al., 2021).

Despite divergence in item loadings, the reliability analyses showed that Certainty/Simplicity ($\alpha = .807$), Attainment of truth ($\alpha = .761$) and Texture ($\alpha = .780$) had good and acceptable reliability whereas Justification ($\alpha = .630$) and Variability ($\alpha = .507$) had questionable and poor reliability. Perhaps, some of the items for Variability do not measure the intended construct, as this dimension had poor internal consistency in the current study as well as in

another study conducted among physiotherapy students and professionals (Bientzle et al., 2014). Or perhaps these inconsistent results are due to cultural and educational differences in shaping connotative epistemic beliefs (Muis et al., 2006, p. 31, 34).

The finding that some items loaded onto different factors and that some factors had questionable or poor reliability than expected may reflect unique nuances in the epistemic belief structures of South African students. Educational practices, historical contexts, and exposure to disciplinary norms may contribute to these variations (Li, 2003, p. 265). This highlights the need for further validation studies that consider cultural and contextual variables when applying these measures within South Africa's culturally and linguistically diverse context. The observed deviations underscore the importance of adapting and re-evaluating epistemic belief measures to ensure their cross-cultural applicability. As suggested by Sandoval et al. (2016, p. 645), measures developed in one context may not fully capture the epistemic belief dimensions present in another. Future research should focus on refining these instruments for use in South African populations, incorporating qualitative methods to understand how epistemic beliefs are expressed and operationalised in this context.

5.4. Insights from the inferential statistics

Overall, the findings of the factor analysis contribute to the broader understanding of epistemic beliefs by offering insights into their dimensionality and contextual variability.

These results also emphasise the importance of culturally sensitive approaches to psychological research and the ongoing validation of measures across diverse populations. Although the study hypothesised that there would be a difference in epistemic beliefs between first-generation and continuing generation groups, the absence of a statistically significant difference suggests two possible explanations.

First, the null results may reflect limited statistical power. Constraints in statistical power can arise from small sample sizes, low measurement sensitivity, high within-group variability, and subtle true effects, all of which make it difficult to detect statistically significant differences even when meaningful difference exist (Shibasaki & Martins, 2018). Additionally, contextual

factors such as prior educational experience, linguistic diversity, compensatory academic support, or SES-related variability may have reduced observable differences. These considerations suggest caution in interpreting the null results as evidence of equivalence, and highlight the need for future studies using more sensitive measures or larger, more heterogeneous samples.

Second, it may also be possible that both groups possess similar levels of understanding and approach to knowledge. This finding is encouraging as it links to the concept of “epistemological access”, which emphasises the importance of previously disadvantaged students gaining meaningful access to the ways of thinking and reasoning that are essential in higher education (Morrow, 2009). The results imply that despite differences in family educational history, these students have both physical and epistemological access in university, which is an integral part of academic success and an equitable educational experience. The outcome also allows for students to be evaluated from a strength-based perspective, especially first-generation students who have exhibited assets such as reflexivity and sophisticated epistemic beliefs despite coming from homes where immediate family members did not attend university. The ability to adapt and persist in the face of adversity engenders assets that are necessary for academic success at university (Garrison & Gardner, 2015). Although there are limitations in statistical power and the risk of false negative results, the findings suggest an alternative perspective to deficit and/or Afro-pessimistic views of African students (Abebe & Ofosu-Kusi, 2016).

Nevertheless, replication of the study or use of different methods of data collection would be useful to further investigate the sensitivity of the instruments for these groups within the South African context. It is also possible that there is indeed no effect, even if the current study is replicated or different scales are used. Thus, perhaps future inquiry can focus on other avenues such as looking at school-related variables, the impact of digital learning and ICT use, and linguistic groups. Muis et al. (2016) also encourage the use of more qualitative methods of inquiry to help mitigate the issue of decontextualised quantitative measures, such as questionnaires used in this study.

Additionally, further studies could help address the issue of uneven group sizes. Considering the sample demographics of this study, it would be worth considering whether the imbalance in group sizes—where continuing-generation students constituted more than 70% of the sample—may have contributed to this result. Unequal group sizes can reduce the statistical power of the test, potentially making it more difficult to detect subtle differences between groups (Shibasaki & Martins, 2018). Future research using a quota sampling strategy or in a different context away from the most well-established, metro-based universities might allow for a higher proportion of first-generation students, which could provide insight into whether trends are consistent or different between first-generation and continuing generation students.

In addition to investigating epistemic belief patterns based on generational education status, the study also looked at socio-economic status as a possible moderating variable. The descriptive statistics (see Table 12) showed that out of the 70 students who identified as first-generation students, it emerged that the majority were in the Low SES group ($n = 39$, 55.7%). This finding is consistent with some studies that show that, although this is not the case for all first-generation students, many of them do frequently emerge as coming from low-income households (Checkoway, 2018, p. 72; Meyer & Schreiber, 2024, p. 86).

Two-way ANOVA analyses were conducted to examine differences across all the dimensions of the DFEBQ and CAEB. The results showed that there was no interaction effect between first-generation status and SES level across all analysed dimensions, indicating that SES did not moderate the effects of first-generation status on epistemic beliefs. There were no main effects results for both generation status and SES level for the Texture, Attainment of truth, and Justification of knowledge dimensions. However, there was a significant main effect between SES level and epistemic beliefs for the Certainty/ simplicity dimension. Although the results have to be interpreted with caution due to the violation of the normality and homogeneity of variance for this subscale, this is a noteworthy result that could indicate that students from different socioeconomic backgrounds held meaningfully different beliefs in this dimension. In a country where historical disparities have led to exclusion in spaces of economic and educational development, this is an area that would benefit from further probing and rigorous investigation, as beliefs and views about knowledge constitute a type of cultural capital. The significant results

provide some limited support for the hypothesis that socio-economic status is associated with embodied capital (in this case, views about knowledge), which can affect academic achievement (Zimmerman, 2017). These effects, however, do not involve generational status, which supports the results of the independent samples t-test.

The economic and educational impact of apartheid has been and continues to be a central topic when discussing South African history. Bourdieu (1986) highlighted that although economic discourse has become the main perspective in understanding capital, there is also cultural capital, which looks at non-economic assets such as knowledge and skills (embodied cultural capital), resources like books or art (objectified cultural capital) and academic qualifications (institutionalised cultural capital). SES (economic indicator) is very relevant to the concept of cultural capital because of the impact it has on non-economic assets such as mental and physical development, access to resources, information, and higher education, which affect livelihood and social mobility. Thus, by investigating the SES of first-generation and continuing generation students, it is also an inquiry into the historical dynamics that affected the type of cultural capital that families passed on to their children (Vally, 2013). Although the current study was conducted in post-apartheid South Africa, Vygotsky's theory offers a sociocultural perspective that brings attention to the fact that many children grew up around parents or grandparents who lived through apartheid, who became their 'mediators' or 'more knowledgeable others' that played a primary role in their cognitive development (Alkhudiry, 2022). In that regard, both the theory of cultural capital and sociocultural development highlight the transfer of both economic and non-economic capital to the next generation, which can affect their lives in several ways.

Dirk (2020) briefly brings attention to the 2015 and 2016 student protests that were initially sparked by financial disparities, but quickly evolved into wider critique of the lack of equitable transformation in higher education. Dirk (2020) also discusses what they term "a failed attempt" at transformation by arguing that senior academics in a historically white South African university used their academic capital and positions to undermine the transformation process by maintaining Fundamental Pedagogics (p. 155–160). Fundamental Pedagogics refers to an ideology that produced docile academic staff who implemented apartheid's segregationist

policies without questioning or critiquing them (Robinson et al., 2024). Thus, it becomes evident that the relationship between socio-economic status is highly intertwined with cultural capital which continues to affect previously disadvantaged students. This is not only important in terms of cultural capital, but also in reference to the theory of cognitive development, where mediators such as academic instructors play an integral role in the communication of information through language (Mahn & John-Steiner, 2012) and in bridging the gap between what students know and what can be achieved with assistance (Lantolf, 2000). If mediators such as academic authorities espouse and maintain views that are not inclusive of the diverse student population, it can lead to the imposition of a one-sided worldview about knowledge that perpetuates the marginalisation of previously disadvantaged students (e.g. current study found differences in epistemic beliefs between students of different SES levels).

This needs to constantly be interrogated and challenged in the broader scheme of seeking transformative justice within education. Nevertheless, the result of the independent samples t-test provides a hopeful picture that although there may be economic and socio-cultural disparities that affect both the monetary and cultural capital of different educational groups, they do not seem to be affecting how these groups view how knowledge is conceptualised and acquired. This raises the question of what factors might be contributing to first-generation and continuing-generation students having similarly developed epistemic beliefs despite coming from different educational backgrounds. Any factors that might be contributing towards mitigating differences between students from different backgrounds should be investigated, understood, and supported to support the diverse student population in universities.

The findings that socio-economic status was significantly associated with epistemic beliefs suggest that structural inequalities continue to shape how students engage with knowledge and learning at university. Students from lower SES backgrounds may have less access to the material and cultural resources that foster more sophisticated epistemic understanding, even when they reach tertiary education. Although no significant differences emerged between first-generation and continuing-generation students, the SES main effect underscores that epistemic development is deeply intertwined with broader social and economic conditions. Universities can respond by strengthening epistemic access through initiatives that

address resource disparities, such as providing accessible digital infrastructure, extended academic support, and mentorship opportunities that explicitly engage with disciplinary ways of knowing. These interventions should aim not only to bridge academic skills gaps but also promote epistemic inclusion, enabling all students to participate confidently in academic knowledge practices irrespective of background (Case et al., 2013; Mathebula, 2019).

5.5. Limitations of the study

The following limitations are noted in the present study. A notable limitation in the study is the use of a convenience non-probability sampling strategy, where participants volunteered to participate in the study. This led to unequal group sizes, which is a limitation where continuing generation students comprised more than 70% of the sample. Although the independent samples t-test and two-way ANOVA can still be reliable with unequal group sizes, the decision to continue with the analyses despite some group combinations showing non-normal distributions may have impacted the outcome of the analyses. Another limitation is the potential lack of statistical power, which increases the risk of Type II errors. Given the sample size ($n = 244$) and the non-significant findings in this study, meaningful relationships may have gone undetected. Future research with larger samples may help clarify whether such effects exist.

Using purposive non-probability sampling within the University of the Witwatersrand, which is a well-established university located in a metropolitan area means that the sample or the results may not be representative of the broader South African population.

As an ex post facto non-experimental design, the study cannot establish causal relationships between variables, only associations. The descriptive findings that indicate moderately sophisticated/evaluativist discipline-focused epistemic beliefs and slightly more naïve connotative epistemic beliefs should therefore be interpreted as associative rather than causal.

The measures used in this study were all self-report questionnaires which is another limitation. The use of self-report quantitative questionnaires may not fully assess or capture

epistemic beliefs, which are conceptually complex to quantify (Chinn et al., 2011). Self-report questionnaires also may introduce bias as participants might have responded based on what they think is expected of them (Sandoval, 2005), or based on the 1% course credit incentive that may have led them to respond hastily or randomly to gain course credit, especially since the survey was released right before exams.

The use of the DFEBQ and the CAEB, which were developed in the North American context, may not have been contextually adequate to investigate epistemic belief within a South African population. Specifically for the DFEBQ, the factor analysis did not replicate the analysis conducted by Hofer (2000). The current study included both general and discipline-focused items while unlike Hofer (2000), who ran factor analysis on the discipline-focused items. This is a limitation that affects comparability and may have introduced conceptual overlap. Additionally, a series of decisions were made in the process of handling cross-loaded items. Although the best attempts were made to be as theoretically accurate as possible, there may have been unintended shortfalls. The DFEBQ and the CAEB both had more than one dimension, which led to multiple analyses in assessing parametric assumptions and running inferential analyses with each of the dimensions instead of analysing a composite of the scales. Although this was in line with theoretical frameworks of epistemic beliefs, processes and decisions at each stage may have affected the outcome. Finally, the cultural validity of the DFEBQ and CAEB may be limited, as both were developed in Western contexts and may not fully capture the linguistic nuances of South Africans' epistemic beliefs. Since the research was carried out at an institution with English as the medium of instruction, non-English native speakers may have experienced limitations in how the items were understood and interpreted.

5.6. Conclusion

Notwithstanding the above-noted limitations, this study presents results that contribute to the body of knowledge in relation to the investigation of epistemic beliefs. Although personal epistemology has been investigated within the South African context, this study adds a different perspective as it has sought to investigate epistemic beliefs between first-generation and

continuing generation students. This is valuable both for personal epistemology research and evaluation of South Africa's educational system.

The descriptive information provided by the IT survey offer useful information the students' prior familiarity with ICT and online resources, which forms an integral part of their learning experience at university. The scores indicate moderate access to technological devices and frequency of online resources for schoolwork; however, the standard deviations indicate variability in their responses which highlights the need for universities to constantly be aware that ICT skills vary among students which can affect their studies and seek ways to bridge the gap.

The results showing that students' epistemic beliefs were similarly developed across different educational backgrounds highlight the value of seeking to understand students' beliefs about knowing and knowing in relation to their contextual factors. This is not only important on the basis of understanding their individual educational experiences, but it also probes into the present dynamics of transformation and development in post-apartheid South Africa. The factor analyses that were conducted validated the dimensions that have been proposed in previous studies which provides a South African addition to the literature and discourse surrounding the multi-dimensional model and the connotative aspects of epistemic beliefs. The deviations highlight the possible overlap between dimensions that warrants further development of the models and their accompanying measures.

While being cautious in generalising beyond the current sample, the results indicate that there is a difference between denotative (explicit) and connotative (implicit) epistemic beliefs. The discrepancy in the DFEBQ and the CAEB results may indicate that students are beginning to develop more sophisticated epistemic beliefs within the academic context, but still hold more intuitive understanding about knowledge at a personal level. This could be viewed as a positive trajectory where students are beginning to engage critically with ideas about knowledge and justification (as seen in the DFEBQ), even if they have not fully internalised or affectively integrated these beliefs (as seen in the CAEB). Rather than a contradiction, this pattern reflects a

multi-layered epistemic profile where sophistication at the denotative level can co-exist with developing or transitional connotative beliefs.

The results imply there might be little disparity in the embodied cultural capital (knowledge and skills) between the groups in this sample; however, this cannot be inferred since the absence of significant results does not mean the absence of an effect. The results of the two-way ANOVA offer a suggestive trend that SES might not be moderating the relationship between epistemic beliefs and educational generational status; however, there is a main effect between SES and epistemic beliefs, which warrants further investigation.

References

- Abebe, T., & Ofosu-Kusi, Y. (2016). Beyond pluralizing African childhoods: Introduction. *Childhood*, 23, 303–316. <https://doi.org/10.1177/0907568216649673>
- Adeyemi, O. E. (2017). Diverse family forms and quality-of-life in sub-Saharan African countries. *Development Southern Africa*, 34(6), 682–693. <https://doi.org/10.1080/0376835X.2017.1405797>
- Alam, S., Ayub, M. S., Arora, S., & Khan, M. A. (2023). An investigation of the imputation techniques for missing values in ordinal data enhancing clustering and classification analysis validity. *Decision Analytics Journal*, 9, 100341. <https://doi.org/10.1016/j.dajour.2023.100341>
- Alkhudiry, R. (2022). The Contribution of Vygotsky's Sociocultural Theory in Mediating L2 Knowledge Co-Construction. *Theory and Practice in Language Studies*, 12(10), Article 10. <https://doi.org/10.17507/tpls.1210.19>
- Antia, B. E., & Dyers, C. (2016). Epistemological access through lecture materials in multiple modes and language varieties: The role of ideologies and multilingual literacy practices in student evaluations of such materials at a South African University. *Language Policy*, 15(4), 525–545. <https://doi.org/10.1007/s10993-015-9389-4>
- APA Dictionary of Psychology. (2023). *APA Dictionary of Psychology*. <https://dictionary.apa.org/>
- Aspelmeier, J., Love, M., McGill, L., Elliott, A., & Pierce, T. (2012). Self-Esteem, Locus of Control, College Adjustment, and GPA Among First- and Continuing-Generation Students: A Moderator Model of Generational Status. *Research in Higher Education*, 53. <https://doi.org/10.1007/s11162-011-9252-1>
- Badat, S. (2010, April). The Challenges of Transformation in Higher Education and Training Institutions in South Africa. *Paper Commissioned by the Development Bank of Southern Africa*.

- https://www.ru.ac.za/media/rhodesuniversity/content/vc/documents/The_Challenges_of_Transformation_in_Higher_Education_and_Training_Institutions_in_South_Africa.pdf
- Badcock, P. B. T., Pattison, P. E., & Harris, K.-L. (2010). Developing generic skills through university study: A study of arts, science and engineering in Australia. *Higher Education*, 60(4), 441–458. <https://doi.org/10.1007/s10734-010-9308-8>
- Bagarukayo, E., & Kalema, B. (2015). Evaluation of elearning usage in South African universities: A critical review. *International Journal of Education and Development Using ICT*, 11(2). <https://www.learntechlib.org/p/151848/>
- Bakker, M., & Wicherts, J. M. (2014). Outlier removal, sum scores, and the inflation of the Type I error rate in independent samples t tests: The power of alternatives and recommendations. *Psychological Methods*, 19(3), 409–427. <https://doi.org/10.1037/met0000014>
- Beenen, P. C., Filiputti ,Dario, Meyer ,Erna Rosenlund, Carballo Costa ,Lidia, Ophey ,Martin Johannes, Almeida ,Patricia Maria Duarte de, van Wijchen ,Joost Egbertus Jacobus Lidwina, Katajapuu ,Niina Katariina, Brear ,Anna, & and Castro Caldas, A. (2017). Epistemological beliefs of European physiotherapists – a multi-countrycross-cultural adaptation for the DEBQ and the CAEB questionnaires. *European Journal of Physiotherapy*, 19(1), 32–39. <https://doi.org/10.1080/21679169.2016.1233995>
- Bientzle, M., Cress, U., & Kimmerle, J. (2014). Epistemological beliefs and therapeutic health concepts of physiotherapy students and professionals. *BMC Medical Education*, 14(1), 208. <https://doi.org/10.1186/1472-6920-14-208>
- Bless, C., Higson-Smith, C., & Sithole, S. L. (2013). *Fundamentals of social research methods: An African perspective* (5th edn). Juta and Company Ltd.
- Bourdieu, P. (1986). THE FORMS OF CAPITAL. In *Handbook of Theory and Research for the Sociology of Education* (pp. 241–258).

- Bourdieu, P., & Passeron, J.-C. (1990). *Reproduction in education, society and culture* (2 .ed., reprinted). Sage Publ.
- Bråten, I. (2008). Personal Epistemology, Understanding of Multiple Texts, and Learning Within Internet Technologies. In M. S. Khine (Ed.), *Knowing, Knowledge and Beliefs: Epistemological Studies across Diverse Cultures* (pp. 351–376). Springer Netherlands. https://doi.org/10.1007/978-1-4020-6596-5_17
- Cartiff, B. M., Duke, R. F., & Greene, J. A. (2021). The effect of epistemic cognition interventions on academic achievement: A meta-analysis. *Journal of Educational Psychology, 113*, 477–498. <https://doi.org/10.1037/edu0000490>
- Case, J., Marshall, D., & Grayson, D. (2013). Mind the gap: Science and engineering education at the secondary–tertiary interface. *South African Journal of Science, 109*(7/8), 5. <https://doi.org/10.1590/sajs.2013/20120113>
- Cazan, A.-M. (2013). Validity of the Discipline Focused Epistemological Beliefs Questionnaire (DFEBQ) on a Romanian Sample. *Procedia - Social and Behavioral Sciences, 78*, 713–717. <https://doi.org/10.1016/j.sbspro.2013.04.381>
- Checkoway, B. (2018). Inside The Gates: First-Generation Students Finding Their Way. *Higher Education Studies, 8*, 72. <https://doi.org/10.5539/hes.v8n3p72>
- Chen, Q., Kong, Y., Gao, W., & Mo, L. (2018). Effects of Socioeconomic Status, Parent–Child Relationship, and Learning Motivation on Reading Ability. *Frontiers in Psychology, 9*. <https://doi.org/10.3389/fpsyg.2018.01297>
- Cherry, K. (n.d.). *Lev Vygotsky's Life and Theories*. Verywell Mind. Retrieved 4 April 2023, from <https://www.verywellmind.com/lev-vygotsky-biography-2795533>
- Chinn, C. A., Buckland, L. A., & Samarapungavan, A. (2011). Expanding the dimensions of epistemic cognition: Arguments from philosophy and psychology. *Educational Psychologist, 46*(3), 141–167. <https://doi.org/10.1080/00461520.2011.587722>

- Choi, J., & Kwon, N. (2012). The General and Domain-Specific Epistemological Beliefs of Korean Preservice Mathematics Teachers. *Asia-Pacific Education Researcher*, 21, 353–364.
- Conley, A. M., Pintrich, P. R., Vekiri, I., & Harrison, D. (2004). Changes in epistemological beliefs in elementary science students. *Contemporary Educational Psychology*, 29(2), 186–204. <https://doi.org/10.1016/j.cedpsych.2004.01.004>
- Department of Education. (1997). *Education White Paper 3: A Programme for the Transformation of Higher Education* (Vol. 386). Government Printers.
- Dirk, W. P. (2020). Symbolic violence, academic capital and reflexivity: A case-study of post-apartheid curriculum change for teacher education using Bourdieu. *African Sociological Review / Revue Africaine de Sociologie*, 24(2), Article 2.
- Duell, O. K., & Schommer-Aikins, M. (2001). Measures of People's Beliefs About Knowledge and Learning. *Educational Psychology Review*, 13(4), 419–449. JSTOR.
- Evans, J. St. B. T., & Stanovich, K. E. (2013). Dual-Process Theories of Higher Cognition: Advancing the Debate. *Perspectives on Psychological Science*, 8(3), 223–241. <https://doi.org/10.1177/1745691612460685>
- Field, A. P. (2018). *Discovering statistics using IBM SPSS statistics*. SAGE. <https://docs.edtechhub.org/lib/CFJAF8HE>
- Forehand, M. (2005). Bloom's Taxonomy: Original and Revised. In *In M. Orey (Ed.), Emerging perspectives on learning, teaching, and technology*.
- Garrison, N. J., & Gardner, D. S. (2015). *ASSETS FIRST GENERATION COLLEGE STUDENTS BRING TO THE HIGHER EDUCATION SETTING* (Paper Submission No. ED539775; pp. 1–59). Association for the Study of Higher Education (ASHE). <https://eric.ed.gov/?id=ED539775>

- Greene, J. A., Cartiff, B. M., & Duke, R. F. (2018). A meta-analytic review of the relationship between epistemic cognition and academic achievement. *Journal of Educational Psychology, 110*(8), 1084. <https://doi.org/10.1037/edu0000263>
- Gumede, V. (2020). Elusive Pursuit of Reconciliation and Development in Post-Apartheid South Africa. *Strategic Review for Southern Africa, 42*(2), 129–154. ProQuest Central. <https://doi.org/10.35293/srsa.v42i2.77>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate data analysis* (Seventh, Pearson new international). Pearson Education Limited. <https://go.exlibris.link/JpLYjbbs>
- Higgs, P. (2007). Towards an indigenous African epistemology of community in higher education research. *South African Journal of Higher Education, 21*(4), Article 4. <https://doi.org/10.4314/sajhe.v21i4.25689>
- Hoadley, U. (2023, May 15). *COVID-19 Impact on South African Curriculum Policy (2020-2023)*. Research on Socio-Economic Policy. <https://policycommons.net/artifacts/3840994/covid-19-and-the-south-african-curriculum-policy-response-research-note/4646886/>
- Hofer, B. K. (2000). Dimensionality and Disciplinary Differences in Personal Epistemology. *Contemporary Educational Psychology, 25*(4), 378–405. <https://doi.org/10.1006/ceps.1999.1026>
- Hofer, B. K. (2002). Personal Epistemology as a Psychological and Educational Construct: An Introduction. In *Personal epistemology: The psychology of beliefs about knowledge and knowing*. Lawrence Erlbaum Associates, Inc., Publishers.
- Hofer, B. K., & Pintrich, P. R. (1997). The Development of Epistemological Theories: Beliefs about Knowledge and Knowing and Their Relation to Learning. *Review of Educational Research, 67*(1), 88–140. <https://doi.org/10.2307/1170620>
- Hottinger, J., A., & Rose, C., P. (2006). First-Generation College Students. In *A Guide for Student Affairs Professionals*.

- Hunziker, S., & Blankenagel, M. (2024). Cross-Sectional Research Design. In S. Hunziker & M. Blankenagel (Eds), *Research Design in Business and Management: A Practical Guide for Students and Researchers* (pp. 187–199). Springer Fachmedien.
https://doi.org/10.1007/978-3-658-42739-9_10
- Ishitani, T. T. (2006). Studying Attrition and Degree Completion Behavior among First-Generation College Students in the United States. *Journal of Higher Education*, 77(5), 861–885. <https://doi.org/10.1353/jhe.2006.0042>
- Jadhav, A., Pramod, D., & Ramanathan, K. (2019). Comparison of Performance of Data Imputation Methods for Numeric Dataset. *Applied Artificial Intelligence*, 33(10), 913–933.
<https://doi.org/10.1080/08839514.2019.1637138>
- Jansen, J. D. (2001). Guest Editorial: Does the national plan effectively address the critical issues facing higher education? *South African Journal of Higher Education*, 15(3), Article 3. <https://doi.org/10.4314/sajhe.v15i3.25318>
- Kahneman, D. (2011). *Thinking, fast and slow* (p. 499). Farrar, Straus and Giroux.
- Kalman, C. S., Sobhanzadeh, M., Thompson, R., Ibrahim, A., & Wang, X. (2015). Combination of interventions can change students' epistemological beliefs. *Physical Review Special Topics - Physics Education Research*, 11(2), 020136.
<https://doi.org/10.1103/PhysRevSTPER.11.020136>
- Karimi, M. N. (2014). Disciplinary variations in English domain-specific personal epistemology: Insights from disciplines differing along Biglan's dimensions of academic domains classification. *System*, 44, 89–100. <https://doi.org/10.1016/j.system.2014.03.002>
- Kienhues, D., Bromme, R., & Stahl, E. (2008). Changing epistemological beliefs: The unexpected impact of a short-term intervention. *British Journal of Educational Psychology*, 78(4), 545–565. <https://doi.org/10.1348/000709907X268589>

- King, P. M., & Kitchener, K. S. (2004). Reflective Judgment: Theory and Research on the Development of Epistemic Assumptions Through Adulthood. *Educational Psychologist*, 39(1), 5–18. https://doi.org/10.1207/s15326985ep3901_2
- Kuhn, D., & Weinstock, M. (2002). What is epistemological thinking and why does it matter? In *Personal epistemology: The psychology of beliefs about knowledge and knowing* (pp. 121–144). Lawrence Erlbaum Associates Publishers.
- Kwak, S. G., & Kim, J. H. (2017). Central limit theorem: The cornerstone of modern statistics. *Korean Journal of Anesthesiology*, 70(2), 144. <https://doi.org/10.4097/kjae.2017.70.2.144>
- Laerd Statistics. (2021). *Two-way ANOVA using SPSS Statistics*. <https://statistics.laerd.com/premium/spss/twa/two-way-anova-in-spss-22.php>
- Lantolf, J. (2000). Introducing socio-cultural theory. *Sociocultural Theory and Second Language Learning*, 1–26.
- Lantolf, J. P. (2000). *Introducing sociocultural theory*.
- Leal-Soto, F., & Ferrer-Urbina, R. (2017). Three-factor structure for Epistemic Belief Inventory: A cross-validation study. *PLoS ONE*, 12(3), e0173295. <https://doi.org/10.1371/journal.pone.0173295>
- Lee, W. W. S., & Chan, C. K. K. (2018). Relationships among Epistemic Beliefs, Perception of Learning Environment, Study Approaches and Academic Performance: A Longitudinal Exploration with 3P Model. *Asia-Pacific Education Researcher*, 27(4), 267–276.
- Letina, A. (2022). Teachers' Epistemological Beliefs and Inclination Towards Traditional or Constructivist Teaching. *International Journal of Research in Education and Science*, 8, 135–153. <https://doi.org/10.46328/ijres.1717>
- Li, J. (2003). U.S and Chinese cultural beliefs about learning. *Journal of Educational Psychology*, 95(2), 258–267. <https://doi.org/10.1037/0022-0663.95.2.258>

- Lonka, K., Ketonen, E., & Vermunt, J. D. (2021). University students' epistemic profiles, conceptions of learning, and academic performance. *Higher Education*, 81(4), 775–793. <https://doi.org/10.1007/s10734-020-00575-6>
- Lucas, R. E., & Donnellan, M. B. (2012). Estimating the Reliability of Single-Item Life Satisfaction Measures: Results from Four National Panel Studies. *Social Indicators Research*, 105(3), 323–331. <https://doi.org/10.1007/s11205-011-9783-z>
- Lunn Brownlee, J., Ferguson, L. E., & Ryan, M. (2017). Changing Teachers' Epistemic Cognition: A New Conceptual Framework for Epistemic Reflexivity. *Educational Psychologist*, 52(4), 242–252. <https://doi.org/10.1080/00461520.2017.1333430>
- Maclellan, E., & Soden, R. (2004). The Importance of Epistemic Cognition in Student-Centred Learning. *Instructional Science: An International Journal of Learning and Cognition*, 32(3), 253–268. ERIC.
- Madjar, N., Weinstock, M., & Kaplan, A. (2017). Epistemic beliefs and achievement goal orientations: Relations between constructs versus personal profiles. *Journal of Educational Research*, 110(1), 32–49. <https://doi.org/10.1080/00220671.2015.1034353>
- Maher, J. M., Markey, J. C., & Ebert-May, D. (2013). The Other Half of the Story: Effect Size Analysis in Quantitative Research. *CBE Life Sciences Education*, 12(3), 345–351. <https://doi.org/10.1187/cbe.13-04-0082>
- Mahn, H., & John-Steiner, V. (2012). Vygotsky and Sociocultural Approaches to Teaching and Learning. *Handbook of Psychology, Second Edition*, 7, 1–85. <https://doi.org/10.1002/9781118133880.hop207006>
- Makhathini, T. P., Mtsweni, S., & Bakare, B. F. (2020). Exploring engineering students' epistemic beliefs and motivation: A case of a South African university. *South African Journal of Higher Education*, 34(4), 95–111. <https://doi.org/10.20853/34-4-3625>

- Mathebula, M. (2019). Recognising poor black youth from rural communities in South Africa as epistemic contributors. *Critical Studies in Teaching and Learning*, 7(1).
<https://doi.org/10.14426/cristal.v7i1.1921>
- McKenzie, D. J. (2005). Measuring inequality with asset indicators. *Journal of Population Economics*, 18(2), 229–260. <https://doi.org/10.1007/s00148-005-0224-7>
- Meyer, L., & Schreiber, B. (2024). South African private universities: The unique challenges of private university first-generation students – The unique opportunity for private higher education institutions. *Journal of Student Affairs in Africa*, 12(1).
<https://doi.org/10.24085/jsaa.v12i1.5245>
- Moonasamy, A. R., & Naidoo, G. M. (2022). Digital Learning: Challenges experienced by South African university students' during the COVID-19 pandemic. *The Independent Journal of Teaching and Learning*, 17(2), 76–90.
- Morrow, W. E. (2009). *Bounds of democracy: Epistemological access in higher education*. HSRC Press. <https://go.exlibris.link/FjMykPth>
- Muis, K. R., Bendixen, L. D., & Haerle, F. C. (2006). Domain-Generality and Domain-Specificity in Personal Epistemology Research: Philosophical and Empirical Reflections in the Development of a Theoretical Framework. *Educational Psychology Review*, 18(1), 3–54.
<https://doi.org/10.1007/s10648-006-9003-6>
- Muis, K. R., Franco, G. M., & Gierus, B. (2011). Examining epistemic beliefs across conceptual and procedural knowledge in statistics. *ZDM*, 43(4), 507–519.
<https://doi.org/10.1007/s11858-011-0337-2>
- Muis, K. R., Trevors, G., Duffy, M., Ranellucci, J., & Foy, M. J. (2016). Testing the TIDE: Examining the Nature of Students' Epistemic Beliefs Using a Multiple Methods Approach. *The Journal of Experimental Education*, 84(2), 264–288.
<https://doi.org/10.1080/00220973.2015.1048843>

- Ndlovu, T. (2020). Shuttling between the suburbs and the township: The new black middle class(es) negotiating class and post-apartheid blackness in South Africa. *Africa*, 90(3), 568–586. <https://doi.org/10.1017/S000197202000008X>
- Obilor, I. E. (2023). Convenience and Purposive Sampling Techniques: Are they the Same? *International Journal of Innovative Social & Science Education Research*, 11(1), 1–7.
- Odebiyi, O. M., & Choi, Y.-J. (2022). The challenges of measuring epistemic beliefs across cultures: Evidence from Nigerian teacher candidates. *Teaching Education*, 33(2), 214–236. <https://doi.org/10.1080/10476210.2020.1844650>
- Pascarella, E. T., Pierson, C. T., Wolniak, G. C., & Terenzini, P. T. (2004). First-Generation College Students: Additional Evidence on College Experiences and Outcomes. *The Journal of Higher Education*, 75(3), 249–284. <https://doi.org/10.1353/jhe.2004.0016>
- Päuler-Kuppinger, L., & Jucks, R. (2017). Perspectives on teaching: Conceptions of teaching and epistemological beliefs of university academics and students in different domains. *Active Learning in Higher Education*, 18(1), 63–76. <https://doi.org/10.1177/1469787417693507>
- Paulsen, M. B., & Wells, C. T. (1998). DOMAIN DIFFERENCES IN THE EPISTEMOLOGICAL BELIEFS OF COLLEGE STUDENTS. *Research in Higher Education*, 39(4), 365–384. <https://doi.org/10.1023/A:1018785219220>
- Peter, J., Rosman, T., Mayer, A.-K., Lechner, N., & Krampen, G. (2016). Assessing epistemic sophistication by considering domain-specific absolute and multiplicitic beliefs separately. *British Journal of Educational Psychology*, 86, 204–221. <https://doi.org/10.1111/bjep.12098>
- Prensky, M. (2001). Digital Natives, Digital Immigrants Part 1. *On the Horizon*, 9(5), 1–6. <https://doi.org/10.1108/10748120110424816>
- Robinson, M., Rusznyak, L., & Modiba, M. (2024). Fifty years of teacher education in South Africa: Towards systematic learning and social transformation. *Journal of Education for*

Teaching: International Research and Pedagogy, 1–17.

<https://doi.org/10.1080/02607476.2024.2413449>

Rollnick, M., Davidowitz, B., Keane, M., Bapoo, A., & Magadla, L. (2008). Students' learning-approach profiles in relation to their university experience and success. *Teaching in Higher Education*, 13(1), 29–42. Education Research Complete.

Samuels, P. (2016). *Advice on Exploratory Factor Analysis*.

<https://doi.org/10.13140/RG.2.1.5013.9766>

Sandoval, W. A. (2005). Understanding students' practical epistemologies and their influence on learning through inquiry. *Science Education*, 89(4), 634–656.

<https://doi.org/10.1002/sce.20065>

Sandoval, W. A., Greene, J. A., & Bråten, I. (2016). Understanding and Promoting Thinking About Knowledge: Origins, Issues, and Future Directions of Research on Epistemic Cognition. *Review of Research in Education*, 40(1), 457–496.

<https://doi.org/10.3102/0091732X16669319>

Schiefer, J., Edelsbrunner, P. A., Bernholt, A., Kampa, N., & Nehring, A. (2022). Epistemic Beliefs in Science—A Systematic Integration of Evidence From Multiple Studies. *Educational Psychology Review*, 34(3), 1541–1575. <https://doi.org/10.1007/s10648-022-09661-w>

Schommer, M. (1990a). Effects of beliefs about the nature of knowledge on comprehension. *Journal of Educational Psychology*, 82(3), 498. <https://doi.org/10.1037/0022-0663.82.3.498>

Schommer, M. (1990b). Effects of beliefs about the nature of knowledge on comprehension. *Journal of Educational Psychology*, 82(3), 498–504. <https://doi.org/10.1037/0022-0663.82.3.498>

- Schommer-Aikins, M. (2004). Explaining the Epistemological Belief System: Introducing the Embedded Systemic Model and Coordinated Research Approach. *Educational Psychologist*, 39(1), 19–29. https://doi.org/10.1207/s15326985ep3901_3
- Schreck, A., Ophoff, J. G., & Rott, B. (2024). Connotative aspects of epistemological beliefs: A pseudo-longitudinal study with students of different mathematical Programmes of Study. *LUMAT: International Journal on Math, Science and Technology Education*, 12(1), Article 1. <https://doi.org/10.31129/LUMAT.12.1.2138>
- Seedat, M., & Lazarus, S. (2011). Community psychology in South Africa: Origins, developments, and manifestations. *Journal of Community Psychology*, 39(3), 241–257. <https://doi.org/10.1002/jcop.20429>
- Sellbom, M., & Tellegen, A. (2019). Factor analysis in psychological assessment research: Common pitfalls and recommendations. *Psychological Assessment*, 31(12), 1428–1441. <https://doi.org/10.1037/pas0000623>
- Shibasaki, W., & Martins, R. (2018). Simple randomization may lead to unequal group sizes. Is that a problem? *American Journal of Orthodontics and Dentofacial Orthopedics: Official Publication of the American Association of Orthodontists, Its Constituent Societies, and the American Board of Orthodontics*, 154, 600–605. <https://doi.org/10.1016/j.ajodo.2018.07.005>
- Shoaib, A., Naheed, F., & Nasreen, S. (2021). Epistemological Beliefs and Girl Students' Academic Achievements regarding Mathematics Curriculum. *Bulletin of Education & Research*, 43(2), 75–83.
- Spaull, N. (2012). Poverty & Privilege: Primary School Inequality in South Africa. *Working Papers*, Article 13/2012. <https://ideas.repec.org/p/sza/wpaper/wpapers165.html>
- Stahl, E., & Bromme, R. (2007). The CAEB: An instrument for measuring connotative aspects of epistemological beliefs. *Learning and Instruction*, 17(6), 773–785. <https://doi.org/10.1016/j.learninstruc.2007.09.016>

- Tabachnick, B. G., & Fidell, L. S. (2019). *Using Multivariate Statistics* (7th edn). Pearson.
- Tabak, I., & Weinstock, M. (2008). A Sociocultural Exploration of Epistemological Beliefs. In M. S. Khine (Ed.), *Knowing, Knowledge and Beliefs: Epistemological Studies across Diverse Cultures* (pp. 177–195). Springer Netherlands. https://doi.org/10.1007/978-1-4020-6596-5_8
- Vally, S. (2013). *Social class and community in post-apartheid South African education policy and practices* [University of KwaZulu-Natal].
https://www.academia.edu/47563575/Social_class_and_community_in_post_apartheid_South_African_education_policy_and_practices
- van der Merwe, K., & and Nell, W. (2013). Knowledge and Learning: Views of a Sample of South African Higher Education Students. *Journal of Psychology in Africa*, 23(1), 61–67.
<https://doi.org/10.1080/14330237.2013.10820594>
- Walker, S., Brownlee, J., Lennox, S., Exley, B., Howells, K., & Cocker, F. (2009). Understanding first year university students: Personal epistemology and learning. *Teaching Education*, 20(3), 243–256. <https://doi.org/10.1080/10476210802559350>
- Widerberg, C. (2019). *The Two-Sample t-test and the Influence of Outliers: - A simulation study on how the type I error rate is impacted by outliers of different magnitude*.
<https://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-375767>
- Zimmerman, K. (2017). Use of Academic Resources Among Different Socioeconomic Classes. *Sacred Heart University Scholar*, 1(1), 11–23.

Appendices

Appendix A: Participant information sheet

Dear Sir / Madam

My name is **Judith Mahlangu**. I am a Masters student in the **Psychology Department** at the University of the Witwatersrand, Johannesburg. My supervisor is **Dr Michael Pitman**. I am conducting research on epistemic beliefs - beliefs about knowledge - of university students, and how these might be related to aspects of their family/ household and educational backgrounds.

I am inviting you to participate in this research study. Participation will involve you filling out a set of four questionnaires that should take no longer than about 20-30 minutes each? to complete depending on your pace.

If you decide to take part in the research study, it should be solely voluntarily. You do not have to take part. You can withdraw from the study at any time prior to the responses being submitted. You do not have to answer any questions if you do not want to. You will not get any monetary or other benefits if you choose to join the research. Taking part in the research study will not cost you anything aside from providing useful information that will contribute to research in the field of epistemic beliefs. You will not lose any services; benefits or rights you would normally have if you decide not to join.

The information collected from the questionnaires will be confidential and anonymous. During the research activity, I will need to ask for some personal information about you, including answers to a demographic questionnaire. However, you will not be asked to submit any information that could be used to identify you. When I share the results of the research study, no information will be included that could identify you. Information provided for the claiming of research participation course credits (your student number) will be collected in a separate survey. This information will remain separate from your responses to the main survey, and will be deleted once it has been passed on to the first-year psychology administrator.

With your permission, I would like to use the data obtained in the study for my Masters research report. This data will be stored safely in a password protected survey database, and on password protected computers. Only the researcher, Judith Mahlangu, and the research supervisor, Dr Michael Pitman, will have access to this data. The results of the study may also be presented at academic conferences and published in an academic journal. Information provided may also be used in later research projects. At all times, your anonymity and confidentiality will be preserved. The report will be available on the university

library website once published. If you would like to receive a summary of this report, I will be happy to send it to you.

There are no foreseeable risks in choosing to participate in the study; however should any of the questions in the questionnaire make you uncomfortable, feel free to contact counselling services available at the university through the Counselling and Careers Development Unit (CCDU) which accepts walk-ins free or charge or can be contacted through the Wits Crisis Line at 0800 111 331 (24/7/365). An alternative counselling service is also available free of charge at **Online Lifeline** and the contact details for the counselling service are **012 804 3619**, [http: www.lifelinepta.org.za](http://www.lifelinepta.org.za).

If you have any questions during or afterwards about this research study, feel free to contact me on the details listed below. If you have any concerns or complaints about the ethical procedures of this research study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrecnon-medical@wits.ac.za.

Yours sincerely,

Judith Mahlangu



Researcher:

Judith Mahlangu, email 1406760@students.wits.ac.za, Cell No: 078 344 1477

Supervisor:

Dr Michael Pitman, email Michael.pitman@wits.ac.za

Appendix B: Epistemic Cognition Survey

Demographic questions

1. What is your age (in years)?

2. What is your gender?

☐ Female

☐ Male

☐ Other (Please specify self-identification)

3. Please indicate your level of proficiency in South African official languages:

	None	Beginner	Intermediate	Fluent
Afrikaans	☐	☐	☐	☐
English	☐	☐	☐	☐
isiNdebele	☐	☐	☐	☐
isiXhosa	☐	☐	☐	☐
isiZulu	☐	☐	☐	☐
Sesotho sa Leboa	☐	☐	☐	☐
Sesotho	☐	☐	☐	☐
Setswana	☐	☐	☐	☐
siSwati	☐	☐	☐	☐
Tshivenda	☐	☐	☐	☐
Xitsonga	☐	☐	☐	☐

4. Race category (for descriptive purposes)

- ☐ Asian
- ☐ Black
- ☐ Coloured
- ☐ Indian
- ☐ White
- ☐ Prefer not to say

5. In which year did you complete Grade 12/ matric?

6. Are you the first in your immediate family to study at university?

- ☐ Yes
- ☐ No

To better understand your educational background and that of your family, this next section will include questions about the educational history within your family. Questions 7 and 8 refer to your parent/s, primary caregiver/s, and/or guardian/s.

7. What is the highest level of education achieved by your parent/guardian 1?

- ☐ Less than Grade one
- ☐ Primary school
- ☐ High school (excluding matric or Grade 12)
- ☐ Matric
- ☐ Certificate (post-matric)
- ☐ Diploma (post-matric)
- ☐ Technical qualification (e.g. electrician)
- ☐ Bachelor's degree
- ☐ Masters degree
- ☐ PhD degree
- Other (please specify)

8. What is the highest level of education achieved by your parent/guardian 2? (if applicable) ☐ Less than Grade one

☐ Primary school

☐ High school (excluding matric or Grade 12)

☐ Matric

☐ Certificate (post-matric)

☐ Diploma (post-matric)

☐ Technical qualification (e.g. electrician)

☐ Bachelor's degree

☐ Masters degree

☐ PhD degree

Other (please specify)

9. What is the type of high school you matriculated at?

☐ Government school

☐ Private school (independent non-government school)

☐ Home school

Other (please specify)

10. What is/was the location of the high school at which you matriculated?

☐ City

☐ Suburb

☐ Township

☐ Rural

☐ Other (please specify)

11. What are your current living arrangements?

☐ Living at home

☐ On-campus residence

☐ Off-campus private student accredited accommodation

☐ Staying with family/friends during term time

- ☐ Sharing an apartment/flat/cottage
- ☐ Renting an apartment/flat/cottage alone

Other:

12. Have you received NSFAS funding for your current year of study at Wits?

- ☐ Yes
- ☐ No

The questions that follow are about your experiences or beliefs about learning: (Rated on a 5-point Likert-scale with 1 being ‘Strongly agree’ and 5 being ‘Strong disagree’)

13. You will get confused if you try to relate new ideas in a textbook with knowledge you already have about a topic. (dfebq_1)

14. Educators should know by now which is the best method – lectures or small group discussions. (dfebq_2)

15. Learning definitions word-for-word is often necessary to do well on tests. (dfebq_3)

16. Most words have one clear meaning. (dfebq_4)

17. If scientists try hard enough, they can find the truth to almost everything. (dfebq_5)

18. It’s a waste of time to work on problems which have no possibility of coming out with a clear-cut and unambiguous answer. (dfebq_6)

19. Scientists can ultimately get to the truth. (dfebq_7)

20. If lecturers would stick more to the facts and talk less about ideas, one could get more out of university. (dfebq_8)

21. Almost all the information you can learn from a textbook you will get during the first reading. (dfebq_9)

22. If you are ever going to be able to understand something, it will make sense to you the first time you hear it. (dfebq_10)

23. If a person tries too hard to understand a problem, he or she will most likely end up being confused. (dfebq_11)

The following questions refer to the field of psychology:

24. Answers to questions in psychology change as experts gather more information. (dfebq_12)

25. All experts in psychology understand the field in the same way. (dfebq_13)

26. Truth is unchanging in psychology. (dfebq_14)

27. In psychology, most work has only one right answer. (dfebq_15)

28. Principles in psychology are unchanging. (dfebq_16)

29. All professors in psychology would probably come up with the same answers to questions in this field. (dfebq_17)
30. In psychology, it is good to question the ideas presented. (dfebq_18)
31. Most of what is true in psychology is already known. (dfebq_19)
32. First-hand experience is the best way of knowing something in psychology. (dfebq_20)
33. I am more likely to accept the ideas of someone with first-hand experience than the ideas of researchers in psychology. (dfebq_21)
34. Correct answers in psychology are more a matter of opinion than fact. (dfebq_22)
35. There is really no way to determine whether someone has the right answer in psychology. (dfebq_23)
36. Sometimes you just have to accept answers from the experts in psychology, even if you don't understand them. (dfebq_24)
37. If you read something in a textbook for psychology you can be sure it's true. (dfebq_25)
38. If my personal experience conflicts with ideas in the textbook, the book is probably right. (dfebq_26)
39. I am most confident that I know something when I know what the experts think. (dfebq_27)
40. Experts in psychology can ultimately get to the truth. (dfebq_28)
41. If scholars try hard enough, they can find the answers to almost anything. (dfebq_29)

The questions that follow are about your beliefs and attitudes about knowledge, learning and nature of knowing in the field of psychology:

42. Knowledge in psychology is:
Simple (1) (2) (3) (4) (5) (6) (7) Complex (caeb_1)
43. Knowledge in psychology is:
Stable (1) (2) (3) (4) (5) (6) (7) Unstable (caeb_2)
44. Knowledge in psychology is:
Objective (1) (2) (3) (4) (5) (6) (7) Subjective (caeb_3)
45. Knowledge in psychology is:
Integrated (1) (2) (3) (4) (5) (6) (7) Separated (caeb_4)
46. Knowledge in psychology is:
Confirmable (1) (2) (3) (4) (5) (6) (7) Unconfirmed (caeb_5)
47. Knowledge in psychology is:
Dynamic (1) (2) (3) (4) (5) (6) (7) Static (caeb_6)
48. Knowledge in psychology is:
Superficial (1) (2) (3) (4) (5) (6) (7) Profound (caeb_7)
49. Knowledge in psychology is:

Temporary (1) (2) (3) (4) (5) (6) (7) Everlasting (caeb_8)

50. Knowledge in psychology is:

Exact (1) (2) (3) (4) (5) (6) (7) Vague (caeb_9)

51. Knowledge in psychology is:

Absolute (1) (2) (3) (4) (5) (6) (7) Relative (caeb_10)

52. Knowledge in psychology is:

Sorted (1) (2) (3) (4) (5) (6) (7) Unsorted (caeb_11)

53. Knowledge in psychology is:

Precise (1) (2) (3) (4) (5) (6) (7) Imprecise (caeb_12)

54. Knowledge in psychology is:

Flexible (1) (2) (3) (4) (5) (6) (7) Inflexible (caeb_13)

55. Knowledge in psychology is:

Definite (1) (2) (3) (4) (5) (6) (7) Ambiguous (caeb_14)

56. Knowledge in psychology is:

Negotiated (1) (2) (3) (4) (5) (6) (7) Discovered (caeb_15)

57. Knowledge in psychology is:

Structured (1) (2) (3) (4) (5) (6) (7) Unstructured (caeb_16)

58. Knowledge in psychology is:

Completed (1) (2) (3) (4) (5) (6) (7) Uncompleted (caeb_17)

59. Knowledge in psychology is:

Refutable (1) (2) (3) (4) (5) (6) (7) Irrefutable (caeb_18)

60. Knowledge in psychology is:

Open (1) (2) (3) (4) (5) (6) (7) Closed (caeb_19)

61. Knowledge in psychology is:

Connected (1) (2) (3) (4) (5) (6) (7) Divided (caeb_20)

62. Knowledge in psychology is:

Accepted (1) (2) (3) (4) (5) (6) (7) Disputed (caeb_21)

63. Knowledge in psychology is:

Certain (1) (2) (3) (4) (5) (6) (7) Uncertain (caeb_22)

64. Knowledge in psychology is:

Detailed (1) (2) (3) (4) (5) (6) (7) Global (caeb_23)

65. Knowledge in psychology is:

Constructed (1) (2) (3) (4) (5) (6) (7) Pre-existing (caeb_24)

Appendix C: Living Standards Measure (Revised)

Please answer the following questions about your household during the year in which you completed Grade 12/ matric.

Question	Answer	
1. We had the following in my household:		
TV set	TRUE	FALSE
Satellite dish	TRUE	FALSE
Hi-Fi stereo, CD player, MP3 player, Bluetooth speaker	TRUE	FALSE
Computer / Laptop	TRUE	FALSE
At least one cell phone	TRUE	FALSE
Two or more cell phones in household	TRUE	FALSE
Home wifi internet connection	TRUE	FALSE
Streaming services (e.g. Netflix, Disney+, Showmax etc.)	TRUE	FALSE
Combination oven and stove/ hob (electric or gas)	TRUE	FALSE
Electric stove	TRUE	FALSE
Gas stove	TRUE	FALSE
Paraffin stove	TRUE	FALSE
Microwave oven	TRUE	FALSE
Fridge/freezer (combination)	TRUE	FALSE
Dishwashing machine	TRUE	FALSE

Washing machine	TRUE	FALSE
Lounge suite	TRUE	FALSE
Home security service	TRUE	FALSE
2. We had the following amenities in my home:		
Tap water in house/on plot	TRUE	FALSE
Hot running water from a geyser	TRUE	FALSE
Flush toilet in/outside house	TRUE	FALSE
3. There was a motor vehicle in our household	TRUE	FALSE
4. We were living in a city	TRUE	FALSE
5. We were living in a house, cluster or townhouse	TRUE	FALSE
6. We were living in a rural area <u>outside</u> Gauteng and the Western Cape	TRUE	FALSE
7. There were <u>no</u> radios, or only one radio (excluding car radios) in my household	TRUE	FALSE
8. There were <u>no</u> domestic workers or household helpers in my household (both live-in & part time)	TRUE	FALSE

Next, we want to ask you some questions about your households' standard of living during your Grade 12/ matric year.

		It was less than adequate for your household's needs	It was just adequate for your household's needs	It was more than adequate for your household's needs
SES2 _{food}	Concerning your household's <u>food consumption</u> during that year, which of the following was true?	1	3	6
SES3 _{hou}	Concerning your household's <u>housing</u> , which of the following was true?	1	3	6

SES4 _{clth}	Concerning your household's <u>clothing</u> , which of the following was true?	1	3	6
SES5 _{hlth}	Concerning your household's <u>health care cover</u> , which of the following was true?	1	3	6
SES6 _{sch}	Concerning the <u>schooling of children</u> in the household, which of the following was true?	1	3	6

Please think of the ladder below as representing where people stand in South Africa.

At the top of this ladder are the people who are the best off – those who have the most money, the most education and the most respected jobs. At the bottom are the people who are the worst off – who have the least money, least education, and the least respected jobs or no jobs. The higher up you are on this ladder, the closer you are to the people at the very top, the lower you are, the closer you are to the people at the very bottom.



SES1: Thinking about your household during your Grade 12/ matric year, where would you place your

household on this ladder to represent where you think you stood at that time

in your life, compared to other people in South Africa?

10 At the top in South Africa

9

8

7

6

5 In the middle in South Africa

4

3

2

1 At the bottom in South Africa

Appendix D: Access to Technology Survey

01/05/2023, 20:57

Computers & Technology at School

Computers & Technology at School

Please tell us about your access to and use of computers, the Internet and related technologies in high school.

 Not shared



When you were in secondary school/highschool, what access did you have to each of the following computer-related facilities?

[‘On-demand access’ means that you could use this device whenever you needed to do so]

	No access	Limited access	Adequate access	‘On demand’ access
School-owned computers	☐	☐	☐	☐
Home computer (not your own)	☐	☐	☐	☐
Computer of a friend or family member (not at home)	☐	☐	☐	☐
Your own computer	☐	☐	☐	☐



01/05/2023, 20:57

Computers & Technology at School

When you were in secondary/high school, how frequently would you say you made use of ONLINE information and resources for use in your school work?

- ☐ Not at all
- ☐ Very seldom
- ☐ Occasionally
- ☐ Frequently
- ☐ Very frequently



Appendix E: Ethics clearance and permission letters



**SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT ETHICS COMMITTEE
CONSTITUTED UNDER THE UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE
(NON-MEDICAL)**

CLEARANCE CERTIFICATE PROTOCOL NUMBER: MEd/23/08

PROJECT TITLE: Investigating the epistemic beliefs of first-generation and continuing generation students at a South African university.

INVESTIGATOR Mahlangu Judith (1406760)

SCHOOL/DEPARTMENT OF INVESTIGATOR SHCD/Psychology

DATE CONSIDERED 15 August 2023

DECISION OF THE COMMITTEE Approved unconditionally

RISK LEVEL Minimal Risk

EXPIRY DATE 31 December 2025

ISSUE DATE OF CERTIFICATE 24 August 2023 **CHAIRPERSON**

_____ (Dr
Aline Ferreira Correia)

cc: Dr Michael Pitman (Supervisor)

----- **DECLARATION OF INVESTIGATOR**

To be completed in duplicate and **ONE COPY** returned to the Chairperson of the School/Department ethics committee.

I/we fully understand the conditions under which I am/we are authorized to carry out the

abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure be contemplated from the research procedure as approved, I/we undertake to submit an amendment of the protocol to the Committee.

_____ JF. Mahlangu _____ 16 / 08 / 2023 _____ Signature
Date

PLEASE QUOTE THE PROTOCOL NUMBER ON ALL ENQUIRIES



17 October 2023

Judith Mahlangu
Student Number (1406760)
Master of Education (in Educational Psychology)
School of Human and Community Development

TO WHOM IT MAY CONCERN

"Investigating the epistemic beliefs of first-generation and multi-generation students at a South African university."

This letter serves to confirm that the above project has received permission to be conducted on University premises, and/or involving staff and/or students of the University as research participants. In undertaking this research, you agree to abide by all University regulations for conducting research on campus and to respect participants' rights to withdraw from participation at any time.

If you are conducting research on certain student cohorts, year groups or courses within specific Schools and within the teaching term, permission must be sought from Heads of School or individual academics.

Ethical clearance has been obtained. (Protocol number: Med/23/08)

Research Expiration: (31 December 2025)

A handwritten signature in black ink, appearing to read 'Potgieter'.

Nicoleen Potgieter
University Deputy Registrar

Appendix F: Exploratory factor analyses

DFEBQ

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.783
Bartlett's Test of Sphericity	Approx. Chi-Square	1469.551
	df	276
	Sig.	<.001

Removed items with no correlations greater than 0.3

Dfebq_1
Dfebq_2
Dfebq_3
Dfebq_12

Total Variance Explained

Component	Total	Initial Eigenvalues		Extraction Sums of Squared Loadings		
		% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.913	20.470	20.470	4.913	20.470	20.470
2	2.309	9.620	30.091	2.309	9.620	30.091
3	2.096	8.734	38.824	2.096	8.734	38.824
4	1.395	5.813	44.637	1.395	5.813	44.637
5	1.343	5.596	50.233			
6	1.087	4.531	54.764			
7	.998	4.159	58.923			
8	.948	3.951	62.873			
9	.932	3.884	66.757			
10	.819	3.411	70.168			
11	.793	3.303	73.471			
12	.704	2.935	76.406			
13	.680	2.832	79.237			
14	.645	2.688	81.925			
15	.594	2.474	84.399			
16	.576	2.399	86.797			
17	.514	2.142	88.940			
18	.477	1.989	90.929			
19	.442	1.842	92.770			
20	.416	1.732	94.503			
21	.383	1.596	96.098			
22	.350	1.458	97.556			
23	.321	1.338	98.895			
24	.265	1.105	100.000			

Rotated Component Matrix^a

	Component			
	1	2	3	4
dfebq_17	.734			
dfebq_15	.731			
dfebq_14	.692			
dfbeq_16	.678			
dfebq_13	.609			
dfebq_26	.582			
dfebq_25	.516			

dfebq_24	.499			
dfebq_19	.428			.374
dfebq_4	.397			
dfebq_8	.357		.356	
dfebq_7		.828		
dfebq_5		.817		
dfebq_29		.627		.435
dfebq_28		.597		.441
dfebq_21			.621	
dfebq_22			.598	
dfebq_11			.564	
dfebq_6			.476	
dfebq_10	.342		.446	.337
dfebq_9	.357		.433	
dfebq_23			.431	
dfebq_27				.696
dfebq_20			.386	.498

CAEB**KMO and Bartlett's Test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.761
Bartlett's Test of Sphericity	Approx. Chi-Square	930.812
	df	153
	Sig.	<.001

Removed items with no correlations greater than 0.3

Caeb_1
Caeb_6
Caeb_7
Caeb_15
Caeb_23
Caeb_24

Total Variance Explained

Component	Total	Initial Eigenvalues		Extraction Sums of Squared Loadings		
		% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.057	22.540	22.540	4.057	22.540	22.540
2	2.539	14.106	36.647	2.539	14.106	36.647
3	1.247	6.928	43.575			
4	1.231	6.840	50.416			
5	1.034	5.745	56.160			
6	.957	5.314	61.474			
7	.907	5.039	66.513			
8	.770	4.278	70.792			
9	.738	4.099	74.891			
10	.729	4.048	78.938			
11	.622	3.457	82.395			
12	.619	3.437	85.832			
13	.540	2.998	88.830			
14	.492	2.736	91.566			
15	.454	2.524	94.090			
16	.393	2.183	96.273			
17	.372	2.068	98.341			
18	.299	1.659	100.000			

Rotated Component Matrix^a

	Component	
	1	2
caeb_22	.695	
caeb_14	.650	
caeb_9	.614	
caeb_17	.568	
caeb_12	.549	.404
caeb_2	.535	
caeb_5	.493	.332
caeb_10	.453	-.350
caeb_16	.453	.437
caeb_21	.443	

caeb_3	.399	
rev_caeb8	.372	.314
rev_caeb19		-.727
caeb_20		.658
rev_caeb13		-.655
rev_caeb18		-.554
caeb_4		.500
caeb_11	.480	.480

Appendix G: Independent samples t-test for question 1.

DFEBQ

Tests of Normality

Are you the first in your immediate family to study at university?		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Certain_Mean	No	.076	174	.016	.977	174	.006
	Yes	.120	70	.014	.975	70	.164
Attain_Mean	No	.094	174	<.001	.982	174	.023
	Yes	.108	70	.040	.962	70	.032
Justi_Mean	No	.083	174	.005	.986	174	.077
	Yes	.098	70	.091	.984	70	.509

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Significance One- Sided p
Certain_Mean	Equal variances assumed	1.958	.163	.537	242	.296
	Equal variances not assumed			.503	111.958	.308
Attain_Mean	Equal variances assumed	.566	.453	-.360	242	.359
	Equal variances not assumed			-.350	119.914	.364
Justi_Mean	Equal variances assumed	2.577	.110	.006	242	.498

Equal variances not assumed			.005	116.733	.498
-----------------------------	--	--	------	---------	------

Independent Samples Test

		t-test for Equality of Means				
		Significance Two-Sided p	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Certain_Mean	Equal variances assumed	.592	.04001	.07451	-.10675	.18678
	Equal variances not assumed	.616	.04001	.07954	-.11758	.19761
Attain_Mean	Equal variances assumed	.719	-.03645	.10118	-.23576	.16286
	Equal variances not assumed	.727	-.03645	.10423	-.24282	.16992
Justi_Mean	Equal variances assumed	.996	.00039	.07039	-.13826	.13904
	Equal variances not assumed	.996	.00039	.07351	-.14519	.14597

Independent Samples Effect Sizes

		Standardizer ^a	Point Estimate	95% Confidence Interval	
				Lower	Upper
Certain_Mean	Cohen's d	.52640	.076	-.202	.353

Attain_Mean	Hedges' correction	.52804	.076	-.201	.352
	Glass's delta	.50131	.080	-.198	.357
	Cohen's d	.71488	-.051	-.328	.227
Justi_Mean	Hedges' correction	.71710	-.051	-.327	.226
	Glass's delta	.70016	-.052	-.329	.225
	Cohen's d	.49731	.001	-.277	.278
	Hedges' correction	.49886	.001	-.276	.277
	Glass's delta	.48208	.001	-.277	.278

CAEB

Tests of Normality

Are you the first in your immediate family to study at university?		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Texture2Total	No	.064	174	.076	.986	174	.089
	Yes	.092	70	.200*	.978	70	.262

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Significance One-Sided p
Texture2Total	Equal variances assumed	.235	.628	-.092	242	.463
	Equal variances not assumed			-.089	117.758	.465

Independent Samples Test

		t-test for Equality of Means			
		Significance Two-Sided p	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower
Texture2Total	Equal variances assumed	.927	-.00536	.05815	-.11991
	Equal variances not assumed	.930	-.00536	.06046	-.12508

Independent Samples Test

		t-test for Equality of Means 95% Confidence Interval of the Difference Upper
Texture2Total	Equal variances assumed	.10919
	Equal variances not assumed	.11436

Independent Samples Effect Sizes

Standardizer^a | Point Estimate | 95% Confidence Interval

				Lower	Upper
Texture2Total	Cohen's d	.41086	-.013	-.290	.264
	Hedges' correction	.41214	-.013	-.290	.264
	Glass's delta	.39964	-.013	-.291	.264

Appendix H: Two-way ANOVA for research question 2

CAEB

Levene's Test of Equality of Error Variances^{a,b}

		Levene Statistic	df1	df2	Sig.
Texture2Total	Based on Mean	1.437	5	238	.212
	Based on Median	1.465	5	238	.202
	Based on Median and with adjusted df	1.465	5	212.102	.203
	Based on trimmed mean	1.418	5	238	.219

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.^{a,b}

a. Dependent variable: Texture2Total

b. Design: Intercept + uni_1st + NZ_SEStotal + uni_1st * NZ_SEStotal

Tests of Between-Subjects Effects

Dependent Variable: Texture2Total

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.739 ^a	5	.148	.877	.497	.018
Intercept	2381.985	1	2381.985	14132.726	<.001	.983
uni_1st	.087	1	.087	.514	.474	.002
NZ_SEStotal	.292	2	.146	.865	.422	.007
uni_1st * NZ_SEStotal	.568	2	.284	1.685	.188	.014
Error	40.113	238	.169			
Total	3456.928	244				
Corrected Total	40.852	243				

a. R Squared = .018 (Adjusted R Squared = -.003)

DFEBQ**Levene's Test of Equality of Error Variances^{a,b}**

		Levene Statistic	df1	df2	Sig.
Certain_Mean	Based on Mean	2.569	5	238	.028
	Based on Median	2.350	5	238	.042
	Based on Median and with adjusted df	2.350	5	210.507	.042
	Based on trimmed mean	2.476	5	238	.033

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.^{a,b}

a. Dependent variable: Certain_Mean

b. Design: Intercept + uni_1st + NZ_SEStotal + uni_1st * NZ_SEStotal

Tests of Between-Subjects Effects

Dependent Variable: Certain_Mean

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2.521 ^a	5	.504	1.857	.103	.038
Intercept	963.988	1	963.988	3550.637	<.001	.937
uni_1st	.014	1	.014	.052	.820	.000
NZ_SEStotal	2.314	2	1.157	4.262	.015	.035
uni_1st * NZ_SEStotal	.342	2	.171	.630	.533	.005
Error	64.616	238	.271			
Total	1445.826	244				
Corrected Total	67.137	243				

Levene's Test of Equality of Error Variances^{a,b}

		Levene Statistic	df1	df2	Sig.
Attain_Mean	Based on Mean	.499	5	238	.777

	Based on Median	.418	5	238	.836
	Based on Median and with adjusted df	.418	5	233.489	.836
	Based on trimmed mean	.491	5	238	.783

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.^{a,b}

a. Dependent variable: Attain_Mean

b. Design: Intercept + uni_1st + NZ_SEStotal + uni_1st * NZ_SEStotal

Tests of Between-Subjects Effects

Dependent Variable: Attain_Mean

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	3.777 ^a	5	.755	1.499	.191	.031
Intercept	1527.659	1	1527.659	3030.776	<.001	.927
uni_1st	.005	1	.005	.010	.921	.000
NZ_SEStotal	2.373	2	1.186	2.354	.097	.019
uni_1st * NZ_SEStotal	2.033	2	1.016	2.016	.135	.017
Error	119.964	238	.504			
Total	2310.750	244				
Corrected Total	123.741	243				

a. R Squared = .031 (Adjusted R Squared = .010)

Levene's Test of Equality of Error Variances^{a,b}

		Levene Statistic	df1	df2	Sig.
Justi_Mean	Based on Mean	1.467	5	238	.201
	Based on Median	.955	5	238	.446
	Based on Median and with adjusted df	.955	5	220.272	.446
	Based on trimmed mean	1.469	5	238	.201

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.^{a,b}

a. Dependent variable: Justi_Mean

b. Design: Intercept + uni_1st + NZ_SEStotal + uni_1st * NZ_SEStotal

Tests of Between-Subjects Effects

Dependent Variable: Justi_Mean

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.963 ^a	5	.193	.779	.566	.016
Intercept	1333.487	1	1333.487	5389.360	<.001	.958
uni_1st	.073	1	.073	.294	.588	.001
NZ_SEStotal	.324	2	.162	.655	.520	.005
uni_1st * NZ_SEStotal	.730	2	.365	1.474	.231	.012
Error	58.888	238	.247			
Total	1982.203	244				
Corrected Total	59.852	243				

a. R Squared = .016 (Adjusted R Squared = -.005)