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Exploring Epistemological Beliefs Of Higher Education Teachers: Influences Of Demographic And Professional Variables

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Abstract:
Background: *This study explores the epistemological beliefs (EB) of higher education teachers in Mumbai, aiming to understand how these beliefs are influenced by demographic and professional variables. Epistemological beliefs—teachers' perceptions about the nature of knowledge and the process of knowing—play a critical role in shaping teaching practices and student learning. Despite their importance, limited research has addressed how such beliefs vary across teacher characteristics such as gender, age, subject background, qualification, and teaching experience.*
Materials and Methods*: A stratified random sampling technique was used to select 250 higher education teachers from Mumbai. Data were collected using a validated 30-item questionnaire grounded in the theoretical framework of Hofer and Pintrich (1997), which categorizes epistemological beliefs into multiple dimensions. Descriptive and inferential statistical techniques, including independent sample t-tests and one-way ANOVA, were employed to analyze the influence of selected variables on teachers' epistemological beliefs.*
Results*: Statistical analysis revealed that gender was the only variable with a significant effect on epistemological beliefs. Specifically, female teachers exhibited more sophisticated epistemological beliefs compared to their male counterparts. No significant differences were observed based on age, teaching experience, subject specialization, or educational qualifications, indicating a general consistency in beliefs across these variables.*
Conclusion: *The findings suggest that gender plays a meaningful role in shaping epistemological beliefs among higher education teachers, whereas other demographic and professional factors do not show significant influence. This highlights the limited impact of static variables and points to the potential role of dynamic, contextual factors such as institutional culture and professional learning environments. The study advocates for gender-sensitive and reflective professional development programs and supports the integration of epistemological training into teacher education curricula to cultivate critical and informed approaches to teaching and learning.*
Key Words: *Epistemology, Knowledge, Epistemological Beliefs, Knowledge construction.*

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I. Introduction

Higher education has experienced massive change in recent decades, with large number of students from a range of diverse backgrounds. One major outcome of this change is the shift in focus from syllabi to students and their learning (Leicht et. al.,2018). The Indian National Education Policy 2020 has emphasized on development of creative potential of each learner. It recognizes importance of the 'foundational capacities' of literacy and numeracy as well as 'higher- order' cognitive capacities – critical thinking and problem solving along with social, ethical, and emotional capacities and dispositions. The policy (NEP 2020), in tune with the objective of sustainability, further calls for reforms in higher education system with the teacher at the centre as teachers are the most respected and essential members of the society. The teacher becomes focal point as they are the change agents to bring about transformation in education system. Roy and Halder (2018) suggest that teachers are second most important factor of education, as they have power to control the wholesome development of educational system. Since teacher's effectiveness is so decisive in the context of education, teacher's beliefs about teaching & learning need attention. Teacher's beliefs shape their perception, alter their judgment and finally influence the students. Teachers, as all knowledge workers, need to be self regulated and critically reflective lifelong learners. It is important to attend to how (process) of learning as well as what (content) of learning (Klatter et al. 2001). Particularly, teacher's beliefs about knowledge and knowing otherwise known as epistemic belief or personal epistemology, might give significant insight into the how to

improve teaching and learning. Hence recognizing growing concern of influence of teacher beliefs on classroom practice and pedagogical decision, there is a case for studying epistemological belief of Higher Education Teachers.

II. Review Of Literature

Epistemic belief as a research area has been doing progress since its inception and empirical investigation by Perry in 1960. Recent developments in epistemic belief theories highlight that it significantly influences learning and information processing, particularly when engaged with multiple sources, enhancing understanding of knowledge construction and the necessity for advanced epistemic beliefs in educational intervention. Braten et al., (2015) reported that epistemic belief guides learners to approach information influencing their goals and processing strategies. For instance, a belief in absolute knowledge can lead to ineffective learning strategies when faced with complex issues. Rosman & Kerwer, (2019) stated that intervention aimed at fostering epistemic beliefs have shown to enhance learner's ability to evaluate knowledge claims contextually. The interaction between epistemic beliefs and knowledge construction suggests that both can be developed through targeted teaching strategies (Green & Hood, 2013). While epistemic beliefs play a significant role in learning and knowledge construction, it is important to note that there is potential for misconceptions. Learners holding to rigid beliefs hinder their ability to adapt to new information which can complicate the knowledge construction process.

Epistemic beliefs play a key role in shaping how individuals understand knowledge and learning, including in fields like history and physics. Recent literature highlights the complexity of these beliefs and the challenges in measuring them effectively. Conceptual frameworks often categorize epistemic beliefs through developmental and dimensional lenses (Stoel et al., 2022), with specific models in physics education identifying areas such as source, content, certainty, and structure of knowledge (Watson & Thomas, 2024). These beliefs shape how individuals process information, especially from multiple sources, which in turn influences their understanding and application of knowledge (Rosman & Kerwer, 2019). Epistemic beliefs are also integral in promoting critical thinking and integrating various perspectives, as sophisticated beliefs can foster deeper learning outcomes (Silvia, 2023; Green & Hood, 2013). Furthermore, misconceptions about knowledge, such as perceiving it as absolute, can hinder comprehension and lead to superficial learning (Bråten et al., 2015). As such, educational strategies that address and refine these beliefs are essential for enhancing students' cognitive engagement and fostering advanced learning outcomes (Maclellan, 2014; Bråten et al., 2011). Despite their importance, recent work suggests a more complex relationship between epistemic beliefs and knowledge, indicating that sophisticated beliefs do not always directly correlate with higher levels of knowledge, urging a reevaluation of traditional perspectives (Bromme et al., 2008). Moreover, research highlights the need for dynamic, context-sensitive models of epistemic development, particularly in young learners, to improve educational interventions (Schraw, 2001).

III. Theoretical Framework

Epistemology is the philosophical study of the origin and limits of human knowledge. The term is derived from the Greek language where *episteme* means knowledge and *logos means* reason. Epistemology, metaphysics, logic and ethics are four branches of philosophy (Martinich & Avrum , 2021). Most people consider knowledge and Truth to be exactly the same; however, that is not the case. Generally, they do mean the same, as knowledge is considered to be truthful, while knowing the truth is considered to be knowledge. However, there are times when knowledge does not necessarily mean the truth. Epistemology, or the theory of knowledge, is concerned with a variety of questions about knowledge and related topics (Lemos ,2007). Epistemological development was elaborated by a model that emerged from Perry's work consisting of nine positions and four categories, moving from a dualistic or absolutist view of knowledge to a more relativistic view culminating in commitment, namely dualism, multiplicity, relativism and commitment (Hofer & Pintrich, 1997). Belenky et al. (1986) however were concerned with themes of knowing particular to women. They set out to understand 'Women's ways of knowing' following interview method. While Perry focused on nature of knowledge and truth, Belenky et al. focused on source of knowledge. Baxter Magolda's (1987) work began as an attempt to understand gender-related implications of epistemological development. She designed a longitudinal study of epistemological development and proposed developmental sequenced position in epistemological belief. In consistence with Belenky's et al. she found gender related patterns in knowing. King and Kitchener (1994) built on Perry's work as well as Dewey (1938). They interviewed from high school students through middle age adults, brought up a reflective judgment model that focused on the ways that people understand the process of knowing and the corresponding ways they justify their beliefs about ill structured problems. Kuhn (1991) attempted to study how individual responded to everyday problems that lack definitive solutions to understand the underlying beliefs about knowledge. He evidenced similar epistemological thought that resembled Perry's work and that of King and Kitchner. Schommer (1997) tried to understand epistemological belief by an attractive and expedient alternative to interviews, a paper pencil questionnaire. Though a less time-consuming method, the questionnaire

was criticized for having some limitation (Hofer & Pintrich, 1997). Schommer (1997) investigated the development of epistemological belief of high school students from all socioeconomic level and addressed four issues in their analysis such as change in Epistemological belief, the link between EBs and academic performance gender differences and relationship between EBs and academic performance.

IV. Material And Methods

Aim and Objectives

The primary aim of this study was to examine how various demographic and professional factors influence teachers' Epistemological Beliefs. Specifically, the study seeks to explore whether significant differences exist in teachers' Epistemological Beliefs based on their age, gender, professional experience, subject background, and educational qualifications. By systematically analyzing these variables, the research intends to identify patterns and disparities in Epistemological Beliefs among teachers, contributing to a better understanding of how personal beliefs about knowledge, contribute to effective teaching and learning environment.

Sample

A stratified random sampling technique was used. The city of Mumbai was stratified into three categories (Western region/ Central region/ Harbor region). Higher Education Institutes from these regions were identified. The colleges that approved the data collection were selected. 250 higher education teachers from these colleges agreed to fill in a self-reported Epistemological Beliefs survey instrument.

Instrument

The Epistemological Beliefs survey instrument was developed based on Hofer and Pintrich's conceptualization of epistemological beliefs. It is defined as individuals' beliefs about the nature of knowledge and the process of knowing. The two broad dimensions: the nature of knowledge—which includes beliefs about the certainty (fixed vs. evolving) and simplicity (discrete facts vs. complex interrelations) of knowledge and the nature of knowing, which involves beliefs about the sources of knowledge (external authorities vs. personal reasoning) and the justification for knowing (how individuals evaluate and validate knowledge claims). Initially, the tool contained 62 items. To ensure its validity, expert opinions from professionals in the field of education were sought. As a result, 20 items were removed. The revised tool was then administered to 30 higher education teachers to assess the discriminative index of each item, leading to the rejection of an additional 10 items. The tool with 32 items was administered to 30 higher education teachers to calculate reliability. The Chronbach alpha score for the said tool was 0.82. The survey questionnaire with 32 items was administered for final data collection.

Design

To ascertain and study the Epistemological beliefs of higher education teachers from the city of Mumbai, categorical variables such as Age, Professional Experience, Subject Background, Gender, and Qualifications, were taken. The study adopted the descriptive method of the Causal-comparative type. The aim was to identify cause and effect relationship between independent and dependent variables. The researcher appropriated the retrospective causal-comparative method (Brewer & Kubn, 2010). This method determines whether certain demographic variables may have significantly influenced the dependent variable.

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Statistical analysis

This study employed descriptive statistical techniques, including measures of central tendency (mean and median) and measures of dispersion (standard deviation and range), to summarize and interpret the distribution and variability of the collected data. These methods provided a clear understanding of the overall patterns and consistency within the dataset. Additionally, the study utilized Analysis of Variance (ANOVA) and 't' test as inferential statistical technique to examine whether there were statistically significant differences between the means of multiple groups, thereby enabling the researcher to draw conclusions.

Table 1
Consolidated Table Showing Significant Difference In Epistemic Belief Of Higher Education Teachers Based On Demographic And Professional Variables

Variables	Epistemological Beliefs						'P' Value
		N	Mean	Variance	't' value	'F' value	
Gender	Female	177	127.80	11.57	2.32*		0.02
	Male	73	123.89	13.30			
Age Group (in	21-30	40	125.3	10.75		0.28	0.83

years)	31-40	89	126.4	12.95			
	41-50	82	127.13	10.87			
	51 +	39	127.56	14.63			
Experience (in years)	0-10	126	126.61	11.31		0.58	0.55
	11-20	82	125.85	13.12			
	21-30	42	128.35	13.05			
Discipline	Arts	76	128.36	12.46		1.07	0.34
	Commerce	100	125.99	12.59			
	Science	74	125.81	11.37			
Qualification	PhD.	74	127.83	12.28	0.98		0.32
	NonPhD.	176	126.16	12.17			

The data presented examines the epistemological beliefs of teachers across various demographic variables. A significant difference was found with respect to gender, where female teachers (M = 127.80) exhibited stronger epistemological beliefs compared to their male counterparts (M = 123.89), as evidenced by a t-value of 2.32, which is significant at the 0.05 level. This suggests that gender plays a notable role in shaping teachers' beliefs about knowledge and learning. However, the analysis revealed no statistically significant differences in epistemological beliefs based on age group, years of teaching experience, subject background, or educational qualification.

V. Results

The finding shows significant difference between gender in their epistemic beliefs indicating female teachers are likely to have sophisticated Epistemic beliefs than their male counterparts. It should be noted that gender differences in epistemic beliefs are not universal and researches have shown varying results across culture and society. Further societal changes and evolving educational practices may contribute to sophisticated views about knowledge. Trakulphadetkrai (2022) reported that female secondary teachers were more likely to have better views regarding structure of mathematical knowledge, however, Ertekin (2009) reported female teachers to have significantly stronger belief on absolutist knowledge than their male counterpart. There are evidences about gender pattern in reflective thinking, problem solving, metacognitive thinking showing differing gender pattern (Haghighi, 2015). Hofer and Pintrich (1997) state that differences between males' and females' beliefs are a consequence of differing opportunities, affordances and constraints on development of personal epistemology rather than as personal characteristic.

Additionally, the data does not show any significant difference among teachers of 4 age groups; 20-29, 30-39, 40-49, 50+. While some researches claim that age has an impact on how an individual views knowledge (Walter,2009), there are findings which suggest age doesn't influence EB as such (Letina, 2022). There are more evidences for epistemological development determined by age and education (King & Kitchener 1981, Schoenfeld 1983), however these two variables are confounding (Schommer, 1994). This means age and education both influence each other; therefore it may not be possible to see whether the result is because of age or Education.

As regards professional experience, it is evident that EB is not influenced by experience. While it seems intuitive to believe that more years of teaching experience will correspond to more sophisticated epistemic beliefs (Perry et al, 1999), the finding shows that the relationship is not straightforward. In current information age of digital media, social media and many other platforms for sharing knowledge, it is not surprising to see insignificant difference in their views about knowledge. Moreover, teachers' own engagement with academics and engagement with their own profession (workshops, seminars, and professional development activities) offers a scaffolding to attain sophisticated views about knowledge. School culture and climate, administrative policies, teaching methodologies prescribed by the curriculum might have stronger influence on teachers' beliefs about knowledge, than their teaching experience. Although empirical evidences (Mataka, 2019; Chai et al, 2009; Rucinski & Bauch, 2006) showed that teaching experience did influence epistemological beliefs, there were counter evidences stating teaching experience did not influence Epistemic Beliefs (Nisbet & Warren, 2000). Manu (2014) as well reported no significant difference between pre service and in service teachers' epistemological beliefs which imply that difference in experience and number of years in teaching among in service teachers were not likely to have impact on the development of epistemic beliefs. Yenice (2015) reported that grade level did not influence the epistemic beliefs of student teachers indicating that more years of exposure is not likely to influence the view individuals hold about knowledge.

In context of discipline, there was no significant difference in their EB. Against the assumption that disciplines are purely limiting, Corry (2022) argues that discipline provides a basis of local truth claims, tools for interdisciplinarity and communities of knowledge-production. Hence, it is evident from the finding that beliefs about knowledge of the higher education teachers are not limited by their disciplinarity. Though earlier researches (Paulsen & Charles,2024, Rosman et al, 2017, 2020, schommer –Aikins et al., 2003) show difference

in epistemic beliefs across academic discipline, however, Urhahne & Kremer (2020) did not find significant difference between natural science students and social science students as well as linguistic sciences students.

The finding also revealed that teachers with PhD and without PhD do not differ significantly on Epistemic Belief. Epsitemic Belief is regarded as developmental by previous theorist like Perry (1960). There are conflicting findings from previous researches. While Schommer (1993) reported clear relationship between education and sophisticated EB, Schommer (1984) claimed that sophisticated EB is product of both home and formal Education. Further, Hofer & Picntrich (1997) claimed for direct relationship between age, education and higher epistemic belief at the same time, they exhibit uncertainty about development of beliefs about knowledge of individuals after college/formal education. They suggest looking into the socio cultural and professional context as well. While EB development is evident during school or college, it is not possible to detect how EB is developing in different socio cultural and professional context post formal education. While a doctorate degree does help in gaining deeper insight into nature of knowledge and knowing, it cannot be claimed, as teachers without a doctorate degree too are experiencing and interacting with knowledge. Korom &Majkic (2023) rightly stated that general epistemological beliefs are formed in non-academic context (Socio cultural, professional, formal and informal) while academic EB are shaped through formal education. It is plausible that the EB survey instrument had General Epistemological beliefs; therefore teachers scored almost similar indicating insignificant difference in their EB scores.

VI. Implication

The findings of this study highlight the need for targeted professional development that is gender-sensitive and promotes reflective thinking about the nature and justification of knowledge. Given the lack of significant differences in epistemological beliefs across age, experience, subject, and qualifications, teacher training should prioritize context-sensitive, pedagogical strategies over static traits. Integrating epistemological awareness into teacher education curricula can foster critical thinking and enrich classroom practices. Institutions should support this growth through collaborative learning environments that encourage ongoing reflection. In alignment with NEP 2020, policymakers should recognize the role of teacher beliefs in shaping effective, student-centered education and incorporate epistemological training into broader reform efforts.

VII. Conclusion

In conclusion, the study reveals a significant gender difference in the epistemic beliefs of higher education teachers, suggesting that male and female educators may approach knowledge and the process of knowing in distinct ways. However, the absence of significant differences across age, subject specialization, years of teaching experience, and qualification levels indicates that these demographic and professional variables do not substantially influence epistemic beliefs. These findings underscore the importance of considering gender as a factor in understanding how educators perceive knowledge, while also highlighting the relative consistency of epistemic beliefs across other teacher characteristics. Further research may explore the underlying causes of gender-based differences and their potential implications for teaching practices and professional development.

Declaration

We hereby confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome. We confirm that the manuscript has been read and approved by all named authors listed. Further we confirm that the order of authors listed in the manuscript has been approved by all of us. We confirm that data was collected with the due approval of the respondents and that ethical standards were strictly adhered to while working on the data. The corresponding author is the sole contact for the Editorial process. She is responsible for communicating with other authors about progress, submission of revisions, and final approval of proofs. We confirm that we have provided a current, correct email address which is accessible by the corresponding Author.

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