

INTERACTION PATTERNS IN EMI MATHEMATICS CLASSROOMS: EVIDENCE FROM A LOWER-SECONDARY SCHOOL IN HANOI

MÔ HÌNH TƯƠNG TÁC TRONG CÁC LỚP HỌC TOÁN TIẾNG ANH:
MINH CHỨNG TỪ MỘT TRƯỜNG TRUNG HỌC CƠ SỞ Ở HÀ NỘI

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ABSTRACT

English-medium instruction (EMI) has been widely promoted in Vietnamese secondary education, yet empirical research on how EMI operates in lower-secondary classrooms remains scarce. This study examines classroom interaction and language use in EMI Mathematics lessons at a lower-secondary school in Hanoi. Data were collected through classroom observations and audio recordings of ten Mathematics lessons taught by Vietnamese and foreign teachers across two instructional programs. Using a combined framework of Constructivist Grounded Theory and Discourse Analysis, the study analyses interactional organisation, with particular attention to Initiation-Response-Feedback (IRF) patterns, initiation roles, and types of initiation, response, and feedback. The findings reveal a strong and consistent reliance on IRF-based interaction across all lessons, regardless of teacher background or students' English proficiency. Classroom discourse is predominantly teacher-initiated, with convergent questioning and short learner responses characterizing most exchanges. Differences between contexts are functional rather than structural: Vietnamese-teacher classes rely on tighter scaffolding and feedback to secure comprehension, while foreign-teacher classes allow slightly more learner initiation and reasoning-oriented feedback. Across both settings, feedback is the main site where mathematical meaning is clarified, extended, and negotiated. The study argues that IRF remains a pedagogically functional framework in EMI Mathematics classrooms, and that pedagogical development should focus on using initiation and feedback more strategically within existing discourse structures.

Keywords: *English-medium instruction (EMI), classroom interaction, IRF patterns, EMI Mathematics, lower-secondary.*

TÓM TẮT

Dạy các môn học khác bằng tiếng Anh (English-medium instruction - EMI) ngày càng được triển khai trong giáo dục phổ thông ở Việt Nam, tuy nhiên các nghiên cứu thực nghiệm về tương tác lớp học trong các lớp học EMI ở bậc trung học cơ sở vẫn còn hạn chế. Nghiên cứu này khảo sát tương tác lớp học và việc sử dụng ngôn ngữ trong các giờ học Toán tiếng Anh tại một trường trung học cơ sở ở Hà Nội. Dữ liệu được thu thập thông qua quan sát và ghi âm mười tiết học Toán tiếng Anh do giáo viên Việt Nam và giáo viên nước ngoài giảng dạy trong hai chương trình đào tạo khác nhau. Nghiên cứu sử dụng kết hợp khung phương pháp Lý thuyết nền tảng kiến tạo và Phân tích diễn ngôn để phân tích tổ chức tương tác lớp học, tập trung vào các mô hình Khởi xướng - Phản hồi - Phản hồi đánh giá (IRF), vai trò khởi xướng và các loại hình phản hồi. Kết quả cho thấy tương tác lớp học chủ yếu được tổ chức theo mô hình IRF một cách ổn định, bất kể nền tảng giáo viên hay trình độ tiếng Anh của học sinh. Diễn ngôn lớp học chủ yếu do giáo viên khởi xướng, với các câu hỏi hội tụ và những câu trả lời ngắn của người học là đặc trưng của phần lớn các lượt trao đổi. Sự khác biệt giữa các bối cảnh chủ yếu nằm ở chức năng: lớp do giáo viên Việt Nam dạy dùng nhiều chống đỡ và phản hồi để hỗ trợ hiểu bài, còn lớp do giáo viên nước ngoài dạy tạo thêm cơ hội cho người học khởi xướng và lập luận. Ở cả hai bối cảnh, phản hồi giữ vai trò trung tâm trong việc làm rõ và mở rộng ý nghĩa toán học. IRF vẫn là một khung sư phạm hữu ích, và việc cải thiện giảng dạy nên tập trung vào sử dụng khởi xướng và phản hồi hiệu quả hơn.

Từ khóa: *Dạy các môn học khác bằng tiếng Anh (EMI), tương tác lớp học, mô hình IRF, Toán tiếng Anh, trung học cơ sở.*

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1. INTRODUCTION

The choice of instructional language has long been a central concern in applied linguistics and educational research. As English has increasingly assumed the role of a global lingua franca in academic, scientific, and professional domains, educational systems worldwide have adopted English-medium instruction (EMI) as a means of enhancing learners' access to global knowledge and opportunities [1-3].

In Vietnam, EMI has been implemented as part of national efforts to enhance English competence and align education with international standards. The national project to make English the second language in schools, period 2025 - 2035, with a vision to 2045 positions English as a key resource for national development and global integration [4]. As a result, EMI programmes have been introduced at multiple educational levels, including secondary education.

However, at the lower-secondary level, EMI implementation in practice is challenging due to limited teacher English proficiency, students' difficulties in following content, and a lack of pedagogical support for EMI teaching [5, 6]. In addition, existing research in Vietnam has paid limited attention to how EMI actually unfolds in lower-secondary classrooms. Much of the literature remains focused on policy discourse or higher education settings, leaving a gap in understanding of everyday interactional practices at the secondary level [7, 8]. There is a particular lack of empirical studies that closely examine teacher-student interaction as they occur in real-time classroom contexts.

Responding to this gap, the present study focuses on classroom interaction and language use in EMI Mathematics classes at a lower-secondary school in Hanoi. The study is expected to contribute to a deeper understanding of the nature of EMI classroom interaction as it is enacted in a Vietnamese lower-secondary education context, as well as provide insights that may inform EMI pedagogy and practice. In order to achieve the overall aim, the following research question is addressed: How is classroom interaction organized between teachers and students in EMI Mathematics lessons at the lower-secondary level?

2. THEORETICAL FRAMEWORK AND METHODOLOGY

2.1. Theoretical framework

Classroom interaction is central to understanding how English-medium instruction (EMI) is enacted in practice.

Existing theories view classroom talk as more than the transmission of information: sociocultural theory emphasizes interaction as a site for mediated learning and knowledge construction [9, 10], while interactional approaches show how participation and meaning are organized moment by moment through turn-taking, repair, and sequencing [11, 12]. Classroom discourse studies further demonstrate that classroom talk is systematically structured rather than random [13, 14].

Within these traditions, the present study adopts the Initiation-Response-Feedback (IRF) framework as its primary theoretical lens. IRF is one of the most established models for analysing pedagogic discourse because it captures a recurrent structure through which teachers organise participation, elicit knowledge, and manage lesson progression. Although it has sometimes been criticised for reinforcing teacher control, later research suggests that its pedagogic value depends on how it is enacted in specific classroom contexts [15, 16].

The IRF framework is particularly appropriate for this study because it focuses on the organisation of teacher-student interaction in ways that are highly relevant to EMI classrooms. In lower-secondary EMI Mathematics classrooms, interaction is likely to be teacher-led, goal-oriented, and structured around explanation, elicitation, checking, and follow-up. IRF therefore offers a suitable framework for examining how pedagogic roles are distributed and how participation is shaped through classroom discourse.

More specifically, IRF enables analysis of the pedagogic work performed by each interactional move. Initiation frames what counts as relevant knowledge and establishes the kind of response expected from students. Response reveals how learners display understanding, uncertainty, or partial knowledge, making it a crucial site for examining participation in EMI settings. Feedback, in turn, shows how teachers evaluate, reformulate, extend, or close student contributions. By focusing on these three moves, the study examines classroom interaction in a way that is structurally grounded and pedagogically meaningful.

This focus on IRF is especially important in EMI research because previous studies have often paid greater attention to teacher questioning and feedback than to student response as an analytical category in its own right. Adopting an IRF perspective, therefore, allows the study to capture not only patterns of teacher control but also the interactional space in which students

demonstrate understanding and negotiate meaning through English. In this way, IRF provides a coherent theoretical framework for analyzing the discourse organization of EMI Mathematics classrooms.

2.2. Methodology

2.2.1. Context of the study

The study was conducted in English-medium instruction (EMI) Mathematics classrooms at a private secondary school in Hanoi, Vietnam, with a specific focus on the lower-secondary level. The school implements two distinct curricular pathways, referred to in this study as the A-program and the G-program, which students are placed into based on their English proficiency as measured by an entrance test.

The A-program is designed for students with lower English proficiency at entry. Students in this program primarily follow the Vietnamese National Curriculum prescribed by the Ministry of Education and Training (MOET), supplemented with additional subjects such as Writing, English as a Second Language (ESL), and International English Language Testing System (IELTS) preparation (from Grade 9 onwards). Alongside these subjects, students also study selected EMI subjects, including Mathematics and Science.

The G-program, by contrast, is designed for students with higher English proficiency at entry. These students follow a dual-track educational model, combining the Vietnamese National Curriculum with the curriculum of an associated American school. At the lower-secondary level, students in the G-program study core subjects from the American curriculum, such as Language Arts, Mathematics, and Science, as preparatory courses for the full dual-certification pathway implemented at the upper-secondary level.

Within this institutional context, the teaching and learning of Mathematics at the lower-secondary level differ across programs. A-program Mathematics classes are taught by Vietnamese teachers who specialize in teaching Mathematics in English. G-program Mathematics classes are taught by foreign teachers who specialize in Mathematics.

2.2.2. Research participants

The participants in this study include five Mathematics teachers and their respective lower-secondary classes. The teachers were selected to represent both instructional contexts within the school: Vietnamese teachers teaching A-program classes and foreign

teachers teaching G-program classes. Three Vietnamese teachers participated in the study. All hold a Bachelor's degree in Mathematics Teacher Education. Two foreign teachers from the Philippines participated in the study. Both have academic qualifications in Mathematics education (Table 1).

Table 1. Labeling of observed lessons

Lesson	Class	Teacher
Lesson 1-2	A	Teacher A (Vietnamese mathematics teacher)
Lesson 3-4	B	Teacher B (Vietnamese mathematics teacher)
Lesson 5-6	C	Teacher C (Vietnamese mathematics teacher)
Lesson 7-8	D	Teacher D (Foreign mathematics teacher)
Lesson 9-10	E	Teacher E (Foreign mathematics teacher)

2.2.3. Data collection procedures

Classroom observation was selected as the principal data collection method. A total of ten lessons were observed and audio-recorded for this study. Two lessons were observed for each teacher within the same class. Audio recordings were used to capture classroom talk in detail, enabling systematic analysis of turn-taking, interactional sequences, teacher-student exchanges, and language choice. The recordings were subsequently transcribed verbatim to produce lesson transcripts. In addition to classroom transcripts, basic contextual information about the classes, teachers, and curricular programs was collected to support analytic interpretation.

2.2.4. Data analysis procedures

Data analysis in this study followed an iterative, inductive, and interpretive process, informed by the combined methodological framework of Constructivist Grounded Theory (CGT) and Discourse Analysis (DA). The analysis began with repeated close readings of the classroom transcripts to develop familiarity with the interactional flow of lessons. Following initial familiarization, transcripts were analyzed using CGT coding procedures, characterized by constant comparison and progressive abstraction. Through iterative comparison across lessons and classrooms, codes were refined and grouped into more focused categories that captured recurring patterns of interaction and language use. Categories developed through grounded coding were examined in relation to how they manifested across different classes, teachers, and curricular configurations.

Building on the grounded categories developed through CGT, Discourse Analysis was employed as an

interpretive layer to examine how interactional and linguistic patterns functioned as discursive practices. Discourse analysis focused on how recurring patterns of interaction and language use constructed particular roles, identities, and norms within the classroom. Insights gained through discourse interpretation prompted re-examination of earlier transcripts and categories, leading to refinement of analytic claims and conceptual boundaries.

3. RESULTS AND DISCUSSION

3.1. Frequency of IRF patterns

3.1.1. Vietnamese teachers

Across the six lesson transcripts, classroom interaction is consistently structured around a small set of teacher-led IRF-related patterns, with IRF, IR, and IRFF accounting for the majority of exchanges in every lesson (see Table 2).

Table 2. Distribution of IRF patterns in Vietnamese-teacher-led lessons

Pattern	Lesson 1 (n = 52)	Lesson 2 (n = 61)	Lesson 3 (n = 89)	Lesson 4 (n = 71)	Lesson 5 (n = 76)	Lesson 6 (n = 83)
IRF	14 (26.9%)	16 (26.2%)	28 (31.5%)	24 (33.8%)	23 (30.3%)	28 (33.7%)
IR	13 (25.0%)	17 (27.9%)	25 (28.1%)	21 (29.6%)	19 (25.0%)	24 (28.9%)
IRFF	8 (15.4%)	9 (14.8%)	16 (18.0%)	11 (15.5%)	14 (18.4%)	13 (15.7%)
IIRF	7 (13.5%)	7 (11.5%)	8 (9.0%)	5 (7.0%)	7 (9.2%)	8 (9.6%)
I-only	6 (11.5%)	6 (9.8%)	6 (6.7%)	6 (8.5%)	5 (6.6%)	6 (7.2%)
Cleft	1 (1.9%)	2 (3.3%)	3 (3.4%)	2 (2.8%)	3 (3.9%)	2 (2.4%)
IRRF	3 (5.8%)	4 (6.6%)	3 (3.4%)	2 (2.8%)	5 (6.6%)	2 (2.4%)

The analysis shows that IRF-based interaction dominates classroom discourse, accounting for approximately one-quarter to one-third of all exchanges. IRF is typically realised through closed or semi-closed teacher questions eliciting factual recall or confirmation, followed by short learner responses and explicit teacher feedback. This pattern enables teachers to maintain epistemic control while providing a linguistically safe participation format for learners in EMI contexts. The IR pattern occurs with comparable frequency and is commonly used when learner responses are clearly correct, allowing teachers to omit overt feedback in order to maintain lesson pace and reduce cognitive load. The IRFF pattern appears when learner responses require repair or extension, with teachers using expanded

feedback to clarify content, reformulate answers, and provide linguistic scaffolding. Less frequent patterns, such as IIRF, reflect proactive scaffolding in which teachers adjust or simplify initiations before eliciting responses. Rare *cleft* patterns, including I(IR) and I(IRF), signal moments of learner agency, where learners interrupt expected sequences to seek conceptual clarification. Together, these patterns demonstrate the flexibility of IRF-based interaction in supporting both instructional efficiency and meaning negotiation in EMI Mathematics classrooms.

Overall, the Vietnamese-teacher lessons are marked by a tightly controlled interactional structure in which teachers manage turn-taking closely, learners mainly respond rather than initiate, and feedback is used strategically to sustain comprehension while preserving lesson pace.

3.1.2. Foreign teacher

Across the four lesson transcripts taught by foreign teachers, classroom interaction is still predominantly organized around teacher-led IRF-based cycles, with IRF, IR, and IRFF accounting for the large majority of coded exchanges (see Table 3). In this respect, the overall interactional architecture is highly similar to that observed in the lessons taught by Vietnamese teachers, despite clear differences in teacher background and learner English proficiency. That is, higher learner proficiency does not fundamentally alter the dominance of IRF-based interaction; instead, it subtly reshapes how these patterns are deployed and what they are used to accomplish.

Table 3. Distribution of IRF patterns in Foreign-teacher-led lessons

Pattern	Lesson 7 (n = 76)	Lesson 8 (n = 62)	Lesson 9 (n = 31)	Lesson 10 (n = 52)
IRF	30 (39.5%)	23 (37.1%)	8 (25.8%)	16 (30.8%)
IR	15 (19.7%)	15 (24.2%)	10 (32.3%)	19 (36.5%)
IRFF	13 (17.1%)	11 (17.7%)	5 (16.1%)	8 (15.4%)
I-only	4 (5.3%)	4 (6.5%)	3 (9.7%)	4 (7.7%)
IIRF	9 (11.8%)	6 (9.7%)	2 (6.5%)	1 (1.9%)
cleft	1 (1.3%)	0 (0.0%)	1 (3.2%)	2 (3.8%)
IRRF	4 (5.3%)	3 (4.8%)	2 (6.5%)	2 (3.8%)

As in the Vietnamese-teacher lessons, IRF remains the most frequent single pattern across the dataset (see Table 3). Similarly, the high frequency of IR mirrors the earlier dataset. As with the Vietnamese-teacher lessons, IR in the

foreign-teacher classes typically occurs when a learner response is clearly correct and sufficient, allowing the teacher to omit explicit acknowledgement in order to maintain lesson momentum. IRFF also shows a comparable overall frequency to that found in the Vietnamese-teacher lessons.

Taken together, the foreign-teacher lessons show that stronger learner proficiency does not reduce teacher control, but it does allow slightly more space for efficient responses, brief elaboration, and feedback that extends beyond correction toward reasoning.

3.2. Teacher-initiated versus learner-initiated interaction

Analysis of the six lesson transcripts shows a clear asymmetry in initiation roles, with classroom interaction being overwhelmingly teacher-initiated in contrast with a small proportion of learner initiation (see Table 4). This distribution is consistent with the dominance of IRF-based patterns identified previously and reflects a classroom ecology in which teachers retain primary control over topic selection, turn allocation, and the progression of mathematical content.

Table 4. Distribution of initiation roles

Lesson	Teacher-initiated	Learner-initiated	Total exchanges
Lesson 1	40 (76.9%)	12 (23.1%)	52
Lesson 2	51 (83.6%)	10 (16.4%)	61
Lesson 3	78 (84.4%)	11 (15.6%)	89
Lesson 4	65 (88.7%)	8 (11.3%)	71
Lesson 5	68 (89.5%)	8 (10.5%)	76
Lesson 6	73 (88.0%)	10 (12.0%)	83
Lesson 7	71 (93.4%)	5 (6.6%)	76
Lesson 8	54 (87.1%)	8 (12.9%)	62
Lesson 9	19 (61.3%)	12 (38.7%)	31
Lesson 10	39 (75%)	13 (25%)	52

The main finding from Table 4 is twofold: EMI Mathematics interaction remains strongly teacher-led across both groups, but foreign-teacher classrooms show somewhat greater variability and slightly more room for learner-initiated moves.

3.2.1. Vietnamese teacher

Quantitative analysis shows a clear imbalance in initiation roles: teacher-initiated exchanges account for

roughly 60 - 90% of all interactional sequences across the six lessons, while learner initiation generally remains below 40% and often much lower.

Teacher initiations are typically realized through display questions, confirmation checks, and directive prompts (e.g., identifying graph properties, defining terms, or supplying numerical values). Questions are frequently embedded within scaffolding sequences involving repetition, rephrasing, or bilingual support, reinforcing the teacher’s role as the central organizer of classroom discourse and positioning learners as respondents rather than co-directors of talk.

Learner-initiated interaction is comparatively rare and highly context-dependent. When it occurs, it is usually driven by immediate communicative needs, particularly moments of conceptual or linguistic difficulty. Most learner initiations take the form of clarification requests or lexical queries closely tied to the ongoing task.

This pattern suggests that learner participation is encouraged mainly within teacher-defined boundaries. Students do contribute, but they seldom control the direction of the exchange or initiate extended lines of inquiry.

3.2.2. Foreign teachers

Across the four lessons taught by foreign teachers, interaction remains predominantly teacher-initiated. This pattern mirrors the Vietnamese-teacher dataset.

However, learner initiation is more visible and functionally diverse in higher-proficiency classes. Common initiations include lexical clarification and conceptual questions that arise when learners cannot proceed without resolving a language or symbol-related issue. In addition, learners sometimes initiate procedural or method-oriented questions, indicating a greater capacity to formulate mathematical inquiries in English.

Peer-directed learner initiation is also more evident, functioning as a low-risk strategy for resolving lexical or procedural gaps without interrupting whole-class discourse. These side sequences remain interactionally peripheral and do not reshape the public interactional structure.

Compared with the Vietnamese-teacher lessons, the foreign-teacher lessons show not a different interactional system, but a looser version of the same one: teacher control remains dominant, but learners have slightly greater capacity to initiate clarification, method-related talk, and short problem-solving exchanges.

3.3. Types of initiation, response and feedback

3.3.1. Types of initiation

3.3.1.1. Vietnamese teachers

Across lessons, initiation is dominated by convergent questions (questions designed to elicit a specific answer), supplemented by procedural questions and smaller amounts of inform/explain talk (see Table 5). Divergent/open initiations occur only occasionally and are typically framed as invitations for comments or questions rather than as sustained inquiry.

Table 5. Types of Initiation

Lesson	Convergent questions	Procedural questions	Inform	Divergent questions	Total (n)
1	41 (63.1%)	10 (15.4%)	14 (21.5%)	0 (0.0%)	65
2	44 (60.3%)	13 (17.8%)	16 (21.9%)	0 (0.0%)	73
3	62 (61.4%)	26 (25.7%)	9 (8.9%)	4 (4.0%)	101
4	48 (58.5%)	24 (29.3%)	8 (9.8%)	2 (2.4%)	82
5	53 (60.2%)	22 (25.0%)	10 (11.4%)	3 (3.4%)	88
6	57 (61.3%)	23 (24.7%)	11 (11.8%)	2 (2.2%)	93
7	62 (70.5%)	17 (19.3%)	6 (6.8%)	3 (3.4%)	88
8	48 (68.6%)	15 (21.4%)	5 (7.1%)	2 (2.9%)	70
9	21 (61.8%)	7 (20.6%)	3 (8.8%)	3 (8.8%)	34
10	35 (63.6%)	11 (20.0%)	5 (9.1%)	4 (7.3%)	55

Convergent questioning is clearly the teacher’s default tool for maintaining mathematical focus while keeping learner language demands low. This is evident in initiations such as: “What are the names of two axes we have learned?” and “x equals two... what is the property of this line... horizontal or vertical?”. Procedural initiations are also recurrent, typically used to regulate pace and compliance rather than conceptual talk, e.g., “Three, two, one. Let’s revise...” and “Rồi bây giờ mở sách... mở vở ghi...”. Their relatively higher proportion in lesson 3 fits the transcript’s frequent management of task steps and participation. Divergent/open initiations are rare. The teachers occasionally invite broader contributions, e.g., “Can you make some comments about shape A and shape B?” or “Có bạn nào có câu hỏi gì không?”.

Overall, Vietnamese teachers organize interaction primarily around answer-oriented questioning, which supports efficient content coverage but offers limited space for extended reasoning or broader discussion.

3.3.1.2. Foreign teachers

Initiation in both classes is overwhelmingly dominated by convergent questions. For example, in

lesson 1, convergent initiations such as “Now, how would you define the base?” and “Which side is the height?” structure the lesson as a sequence of tightly controlled meaning checks. Procedural questions form the second largest category in both classes, reflecting the ongoing need to regulate pacing, task sequencing, and participation. The relatively high proportion of procedural questions aligns with a lesson rhythm that includes frequent transitions and management talk embedded within content instruction. Divergent questions are rare across both classes, indicating that higher learner proficiency does not automatically translate into open-ended exploratory discourse; rather, such initiations remain marginal and are quickly absorbed back into convergent IRF sequences.

In sum, both groups rely heavily on convergent initiation, but the foreign-teacher lessons show somewhat greater potential for those initiations to open into short reasoning sequences rather than ending with simple answer confirmation.

3.3.2. Types of Response

3.3.2.1. Learners in Vietnamese-teacher lessons

Learner responses across lessons are overwhelmingly specific and short, with “silence/no response” appearing as a notable minority in some lessons. Open-ended responses occur but remain infrequent. However, “silence” becomes a meaningful response type. Open-ended responses remain rare, consistent with the general orientation toward answer-getting rather than extended reasoning (see Table 6).

Table 6. Types of Response

Lesson	Specific, short response	Open-ended response	Silence	Gestures	Total (n)
1	52 (94.5%)	0 (0.0%)	2 (3.6%)	1 (1.8%)	55
2	60 (93.8%)	0 (0.0%)	4 (6.3%)	0 (0.0%)	64
3	84 (93.3%)	2 (2.2%)	3 (3.3%)	1 (1.1%)	90
4	65 (91.5%)	2 (2.8%)	4 (5.6%)	0 (0.0%)	71
5	73 (90.1%)	2 (2.5%)	6 (7.4%)	0 (0.0%)	81
6	80 (95.2%)	2 (2.4%)	2 (2.4%)	0 (0.0%)	84
7	76 (92.7%)	3 (3.7%)	1 (1.2%)	2 (2.4%)	82
8	58 (89.2%)	2 (3.1%)	2 (3.1%)	3 (4.6%)	65
9	29 (85.3%)	2 (5.9%)	1 (2.9%)	2 (5.9%)	34
10	47 (87.0%)	6 (11.1%)	1 (1.9%)	0 (0.0%)	54

The main trend is that learners participate frequently but in highly bounded ways: they answer, confirm, or

remain silent, while sustained explanation is relatively uncommon.

3.3.2.2. Learners in foreign-teacher lessons

Learner responses are overwhelmingly specific and short, reflecting the dominance of convergent initiation. Higher proficiency does enable a small but meaningful presence of open-ended, student-initiated responses. These appear most often following learner-initiated questions or teacher feedback prompts that invite elaboration. While still rare, these responses indicate that learners can attempt partial explanations or reasoning in English, even if these attempts are often taken up and completed by the teacher.

Thus, the difference between the two groups is one of degree rather than type: in both contexts, short responses dominate, but foreign-teacher classrooms allow somewhat greater scope for brief reasoning and elaboration.

3.3.3. Types of Feedback

3.3.3.1. Vietnamese teachers

Across Lessons 1-6, which are taught by Vietnamese teachers in partial EMI Mathematics contexts, feedback is dominated by expand or modify moves, accounting consistently for around 38 to 43% of all feedback types in each lesson. The second most frequent feedback type in these lessons is acknowledge and repeat, ranging from approximately 24% to 39%. Confirm moves occur at moderate but stable levels (roughly 9 to 21%). By contrast, praise remains relatively limited in Lessons 1-4 (generally below 13%), though it increases noticeably in Lessons 5 and 6. Ignore is rare across all six lessons, indicating that Vietnamese teachers almost always respond to learner contributions, either by developing them further or by acknowledging their relevance (see Table 7).

Table 7. Types of Feedback

Lesson	Expand or modify	Confirm	Acknowledge and repeat	Praise	Ignore	Total (n)
1	16 (39.0%)	5 (12.3%)	16 (39.0%)	4 (9.8%)	0 (0.0%)	41
2	18 (38.3%)	10 (21.3%)	17 (36.2%)	2 (4.3%)	0 (0.0%)	47
3	32 (42.7%)	13 (17.3%)	18 (24.0%)	10 (13.3%)	2 (2.7%)	75
4	22 (40.0%)	10 (18.2%)	15 (27.3%)	7 (12.7%)	1 (1.8%)	55

5	28 (41.8%)	6 (9.0%)	16 (23.9%)	14 (20.9%)	3 (4.5%)	67
6	26 (39.4%)	9 (13.6%)	18 (27.3%)	12 (18.2%)	1 (1.5%)	66
7	27 (40.3%)	7 (10.4%)	21 (31.3%)	8 (11.9%)	4 (6.0%)	67
8	23 (43.4%)	10 (18.9%)	15 (28.3%)	4 (7.5%)	1 (1.9%)	53
9	13 (50.0%)	3 (11.5%)	8 (30.8%)	2 (7.7%)	0 (0.0%)	26
10	16 (40.0%)	5 (12.5%)	12 (30.0%)	6 (15.0%)	1 (3.5%)	40

The main finding is that feedback functions as a central mechanism for sustaining the lesson: it helps teachers maintain discourse control, repair or refine learner responses, and bridge conceptual and linguistic gaps.

3.3.3.2. Foreign teachers

In Lessons 8-10, taught by foreign teachers in full EMI Mathematics contexts, expand or modify feedback remains the most frequent category, accounting for approximately 40 to 50% of feedback moves. However, in these lessons, expansion often takes the form of conceptual clarification or reasoning-oriented prompts rather than linguistic repair. Teachers are more likely to extend learner responses by asking how or why an answer was obtained, or by elaborating on the mathematical principle involved. Acknowledge and repeat occurs at comparable levels (around 28 to 31%), functioning to publicly validate correct responses and to model accurate disciplinary English for the class. Confirm feedback appears at levels similar to those in Vietnamese-teacher lessons (approximately 11 to 19%), but is typically realised in English through short confirmation checks such as “X of two?” or “Are you sure?”. One distinguishing feature of the foreign-teacher lessons is the slightly higher and more consistent use of praise, particularly in Lesson 10 (15.0%). Praise is often combined with confirmation or acknowledgement. Nevertheless, praise remains secondary to instructional feedback aimed at refining mathematical understanding. As in the Vietnamese-teacher lessons, ignore remains marginal, indicating that learner contributions are rarely dismissed outright.

Overall, feedback in the foreign-teacher lessons is less oriented toward linguistic mediation and more toward extending mathematical reasoning. This is one of the clearest functional differences between the two teaching contexts.

4. DISCUSSION

The findings show the strong persistence of IRF-based interaction across all EMI Mathematics classrooms. This is consistent with research showing that EMI content lessons are often strongly teacher-led and organized through recurrent triadic exchange rather than extended student-led dialogue [17, 18]. At the same time, IRF is not a fixed or uniform structure. Its pedagogical value depends less on the pattern itself than on how the follow-up move is used. In this study, teachers in both groups used IRF variants to check recall, regulate participation, repair misunderstandings, and, to some extent, extend mathematical talk.

A key finding is that teacher control remains central across both contexts, regardless of teacher nationality or learner proficiency. In both Vietnamese-teacher and foreign-teacher classrooms, teachers largely control topic progression, turn allocation, and what counts as an acceptable response. This matches earlier research on cognitively demanding EMI subjects [17-19]. As noted in the literature, this matters particularly in EMI because it shapes both participation patterns and the linguistic burden placed on learners [20-21]. In the present study, the dominance of convergent initiation and short learner responses reflects both the disciplinary expectations of Mathematics teaching and language-related constraints.

The two contexts are, however, not interactionally identical. In the Vietnamese-teacher lessons, discourse is more tightly scaffolded and more strongly oriented toward maintaining comprehension under partial EMI conditions. Teachers frequently simplify initiations, repeat or rephrase prompts, and use feedback to repair or mediate learner responses. This is consistent with Lo and Macaro's (2012) argument that EMI can constrain classroom talk when students are still developing the linguistic resources needed to express disciplinary understanding in English, and with Nguyen's (2024) finding that Vietnamese EMI classrooms were predominantly teacher-fronted and shaped by language difficulty and local conditions [18, 19]. By contrast, in the foreign-teacher lessons, teacher control remains dominant but is somewhat less restrictive in its local effects. Learners are more able to initiate clarification, ask method-related questions, and occasionally produce brief reasoning-oriented responses, while feedback is more likely to extend conceptual understanding than mainly support linguistic comprehension. One likely explanation is that these teachers work in full EMI settings

with learners of higher English proficiency, though pedagogical style, prior EMI teaching experience, training, and institutional expectations may also contribute.

These differences therefore reflect not teacher identity alone, but the interaction of learner proficiency, degree of EMI implementation, teacher beliefs about classroom talk, and pedagogical traditions within the programme. The Vietnamese-teacher classrooms appear to prioritize safe, efficient participation and controlled scaffolding, whereas the foreign-teacher classrooms allow somewhat greater flexibility because less effort is required to secure basic linguistic comprehension.

Another important finding concerns learner initiation. In both datasets, it remains limited, confirming that students are not major drivers of whole-class discourse [17, 18, 22]. However, the foreign-teacher classes show that when learners have sufficient linguistic resources, they can play a more active role in seeking clarification, checking procedures, and occasionally pursuing mathematical reasoning. This supports the view that learner initiation depends not only on willingness to speak but also on students' linguistic confidence and the interactional space available to them [19, 23]. Even so, classroom discourse remains predominantly teacher-led.

The analysis of feedback further clarifies the distinct pedagogical work performed in the two contexts. Across both datasets, feedback functions not only as evaluation but also as a means of sustaining discourse and shaping how mathematical meanings are publicly constructed, supporting arguments that the third move can either close down talk or reopen it for further meaning-making [15, 24]. In the Vietnamese-teacher lessons, expanded feedback often involves rephrasing, translation, and explicit explanation, bridging conceptual and linguistic gaps; in the foreign-teacher lessons, it more often takes the form of reasoning prompts. This is consistent with EMI and CLIL research showing that feedback can scaffold content understanding and becomes more valuable when it extends reasoning rather than merely evaluates correctness [18, 20].

Taken together, the findings suggest that effective interaction in EMI Mathematics does not require abandoning teacher-led structure. IRF remains a practical framework for organizing participation [18, 24, 25], but what matters is how it is used. Interaction becomes more productive when teachers move beyond answer-checking and use questioning and feedback to extend

understanding, encourage justification, and create manageable opportunities for learner initiation [26, 27].

These findings also have pedagogical implications. Teachers may benefit from using IRF more deliberately as a flexible resource rather than a fixed recitation routine, for example, by using divergent questions such as why, how, or what makes you think so to elicit higher-order thinking. They should also make more explicit space for learner initiation, especially clarification, procedural questions, and short reasoning turns. Feedback can be used more systematically not only to confirm correctness but also to scaffold conceptual explanation: in lower-proficiency or partial EMI contexts, through rephrasing, repetition, or bilingual support; and in higher-proficiency contexts, through prompts that require justification or comparison of methods. Finally, EMI teacher development should address not only language proficiency but also interactional pedagogy, how questioning, feedback, and turn-taking can support both mathematical learning and participation in English.

5. CONCLUSION

This study shows that lower-secondary EMI Mathematics classrooms in Vietnam are characterized by a strong persistence of IRF-based interaction across both Vietnamese-teacher and foreign-teacher contexts. Rather than reflecting teacher identity alone, this pattern appears shaped by the combined influence of disciplinary expectations, learner English proficiency, degree of EMI implementation, and local pedagogical conditions. Differences between the two contexts are therefore not structural but functional: Vietnamese-teacher classrooms use tighter scaffolding and feedback to secure comprehension, while foreign-teacher classrooms allow slightly more learner initiation and reasoning-oriented feedback. Across both settings, feedback remains the key site where mathematical meaning is clarified, extended, and negotiated. Taken together, the findings suggest that improving EMI Mathematics practice may lie less in replacing teacher-led interaction and more in using initiation and feedback more strategically to support deeper conceptual understanding and participation in English.

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