



TEACHER BELIEFS OF PROSPECTIVE FILIPINO EDUCATORS: A ROBUST THREE-FACTOR MODEL

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Abstract

Shifting to student-centered teaching-learning in the Philippines entails closer scrutiny of teacher beliefs. These beliefs shape the adoption and application of knowledge in classroom settings and educational reforms. Thus, this study aims to support the theoretical underpinnings of teacher belief. In particular, this study aims (1) to identify a factor structure of teacher beliefs among prospective Filipino educators via exploratory factor analysis (EFA), (2) to evaluate the identified factor model's fit indices and psychometric properties via confirmatory factor analysis (CFA), and (3) to provide a CFA-based measurement model with excellent model fit. In this two-phase study, EFA and CFA were used. Using the thumbs-up rule 10:1 observation-to-variable ratio, 435 teacher-education students from Central Luzon, Philippines, agreed to participate voluntarily in the EFA study, while 441 students participated in the CFA study. Three experts validated the self-made instrument prior to EFA and CFA procedures. The stability of the three-factor solution—Reliable Improver, Knowledge Dispenser, and Equity Promoter—is evident in both EFA before and after transformation. The broader construct Reliable Improver combines Growth Advocate and Engagement Advocate items, highlighting shared concepts. The three teacher beliefs identified are distinct. Equity Promoter shows a negative correlation with Knowledge Dispenser and Reliable Improver beliefs, highlighting a tension between structure and adaptability. Strategic Scaffolders items were removed due to cross-loadings, suggesting its harmonization within Reliable Improver and Knowledge Dispenser beliefs, both leveraging scaffolding structures for structured teaching or guided improvement. Reliable Improver via systematic, dependable teaching methods for continuous improvement complements Knowledge Dispenser's structured delivery.

Keywords: factor analysis, factor model, Filipino, prospective teacher, teacher beliefs

Introduction

Learning is fundamentally the process of gaining new knowledge and abilities, and learning theories emphasize creating an acceptable method. Positive results are methodological, whereas negative results are skeptical. A learning strategy must, therefore, at the very least demonstrate that it can succeed in a significant sense as to its claims. As a result, three main divisions of learning theory can be distinguished: behaviorism, cognitivism, and constructivism (Ignacio & Paras, 2024; Small, 2003). This interplay of behaviorism, cognitivism, and constructivism grounds individuals' understanding of how these theories influence teacher beliefs in dynamic classroom settings.

Behaviorism served as the foundation for early learning theories, in which teachers used conditioning to impart knowledge and expect students to learn passively (Miller, 2003; Thanh-

Pham, 2011). This teacher-centered approach emphasized information absorption without active student involvement (Boghossian, 2006). Teachers at this level deliver content without necessarily encouraging students to understand and/or engage deeply with it. Learning tends to be superficial, with students primarily memorizing information rather than developing a deep understanding. The focus is on delivering content and structuring the material (Biggs & Tang, 2011; Ignacio, 2016). At this level, teachers aim to present information in a well-organized, logical sequence, expecting that clear explanations and organization enhance student understanding. The teacher views their primary role as an information provider (i.e., surface teaching-inclined). According to McNeece (2019), the teacher's responsibility is viewed as positing explicit instruction.

In response, cognitive theories shifted focus to active learning, where students connect ideas to build knowledge (Bélanger, 2011; Gardner, 1985). Teachers at this level focus on fostering a deeper understanding of content/material, encouraging students to connect ideas, analyze, and apply knowledge (Biggs & Tang, 2011). Teaching methods are designed to engage students actively in learning, often via inquiry-based activities, discussions, and problem-solving. The focus is on facilitating learning processes. Teachers at this level view their role as assisting students in actively building their own knowledge. Instead of focusing on content delivery, they use teaching methods that engage students in active learning (i.e., deep teaching-inclined). As per McNeece (2019), the teacher's role is viewed as positing collaboration and guided instruction.

As capitalism emerged, education also began emphasizing "21st-century skills," a proxy term for such necessary "future" skills (Engel & Rutkowski, 2008; Kennedy et al., 2023; Woodford & Quiles, 2019). With the decline of behaviorism, Western constructivist-grounded student-centered teaching-learning (SCTL) took hold, promoting experiential learning (Jacobs & Renandya, 2019; Lin, 2016; Pedersen & Liu, 2003). This level is characterized by the teacher's strategic approach to foster learning outcomes (Barr & Tagg, 1995; Doyle, 2008; Ignacio, 2021). Teachers are aware of both surface and deep learning approaches and use them strategically to help students reach specific goals and needs. The focus is aligned with student-driven inquiry and exploration (Biggs & Tang, 2011). Teachers at this level embrace entirely the principles of constructive alignment. Teachers design learning activities, assessments, and outcomes to justly support students in achieving mastery over content and skills (i.e., strategic teaching-inclined). According to McNeece (2019), the teacher's responsibility is viewed as providing quality control checkpoints for students without much-giving biases, providing more student independence.

On Scaffolding and Inquiry Levels

There are various teaching levels, from one that is more teacher-centered to one that is more student-centered (Biggs & Tang, 2011). These levels reflect a progression in how teachers perceive and approach their role in facilitating student learning (surface teaching-inclined, deep teaching-inclined, and strategic teaching-inclined). Scaffolding through various levels of inquiry supports students' progress from structured guidance to independent learning (Blanchard et al., 2010; Bucks et al., 2008). Hence, the teachers' fundamental concern is to design supportive learning environments that stress both social and emotional development as well as epistemic skills and knowledge. An inquiry level categorization in various levels is helpful in assisting interaction between students and teachers.

Scaffolding helps students become involved in a certain subject or area so they can do tasks they might not be able to complete independently, lowering uncertainty and improving learning opportunities (Rasku-Puttonen et al., 2003). This helps students take responsibility for their learning little by little. Scaffolding is a tool that teachers use to emphasize task

aspects, enhance self-reliance, model helpful conduct, evaluate students' skill performance, and encourage metacognition and reflective learning (Molenaar et al., 2010; Renninger & Granott, 2005). It provides structured support at the beginning, such as clues and models, and is then reduced as students gain confidence and independence. By adjusting support to meet students' needs, scaffolding helps facilitate their growth and development toward autonomy. The literature splits between static and dynamic scaffolding (Ignacio & Paras, 2024). Static scaffolding is pre-planned, addressing anticipated challenges, while dynamic scaffolding is responsive, adapting to students' immediate needs during the learning process. This flexibility ensures that support is provided as needed, based on students' progress and specific learning tasks. Static scaffolding can be blended with content structuring, while dynamic scaffolding can be added to facilitate learning.

Table 1
Inquiry Levels

Process/ Level	Level 0: Verification	Level 1: Structured Inquiry	Level 2: Guided Inquiry	Level 3: Open Inquiry
Problems	Given	Given	Given	Open
Ways and Means	Given	Given	Open	Open
Answers	Given	Open	Open	Open

As summarized, various inquiry levels are shown (see Table 1): Level 1, the teacher sets the task or poses the problem and chooses ways and means the students must undertake; Level 2, the teacher still provides the situation or task to the students. But now, the students are open and/or have access to the methods/ways/means and answers; Level 3 students are required to pose the problem because they are confronted with the raw phenomenon. Students are assigned greater responsibility as the level of inquiry rises. Level 0 focuses on the observation of unfamiliar phenomena (Blanchard et al., 2010).

Table 2
Scaffolding and Inquiry Levels

Characteristic/ Level	Level 0: Confirmation	Level 1/2: Structured Inquiry	Level 1: Guided Inquiry	Level 2: Open Inquiry	Level 3: Authentic Inquiry
Problem/Question	Provided	Provided	Provided	Provided	Not Provided
Theory/Background	Provided	Provided	Provided	Provided	Not Provided
Procedure/Design	Provided	Provided	Provided	Not Provided	Not Provided
Results Analysis	Provided	Provided	Not Provided	Not Provided	Not Provided
Results Communication	Provided	Not Provided	Not Provided	Not Provided	Not Provided
Conclusion	Provided	Not Provided	Not Provided	Not Provided	Not Provided
More Structure			Less Structure		

Meanwhile, Bucks et al. (2008) built upon previous frameworks an inquiry-level rubric, distinguishing between highly structured tasks, where the teacher provides most components for students, and less structured tasks, where students take on more responsibility in designing the tasks (see Table 2). This is also in line with McNeece (2019) on the gradual release of teacher responsibility. Student responsibility for learning increases as teacher responsibility for instruction decreases—from explicit to guided instruction to collaboration to independence.

Teacher Beliefs

Based on the assertions above, it can be assumed that a certain level of scaffolding structure is significant to a learning theory and teaching level. It supports constructivism in progressing knowledge change, cognitivism and behaviorism in a more realist philosophical perspective that emphasizes absolute truth and more objective knowledge (Bélanger, 2011; Harasim, 2017; Lefrançois, 2000). SCTL engages students in managing their own learning while teachers provide opportunities for interaction, growth, and tailored support (Biggs & Tang, 2011; Lou & Restall, 2020). Globalization has further expanded these SCTL practices worldwide (Engel & Rutkowski, 2008; Thanh-Pham, 2011).

Consequently, shifting to SCTL in the Philippines requires reviewing teacher beliefs, as they are a critical factor hindering practice modifications (Alonzo et al., 2021). Research hints that belief is a key part of teachers' competence. According to Blömeke (2014), beliefs can be viewed as essential for knowledge application in classroom settings as it is assumed to direct perception and behavior, a bridge for teaching and knowledge. In the education context, beliefs communicate teachers' psychologically held teaching and learning conceptions and are independent constructs defined from the sociocultural perspective (Mo, 2020; Zheng, 2015). As a working definition, according to Skott (2015), the teacher belief is an "individual, subjectively true and value-laden mental constructs that are of relatively stable results of substantial social experience and that have a significant impact on one's interpretations of and contributions to classroom practices" (p. 19). Shaped by sociocultural experiences, teacher belief plays a key role in educational reform (Wang & Hsieh, 2014). Teacher belief is a crucial aspect that influences actions, knowledge, and thoughts in the classroom. While it may be naive to say that teacher beliefs alone may determine behavior and action, it is unbiased and reasonable to say prior learning and experiences influence teacher beliefs, and the interplay of teacher preparation, educational environments, and teacher beliefs influences what teachers do (Hativa & Goodyear, 2002; Zheng, 2015). However, regardless of SCTL belief preferences, teachers may revert to traditional methods due to limited experiences (Cunningham, 2021). This must be counted from their university years in teacher education. Teacher beliefs are crucial in teaching, influencing professional capabilities, and behavior adoption (Felbrich et al., 2014; Tang & Hsieh, 2014).

In a preliminary qualitative-exploratory study by Ignacio (2024) on teacher beliefs of prospective mathematics educators in the Philippines, several key themes emerged: Knowledge Dispenser (traditional and teacher-centered), Strategic Scaffolder (facilitating learning via scaffolding), Reliable Improver (emphasizing growth and student engagement), and Equity Promoter (addressing individual needs) beliefs. Consistent with McNeece (2019), student responsibility for learning increases as teacher responsibility for instruction decreases—from explicit to guided instruction to collaboration to independence. However, for this study, the Reliable Improver belief could be further split into two: Engagement Advocate and Growth Advocate beliefs. This teacher belief construct serves as the basis for the present study.

Despite the growing body of research on student-centered teaching globally, limited studies examine the sociocultural dimensions of teacher beliefs specific to the Philippine educational system. The future educators' teacher beliefs significantly influence their classroom situations and judgment on knowledge usage and reaction (Felbrich et al., 2014). Teacher

beliefs, modeled by sociocultural factors, can provide insight into the reasons and practices for teaching and learning. The present researchers are interested in exploring and analyzing the underlying factor structure of teacher beliefs among prospective educators in the Philippines. This study bridges this gap by contextualizing teacher beliefs within the unique sociocultural and educational framework of the Philippines. Hence, the study aims to support the theoretical underpinnings of teacher beliefs. By addressing teacher beliefs, this study hopes to propose enhancements to the pedagogical practices' alignment with global academic standards, fostering more inclusive, adaptive learning situations.

Research Aim

In this line, this study aims to identify and confirm an underlying structure of teacher belief among prospective Filipino educators through exploratory and confirmatory factor analysis. In particular, it seeks to (1) identify a factor structure of teacher beliefs among prospective Filipino educators through exploratory factor analysis (EFA), (2) evaluate the identified factor model's fit indices and psychometric properties through confirmatory factor analysis (CFA), and (3) provide a CFA-based measurement model with excellent model fit. Furthermore, the researcher aims to validate the teacher beliefs model proposed by Ignacio (2024) for prospective mathematics educators and assess its applicability to prospective Filipino educators in a broader context. In this regard, the study will examine five initial "dummy" latent factors through factor analysis, specifically: Knowledge Dispenser (KD), Strategic Scaffold (SS), Engagement Advocate (EA), Growth Advocate (GA), Equity Promoter (EP), and teacher beliefs.

Research Methodology

Design

This study used factor analysis. Factor analysis is a statistical procedure used to build a theory on the nature of constructs with two discrete classes: EFA and CFA. The researcher explores correlations between measured variables. The correlations have been summarized into a smaller number of latent constructs. "A prime use of factor analysis has been in the development of both the operational constructs for an area (EFA) and the operational representatives for the theoretical constructs (CFA)" (Thompson, 2004; p. 5). The study is concerned with identifying and validating the underlying dimensions of teacher beliefs among prospective Filipino educators and developing a reliable and valid factor model.

Participants

Using a general thumbs-up rule 10:1 ratio (observation-to-variable), it was anticipated that the number of participants from the Central Luzon region, Philippines, would allow factor solution for the underlying variables (Hair et al., 2010; Thompson, 2004). For EFA, participants were 435 teacher-education (TE) students enrolled in 31 randomly selected sections across five programs and various year levels. For CFA, participants were 441 TE students enrolled in 29 sections across five programs and year levels. Both EFA and CFA participants' demographics were reported based on gender, age, enrolled TE programs, and year levels in Table 3.

Table 3
Demographics of the Participants

Demographics	Category	EFA Participants	CFA Participants
Gender	Male	104	101
	Female	323	325
	Prefer not to say	8	15
	Total	435	441
Age	20 years old and below	281	287
	21-24 years old	148	149
	25 years old and above	6	5
	Total	435	441
TE Program	BECED (Early Childhood Ed.)	71	41
	BEED (Elementary Ed.)	86	44
	BPED (Physical Ed.)	63	20
	BSED (Secondary Ed.)	203	307
	BTLED (Technology & Livelihood Ed.)	12	29
	Total	435	441
Year Level	First Year	89	25
	Second Year	112	218
	Third Year	146	111
	Fourth Year	88	87
	Total	435	441

Instrument

The self-made instrument for this EFA/CFA study underwent rigorous validation by three experts in the field of education. The three validators checked for the adequacy of the instrument to see if it represents all facets of the construct being studied: domain specification, expert reviews, e.g., relevance, clarity, and coverage, and language used for Filipino teacher-education contexts. The validators recommended rephrasing items for better cultural relevance, modifying unfamiliar terms to Filipino preservice teachers, and ensuring the instrument's language was accessible to diverse regional audiences. These adjustments ensured that the instrument was accessible to diverse regional audiences and adequately reflected the constructs under investigation. When two out of three validators agree on an item on a particular "dummy" variable, it will be settled. In the end, each of the five "dummy" latent factors contains eight items: KD, EA, GA, EP, and SS teacher beliefs, for a total of 40 items. Each item addressed a particular teacher belief area, with each item scored on a scale of 1 (Not at All True of Me) to 7 (Very True of Me). Each item is subjected to EFA/CFA to obtain the most reliable valid measurement model for teacher beliefs of prospective Filipino educators.

Procedures and Ethical Considerations

Before beginning the data-gathering procedures via a Google Forms survey, the researcher requested permission from the college dean to carry out the research. Regarding ethical concerns, voluntary involvement, informed consent, and anonymity were all upheld. Each participant is given an identification number. There was enough time for the prospective teachers to respond to the questionnaire. Data were gathered during the first semester of 2024–2025. The data were submitted to EFA/CFA procedures.

Analysis

Analyses were conducted in SPSS and AMOS. Bartlett's sphericity test was run to check for randomness and factorability in the correlation matrix—the *KMO* statistic needed to be greater than or equal to .50. (Watkins, 2018). The correlation matrix underwent EFA after factorability was confirmed. Since the goal was to find a factor structure, it was decided to use common factor analysis instead of principal component analysis. According to Fabrigar and Wegener (2012),

When the goal of research is to identify latent constructs for theory building or to create measurement instruments in which the researcher wishes to make the case that the resulting measurement instrument reflects a meaningful underlying construct, we argue that common factor analysis (EFA) procedures are usually preferable. (p. 32)

The iterated principal axis extraction method was used to perform common factor analysis over principal component analysis due to its relative nonnormality tolerance and proven weak factor recovery capabilities. Similarly, when an amount of correlation exists, oblique rotation over orthogonal (e.g., oblimin) is recommended. Researchers use oblique rotation techniques since they typically produce factor structures that are more realistic and statistically sound. Oblimin is the recommended choice in order to give a more accurate representation of the multidimensional interconnected nature of teacher beliefs in the educational context (Watkins, 2021; 2018). A priori considerations were devised for assessing factor sufficiency along with scree plot results, respectively. To obtain the most valid and reliable measurement model for the obtained factor structure in the EFA, model fit indices and psychometric properties such as convergent validity, construct reliability, and discriminant validity were assessed via CFA.

Research Results

Conducting EFA before and after transformation aids in obtaining reliable factor structure. This process of obtaining such factor structure is further confirmed through CFA. This ensures the dimensions are accurately represented and that the measurement model is valid and meaningful.

Pilot Testing: EFA Before Transformation

Of the 435 respondents, no items were missing. Every respondent provided an answer for each item. *KMO* statistic was .90. The results of Bartlett's sphericity test were significant, $\chi^2(105) = 2869, p < .001$. This indicates there are enough inter-item correlations to proceed, and the sample size is adequate and robust for factor extraction.

Table 4
Descriptive Statistics and Factor Loadings on the Teacher Beliefs Items Before Transformation

Measured Variable	Descriptive Statistics				Factor			
	<i>M</i>	<i>SD</i>	Skewness	Kurtosis	1	2	3	<i>h</i> ²
GA3	6.80	.68	-4.95	30.51	.84	.00	.05	.65
GA2	6.27	1.05	-1.79	4.18	.66	.00	.02	.42
EA2	6.27	1.06	-1.89	4.88	.65	.04	.06	.39
EA6	4.58	1.64	-.41	-.51	.64	.01	-.18	.58
GA6	6.44	.88	-1.87	4.41	.58	.00	-.25	.58
EA4	4.25	1.74	-.32	-.67	.58	.01	-.30	.65
KD4	6.54	.96	-2.76	8.99	-.15	.80	.06	.60
KD5	6.66	.76	-3.02	11.87	-.02	.67	-.13	.50
KD8	5.52	1.30	-.82	.47	.11	.63	.02	.43
KD6	5.57	1.38	-1.02	.89	.00	.62	-.11	.44
KD3	6.56	.80	-2.54	8.98	.08	.62	.08	.38
EP7	6.75	.67	-3.83	19.72	-.02	-.02	-.83	.66
EP6	6.47	.86	-2.08	5.66	.10	.02	-.76	.70
EP4	6.69	.79	-3.51	14.87	-.03	.11	-.69	.50
EP1	5.18	1.63	-.82	.01	.13	-.04	-.60	.46

Note: *N* = 435; *M* mean; *SD* standard deviation; *h*² = communality; suppress coefficients: < .5.

Table 4 provides factor loadings and descriptive statistics for the set of data. Univariate skewness and kurtosis imply nonnormality. Mardia's multivariate skewness and kurtosis ($p < .001$) were significant. This implies multivariate nonnormality. While the researcher intended to use and check for five factors, the scree plot initially recommended a three-factor solution via the inflection point. Therefore, the adequacy of the three-factor solution was examined. Factor 1 was loaded with six, Factor 2 with five, and Factor 3 with four items.

It can be seen that Factor 1 loads both GA and EA items. When different items load onto the same factor, it implies that they all contribute to explaining that particular aspect of variance in the data. In essence, a factor loads different items in EFA because these items share an underlying concept that resonates with that factor. For this reason, Factor 1 in EFA before transformation is returned and renamed as Reliable Improver.

Interestingly, the highest mean score overall with the lowest *SD* loads in Factor 3 with Equity Promoter items, followed by Factor 2 with Knowledge Dispenser items, and Factor 1 with Reliable Improver items. Additionally, the Factor 3 loadings are all negative. The high mean for Equity Promoter items suggests that respondents generally scored high on items related to promoting equity, indicating they strongly agree with this belief. However, the negative loadings imply that as the overall factor increases, Equity Promoter items tend to decrease, and vice versa. Since the latent factors are intended to capture various dimensions of teacher beliefs, the pattern implies that respondents who strongly endorse Equity Promoter items may view this as somewhat distinct or even contrasting with Knowledge Dispenser and Reliable Improver, where items load positively. This is verified via the factor correlation matrix in Table 5.

It can also be noted that Strategic Scaffolders items are eliminated in Table 4. This is due to low factor loadings of Strategic Scaffolders items. Factor loadings in Table 4 are suppressed to less than .5. The highest relative factor loadings of Strategic Scaffolders items load onto either Factor 1 or Factor 2. The Strategic Scaffolders items that load onto multiple factors may not

have a strong or unique association with any one factor, as they share variance with various constructs. As a result, it may not closely reflect the specific latent factor it is intended to measure.

For Factor 1, the coefficient alpha (α) was .86. For Factor 2, the α was .80. And for Factor 3, the α was .83. The extraction sums of squared loadings represent the total common variation explained by the factors extracted by the analysis. 53% of the total shared variance was explained by the three extracted factors, with Factor 1 accounting for 35%, Factor 2 for 13%, and Factor 3 for 5%. This signals that the factor model captures an acceptable portion of the shared variance in the data, supporting its fit and interpretability. Factors 1 and 2 exhibited a correlation of .22, Factors 1 and 3 exhibited a correlation of -.63, and Factors 2 and 3 exhibited a correlation of -.27 (see Table 5). The inverse correlation may reflect inherent tensions between maintaining equitable practices and structured, improvement-focused approaches. This suggests teachers prioritizing equity might adopt more fluid strategies over rigid frameworks. Similarly, negative correlations between Equity Promoter and the other two factors, Reliable Improver and Knowledge Dispenser, reflect inherent tensions in pedagogical approaches. This further suggests that teachers who prioritize equity and adaptability may perceive structured, improvement-focused methods as less compatible with their inclusive and flexible strategies. Such findings underscore the need for teacher education programs to resolve these philosophies, ensuring that inclusivity does not conflict with structured pedagogy. Each factor appears to capture a distinctiveness of the underlying construct, with low to moderate correlations. The initial EFA before transformation endorsed a three-factor solution.

Table 5
Factor Correlation Matrix, Coefficient Alpha, and Common Variance Before Transformation

Factor	1	2	3	α	% CV
1	1.00			.86	35
2	.22	1.00		.80	13
3	-.63	-.27	1.00	.83	5
Total					53

Note: α coefficient alpha; CV common variance.

In light of these findings, the three-factor solution for teacher beliefs—*Reliable Improver*, *Knowledge Dispenser*, and *Equity Promoter*—is reanalyzed by going through data transformation, explicitly, reflection, and then log transformation to assess the quality of the initial factor structure.

EFA After Transformation

Reflection transformation followed by the log transformation was run to manage negatively skewed data. From Table 6, the $KMO = .89$ and Bartlett's sphericity test yielded significant results, $\chi^2(105) = 2428, p < .001$. While univariate skewness and kurtosis were reduced, Mardia's multivariate skewness and kurtosis remained statistically significant ($p < .001$). Three factors were also suggested by the scree plot. Factor 1 was loaded with seven items, Factor 2 with four, and Factor 3 with four after the sufficiency of the three-factor solution was assessed.

Table 6
Descriptive Statistics and Factor Loadings on the Teacher Beliefs Items After Transformation

Measured Variable	Descriptive Statistics		Factor			<i>h</i> ²
	Skewness	Kurtosis	1	2	3	
GA3	1.00	-.26	.81	-.05	.04	.60
GA2	.81	-.61	.67	-.04	.01	.43
EA2	.81	-.54	.62	.00	.01	.37
GA6	1.34	.87	.59	-.01	-.21	.54
EA8	1.49	1.15	.58	-.07	-.25	.56
GA5	.51	-.91	.58	.22	.07	.38
EA6	1.09	.06	.57	-.03	-.19	.49
KD4	-.73	-.05	-.13	.75	.02	.54
KD5	-.14	-1.10	-.01	.70	-.11	.52
KD3	-.62	-.36	.13	.59	.09	.37
KD6	.02	-1.13	.03	.57	-.12	.38
EP6	2.34	5.07	.01	.04	-.81	.69
EP7	2.26	4.44	.00	-.01	-.77	.59
EP4	1.64	1.69	.02	.12	-.64	.47
EP1	3.17	10.23	.10	-.04	-.58	.40

Note: *N* = 435; *h*² = communality; suppress coefficients: < .55.

For Factor 1, the α was .85. For Factor 2, the α was .75. And for Factor 3, the α was .81. Of the total shared variance, the three components that were extracted explained 50%, with Factor 1 accounting for 33%, Factor 2 for 11%, and Factor 3 for 6%. The factor model captures an acceptable portion of the shared variance in the data, supporting its interpretability and fit. According to Table 7, there was a correlation of .22 between Factors 1 and 2, -.61 between Factors 1 and 3, and -.18 between Factors 2 and 3.

Table 7
Factor Correlation Matrix, Coefficient Alpha, and Common Variance After Transformation

Factor	1	2	3	α	% CV
1	1.00			.85	33
2	.22	1.00		.75	11
3	-.61	-.18	1.00	.81	6
Total					50

Note: α coefficient alpha; CV common variance.

The stability of the three-factor solution—*Reliable Improver (RI)*, *Knowledge Dispenser (KD)*, and *Equity Promoter (EP)*—is evident both before and after transformation, with no significant changes in the factor loadings. Most items remain stable across transformations, with only minor variations. This consistency across transformations reinforces the robustness of the identified factor structure, indicating its stability under different analytical conditions.

The EFA-derived factor structure undergoes further verification and validation in CFA with an independent sample (*N* = 441). Model fit indices are assessed, along with tests for convergent validity, construct reliability and discriminant validity. The following section details

the refinement process of the EFA-derived factor model via CFA, ultimately leading to a highly valid and reliable measurement model of teacher beliefs for prospective Filipino educators.

CFA: Measurement Model Respecification and Psychometric Properties

The EFA-derived factor model ^a and the final measurement model ^b were evaluated for overall fitness using a number of model fit indices, including χ^2 (chi-squared statistic); χ^2/df (normed chi-square); CFI (comparative fit index); TLI (Tucker-Lewis index); and RMSEA (root mean square error of approximation).

Table 8
Fit Indices of the Measurement Model

Model	<i>m</i>	χ^2 (<i>p</i> > .05)	<i>df</i>	χ^2/df (≤ 3)	CFI (≥ .95)	TLI (≥ .95)	RMSEA (≤ .07)	Overall Model Fit
1 ^a	32	1174.30***	461	2.55	.86	.85	.06	Inadequate
2	19	344.52***	145	2.38	.94	.93	.06	Inadequate
3	14	155.72***	74	2.10	.97	.96	.05	Adequate
4	11	80.91***	37	2.19	.98	.97	.05	Adequate
Final ^b	9	42.90***	22	1.95	.99	.98	.05	Excellent

Note. ****p* < .001; *N* = 441. *m* number of measured variables. The threshold values are below each indicator adapted from *Multivariate Data Analysis* (7th ed., p. 672) by J.F. Hair et al., 2010. If χ^2 is ***, χ^2/df is referred.

Table 8 shows how well the data fits the final measurement model. Specifically, the $\chi^2(22) = 42.90$, *p* < .001 with $\chi^2/df = 1.95$, CFI = .99, TLI = .98, and RMSEA = .05. The high CFI and TLI, combined with a low RMSEA, all support the idea that the model is an excellent fit for the data. The psychometric properties of the obtained CFA-based final measurement model are reported in the following discussion (see Tables 8-10).

Table 9
Convergent Validity and Construct Reliability of the Final Measurement Model

Factor	Measured Variables	Convergent Validity		Construct Reliability	
		λ (≥ .60)	AVE (≥ .50)	CR (≥ .70)	α (≥ .70)
KD	KD6	.69***			
	KD4	.68***	.50	.75	.71
	KD5	.74***			
RI	EA4	.70***			
	EA8	.69***	.55	.79	.77
	GA6	.83***			
EP	EP6	.72***			
	EP5	.84***	.55	.78	.78
	EP7	.64***			

Note. ****p* < .001; *N* = 441. factor loadings; AVE average variance extracted; CR composite reliability; α coefficient alpha. Threshold values are at the right of each indicator adapted from *Multivariate Data Analysis* (7th ed., p. 709) by J.F. Hair et al., 2010.

From Table 9, at the level of the measured variables, all standardized factor loadings () are significant, with values equal to or greater than .64 ($\geq .64$). This indicates that each item is sufficiently representative of the latent factor/construct and contributes meaningfully to the overall measurement model. At the factor level, the AVE for the latent factor is equal to or greater than .50 ($AVE \geq .50$). This indicates that each latent factor explains at least 50% of the variance in its associated measured variables. The three factors capture a substantial amount of variance in their indicators, and items within each factor accurately represent the latent construct. Similarly, the CR and the α for each latent factor obtain a value equal to or greater than .75 ($CR \geq .75$) and .71 ($\geq .71$), respectively. This implies that the set of items used to measure the latent factor consistently and collectively represents it, exhibiting a high degree of stability and reliability. Overall, Table 8 implies that the items designed to measure the latent factors are highly related, suggesting that they are definitely the same underlying concept and that the items consistently measure the construct reliably and stably.

Table 10
Discriminant Validity of the Final Measurement Model

Factor	<i>M</i>	<i>SD</i>	KD	RI	EP
KD	4.10	1.71	.71		
RI	6.60	.74	.22	.74	
EP	6.74	.67	.20	.58	.74

Note. $N = 441$. Diagonal elements (in bold): square root of AVE, off-diagonal entries: latent correlations with $p < .001$. The Fornell- Larcker criterion was adapted from Fornell & Larcker (1981).

From Table 10, the correlations between distinct latent factors are equal to or less than or equal to .58. The diagonal entries in boldface are $\sqrt{AVE}$ of the latent factor. The $\sqrt{AVE}$ is equal to or greater than .71 ($\sqrt{AVE} \geq .71$). Given that the maximum correlation observed is .58, and the minimum $\sqrt{AVE}$ is .71, each latent factor captures a substantial amount of unique variance that is not shared with other factors. The findings confirm that the latent factors in the final measurement model have adequate discriminant validity.

Since the model fits data well and exhibits a valid, stable, and dependable factor structure across different analyses, its usefulness and generalizability are assured. The obtained three-factor model is *robust*.

Table 11
Indicators of the Final Measurement Model of Teacher Beliefs for Prospective Filipino Educators

Teacher Beliefs	Item	Indicator
Knowledge Dispenser (KD)	KD6	1. I believe learning comes from listening to the teacher.
	KD4	2. I think lessons should focus on teacher explanations.
	KD5	3. I think students learn best from teacher explanations.
Reliable Improver (RI)	EA4	4. I believe learning is better when students are involved.
	EA8	5. I advocate that teachers should keep students engaged.
	GA6	6. I think teachers should support students' progress.
Equity Promoter (EP)	EP6	7. I advocate that teachers should treat all students fairly.
	EP5	8. I advocate that teachers must include everyone in learning.
	EP7	9. I affirm that every student deserves equal support from the teacher.

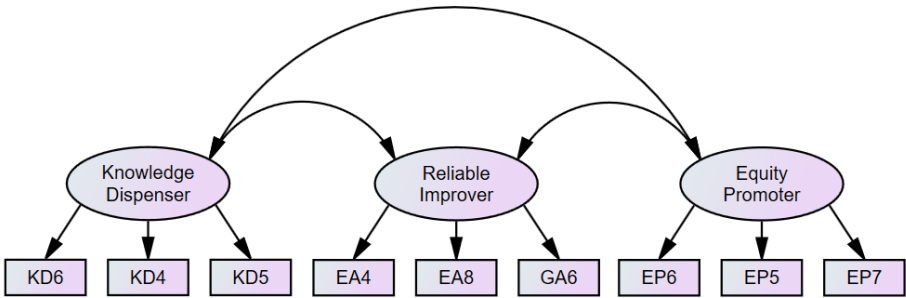
As shown in Table 11, the three factors of the CFA-based final measurement model are as follows: *Knowledge Dispenser*, *Reliable Improver*, and *Equity Promoter*. Each of these factors is associated with a set of indicators that reflect the distinct teacher beliefs of prospective Filipino teachers.

The Knowledge Dispenser belief reflects traditional teaching, endorsing the notion that the teacher is the central knowledge source. It aims at direct instruction, in which students passively take in knowledge, ideas, and resources from the teacher. Indicators KD6, KD4, and KD5 reflect the teacher's role in conveying information as the fundamental mechanism for student learning. The uniform method would guarantee that all students receive the same knowledge in the same manner. This highlights delivering to all students the same instructions, content, and resources.

The Reliable Improver supports the idea that active student participation leads to effective learning. Indicators EA4, EA8, and GA6 illustrate a progressive view where teachers act as facilitators, enhancing learning via active student involvement via relevant pedagogies. This belief emphasizes creating a collaborative environment that supports continuous improvement by means of involving and engaging students, promoting collaboration, and strategies to foster participation and growth. This tends to focus on raising standards or enhancing practices in a way that benefits all. This highlights how active involvement and engagement may result in dependable, steady progress for each learner.

The Equity Promoter embodies the belief that every student should receive fair treatment and equitable opportunities in the classroom. EP6, EP5, and EP7 demonstrate a commitment to equitable practices. Equitable treatment ensures fairness and equality, providing equal access to opportunities for all, ensuring inclusivity, and meeting individual needs so that students can reach their full potential. This highlights tailored support according to each person's needs.

Figure 1
Final Measurement Model of Teacher Beliefs for Prospective Filipino Educators



CFA-Based Measurement Model Diagram of
Teacher Beliefs for Prospective Filipino Educators

Discussion

According to the study's findings, it can be noted in the EFA before and after transformation that Factor 1 loads both GA and EA items. This assumes that in the minds of prospective teachers, the concepts of growth and engagement might not be as distinct as initially intended, and psychometrically, they may be under a broader construct. So, GA and EA items under Factor 1 are renamed Reliable Improver. Reliable Improver combines GA and EA items, highlighting a shared concept under this broader construct, as confirmed by Ignacio (2024). Teacher support of student participation, student engagement itself, and student growth are interrelated (Ing et al., 2015; McNeece, 2019).

Similarly, it can be observed that Strategic Scaffolder items are removed (see Table 3) due to low factor loadings, with their relatively highest factor loading per item being cross-loaded either with Reliable Improver or Knowledge Dispenser beliefs. This gives the notion that the Strategic Scaffolder belief is embedded in Reliable Improver or Knowledge Dispenser beliefs. This further underlines the applicability of scaffolding structures (Blanchard et al., 2010; Bucks et al., 2008). For a Knowledge Dispenser, the scaffolding may involve breaking down content into smaller and manageable steps that follow a structured delivery (Ihedioha, 2012; Ignacio, 2016). For a Reliable Improver, scaffolding may imply using structured, supportive teaching techniques with the underlying belief that students can consistently improve with the proper guidance (Ignacio, 2022; Ing et al., 2015). This is in line with Biggs and Tang's (2011) surface teaching-inclined and deep teaching-inclined teaching levels, respectively. In both beliefs, scaffolding allows consistency and predictability, whether in content clarity or skill-building, due to moderate to high structure (Blanchard et al., 2010; Bucks et al., 2008; Ignacio, 2022; 2016; Ignacio & Sison, 2022). In line with and as mentioned by Ignacio and Paras (2024), static scaffolding can be blended with content structuring, while dynamic scaffolding can be added to facilitate learning. By fully planning and structuring how support is given and gradually reduced, teachers ensure students move forward with a firm grasp of foundational knowledge.

Furthermore, based on the EFA results before and after transformation (see Tables 4-7), the Equity Promoter belief has negative factor loadings as well as a negative factor correlation with Reliable Improver and Knowledge Dispenser beliefs. The Equity Promoter aligns less with a strictly consistent, improvement-focused approach. This emphasizes the alignment of the Equity Promoter belief to a more open-to-authentic inquiry, the Knowledge Dispenser belief to a more verification/confirmation-to-structured inquiry, and the Reliable Improver belief with guided-to-open inquiry (Blanchard et al., 2010; Bucks et al., 2008; Ihedioha, 2012; Ing et al., 2015; Zevenbergen & Ortiz-Franco, 2002).

Knowledge Dispenser focuses on the transmission of content or facts. The Equity Promoter and Knowledge Dispenser beliefs likely reflect fundamental differences in teaching philosophies. The Equity Promoter belief prioritizes inclusivity and adapts instruction to diverse student needs, focusing on a supportive, student-centered environment (Zevenbergen & Ortiz-Franco, 2002). In contrast, the Knowledge Dispenser follows a more traditional, teacher-centered approach, viewing teaching primarily as a direct transmission of content (Ihedioha, 2012; Miller, 2003; Thanh-Pham, 2011). This difference suggests that teachers who emphasize equity and flexibility are less likely to adopt a rigid, content-focused role, while those who see themselves as primary sources of knowledge may lean toward uniform, one-way teaching rather than tailored adaptive approaches. While Knowledge Dispenser is a material-centered belief driven by structured delivery, Equity Promoter is a student-centered belief driven by equitable practices. As mentioned by Zevenbergen and Ortiz-Franco (2002) in their editorial on equity and the significance of meeting student needs,

Some students do not have the same access, success, participation, or retention [...] as some of their peers [...] Education is seen to be a 'political' act through which some students are more likely to be seen as successes and others not. By better understanding how practices work to support particular ideologies of [...] teaching and learning, [...] community is better positioned to develop practices that are more inclusive (p. 151).

Reliable Improver, on the other hand, while *not* a standard belief, is assumed to value consistency and dependability, supporting systematic teaching methods. This emphasis on dependability supports a teaching approach that students can trust to be reliable and responsive to continuous improvement, advancing sustained student engagement for growth. The focus on consistency might contrast with Equity Promoter's adaptability, leading to a negative

correlation, as it can be challenging to maintain strict standards while also fully adapting practices for individual needs. While Equity Promoter is a student-centered belief driven by equitable practices, Reliable Improver is a pedagogy-centered belief focused on student active participation driven by continuous improvement. As mentioned by Ing et al. (2015) in their study on student participation,

First, student participation positively predicted student achievement. The more actively students participated, by explaining their own thinking and engaging with the ideas of other students, the higher were their achievement scores. Second, teacher support of student participation (TSSP) positively predicted student participation. The more frequently teachers supported students' participation, the higher were students' levels of participation [...] TSSP was related to student participation which, in turn, was related to student achievement (p. 353).

Knowledge Dispenser belief has a positive correlation with Reliable Improver belief. A Reliable Improver belief continually seeks to improve and ensure consistent quality in the teaching methods, often by honing structured practices and refining instructional strategies. This aligns with the Knowledge Dispenser belief, which also values clarity, structure, and depth of content delivery. Both beliefs focus on reliable, systematic approaches to achieve learning objectives. Both beliefs value a structured learning environment where knowledge is clearly conveyed, and students are provided with reliable frameworks for understanding the material. The Reliable Improver and Knowledge Dispenser might both see consistency and reliability as the mechanisms of learning, making these beliefs complementary in practice. While Reliable Improver is a pedagogy-centered belief driven by continuous improvement, Knowledge Dispenser is a material-centered belief driven by structured delivery. As stated by Ihedioha (2012) in her paper on knowledge transmission teaching models,

Transmitter of knowledge model emphasizes the need to give pupils basic facts and information before they can be expected to think for themselves. They must learn what is already known before they can come up with any new ideas that might fit in with the existing knowledge. The main characteristic of this model is the high degree of structure employed [...] The teacher views that it is the teacher that causes learning to occur (pp. 36-39).

From Tables 8-10, the CFA-based final measurement model fits the data exceptionally well.

The indicators confirm convergent validity, construct reliability, and discriminant validity. That is, the items designed to measure the latent factors are highly related to measure the same underlying concept consistently, reliably, and stably. Each latent factor is distinct from the other factor. For Reliable Improver and Equity Promoter, both beliefs emphasize engagement/improvement, but from different angles—Reliable Improver encourages perseverance for continuous growth, and Equity Promoter ensures all students have equal access to resources and support. Equally, for Knowledge Dispenser and Equity Promoter, both beliefs stimulate student achievement, providing the necessary information and ensuring everyone has the opportunity to benefit from it, respectively. Lastly, for Knowledge Dispenser and Reliable Improver, both beliefs support student growth by providing access to critical information and by encouraging ongoing progress through consistent effort, respectively.

Conclusions and Implications

The study highlights distinct relationships and overlaps among teacher beliefs of prospective Filipino educators based on factor analyses. Factor 1 in the EFA, Reliable Improver, combines GA and EA items, highlighting a shared concept. Strategic Scaffolder

items were removed due to cross-loadings, suggesting its integration within Reliable Improver or Knowledge Dispenser beliefs, both leveraging scaffolding structures for structured teaching or guided improvement. Equity Promoter belief, emphasizing inclusivity and adaptability, showed negative correlations with Reliable Improver and Knowledge Dispenser, which prioritize consistency and structure. These differences reflect philosophical divides: Equity Promoter aligns with student-centered, adaptive approaches, while Knowledge Dispenser is content-focused, emphasizing clarity and structure. Reliable Improver centers on systematic, dependable methods fostering continuous growth, complementing Knowledge Dispenser's structured delivery. The findings confirm that the constructs are valid, reliable, and distinct. Knowledge Dispenser and Reliable Improver emphasize consistency, while Equity Promoter focuses on adaptability. These beliefs offer different approaches to advance engagement and growth by balancing equity, reliability, and structured teaching. The study findings resonate with global shifts towards inclusive education and emphasize the need to tailor pedagogical approaches to diverse learner needs. For instance, the alignment of Equity Promoter beliefs with principles of equitable access aligns with Sustainable Development Goals (SDG 4: Quality Education), which advocate for inclusive, equitable learning opportunities. By integrating these teacher beliefs into educational systems, Filipino educators can better respond to the challenges of globalization and promote a more holistic approach to learning. It is recommended that further studies be conducted in the Philippine context to use the CFA-based final measurement model as a tool to assess teacher beliefs and substantiate findings further. Also, future studies may consider checking for its robustness via cross- and multi-group validation.

Declaration of Interest

The authors declare no competing interest.

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