

Multilingual Pedagogy in Engineering Classroom: Students' Perceptions of Code-Switching and Code-Mixing

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Abstract

Code-switching (CS) and code-mixing (CM) are considered as pedagogical approaches that help effective teaching and learning in multilingual engineering classrooms. It is used widely in higher education but there is limited research to find out students' views on these multilingual practices in engineering institutions. The study examines the role of CS and CM as teaching-learning strategies among undergraduate engineering students at Vidyalankar Institute of Technology, Mumbai. The study used mixed-method research design which involved 100 undergraduate engineering students. Quantitative data were collected through a structured questionnaire containing 14 Likert-scale items and analysed using descriptive statistics and the Chi-square Goodness-of-Fit test. Qualitative data obtained from students' classroom interactions were analysed using thematic analysis to get better understanding of their learning experiences. The findings indicate that students have positive perceptions towards the pedagogical use of CS and CM. Participants stated that multilingual instruction improved conceptual understanding, comprehension of technical concepts, increased classroom engagement and improved confidence in communication. The qualitative findings further revealed that strategic use of Hindi and Marathi alongside English helped students to connect new engineering concepts with their prior linguistic knowledge while maintaining English technical terminology. The study concludes that CS and CM work as effective learner-centred teaching methods that complement English-medium teaching rather than replace it. The findings support to multilingual pedagogy in engineering education and suggest that the thoughtful use of students' first languages can promote inclusive, interactive, and conceptually effective learning environments in linguistically diverse higher education institutions.

Keywords: Code-switching, code-mixing, multilingual pedagogy, engineering education.

1. Introduction

Code switching is the practice of shifting between two or more languages or dialects within a single conversation, often encouraged by a change in context, topic, or audience. Code mixing is the blending of elements such as words, phrases, or grammatical structures from different languages within a single sentence or utterance. Both phenomena are common in multilingual and bilingual communities, reflecting the speaker's linguistic flexibility and social identity.

Metropolitan cities in India are multilingual and the code switching, and code mixing is a common practice used for interpersonal communication. In higher education and professional courses, it is observed that teachers and students often display their linguistic competence by practicing CS and CM outside

classroom interaction and within class by selecting different codes to get the desired impact. All selected codes are used with equal competency.

Engineering colleges in metropolitan cities use English as the medium of instructions and classroom interactions. Mumbai is a multilingual city, people prefer to communicate using multiple languages like English, Hindi and Marathi. CM and CS practice cannot be always due to lack of linguistic proficiency; it can be a deliberate practice to enhance the communication impact and create supportive language environment in the classroom.

The research considered the linguistic approach and essence of the use of code switching and code mixing in Engineering college in Mumbai. The academic and non-academic discussions within the college faculty and students were considered. It is common assumption that code switching and code-mixing take place in informal conditions. In most formal situations, code switching is limited as this feature is mainly observed in oral communication than the written one. The research has proved that code switching happens in formal situations too. Code switching and code mixing as a communication strategy is used in classroom interaction, public interviews, public speech etc. Bilinguals often mix two languages when they speak. This aspect is usually seen in classroom teaching of undergraduate classes. Bilinguals often possess the linguistic competence of both languages that helps them to use code switching and code mixing. This linguistic approach is common in multilingual society.

2. Theoretical background

Engineering education in India takes place in linguistically diverse classrooms where students come from differed educational, regional, and socio-cultural backgrounds. English is used as the primary medium of instruction in engineering colleges, many students possess greater proficiency in regional languages or Hindi, especially when processing complex technical concepts. Within this multilingual educational context, code-switching (CS) and code-mixing (CM) have become as valuable pedagogical practices that help comprehension, classroom interaction, and knowledge construction.

Code-switching refers to the systematic change between two or more languages within a conversation or discourse. According to Gumperz (1982), code-switching is a contextual and socially meaningful linguistic strategy rather than a random shift between languages. In educational settings, instructors deliberately switch languages to clarify technical terminology, explain abstract concepts, encourage student participation, and create an inclusive classroom environment. Such language shift serves communicative as well as instructional purposes by reducing linguistic barriers without compromising academic rigor.

Code-mixing is the inclusion of linguistic elements such as words, phrases, or clauses from one language into the grammatical structure of another. Code-switching involves a change between complete linguistic systems, code-mixing generally occurs within a sentence or utterance. In multilingual classrooms, teachers frequently mix technical English terminology with students' first languages to improve conceptual understanding while maintaining disciplinary vocabulary. This practice enables learners to connect unfamiliar technical concepts with existing linguistic knowledge, helping cognitive processing.

The difference between code-switching and code-mixing has been assessed in sociolinguistic literature. Code-switching may occur at inter-sentential, intra-sentential, or tag levels, whereas code-mixing involves lexical insertion or structural integration within a single sentence. Modern research often considers both phenomena as parts of multilingual communication.

The present study is based on Interactional Sociolinguistic Theory proposed by Gumperz (1982), which

claims that language choice is governed by communicative intentions and social contexts rather than random preference. According to this perspective, speakers use different linguistic codes to negotiate meaning, establish interpersonal relationships, and achieve specific communicative goals. Within engineering classrooms, teachers deliberately change between English and students' familiar languages to simplify difficult concepts, emphasize important information, verify comprehension, and encourage active participation. Thus, code-switching becomes an intentional pedagogical resource that supports effective classroom communication.

The study also explores Vygotsky's Sociocultural Theory (1978), which highlights that learning occurs through social interaction and that language works as the primary mediating tool for cognitive development. Vygotsky proposed that learners construct knowledge through interaction with more knowledgeable individuals within the Zone of Proximal Development (ZPD). From this perspective, the strategic use of students' first language serves as instructional framework that helps learners to bridge the gap between prior knowledge and new disciplinary concepts. In engineering education, where students are required to understand complex scientific and technical principles, code-switching offers cognitive support by reducing linguistic overload and enabling deeper conceptual understanding.

The other theoretical foundation for this study is the Matrix Language Frame (MLF) Model developed by Myers-Scotton (1993). The MLF model explains the grammatical organization of bilingual discourse by proposing that one language functions as the matrix language, providing the grammatical framework, while the embedded language adds lexical items or phrases. In engineering classrooms, English serves as the matrix language because it is the official medium of instruction. Simultaneously, teachers may insert lexical items or explanatory phrases from Hindi or Marathi to strengthen meaning and enable comprehension. The MLF model provides an effective framework for analysing naturally occurring instances of code-mixing in classroom communication.

The study also uses the concept of translanguaging, developed by García and Li Wei (2014), which redefines multilingual communication as the dynamic use of an individual's entire linguistic resource rather than the movement between separate language systems. Translanguaging questions traditional monolingual approaches to education by accepting multilingual competence as a cognitive and pedagogical resource. Within engineering education, translanguaging helps students to use all available linguistic resources while engaging with technical content, enabling deeper understanding, collaborative learning, and classroom participation. This view is relevant in metropolitan cities where classrooms consist of students representing diverse linguistic communities.

These theoretical perspectives give a comprehensive framework for understanding the pedagogical functions of code-switching and code-mixing in multilingual engineering classrooms. Interactional Sociolinguistics explains the communicative motivations underlying teachers' language choices, Sociocultural Theory highlights the cognitive benefits of linguistic framework, the Matrix Language Frame Model accounts for the structural characteristics of bilingual discourse, and Translanguaging Theory acknowledges multilingual practices as genuine educational resources rather than deviations from monolingual norms.

Based on these theoretical foundations, the present study visualizes code-switching and code-mixing not merely as linguistic phenomena but as intentional teaching methods that help conceptual understanding, improve classroom interaction, reduce communication barriers, and support learning in engineering education in multilingual settings.

3. Literature review

Foundational theories of Code-Switching and Code-Mixing

Blom and Gumperz (1972) began the study of code-switching by differentiating between situational and metaphorical code-switching. Situational code-switching occurs when a change in the social context or setting requires the use of another language, whereas metaphorical code-switching is employed to convey social meanings, interpersonal relationships, or shifts in discourse. Their ethnographic study showed that language change is a purposeful communicative strategy influenced by social and contextual factors rather than a random linguistic phenomenon. Their work formed the sociolinguistic basis for understanding multilingual communication in educational settings.

Gumperz (1982) categorized code-switching as a discourse strategy through which bilingual speakers negotiate meaning, express identity, and achieve communicative goals. He claimed that language change functions as a contextualization clue that allows speakers to emphasize ideas, clarify meanings, and maintain interpersonal relationships. This perspective explains why teachers purposefully switch between languages to support learning, emphasize concepts, and improve interaction with students.

Poplack (1980) gave systematic linguistic analysis of code-switching and proposed a typology consisting of inter-sentential, intra-sentential, and tag-switching. Her study showed that proficient bilingual speakers face grammatical constraints while changing between languages, indicating that code-switching is a rule-governed linguistic process rather than evidence of language deficiency. Poplack's classification continues to serve as a fundamental framework for analysing bilingual classroom discourse.

Myers-Scotton (1993) introduced the Matrix Language Frame (MLF) Model, which explains the grammatical structure of code-mixed utterances by proposing that one language functions as the matrix language while another contributes embedded lexical elements. She also proposed the Markedness Model, which explains language choice based on speakers' communicative intentions and social expectations. These theoretical models have been widely applied in educational research to understand how teachers integrate students' first language into English-medium instruction without disrupting the grammatical framework of the target language.

Multilingualism and pedagogical perspectives

Vygotsky (1978) highlighted the vital role of language in cognitive development through his Sociocultural Theory. He proposed that learning occurs through social interaction within the Zone of Proximal Development (ZPD), where teachers provide framework to support learners' understanding. Vygotsky did not discuss code-switching, his theory provides a strong pedagogical foundation for multilingual instruction, as the deliberate use of students' first language helps teachers to bridge prior knowledge with new academic concepts and promote meaningful learning.

García and Li Wei (2014) improved the concept of translanguaging, which perceives multilingual individuals work upon their complete linguistic range rather than switching between separate language systems. They argued that multilingual practices should be regarded as valuable cognitive and pedagogical resources that enhance learning, participation, and identity construction. In multilingual classrooms, translanguaging supports flexible language use that helps conceptual understanding.

Grosjean (2010) questioned the traditional perspective of bilingualism by claiming that bilingual speakers should not be considered as two separate monolinguals. Bilinguals have integrated linguistic competence that they use according to communicative contexts. He emphasized that bilingual individuals naturally change between languages depending on speakers, topics, and situations. His perspective provides important insights into understanding students' multilingual behaviour in higher education classrooms.

Baker (2011) emphasized the advantages of bilingualism and multilingual education, highlighting that the appropriate use of learners' first language can improve academic achievement, cognitive development, and classroom participation. He argued that multilingual pedagogical practices encourage inclusive learning environments by reducing linguistic barriers and enabling deeper understanding of academic content. His work has influenced contemporary approaches to bilingual and multilingual education.

Empirical studies on classroom Code-Switching

More recent empirical studies have expanded these theoretical views by examining the pedagogical functions of code-switching and code-mixing in educational settings. Bhatti, Shamsudin, and Mat (2018) observed that code-switching occurs naturally during classroom communication and helps effective interaction between teachers and learners. Paramesvaran and Wei Lim (2018) reported that deliberate code-switching in English language classrooms encouraged active student participation and improved classroom engagement. Similarly, Syam, Sangkala, and Syarif (2018) found that code-mixing enhanced students' comprehension and maintained their interest during classroom instruction.

Recent studies support the pedagogical significance of multilingual instructional practices. Kuzyk et al. (2020) described code-switching as a natural feature of bilingual communication that reflects speakers' linguistic competence. Pratama (2022) demonstrated that teachers employ code-switching to clarify concepts, avoid misunderstandings, strengthen teacher-student relationships, and improve classroom interaction. Belyaeva (2023) observed that teachers used code-switching rather than code-mixing to facilitate English-medium instruction, indicating that language change was a deliberate instructional strategy. Winanta (2024) related students' limited English proficiency as a major factor influencing teachers' use of code-switching and code-mixing in classrooms. Most recently, Alsuhayl, Alsoweid, and Alharbi (2026), in a systematic review of studies published between 2018 and 2025, concluded that strategic code-switching improves conceptual understanding, clarifies technical vocabulary, enhances classroom management, and promotes learner participation. However, they also cautioned that excessive reliance on the first language may reduce opportunities for target-language exposure, advocating a balanced and purposeful approach to multilingual pedagogy.

4. Research gap

The available research on code-switching and code-mixing in classrooms focuses on English language teaching and sociolinguistic roles. These studies consider pedagogical importance of multilingual communication; we find limited research on code-switching and code-mixing as deliberate teaching-learning practice in engineering education. The present research work explores students' understanding of the pedagogical use of code-switching and code-mixing in improving conceptual understanding, confidence building, classroom engagement and leaning experience in technical classroom.

5. Objectives of the study

The research tries to evaluate the pedagogical role of code-switching (CS) and code-mixing (CM) in engineering education in a multilingual metropolitan context. The study had following objectives.

- To evaluate engineering students' views of code-switching and code-mixing as teaching-learning methods in multilingual classrooms.
- To identify the role of code-switching and code-mixing in improving conceptual knowledge of engineering subjects.

- To examine the impact of code-switching and code-mixing on classroom engagement, participation, confidence, and communication among engineering students.
- To study students' experiences CS/CM practices through classroom interactions.
- To specify pedagogical recommendations for the effective use of code-switching and code-mixing in engineering education.

6. Research question

The present study tried to explore the factors responsible for code-switching and code-mixing in classroom interaction and role played by code-switching and code-mixing in the classroom of a professional course. The study tried to find out the relationship between CS/CM and confidence building and developing communication in classroom interaction.

7. Methodology

Research design

The present study used a mixed-methods research design, mixing quantitative and qualitative analysis to find out students' views on code-switching (CS) and code-mixing (CM) as teaching-learning methods in engineering education. For quantitative analysis, a questionnaire was shared with students to understand their views on pedagogical use of CS/CM and the qualitative analysis includes interactions with students to understand their experiences in multilingual classrooms. The usage of both methods helped to understand the role of CS/CM in teaching and learning.

The study was conducted at Vidyalkar Institute of Technology, Mumbai, an autonomous engineering institution located in a metropolitan city. The institute has multilingual academic setting. English is the medium of instruction, often students and faculty members use Hindi, Marathi, and English during classroom interactions. The participants were the undergraduate engineering students at Vidyalkar Institute of Technology. The participants were bilingual or multilingual, with proficiency in English along with Hindi, Marathi, or other regional languages.

8. Data collection

Data were collected using two ways: a structured questionnaire consisting of 14 statements was shared with engineering students to find out their views on code-switching and code-mixing in classroom teaching. The questionnaire used a four-point Likert scale ranging from *Strongly Agree* to *Strongly Disagree*. The questions explored different pedagogical factors, like conceptual understanding, classroom engagement, confidence, communication, academic learning, and teacher accessibility. The second method was observing students' classroom interactions, where code-switching and code-mixing naturally occurred during discussions and communication related to teaching and learning. These interactions gave sufficient evidence of students' experiences and perceptions regarding use of CS/CM.

Data analysis

The quantitative data were analysed using descriptive and inferential statistical methods. Each questionnaire item was analysed to get frequencies and percentage. The Chi-square Goodness-of-Fit test was used to decide whether the observed response distributions differed significantly from an equal distribution across the response categories.

Thematic analysis was carried out using students' interactions to get qualitative data. The interactions were organised as per themes like conceptual understanding, classroom engagement, confidence, learning

outcomes, and teacher accessibility. The qualitative results were then combined with the quantitative results to give a comprehensive picture of the pedagogical role of code-switching and code-mixing in multilingual engineering classrooms.

The participants were informed about the purpose of the research before data collection. The confidentiality of all participants was maintained throughout the study. Responses were analysed solely for academic and research purposes.

Qualitative analysis

The students' classroom interactions were analysed using thematic analysis to get qualitative data. The responses were organised into different themes like conceptual understanding, classroom engagement, confidence and communication, academic learning, and teacher accessibility. These themes gave understanding about how multilingual teaching practices impact students' learning experiences.

Conceptual understanding

The prominent theme observed from the students' interactions was the role of CS and CM in conceptual understanding. Students informed that complex engineering concepts became easier to understand when teachers explained them in Hindi or Marathi while maintaining technical terminology in English. It helped them to reduce confusion. Students said that bilingual explanations were useful in subjects like mathematics, programming and engineering mechanics.

Increased classroom participation and engagement

Students felt that teachers who used English and Hindi/Marathi created interactive atmosphere with more participation and engagement. They could ask questions, seek clarification and participate in discussions. Classroom discussions were inclusive and collaborative.

Confidence and reduced anxiety

The analysis showed that CS/CM improved students' confidence and reduced language related anxiety. The use of Hindi/ Marathi by teachers made students comfortable in communicating their ideas. It created supporting learning environment. They willingly participated in discussions.

Improved learning and academic performance

Students related CS/CM with improved learning outcomes as it helped them to understand difficult concepts and could perform well in written examination. They considered CS/CM as supporting method in learning while retaining importance of English technical vocabulary.

Teacher accessibility and Learner-centred instruction

Students find the teachers who use CS/CM more approachable and understand students' needs. They find learning more comfortable in this academic environment. They experience improved communication. The practice is appreciated by students.

Quantitative findings

The quantitative analysis helped to understand students' views on code-switching (CS) and code-mixing (CM) as pedagogical practice. Data collected through the questionnaire were analysed using descriptive and inferential statistical methods. Descriptive statistics, including frequencies and percentages, were used to identify patterns in students' responses regarding the effectiveness of CS and CM. The Chi-square Goodness-of-Fit test was used to check whether the observed response distributions differed significantly from an equal distribution across the response categories. The findings are shown in two sections: the first discusses the distribution of students' responses to each questionnaire item, while the second presents the results of the Chi-square analysis, providing statistical evidence for the significance of students' perceptions regarding the pedagogical use of code-switching and code-mixing in engineering education.

Table 1: Distribution of responses

Question	Strongly Agree	Agree	Disagree	Strongly Disagree	Total	Chi-Square	D F	p-value	Significant
I often use CS/CM when communicating with my teachers, friends and family	44	51	4	1	100	82.16	3	1.05596E-17	Yes
I feel less stressful when communicating in CS/CM	37	47	13	3	100	50.24	3	7.10211E-11	Yes
I feel more confident and motivated when communicating in CS/CM	39	46	13	2	100	52.4	3	2.46124E-11	Yes
I feel that it is okay to mix between 2 or more languages when communicating	37	43	17	3	100	40.64	3	7.79597E-09	Yes
I use CS/CM when I find it difficult to get equivalent word in English	45	40	7	8	100	49.52	3	1.01092E-10	Yes
Translation of concept/idea in Hindi/Marathi is easy to understand	40	54	5	1	100	81.68	3	1.33855E-17	Yes
I find a teacher more approachable who uses CS/CM	46	39	11	4	100	50.96	3	4.98903E-11	Yes
The teacher always switches to Hindi/Marathi when we don't understand the concept	29	50	16	5	100	44.88	3	9.8123E-10	Yes
Teaching the course with CS/CM will increase my possibilities of passing the examinations	44	42	9	5	100	52.24	3	2.6623E-11	Yes
I find it difficult to understand the concept if	19	28	36	17	100	9.2	3	0.026746636	Yes

only English is used while teaching									
Do you prefer teacher using CS/CM in classroom teaching/interaction with students	44	44	9	3	100	58.48	3	1.24142E-12	Yes
I feel more engaged and understand what is going on in the lecture with CS/CM	42	48	4	6	100	64.8	3	5.53528E-14	Yes
I am able to understand a difficult concept and ideas with CS/CM	43	40	11	6	100	44.24	3	1.34202E-09	Yes
I am able to gain more knowledge during any communication using CS/CM	51	41	6	2	100	72.88	3	1.03132E-15	Yes

Table 1 shows the distribution of students' responses regarding the use of code-switching (CS) and code-mixing (CM) in engineering classrooms. The results show positive perception of CS/CM as a teaching-learning strategy. Majority of respondents (95%) either strongly agreed or agreed that they frequently use CS/CM while communicating with teachers, friends, and family. Similarly, 94% of the students agreed that translating concepts into Hindi or Marathi makes them easier to understand. The responses show that students remark CS/CM as beneficial for classroom learning. Nearly 90% of the respondents agreed that they feel more engaged and better understand lectures when teachers employ CS/CM, while 83% reported that they can understand difficult concepts more effectively through multilingual instruction. 92% believed that they gain more knowledge when communication includes multiple languages, highlighting that language interchange helps knowledge acquisition.

85% stated that they feel more confident and motivated when communicating through CS/CM, whereas 84% agreed that they experience less stress. 85% considered teachers who use CS/CM to be more approachable, reflecting the role of multilingual communication in inclusive and supportive classroom environment.

86% of respondents agreed that teaching through CS/CM helps them passing examinations, while 88% preferred teachers who integrate CS/CM into classroom instruction. However, responses to the statement "I find it difficult to understand the concept if only English is used while teaching" were comparatively mixed, 47% agreed with the statement and 53% disagreed, suggesting that while many students benefit from multilingual instruction, a considerable proportion remain comfortable learning exclusively through English.

The descriptive results show that students consider code-switching and code-mixing as effective pedagogical methods.

Table-2 Chi-Square Goodness of Fit Test results

Question	N	χ^2	df	p-value
I often use CS/CM when communicating with my teachers, friends and family	100	82.16	3	< 0.001
I feel less stressful when communicating in CS/CM	100	50.24	3	< 0.001
I feel more confident and motivated when communicating in CS/CM	100	52.4	3	< 0.001
I feel that it is okay to mix between 2 or more languages when communicating	100	40.64	3	< 0.001
I use CS/CM when I find it difficult to get equivalent word in English	100	49.52	3	< 0.001
Translation of concept/idea in Hindi/Marathi is easy to understand	100	81.68	3	< 0.001
I find a teacher more approachable who uses CS/CM	100	50.96	3	< 0.001
The teacher always switches to Hindi/Marathi when we don't understand the concept	100	44.88	3	< 0.001
Teaching the course with CS/CM will in-	100	52.24	3	< 0.001

crease my possibilities of passing the examinations				
I find it difficult to understand the concept if only English is used while teaching	100	9.2	3	0.0267
Do you prefer teacher using CS/CM in classroom teaching/ interaction with students	100	58.48	3	< 0.001
I feel more engaged and understand what is going on in the lecture with CS/CM	100	64.8	3	< 0.001
I am able to understand difficult concepts and ideas with CS/CM	100	44.24	3	< 0.001
I am able to gain more knowledge during any communication using CS/CM	100	72.88	3	< 0.001

Table 2 shows the results of the Chi-Square Goodness-of-Fit test conducted to decide whether students' responses differed significantly from an equal distribution across response categories.

The results show statistically significant differences for all fourteen questionnaire items. Thirteen items produced highly significant results ($\chi^2 = 40.64-82.16$, $p < .001$), indicating that students' responses were strongly concentrated toward agreement rather than being evenly distributed across the four response options. The highest chi-square values were observed for the statements related to the frequent use of CS/CM in daily communication ($\chi^2 = 82.16$), the ease of understanding concepts through Hindi/Marathi translation ($\chi^2 = 81.68$) and gaining more knowledge through CS/CM ($\chi^2 = 72.88$). These findings indicate a strong consensus among respondents regarding the educational value of multilingual communication. The only statement with a comparatively lower chi-square value was "I find it difficult to understand the concept if only English is used while teaching" ($\chi^2 = 9.20$, $p = .0267$). Although statistically significant, the smaller chi-square statistic reflects greater variability in students' responses to this item.

The chi-square analysis proves that students' views are not randomly distributed but demonstrate a consistent positive orientation towards the use of code-switching and code-mixing in engineering classrooms.

9. Discussion

The blending of quantitative and qualitative analysis gives a comprehensive understanding of the pedagogical role of code-switching and code-mixing in engineering education. The questionnaire results showed a strong positive perception of multilingual instructional practices, while the thematic analysis explained the underlying reasons for these perceptions through students' classroom experiences. Students consider CS and CM as effective instructional platforms that help conceptual understanding without compromising the role of English. Students considered multilingual explanations valuable while learning technically challenging concepts, indicating that language change improves cognitive processing.

Multilingual pedagogy helps to have an engaging and inclusive classroom environment. Students stated more confidence in asking questions, participating in discussions, and interacting with teachers when familiar languages were used into teaching. CS and CM can perform affective and social functions that help learner engagement and motivation.

Engineering students do not support replacing English with regional languages. Instead, they prefer a balanced instructional approach in which English remains the medium for technical terminology while Hindi or Marathi is used to clarify difficult concepts. It indicates learner-centred pedagogical methods that identify multilingualism.

The quantitative and qualitative evidence suggests that code-switching and code-mixing are purposeful teaching-learning methods that improve conceptual clarity, classroom interaction, confidence, and academic learning in multilingual engineering classrooms.

10. Conclusion

The present research studied engineering students' understandings of code-switching (CS) and code-mixing (CM) as teaching-learning methods in multilingual classrooms in a metropolitan city. The results show that students feel the intentional use of multiple languages as an effective pedagogical method that develops theoretical understanding, classroom engagement, confidence, and overall learning experiences. Both the descriptive statistics and the Chi-square analysis showed a strong positive preference towards the use of CS and CM, suggesting that these multilingual methods are accepted by engineering students.

Code-switching and code-mixing go beyond their traditional sociolinguistic functions and work as instructional methods that help learning. Students stated that explanations using familiar languages, while maintaining English technical terminology, helped them understand complex engineering concepts more effectively. Multilingual communication can reduce language-related anxiety, encourage active participation, improve teacher-student interaction, and create an inclusive learning environment. These results show that language interchange works as an instructional platform that helps cognitive processing without minimizing the importance of English as the medium of technical education.

The inference of this study is that engineering faculty should consider the use of CS and CM as learner-centred pedagogical approaches rather than viewing them as deviations from English-medium instruction. In linguistically diverse classrooms, where students possess different levels of English proficiency, flexible language practices can bridge communication gaps. The results also show that multilingual

teaching should complement rather than replace English, ensuring that students continue to develop the language proficiency required for professional growth.

The research highlights multilingual pedagogy by giving empirical evidence from engineering education which has not been addressed in studies of classroom code-switching and code-mixing. The research tried to show how multilingual teaching methods can improve teaching effectiveness and improve learning outcomes in technical higher education.

The study has certain limitations. The outcomes are based on students' self-reported insights collected through questionnaires and classroom interactions from engineering college within a metropolitan setting. The results may not be applicable to institutions located in rural or monolingual settings. The future studies may consider classroom observations, teacher interviews, and learning achievement data to translate findings and examine the long-term impact of CS and CM on academic performance. Comparative studies through engineering disciplines, geographical regions, and institutional types would enhance understanding of multilingual pedagogical methods in higher education.

The study asserts that code-switching and code-mixing are not just linguistic phenomena but effective pedagogical resources that help teaching and learning in multilingual engineering classrooms. When used purposefully, these strategies help to have conceptual clarity, learner engagement, and more inclusive educational environment.

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