

# Correlation Factors and Structural Equation Modeling Analysis of Translanguaging in English Medium Instruction Settings for Sustainable Educational Practices

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## Research Article

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## Abstract

This study utilizes structural equation modeling (SEM) to explore students' perceptions of translanguaging practices in English as a Medium of Instruction (EMI) classrooms within the Saudi context. A sample of 150 EMI students (90 male and 60 female) participated in the study by completing a questionnaire comprising 17 questions across three constructs: perceptions of translanguaging practices, beliefs about translanguaging, and the effectiveness of translanguaging in EMI settings. The findings contribute to our understanding of translanguaging practices in the EMI context, offering insights into students' perceptions and beliefs. This research also provides guidance to educators on effectively utilizing translanguaging to create engaging, effective, and sustainable EMI environments. The study underscores the importance of sustainability in educational practices and calls for further research to explore the long-term impacts of translanguaging on educational sustainability.

## Introduction

The increase in the adoption of English as the Medium of Instruction (EMI) has been witnessed in the higher education landscape (Al-Kadi, 2018; De Oliveira, 2019). This transformation in the educational landscape across nations can be attributed to several factors including the inevitable march of globalization (Devos, 2017), the increasing dominance of English (Jenkins, 2016), and the pursuit of attracting international students and faculty (Knight, 2008). Therefore, EMI has applied in non-English-speaking countries like China (Li & Chen, 2022), Japan (Uehara, 2021), South Korea (Lee & Byon, 2020), Saudi Arabia (Alasmari et al 2022, Alasmari 2024)

where higher educational institutions have embraced English as the lingua franca for instruction. Different models of EMI have appeared, with the most prevalent approach being the exclusive use of English in specific programs or majors (Basturkmen, 2012).

Recently, EMI has been in the discussion to reveal its potential advantages such as enhancing access to global research and scholarship (Aitchison, 2019), improving language skills (Doiz, 2018), and exposure to diverse international perspectives (Dearden, 2017). Also, the challenges and disadvantages of EMI cannot be overlooked. Language comprehension hurdles (Cummins, 2001), reduced opportunities for cultural exchange (Kramsch, 1998), and an increased workload for students (Byrnes, 2009) pose the gap for further research to understand more about pedagogical implication underpinning the EMI from different perspective such as students' perception of translanguaging in EMI contexts. This is because the path towards effective EMI implementation requires a balanced approach that optimizes its benefits while mitigating its challenges, ensuring that the educational journey remains both enriching and accessible for all students (Kramsch, 2019).

## Literature review

Over the past years, more attention has been given to translanguaging (Alasmari et al., 2022). It began flourishing in North America and Europe before its omnipresence across nations. Substantial number of studies have researched this practice to unveil its transformative potential in bilingual and multilingual educational systems (Williams, 1996; Garcia, 2009; Blackledge & Creese, 2010; Baker, 2011; Li Wei, 2011). While its origins can be traced to Wales as it was devised to describe the dynamic linguistic behaviors of Welsh-English bilinguals in secondary education (Williams, 1994, 1996)., it has also been spread in Asia, Australia, and Africa over the past decade (Romanowski, 2019).

Numerous definitions of translanguaging education have been provided in the literature, However, Mazak (2017) combined the features of translanguaging from the perspectives as a multi-faceted phenomenon involving:

(1) a language ideology that sets bilingualism as the norm, (2) a theory of bilingualism that perceives that bilinguals draw from one integrated linguistic repertoire to navigate their bilingual worlds, (3) a pedagogical stance that allows people to learn and teach by drawing from their linguistic and semiotic resources, (4) a set of practices that are drawn from linguistic and semiotic resources of bilinguals, and being (5) transformational as it transforms the traditional notion of languages themselves and their practices along with the lives of bilinguals (pp. 5–6)

Therefore, it exceeds the notion of different languages, but viewing the language variation as a cohesive linguistic repertoire that energies different levels of effective communication, cognitive ability, and meaning making (Lewis, Jones & Baker, 2012). Furthermore, researchers (e.g. Mignolo, 2000; and Li Wei, 2011) have emphasized the transdisciplinary nature of translanguaging which in return reveals the multifaceted human interactions that shape our linguistic reality. Furthermore, this perspective introduces languages as fluid construct that are embedded within social, cultural, historical, and political contexts (Bloomaert, 2010). Hence, Pennycook (2010) stressed on view that languages are creative force which challenges the traditional view of language as a mere structure. Similarly, Canagarajah (2011) describes translanguaging as a movement between languages as they are belonging to a unified linguistic system which is opposite to the view of of moving between languages means transferring between distinct entities.

The discussion about translanguaging usually brings the phenomena of code switching and code-mixing. In the discourse literature, the difference between translanguaging and code switching is that the former is seen as the use of speaker's entire linguistic system which the latter is seen as the ability to select from different languages (García & Li Wei, 2014; Romanowski, 2019). Therefore, there is a fundamental distinction between translanguaging and code switching in the educational discourse because translanguaging is seen as a more natural process that relies on the integrating elements of different languages into a single talk (Molina and Samuelson (2017). Still, this difference in how to perceive translanguaging and code switching is important for understanding not only the functionality of choosing languages in an utterance but also the implications of translanguaging for multilingual education. Translanguaging pays attention to all languages and empowers multilingual learners to use and leverage their full linguistic repertoire to learn and communicate.

This literature review explores research on translanguaging in English-Medium Instruction (EMI) classrooms. The review is organized into two sections: the first section focuses on studies that examine translanguaging practices, while the second section discusses studies on perceptions and attitudes towards translanguaging.

## Translanguaging in EMI Classrooms

Studies examining language use in EMI classrooms from a translanguaging perspective have investigated co-learning between teachers and students and students' ability to access knowledge. For example, Mazak and Herbas-Donoso (2014) identified three types of translanguaging practices in EMI science classes in Puerto Rico, including using key terms in English while discussing content in Spanish, using both languages side-by-side in written materials, and discussing English texts in Spanish. Tai and Li (2018) explored how EMI teachers and students jointly gain new knowledge through translanguaging in bi/multilingual classrooms. Additionally, Mazak and Herbas-Donoso (2015) conducted an ethnographic case study of a science lecturer who employed translanguaging practices, revealing that while lectures and discussions were primarily conducted in Spanish, the textbook and course materials were in English. These studies suggest that translanguaging can be an effective pedagogical practice for teaching scientific concepts to bilingual students.

Similarly, Wang and Curdt-Christiansen (2019) conducted an ethnographic study in a business management program in China, where they found that translanguaging was commonly used by teachers and students for purposes such as translating technical terminology, constructing meaning using both languages simultaneously, providing summaries in one language of content taught in the other language, and providing examples in the local language related to the context. The authors also emphasized the importance of supportive and flexible language-in-education policies to encourage multilingual teaching practices in EMI settings. Lin and He (2017) challenged monolingual teaching principles in their ethnographic study of an EMI science classroom in Hong Kong, highlighting how translanguaging serves as a resource for scaffolding and identity affirmation.

## Perceptions and Attitudes towards Translanguaging in EMI

Research on the perception of translanguaging has examined how teachers and students perceive and approach the use of multilingual practices in education. Various studies have revealed a range of perspectives among teachers. For instance, Macaro (2018) identified three distinct positions held by English teachers regarding the use of students' native language (L1) in ESL/EFL contexts: the virtual position, which supports exclusive use of the L1; the maximal position, which acknowledges the value of flexibly incorporating students' L1 while feeling guilty about not using the target language; and the optimal position, which believes that strategically leveraging students' multilingual resources can enhance their learning. Wang (2019, a, b) found a range of attitudes among EMI teachers towards the use of translanguaging strategies, with some supporting these practices while others did not see their value or felt guilty about using them, leading to the continuation of monolingual approaches. Various challenges hinder teachers from adopting a translanguaging approach, including variation in institutional language policies, lack of experience and guidance in implementation, and concerns regarding the excessive use of students' L1.

In contrast to teachers' positions, there is a lack of research examining students' beliefs about translanguaging. However, Moody et al. (2019) suggested that graduate students generally perceive translanguaging as a natural practice that facilitates their second language (L2) learning, supporting its integration in education. Wang (2019b) found that international Chinese learners in Hong Kong held a positive view regarding the value of using English. Kuteeva (2019) explored university students' attitudes toward translanguaging practices in Sweden, revealing that translanguaging was commonly used in group discussions among proficient speakers of both/all languages. However, students stated that translanguaging practices were most effective when all group members shared proficiency in both/all languages, excluding international students with limited proficiency in the local language.

The reviewed literature highlights the significance of translanguaging practices in EMI classrooms. Studies have examined various aspects, including co-learning, access to knowledge, and perceptions of teachers and students. While some teachers support translanguaging practices, others have reservations or continue to adopt monolingual approaches. Students generally perceive translanguaging positively, but its effectiveness may depend on language proficiency levels within the classroom. Further research is needed to explore the perception and implementation of translanguaging in the EMI context in higher education in Saudi Arabia.

## Problem Statement

Despite the increasing multilingualism within higher education institutions, there is a relative lack of exploration of translanguaging practices in the English-Medium Instruction (EMI) context. This research focuses on the EMI context due to the persistent under-exploration of translanguaging practices in this particular setting (Rajendram et al., 2023). The study aims to address this gap by investigating students' perceptions of translanguaging in EMI classrooms, examining their beliefs about translanguaging, exploring its pedagogical implementation and effectiveness, and utilizing multivariate, structural equation modeling, and correlation analysis to reveal the translanguaging practices in the EMI context. This research is significant in its originality and novelty as it pioneers an analysis of translanguaging practices from the perspective of students. The adoption of EMI in Saudi Arabian institutions holds the promise of various benefits, but it also raises important questions regarding the most suitable pedagogical strategies for this context.

## Research Questions

Using SEM analysis, this attempt addressed the following questions:

1. What are the students' perspectives on the translanguaging practices in EMI classrooms?
2. What are the student's beliefs of translanguaging in the EMI context?
3. How do students assess the effectiveness of translanguaging in fostering a more engaging and successful EMI environment?

## Method

The primary focus of this investigation was to explore students' perceptions of translanguaging in EMI contexts at the collegiate level in Saudi Arabia. Drawing on Mackey and Gass (2021), a quantitative research design involving controlled measurement was used to address the research problem. It is survey-based research with defined questions that guided the research design, data collection, and analysis process.

## Participants

A sample of 150 EMI students (90 male and 60 female) participated in the study, aged between 19 and 24. This cohort of EMI learners were accessed at the university level. They are basically undergraduates pursuing a bachelor's degree at a Saudi university. They were invited to fill out the questionnaire during the academic year 2022/2023.

## Instrument

A questionnaire was adapted to garner information on various factors related to the research questions, including attitudes, assessments of the practices, and assessment of the effectiveness. It was built on the basis of previous studies, viz., Hillman et al. (2019) and Alasmari et al. (2022). To customized it to specifically target the EMI students, modifications were made to the version in focus. It was prepared in 17 questions. The first two questions related to background information about the participants. Questions pertaining to students' perceptions of Translanguaging practices comprised Q3 through Q7, student's beliefs of translanguaging comprised Q8 through Q12, and effectiveness of translanguaging in EMI comprised Q13 through Q17. All the 15 questions that made the three constructs were closed-ended using a five-unipolar scale to measure the three constructs: students' perspectives on the practices of translanguaging in EMI classes, students' beliefs on the use of translanguaging EMI classrooms, and effectiveness of translanguaging in EMI classes.

## Procedures

The Cronbach's alpha for the three constructs of the questionnaire was measured to ensure its reliability. The Cronbach's alpha for the first construct is  $\alpha = 0.780$ . This value is above the commonly accepted threshold of 0.7, indicating that the items in this construct have good internal consistency. The Cronbach's alpha for the second construct is  $\alpha = 0.744$ . This value is also above the threshold of 0.7, indicating satisfactory internal consistency for this set of items. The Cronbach's alpha for the third construct is  $\alpha = 0.873$ . This is notably high and well above the threshold of 0.7, signifying excellent internal consistency for this set of items. With these values, all three constructs demonstrate good to excellent internal consistency, which bodes well for further analysis.

Apart from reliability measurement, other considerations were maintained including clarity of questions, concise language, and instructions. Above all, the final version of the survey was translated into learners' native language (Arabic) to enable them provide salient details and accurately capture students' perceptions of translanguaging practices in ESP programs and the respondents were given ample time to specify their answers. The participants were given the option to respond in Arabic if they preferred, allowing them to express their perspectives without any language barriers and ensuring their comfort and confidence in providing responses.

For data analysis, the set of numeric data were based on quantity measurement. Driven by the nature of the study, the data were collected quantitatively through the questionnaire and analyzed statistically using the SPSS. The correlation is tested statistically. The study employs a structural equation modeling (SEM) analysis to provide insights into the implementation and effectiveness of translanguaging in the EMI context. SEM combines factor analysis and multiple regression analysis.

## Results and Findings

The sample consists of 150 participants, with 40.7% identifying as Gender 1 and 59.3% as Gender 2. This suggests a relatively balanced representation, though slightly skewed towards Gender 2. The sample is evenly distributed across three majors, with each major accounting for 33.3% of the total participants. This balanced distribution ensures that insights from the study are not biased towards any single academic discipline.

Table 1  
Descriptive statistics of the variables

| Descriptive statistics of the variables |   |    |       |          |   |    |       |          |   |    |       |          |   |    |       |
|-----------------------------------------|---|----|-------|----------|---|----|-------|----------|---|----|-------|----------|---|----|-------|
| Variable                                |   | N  | %     | Variable |   | N  | %     | Variable |   | N  | %     | Variable |   | N  | %     |
| Q1                                      | 1 | 61 | 40,7% | Q4       | 1 | 8  | 5,3%  | Q10      | 1 | 50 | 33,3% | Q14      | 1 | 74 | 49,3% |
|                                         | 2 | 89 | 59,3% |          | 2 | 10 | 6,7%  |          | 2 | 38 | 25,3% |          | 2 | 46 | 30,7% |
| Q2                                      | 1 | 50 | 33,3% | Q5       | 3 | 23 | 15,3% | Q11      | 3 | 36 | 24,0% | Q15      | 3 | 21 | 14,0% |
|                                         | 2 | 50 | 33,3% |          | 4 | 29 | 19,3% |          | 4 | 19 | 12,7% |          | 4 | 8  | 5,3%  |
|                                         | 3 | 50 | 33,3% |          | 5 | 80 | 53,3% |          | 5 | 7  | 4,7%  |          | 5 | 1  | 0,7%  |
| Q1                                      | 1 | 33 | 22,0% | Q5       | 1 | 32 | 21,3% | Q11      | 1 | 38 | 25,3% | Q15      | 1 | 83 | 55,3% |
|                                         | 2 | 36 | 24,0% |          | 2 | 35 | 23,3% |          | 2 | 35 | 23,3% |          | 2 | 49 | 32,7% |
|                                         | 3 | 55 | 36,7% |          | 3 | 45 | 30,0% |          | 3 | 35 | 23,3% |          | 3 | 16 | 10,7% |
|                                         | 4 | 21 | 14,0% |          | 4 | 28 | 18,7% |          | 4 | 28 | 18,7% |          | 4 | 1  | 0,7%  |
|                                         | 5 | 5  | 3,3%  |          | 5 | 10 | 6,7%  |          | 5 | 14 | 9,3%  |          | 5 | 1  | 0,7%  |
| Q2                                      | 1 | 33 | 22,0% | Q8       | 1 | 97 | 64,7% | Q12      | 1 | 76 | 50,7% | Q16      | 1 | 85 | 56,7% |
|                                         | 2 | 37 | 24,7% |          | 2 | 42 | 28,0% |          | 2 | 50 | 33,3% |          | 2 | 48 | 32,0% |
|                                         | 3 | 56 | 37,3% |          | 3 | 8  | 5,3%  |          | 3 | 18 | 12,0% |          | 3 | 13 | 8,7%  |
|                                         | 4 | 22 | 14,7% |          | 4 | 2  | 1,3%  |          | 4 | 5  | 3,3%  |          | 4 | 2  | 1,3%  |
|                                         | 5 | 2  | 1,3%  |          | 5 | 1  | 0,7%  |          | 5 | 1  | 0,7%  |          | 5 | 2  | 1,3%  |
| Q3                                      | 1 | 12 | 8,0%  | Q9       | 1 | 88 | 58,7% | Q13      | 1 | 73 | 48,7% | Q17      | 1 | 90 | 60,0% |
|                                         | 2 | 24 | 16,0% |          | 2 | 46 | 30,7% |          | 2 | 58 | 38,7% |          | 2 | 41 | 27,3% |
|                                         | 3 | 39 | 26,0% |          | 3 | 13 | 8,7%  |          | 3 | 17 | 11,3% |          | 3 | 14 | 9,3%  |
|                                         | 4 | 31 | 20,7% |          | 4 | 2  | 1,3%  |          | 4 | 2  | 1,3%  |          | 4 | 3  | 2,0%  |
|                                         | 5 | 44 | 29,3% |          | 5 | 1  | 0,7%  |          |   |    |       |          | 5 | 2  | 1,3%  |

For Q1(Translanguaging Practices), a majority of respondents (36.7%) indicated that their teachers sometimes explain academic concepts in Arabic, with smaller percentages indicating always (22.0%) and often (24.0%). For Q2 (Translanguaging Practices), the most common response was sometimes (37.3%), followed by often (24.7%) and always (22.0%). Q3 (Translanguaging Practices) results show that a significant portion (29.3%) never experience teachers allowing Arabic for answering questions, though there is a spread across all frequency options. For Q4 (Translanguaging Practices), the majority (53.3%) reported that use of L1 (Arabic) to understand written texts is never allowed, while Q5 (Translanguaging Practices) shows that Arabic is sometimes allowed for discussions among students (30.0%).

In Q8 (perspectives), a strong majority (64.7%) agree that Arabic can be used to explain academic concepts and specific terms, while Q9 indicates broad agreement (58.7%) that Arabic can be used for classroom management. For Q10-Q12 (perspectives), the results show a varied range of perceptions but generally reflect a tendency towards utilizing Arabic to support different aspects of EMI, with neutral, agree, and strongly agree responses showing substantial representation.

For Q13 (The pedagogical implementation and effectiveness), a significant percentage (39.3%) strongly agree that using L1 in classrooms empowers student engagement, followed closely by those who agree (37.3%). Similarly, Q14 (The pedagogical implementation and effectiveness) shows strong agreement (35.3%) and agreement (28.7%) that Arabic enhances motivation for learning ESL. Across Q15 to Q17 (The pedagogical implementation and effectiveness), the consensus remains positive, reflecting a widespread belief in the benefits of Arabic in EMI settings.

## Correlation Matrix Analysis

The correlation matrix in Table 2 reveals the relationships between the various survey items. Notable high positive correlations include:

very high correlation between Q1 (Translanguaging Practices) and Q2 (Translanguaging Practices) ( $r = 0.831$ ,  $p < 0.01$ ), indicating a strong linkage between gender variables. Strong correlations within the practices construct: Q3 (Translanguaging Practices) and Q4 (Translanguaging Practices) ( $r = 0.541$ ,  $p < 0.01$ ) and Q4 and Q5 (Translanguaging Practices) ( $r = 0.325$ ,  $p < 0.01$ ), signifying consistency in responses regarding translanguaging practices.

Table 2  
Correlation Matrix of the variables

| Q   | Q1     | Q2     | Q1     | Q2     | Q3     | Q4     | Q5     | Q8     | Q9     | Q10    | Q11    | Q12    | Q13    | Q14    | Q15    | Q      |
|-----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
|     | 1      | ,831** | 0,089  | 0,088  | 0,020  | ,162*  | 0,139  | -0,007 | -0,029 | 0,038  | 0,080  | -0,037 | 0,016  | -0,086 | -0,075 | -0,065 |
| Q1  | ,831** | 1      | 0,008  | 0,055  | -0,006 | 0,150  | 0,082  | 0,091  | 0,118  | 0,055  | 0,038  | 0,048  | 0,089  | 0,026  | 0,022  | 0,065  |
| Q1  | 0,089  | 0,008  | 1      | ,559** | ,360** | ,357** | ,351** | 0,088  | 0,039  | 0,033  | 0,043  | 0,092  | 0,079  | 0,059  | 0,078  | 0,065  |
| Q2  | 0,088  | 0,055  | ,559** | 1      | ,442** | ,415** | ,394** | 0,080  | 0,086  | 0,060  | 0,139  | 0,075  | ,180*  | 0,102  | ,163*  | 0,065  |
| Q3  | 0,020  | -0,006 | ,360** | ,442** | 1      | ,541** | ,442** | 0,144  | 0,124  | ,354** | ,306** | 0,142  | ,183*  | ,192*  | 0,153  | 0,065  |
| Q4  | ,162*  | 0,150  | ,357** | ,415** | ,541** | 1      | ,325** | 0,071  | 0,094  | ,250** | ,362** | 0,078  | 0,034  | 0,126  | 0,128  | 0,065  |
| Q5  | 0,139  | 0,082  | ,351** | ,394** | ,442** | ,325** | 1      | ,258** | 0,146  | ,171*  | ,209*  | ,292** | ,270** | ,214** | ,272** | ,265   |
| Q8  | -0,007 | 0,091  | 0,088  | 0,080  | 0,144  | 0,071  | ,258** | 1      | ,632** | ,365** | ,301** | ,363** | ,453** | ,517** | ,393** | ,365   |
| Q9  | -0,029 | 0,118  | 0,039  | 0,086  | 0,124  | 0,094  | 0,146  | ,632** | 1      | ,246** | ,237** | ,334** | ,436** | ,403** | ,321** | ,365   |
| Q10 | 0,038  | 0,055  | 0,033  | 0,060  | ,354** | ,250** | ,171*  | ,365** | ,246** | 1      | ,723** | ,273** | ,366** | ,420** | ,197*  | ,265   |
| Q11 | 0,080  | 0,038  | 0,043  | 0,139  | ,306** | ,362** | ,209*  | ,301** | ,237** | ,723** | 1      | ,353** | ,409** | ,388** | ,314** | ,265   |
| Q12 | -0,037 | 0,048  | 0,092  | 0,075  | 0,142  | 0,078  | ,292** | ,363** | ,334** | ,273** | ,353** | 1      | ,699** | ,530** | ,570** | ,465   |
| Q13 | 0,016  | 0,089  | 0,079  | ,180*  | ,183*  | 0,034  | ,270** | ,453** | ,436** | ,366** | ,409** | ,699** | 1      | ,624** | ,548** | ,465   |
| Q14 | -0,086 | 0,026  | 0,059  | 0,102  | ,192*  | 0,126  | ,214** | ,517** | ,403** | ,420** | ,388** | ,530** | ,624** | 1      | ,531** | ,465   |
| Q15 | -0,075 | 0,022  | 0,078  | ,163*  | 0,153  | 0,128  | ,272** | ,393** | ,321** | ,197*  | ,314** | ,570** | ,548** | ,531** | 1      | ,465   |
| Q16 | -0,020 | 0,091  | 0,134  | 0,073  | 0,137  | 0,072  | ,234** | ,368** | ,323** | ,212** | ,174*  | ,476** | ,524** | ,418** | ,655** | 1      |
| Q17 | -0,065 | 0,058  | 0,093  | 0,154  | ,193*  | 0,116  | ,293** | ,430** | ,373** | ,301** | ,327** | ,581** | ,550** | ,620** | ,693** | ,665   |

High correlations between perception items, such as Q8 and Q9 (perspectives) ( $r = 0.632$ ,  $p < 0.01$ ) and Q10 and Q11 (perspectives) ( $r = 0.723$ ,  $p < 0.01$ ), suggest that students who favor using Arabic for understanding concepts also support its use in classroom management and answering questions. Effectiveness items also show strong inter-correlations, including Q13 and Q14 (The pedagogical implementation and effectiveness) ( $r = 0.624$ ,  $p < 0.01$ ) and Q15 and Q16 (The pedagogical implementation and effectiveness) ( $r = 0.655$ ,  $p < 0.01$ ), indicating a belief that multiple aspects of using Arabic contribute positively to student engagement and comprehension.

Additionally, some moderate positive correlations, such as Q3 (Translanguaging Practices) with Q1 (Translanguaging Practices) ( $r = 0.360$ ,  $p < 0.01$ ) and Q9 with Q8 (perspectives) ( $r = 0.632$ ,  $p < 0.01$ ), highlight logical connections within the constructs. However, there are also weak or negative correlations like Q1 (Translanguaging Practices) with Q13 (The pedagogical implementation and effectiveness) ( $-0.086$ ), which may indicate areas where participant responses were more varied or less related.

## Path Diagram of the SEM

The path diagram in Fig. 1 outlines a structural equation model (SEM) aimed at investigating relationships among various survey questions related to translanguaging practices in English-Medium Instruction (EMI) contexts. The model comprises three key latent variables: Translanguaging Practices, Perspectives, and Pedagogical Implementation, each measured by specific observed variables (survey questions).

Starting with Translanguaging Practices, this latent variable is measured by the observed variables Q1 to Q5 (Translanguaging Practices). Each path from Translanguaging Practices to these observed variables has a standardized coefficient of 1, indicating a strong direct relationship. The diagram also includes error terms ( $e_1$  to  $e_5$ ) for these observed variables, which account for the variance not explained by Translanguaging Practices.

Moving to Perspectives, this latent variable is measured by observed variables Q8 to Q12. Like Translanguaging Practices, each path from Perspectives to the corresponding observed variables (Q8, Q9, Q10, Q11, Q12) (perspectives) has a standardized coefficient of 1. An exception is Q11, which includes both a direct effect from Perspectives and a coefficient of 1 directly linking it to Perspectives, denoted by an additional arrow. The error terms ( $e_6$  to  $e_{10}$ ) capture the residual variance in these observed variables.

The Pedagogical Implementation latent variable is reflected through observed variables Q13 to Q17 (The pedagogical implementation and effectiveness). Similarly, all paths from Pedagogical Implementation to these observed variables have standardized coefficients of 1, signifying a direct, strong relationship. The error terms ( $e_{11}$  to  $e_{15}$ ) represent the unique variances in the observed variables unexplained by Pedagogical Implementation.

Overall, the diagram indicates strong intrinsic connections between the latent variables and their observed measures, denoted by the standardized coefficients of 1. The model captures nuanced relationships and the interdependence among Translanguaging Practices, Perspectives, and Pedagogical Implementation in the EMI context. This comprehensive framework supports a multifaceted understanding of students' perceptions, practices, and pedagogical strategies regarding translanguaging in EMI settings.

## Results of the SEM estimation

The regression results in Table 3 present the estimates, standard errors (S.E.), critical ratios (C.R.), and p-values (P) for the relationships between the observed variables and their respective latent constructs. For Translanguaging Practices, the observed variables Q1 to Q5 (Translanguaging Practices) are all significantly influenced by this latent variable. Specifically:

The regression coefficient for Q2 (Translanguaging Practices) is 1.078 with a significant critical ratio (C.R.) of 6.14 and p-value (P) of less than 0.001 (denoted by \*\*\*), indicating a strong and significant relationship.

Q3 (Translanguaging Practices) has an even higher regression coefficient of 1.373, with a C.R. of 6.229 and a P value of less than 0.001, highlighting its substantial impact. Similarly, Q4 and Q5 (Translanguaging Practices) both exhibit significant regression coefficients of 1.16 and 1.069, respectively, with their critical ratios and p-values indicating strong relationships (C.R. of 5.865 and 5.544;  $P < 0.001$ ). For Perspectives, the observed variables Q8 to Q12 (perspectives) are all significantly connected. For instance: Q9 (perspectives) has a regression coefficient of 0.937, with a C.R. of 5.903 and a highly significant p-value ( $P < 0.001$ ). Q10 (perspectives) shows a significant regression coefficient of 1.346, with a C.R. of 5.506 and  $P < 0.001$ . Q11 and Q12 (perspectives) reinforce this trend with coefficients of 1.538 and 1.306, respectively, demonstrating strong and significant relationships (C.R. of 5.74 and 7.029;  $P < 0.001$ ).

Table 3  
summary regression results

| Q1  |      |                            | Estimate | S.E.  | C.R.   | P   |
|-----|------|----------------------------|----------|-------|--------|-----|
|     | <--- | Translanguaging Practices  | 1        |       |        |     |
| Q2  | <--- | Translanguaging Practices  | 1,078    | 0,176 | 6,14   | *** |
| Q3  | <--- | Translanguaging Practices  | 1,373    | 0,22  | 6,229  | *** |
| Q4  | <--- | Translanguaging Practices  | 1,16     | 0,198 | 5,865  | *** |
| Q5  | <--- | Translanguaging Practices  | 1,069    | 0,193 | 5,544  | *** |
| Q8  | <--- | Perspectives               | 1        |       |        |     |
| Q9  | <--- | Perspectives               | 0,937    | 0,159 | 5,903  | *** |
| Q10 | <--- | Perspectives               | 1,346    | 0,244 | 5,506  | *** |
| Q11 | <--- | Perspectives               | 1,538    | 0,268 | 5,74   | *** |
| Q12 | <--- | Perspectives               | 1,306    | 0,186 | 7,029  | *** |
| Q13 | <--- | Pedagogical implementation | 1        |       |        |     |
| Q14 | <--- | Pedagogical implementation | 1,242    | 0,138 | 9,021  | *** |
| Q15 | <--- | Pedagogical implementation | 1,077    | 0,112 | 9,576  | *** |
| Q16 | <--- | Pedagogical implementation | 1,069    | 0,121 | 8,847  | *** |
| Q17 | <--- | Pedagogical implementation | 1,278    | 0,124 | 10,273 | *** |

For Pedagogical Implementation, the observed variables Q13 to Q17 (The pedagogical implementation and effectiveness) are correspondingly significant. Specifically: Q14 reflects a positive regression estimate of 1.242 with a high critical ratio of 9.021 and  $P < 0.001$ . Q15, Q16, and Q17 (The pedagogical implementation and effectiveness) each exhibit strong estimates of 1.077, 1.069, and 1.278, respectively, with corresponding high critical ratios (C.R. of 9.576, 8.847, and 10.273) and significant p-values ( $P < 0.001$ ).

In summary, the regression results confirm that the observed variables are strongly and significantly affected by their corresponding latent constructs, illustrating robust relationships within the model.

## Covariances Assessment

Table 4 outlines the covariances among the three latent constructs: Translanguaging Practices, Perspectives, and Pedagogical Implementation.

The covariance between Translanguaging Practices and Perspectives is estimated at 0.109, with a standard error (S.E.) of 0.037, and a significant critical ratio (C.R.) of 2.921 ( $P = 0.003$ ). This indicates a noteworthy positive relationship between these two constructs.

Similarly, the covariance between Pedagogical Implementation and Translanguaging Practices is 0.108, with a standard error of 0.04 and a critical ratio of 2.729, and it is statistically significant ( $P = 0.006$ ). This denotes a meaningful positive relationship.

Table 4  
Covariances of the latent variables

| Translanguaging Practices  |      |                           | Estimate | S.E.  | C.R.  | P     | Label |
|----------------------------|------|---------------------------|----------|-------|-------|-------|-------|
|                            | <--> | Perspectives              | 0,109    | 0,037 | 2,921 | 0,003 |       |
| Pedagogical implementation | <--> | Translanguaging Practices | 0,108    | 0,04  | 2,729 | 0,006 |       |
| Pedagogical implementation | <--> | Perspectives              | 0,227    | 0,041 | 5,477 | ***   |       |

The covariance between Pedagogical Implementation and Perspectives is the strongest, estimated at 0.227 with a standard error of 0.041 and an impressive critical ratio of 5.477, with a highly significant p-value ( $P < 0.001$ ). This robust relationship suggests that these constructs are closely related and likely influence each other substantially.

Overall, the covariances indicate significant positive relationships among the latent variables. These interconnections underscore the multidimensional interplay between students' translanguaging practices, their perspectives, and the effectiveness of pedagogical implementation in the EMI context. The strong statistical significance of these covariances highlights the integral role that each construct plays in understanding and implementing translanguaging strategies in education.

## SEM Accuracy Assessment

Table 5 presents the Chi-Square (CMIN) fit index for three models: the Default, Saturated, and Independence models. The Default model has a chi-square value (CMIN) of 304.29 with 87 degrees of freedom (DF), yielding a CMIN/DF ratio of 3.498. The p-value for this model is 0, indicating statistical significance but not a perfect fit. The Saturated model, with 135 parameters, has a chi-square value of 0, representing a perfect fit.

Table 5  
CMIN

| Model              | NPAR | CMIN     | DF  | P | CMIN/DF |
|--------------------|------|----------|-----|---|---------|
| Default model      | 48   | 304,29   | 87  | 0 | 3,498   |
| Saturated model    | 135  | 0        | 0   |   |         |
| Independence model | 30   | 1099,556 | 105 | 0 | 10,472  |

In contrast, the Independence model's chi-square value is much higher at 1099.556, with 105 DF and a CMIN/DF ratio of 10.472, indicating a very poor fit. The relatively lower CMIN/DF ratio for the Default model compared to the Independence model suggests a better fit, though it exceeds the commonly recommended threshold of 3 for a good model fit.

## Baseline Comparisons

Table 6 provides baseline comparisons using various fit indices to assess the quality of the Default, Saturated, and Independence models. The Default model exhibits a Normed Fit Index (NFI) of 0.723, a Relative Fit Index (RFI) of 0.666, an Incremental Fit Index (IFI) of 0.785, a Tucker-Lewis Index (TLI) of 0.736, and a Comparative Fit Index (CFI) of 0.782.

Table 6  
Baseline Comparisons

| Model              | NFI    | RFI   | IFI    | TLI   | CFI   |
|--------------------|--------|-------|--------|-------|-------|
|                    | Delta1 | rho1  | Delta2 | rho2  |       |
| Default model      | 0,723  | 0,666 | 0,785  | 0,736 | 0,782 |
| Saturated model    | 1      |       | 1      |       | 1     |
| Independence model | 0      | 0     | 0      | 0     | 0     |

While these indices suggest that the Default model fits the data better than the Independence model (which scores 0 on all indices), it does not achieve the excellent fit indicated by the Saturated model, which scores 1 across all indices. These results suggest that while the Default model provides a better fit than a model assuming independence among variables, it falls short of the ideal thresholds, particularly for NFI, RFI, IFI, TLI, and CFI, which are generally recommended to be above 0.9.

## Parsimony-Adjusted Measures

Table 7 reports the parsimony-adjusted measures for different models, focusing on the trade-off between model fit and complexity. For the Default model, the Parsimony Ratio (PRATIO) is 0.829, indicating a reasonable balance between parsimony and complexity. The Parsimony Normed Fit Index (PNFI) is

0.599, and the Parsimony Comparative Fit Index (PCFI) is 0.648, both of which are lower than the ideal values but suggest a moderate fit. The Saturated model shows scores of 0 for all indices, signifying a perfect yet overly complex fit.

Table 7  
Parsimony-Adjusted Measures

| Model              | PRATIO | PNFI  | PCFI  |
|--------------------|--------|-------|-------|
| Default model      | 0,829  | 0,599 | 0,648 |
| Saturated model    | 0      | 0     | 0     |
| Independence model | 1      | 0     | 0     |

The Independence model presents the highest parsimony (PRATIO = 1) but scores 0 on the other indices, reflecting poor fit due to oversimplification. These measures collectively suggest that while the Default model accounts well for parsimony, it still has room for improvement in achieving the optimal balance between simplicity and explanatory power.

## Non-Centrality Parameter (NCP)

Table 8 introduces the Non-Centrality Parameter (NCP) to assess model fit, providing estimates and confidence intervals. The Default model has an NCP of 217.29, with a 90% confidence interval ranging from 167.913 to 274.26. This suggests a relatively moderate level of model misfit. The Saturated model, having an NCP of 0, indicates a perfect fit.

Table 8  
NCP

| Model              | NCP     | LO 90   | HI 90    |
|--------------------|---------|---------|----------|
| Default model      | 217,29  | 167,913 | 274,26   |
| Saturated model    | 0       | 0       | 0        |
| Independence model | 994,556 | 891,785 | 1104,762 |

In contrast, the Independence model's NCP is significantly higher at 994.556, with a 90% confidence interval from 891.785 to 1104.762, denoting a very poor fit. The lower NCP value for the Default model compared to the Independence model reflects a better fit, although it still indicates some degree of model misfit.

## Fit Mean Square Error (FMIN)

Table 9 presents the Fit Mean Square Error (FMIN) to evaluate model fit. For the Default model, FMIN is 2.042 and F0 is 1.458, with a 90% confidence interval ranging from 1.127 to 1.841. These values indicate a relatively acceptable fit, falling in a range that suggests reasonable approximation error.

Table 9  
FMIN

| Model              | FMIN  | F0    | LO 90 | HI 90 |
|--------------------|-------|-------|-------|-------|
| Default model      | 2,042 | 1,458 | 1,127 | 1,841 |
| Saturated model    | 0     | 0     | 0     | 0     |
| Independence model | 7,38  | 6,675 | 5,985 | 7,415 |

The Saturated model, showing FMIN and F0 values of 0, indicates a perfect, though overly complex, fit. The Independence model has much higher values, with FMIN at 7.38 and F0 at 6.675, along with a 90% confidence interval from 5.985 to 7.415, signifying a very poor fit. These results suggest that the Default model fits the data significantly better than the Independence model, but it is not flawless.

## Root Mean Square Error of Approximation (RMSEA)

Table 10 assesses model fit using the Root Mean Square Error of Approximation (RMSEA). The Default model has an RMSEA of 0.129, with a 90% confidence interval ranging from 0.114 to 0.145 and a PCLOSE value of 0. While this RMSEA value is above the threshold for a good fit (typically < 0.08), it indicates a mediocre fit.

Table 10  
RMSEA

| Model              | RMSEA | LO 90 | HI 90 | PCLOSE |
|--------------------|-------|-------|-------|--------|
| Default model      | 0,129 | 0,114 | 0,145 | 0      |
| Independence model | 0,252 | 0,239 | 0,266 | 0      |

The Independence model, with an RMSEA of 0.252 and a 90% confidence interval ranging from 0.239 to 0.266, shows a very poor fit, as reflected by its high RMSEA value. The PCLOSE value of 0 for both models further emphasizes that neither model achieves a close fit to the data. However, the Default model demonstrates a considerably better fit compared to the Independence model, although there's still substantial room for improvement.

## Discussion and Implication

This section delves into a comprehensive discussion of how the SEM results effectively address the research questions posed in this study. By leveraging SEM analysis, the findings offer nuanced insights that not only answer the research questions but also contribute to a broader understanding of translanguaging practices in EMI settings as can be seen in this section:

## Students' perspectives on the translanguaging practices in EMI classrooms

The structural equation modeling (SEM) results reveal significant insights into students' perspectives on translanguaging practices in EMI classrooms. Within the SEM framework, the latent variable Perspectives was modeled using observed variables (Q8 to Q12) (perspectives). All paths from Perspectives to these observed variables showed statistically significant relationships with high regression coefficients (e.g., Q8 with  $P = 1$  and Q12 with  $P < 0.001$ ) (perspectives), indicating a strong connection. Specifically, students strongly believe that the use of their first language (Arabic) in EMI classrooms can facilitate better understanding of academic concepts and classroom management. These results suggest a broadly positive perspective among students regarding the implementation of translanguaging practices in enhancing their learning experience in EMI settings. The SEM results reveal that students in Saudi EMI classrooms view translanguaging positively, particularly the use of Arabic to enhance understanding and classroom management. This aligns with previous research, such as Mazak and Herbas-Donoso (2014) and Wang and Curdt-Christiansen (2019), which highlighted the benefits of translanguaging in facilitating comprehension and engagement in EMI contexts. The findings also support García and Li Wei's (2014) argument that translanguaging empowers students by leveraging their full linguistic repertoire. Similar to Kuteeva (2019), who found positive perceptions of translanguaging in Swedish EMI programs, our study confirms that Saudi students value translanguaging as a means to improve their learning experience.

## The students' beliefs of translanguaging in the EMI context

Students' beliefs about translanguaging in EMI contexts are well captured by the observed variables under the Perspectives latent construct. The high and significant coefficients for Q9, Q10, Q11, and Q12 (perspectives) (with critical ratios consistently above the threshold of 5.0 and p-values  $< 0.001$ ) underscore that students hold strong beliefs in the effectiveness and necessity of translanguaging elements. For instance, a coefficient of 1.346 for Q10 and 1.538 for Q11 (perspectives), reflecting beliefs about oral and written use of Arabic, respectively, highlight that students are confident that translanguaging facilitates better communication and comprehension. These beliefs reinforce the idea that incorporating translanguaging practices is not merely beneficial but essential for maximizing educational outcomes in the EMI context.

The strong beliefs students hold about the effectiveness of translanguaging in EMI contexts align with existing research. Studies by Mazak and Herbas-Donoso (2014) and Tai and Li (2018) emphasize that using a first language in multilingual classrooms enhances communication and comprehension, supporting the idea that translanguaging is essential for understanding complex academic content. This is particularly relevant in Saudi EMI settings, where Arabic plays a crucial role in bridging gaps in English instruction.

These findings also resonate with García and Li Wei's (2014) theory that translanguaging leverages students' full linguistic repertoire, making learning more effective. The positive perceptions reflected in high SEM coefficients for both oral and written communication echo Wang and Curdt-Christiansen's (2019) and Kuteeva's (2019) observations that students in multilingual EMI environments value translanguaging for its role in enhancing engagement and understanding. Overall, this study reinforces the importance of integrating students' first languages in EMI classrooms to improve educational outcomes.

### Students assessment of the effectiveness of translanguaging in fostering a more engaging and successful EMI environment:

The SEM results indicate that students assess the effectiveness of translanguaging practices (captured by the Pedagogical Implementation latent variable) very positively. All observed variables (Q13 to Q17) (The pedagogical implementation and effectiveness) related to pedagogical effectiveness showed substantial regression estimates with high critical ratios and significant p-values ( $p < 0.001$ ). For example, Q14 (The pedagogical implementation and effectiveness) (1.242) and Q17 (The pedagogical implementation and effectiveness) (1.278) underscore a statistically significant positive assessment by students regarding the role of translanguaging in enhancing engagement and comfort within the EMI environment. Moreover, the high covariance (0.227) between Pedagogical Implementation and Perspectives, with a critical ratio of 5.477 and a highly significant p-value ( $p < 0.001$ ), suggests that the perceived pedagogical benefits directly relate to students' positive perspectives and beliefs. This comprehensive assessment reveals that students find translanguaging practices crucial for engagement and success in EMI settings, validating their essential role in educational strategies. This finding is consistent with Lin and He (2017), who highlighted the role of translanguaging in scaffolding learning and affirming student identity in EMI environments. Moreover, the strong covariance between Pedagogical Implementation and Perspectives underscores the interconnectedness between students' positive

views on translanguaging and its perceived effectiveness in educational strategies. This echoes Mazak and Herbas-Donoso (2015) and Wang and Curdt-Christiansen (2019), who found that translanguaging practices not only facilitate comprehension but also foster a more inclusive and supportive learning environment. Overall, these results validate the essential role of translanguaging in enhancing student success and engagement in EMI classrooms, reinforcing its importance as highlighted in the literature.

## Sustainability Implications of Translanguaging in EMI Settings:

In addition to enhancing student engagement and comprehension, the strategic implementation of translanguaging practices in EMI settings can contribute significantly to the sustainability of educational practices. By embracing students' native languages as valuable resources, institutions can foster more inclusive and accessible learning environments that are adaptable to diverse student needs. This approach not only supports the academic success of multilingual learners but also promotes the long-term sustainability of EMI programs by reducing linguistic barriers and facilitating a smoother transition for students into English-dominant academic environments. Moreover, incorporating translanguaging as a pedagogical strategy aligns with broader sustainability goals in education, which emphasize equity, cultural preservation, and the responsible use of linguistic resources. Future research should explore the role of translanguaging in promoting sustainable educational practices, particularly in contexts with significant linguistic diversity."

Finally, the SEM analysis robustly supports the notion that students not only have favorable perspectives and strong beliefs in the utility of translanguaging practices but also assess these practices as effective in fostering a more engaging and successful EMI environment. This finding is a key contribution to the existing literature, as it not only confirms the positive attitudes toward translanguaging identified in previous studies (e.g., García and Li Wei, 2014; Wang and Curdt-Christiansen, 2019) but also extends this understanding by demonstrating how these beliefs translate into perceptions of pedagogical effectiveness. By showing that students assess translanguaging practices as effective in creating a more engaging and successful learning environment, this study offers empirical support for the integration of translanguaging as a strategic educational approach in EMI contexts. This contribution is particularly valuable in the Saudi context, where the adoption of EMI is growing. The study underscores the importance of incorporating students' first languages into teaching practices, thereby reinforcing their role in enhancing student engagement, comfort, and overall success in EMI classrooms.

Also, the study provides actionable insights for educators and policymakers in Saudi Arabian institutions. The positive assessment of translanguaging by students suggests that its strategic implementation can enhance engagement, comprehension, and overall educational outcomes. Educators are encouraged to adopt translanguaging practices deliberately, leveraging students' linguistic resources to create a more supportive and effective learning environment. This can be particularly beneficial in subjects that are conceptually challenging, where the use of students' first language can bridge gaps in understanding.

## Conclusion

This investigation, using SEM analysis, delved into the perceptions of EMI students on translanguaging practices in English as an EMI classrooms in the Saudi context. It examined the students' perceptions of translanguaging practices, beliefs of translanguaging, and the effectiveness of translanguaging in EMI. The study provides insights into students' perceptions and beliefs and guides educators on effectively utilizing translanguaging for an engaging and effective EMI environment. It contributes to our understanding of translanguaging practices in the EMI context. Given the context of the study and the research design, the study provide room for further research that employ a triangulation of methods for more in-depth analysis of translanguaging in EMI setting. However, this study is similar to other empirical studies in the fact that it has some limitations. For example, given the fact that in a bias in questionnaire-based research cannot be completely eliminated, the situations depicted are hypothetical. In this type of questionnaire, learners are only indicating how they think they would respond; this may or may not correspond to how they would actually respond in real life (Mackey & Gass, 2021, p. 104). Hence, future researchers could make use of this paper as a point for departure to conduct similar studies combining quantitative and qualitative research design. "Questionnaires usually do not provide a complete picture of the complexities of individual contexts" (Mackey & Gass, 2021, p. 105). Fianlly To further enhance the understanding of translanguaging in EMI settings, future research could explore longitudinal studies that track students' actual behavior and performance over time to compare with their self-reported perceptions. Additionally, conducting in-depth qualitative interviews or classroom observations could provide richer, contextual insights that complement the quantitative findings of this study.

## Declarations

### Data availability statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

### Consent to publish

Informed consent to participate and informed consent to publish were obtained from all participants

### Ethical/institutional Approval

Ethical approval was obtained from the research committee at the English Department at Bisha University in Saudi Arabia. All procedures performed in this study involving human participants were conducted in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments.

### Funding

NA for now, if any updates are available, we will provide it to journal ASAP.

### Conflict of Interests

The authors declared that there is no known conflict financial and non-financial interests or personal relationships that could have appeared to influence the work reported in this paper.

During the writing of this work the author(s) used AI-assisted technologies for the purpose of English language polishing. The author(s) take responsibility for the content and intended meaning of this article.

### Informed consent

The participants were informed about the study and gave their consent to use their responses for this study. Written informed consent was obtained from all participants prior to data collection. Participants were informed about the study purpose, procedures, voluntary nature of participation, and their right to withdraw at any time without penalty

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# Figures

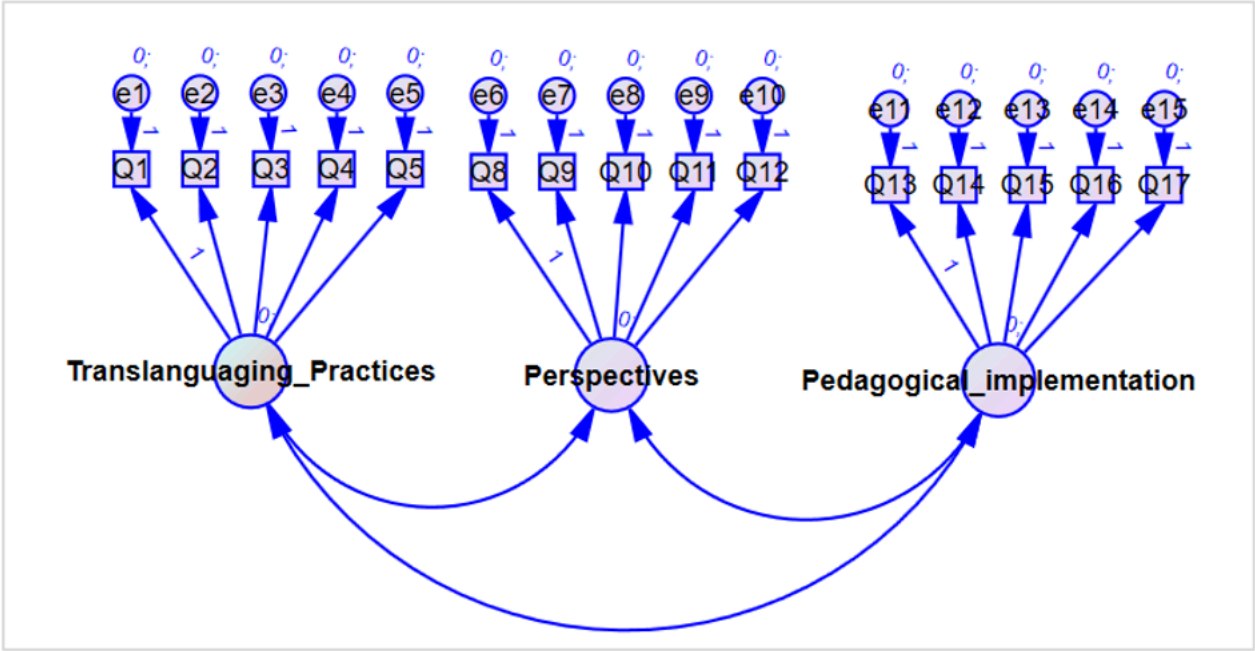


Figure 1  
the path diagram of the model