



# Associating teacher motivation and professional background with perception of effective mathematics teaching—a latent class analysis on a national sample in Vietnam

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## Abstract

Teachers' perceptions about effective teaching shape their practices. This study examines mathematics teachers' perceptions and their relationship with professional background and teacher motivation. The data were collected via an open survey that included professional background, motivation for being a mathematics teacher, the top three goals of a good mathematics lesson, and the criteria for evaluating a colleague's lesson. Drawing on 632 responses from a national sample, we used latent class analysis to differentiate teacher profiles. Informed by the pedagogical triangle—student, teacher, and content—we found that teachers focused on student-learning when discussing lessons they viewed as successful, while emphasizing teacher-teaching when evaluating their colleagues' lessons. Location, highest qualification, school level, and teacher motivation were associated with perceptions of effective teaching. The analysis yields five classes, highlighting different teacher profiles—the levels of schooling they taught, their highest qualifications, and the teacher motivations collectively influencing their perceptions of good mathematics teaching. Methodological considerations for investigating teachers' perceptions and their implications for professional development are provided.

**Keywords** Effective teaching · Evidence-based approaches · Teacher motivation · Teacher perception

What is good teaching? This classic question is relevant to both teachers seeking to enhance student learning and to researchers interested in exploring evidence-based approaches. However, research on this question has yielded conflicting findings (Blazar, 2018; Blazar & Kraft,

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2017; Good et al., 1983). As teachers are curriculum makers (Tran & O'Connor, 2024) whose practices are most influential to student day-to-day learning, listening to their voices is essential. Although research has examined teachers' perceptions of good teaching in various countries, including Australia, China, Finland, Germany, Hong Kong, Malaysia, Switzerland, the Philippines, and the USA (e.g., Cai et al., 2009a, 2009b, 2009c; Li, 2011; Wilson et al., 2005), these findings are limited by the small sample sizes of teachers surveyed. While these studies provide results that represent the respective countries where the research is conducted, they do not adequately link them to relevant contextual background, such as teaching experience, qualifications, and teacher motivations. Moreover, research on teacher effectiveness using correlational designs has identified measures, such as teaching experience and teacher knowledge, that are associated with student achievement (Burroughs et al., 2019). Therefore, linking these two findings by examining whether these measures are associated with teacher perceptions about effective teaching is an important research area.

Two dominant approaches to mathematics teaching in Vietnam have emerged following the 2018 curriculum reform: (a) the traditional approach, where knowledge is transmitted from teachers to students, and (b) the constructivist approach, which features student agency, with knowledge being developed and discovered through teacher-guided learning activities (Vietnam Ministry of Education & Training, 2018). As it is expected that the reform curriculum might have influenced effective teaching practices this context offers opportunities to examine the stability of teachers' perceptions and their susceptibility to change. This study examines how Vietnamese mathematics teachers perceive effective teaching by drawing on a national data sample. Additionally, we examine the profiles of these teachers, to offer comprehensive insights into their professional backgrounds, teacher motivations, and perceptions. Consequently, studying effective mathematics teaching in Vietnam holds practical value and the potential to contribute to the global understanding of research in this area.

## 1 Literature review

### 1.1 What is effective teaching?

Early research on effective teaching adopted the process–product approach which focuses on quantifiable teacher behaviors that are associated with student achievement (Brophy & Good, 1996; Good et al., 1983). Extending this line of research, recent studies have provided evidence on broader student outcomes, including cognitive skills, attitudes, and social-emotional competencies (Blazar & Kraft, 2017; Kraft, 2019). However, some researchers argued that the process–product approach considered “effective teaching ... primarily in terms of what teachers could do as an activity itself, rather than as an activity based on student thinking” (Wilson et al., 2005, p. 86), advocating for a shift to a student-centered (or constructivist inquiry) approach (e.g., NCTM, 2014). Effective student-centered practices include using representations, such as manipulatives, graphs, diagrams, and symbols (Capraro et al., 2010) to support learning, and creating classroom interactions around diverse approaches (NCTM, 2014). In this environment, students actively engage in mathematics through worthwhile, carefully designed, appropriate tasks (Anthony & Walshaw, 2008), while teachers simultaneously use their substantial knowledge flexibly in teaching (Nguyen & Tran, 2023; Tran & O'Connor, 2024).

Effective student-centered teaching approaches have been contested. Research conducted in educational psychology has suggested an association between effective characteristics of teaching and *direct instruction* (Stockard et al., 2018). Stockard et al., in their meta-analysis, reported that direct instruction was associated with favorable outcomes across subject areas such as mathematics, reading, language, and spelling. Similarly, Zhang et al. (2022) drew on well-controlled and correlational studies to argue for the effectiveness of direct instruction in science. However, the arguments supporting direct instruction as more effective than student-centered approaches have been critiqued (e.g., Blazar & Pollard, 2023; de Jong et al., 2023). The comparison of studies on direct instruction conducted by Stockard et al. (2018) drew on a small number of well-controlled studies to compare the direct-instruction approach with a business-as-usual classroom approach, which is not necessarily student-centered. Similarly, de Jong et al. (2023) critiqued Zhang et al.'s (2022) study, highlighting the limited substantiation of claims, including drawing evidence from single studies and misinterpreting previous research. Some researchers have argued that labeling instruction as student-centered or teacher-centered is unproductive, as evidence of student-learning is associated with practices that do not fit squarely into either approach (Blazar & Pollard, 2023; de Jong et al., 2023). Furthermore, the debate between student-centered and teacher-centered approaches is complicated by international comparisons, where contextual differences play a significant role on perceptions of overall effectiveness (Cai et al., 2009a, 2009b, 2009c; Li, 2011).

The discourse on effective teaching assumes a close relationship between teaching and learning, where the primary purpose of teaching is to promote learning, or a *learnification* focus (Biesta, 2015). Biesta critiqued this discourse for marginalizing broader educational purposes and argued that “the point of education is not that students learn, but that they learn something, that they learn it for particular reasons, and that they learn it from someone” (p. 234), parallel to the dimensions of *content*, *purpose*, and *relationships*. Biesta further maintained that “the question of purpose is the most important and fundamental question” (p. 234). These purposes include *qualification*, “the transmission and acquisition of some content (knowledge, skills, dispositions),” *socialization*, connecting “students to particular traditions and ways of doing and being,” and *subjectification*, “their formation as a person, ... students can be(come) subjects in their own right and not just remain objects of the desires and directions of others” (p. 235). Additionally, the prevailing discourse has placed undue responsibility on teachers for producing measurable learning outcomes, treating teaching–learning as a cause-and-effect relationship. Biesta has provided an alternative conceptualization of teaching which challenges the practice of accountability metrics and standardized outcomes. This conceptualization emphasizes the importance of listening to teachers’ professional judgment and voices (Nguyen & Tran, 2023; Tran & O’Connor, 2024). Teachers are responsible for the quality of educational *relationships* (Biesta, 2015, 2021), but do not guarantee learning as an outcome. Teachers also draw on their perceptions of teaching, which are shaped by their individual cultures and experiences.

## 1.2 Teachers’ perceptions of effective teaching

Perceptions are considered individuals’ interpretations of sensory information, which draw on data detected by their senses and through prior experiences. Teachers’ perceptions of effective teaching can be understood as a combination of conscious and subconscious beliefs, concepts, meanings, rules, and preferences about good teaching (Tran et al., 2026). There have been a number of studies on teachers’ perceptions of effective teaching in various cultural contexts (see Cai et al., 2009a, 2009b, 2009c, for a volume of international studies) which utilize various

methods. Cai and colleagues (2009a, 2009b, 2009c) interviewed a group of distinguished mathematics teachers from Australia, China, Hong Kong, and the USA about the nature of mathematics, learning, and effective teaching. This study found that all teachers considered understanding mathematics to be the ultimate goal; however, their views about understanding and student engagement varied. Although they agreed on the role of real-life and concrete experiences in facilitating understanding, they differed on when to use this approach, depending on student population and the nature of content. Contrasting views emerged on how practices should be used, with US and Australian teachers advocating greater caution. They all agreed that teachers needed strong knowledge, but nuances emerged, such as the fact that US teachers did not mention curriculum knowledge. US and Australian teachers discussed listening skills, whereas teachers in China and Hong Kong considered clear communication and explanation. Building rapport with students was emphasized by US and Australian teachers, and classroom management (including disciplinary issues) was foregrounded by US teachers. Teachers in China and Hong Kong emphasized content coherence, whereas teachers in the USA focused on content appropriateness. Maass (2009) employed a similar approach, investigating the views of 40 German mathematics teachers on effective teaching. Some teachers believed in a transmission/teacher-centered approach, characterized by structured lessons and clear teacher explanations. In contrast, others considered independent open-ended problem-solving to be more effective. These findings highlight variations within and across cultures, showing that perceptions are not neatly sorted into student-centered or teacher-centered approaches.

Other researchers have used different approaches to gauge teachers' perspectives in a specific situation, such as recalling characteristics of an effective teacher (Lim, 2009), evaluating a videotaped lesson (Huang & Li, 2009), or surveying written responses to general (Li et al., 2009) and specific situations about effective teaching (Kuntze & Rudolph-Albert, 2009). Using two questionnaires, Kuntze and Rudolph-Albert (2009) studied 42 German and 10 Swiss secondary mathematics teachers. Teachers identified observable criteria for evaluating colleagues' lessons and instructional criteria for judging the effectiveness of their lessons in the first questionnaire. The second questionnaire asked them to use their criteria to judge two videotaped classroom situations, one featuring a small-step-question teaching script with the class decomposed into small sub-questions where each step is checked before moving to the next, and the other displaying students' discourse and argumentation. The results showed that Swiss teachers, more than their German colleagues, emphasized content-related criteria. In contrast, their German colleagues highlighted discipline, modes of presentation, aspects of motivation, and student-centered practices. When judging the videos, some instructional criteria received similar attention but others, such as discipline and student-centered methods, received different attention.

The review highlights the complications teachers face when navigating multiple sources of principles and evidence to inform classroom decisions. Teachers must base their pedagogical decisions on their available resources (including knowledge of effective teaching) and their goals (Schoenfeld, 2010), which are linked to teacher motivation.

### 1.3 Teacher motivation and its relationship with effective teaching

While general motivation is defined as the energy that drives people to act and to engage in an activity (Han & Yin, 2016), teacher motivation is specifically defined as the attraction, retention, and commitment to teaching (Richardson & Watt, 2014). Teachers' practices are associated with their motivations (Han et al., 2016; Lazarides et al., 2025; Richardson & Watt, 2014), as Lazarides and colleagues explain, "teacher motivation matters on a fundamental level of teaching behaviors" (p. 2). Richardson and Watt (2014) found that preservice teachers' initial motivations

influence their self-reported teaching styles during the first eight years of teaching. Ability motivations (the belief in one's ability to teach well) predict later positive teaching practices. In contrast, fallback motivations (choosing teaching as an alternative option) and social influences (choosing teaching because of opinions, expectations, or encouragement of others) are linked to reported negative practices (e.g., the extent to which students think that teachers react negatively towards mistakes). A systematic review by Lazarides et al. (2025) suggests that while many studies demonstrate a link between teacher motivation and teaching practice, the mediational processes—such as how motivation influences perceptions, which in turn affect practice—are less well understood. Furthermore, contextual factors like school and professional experience shape motivation (Richardson & Watt, 2014) and perceptions (Cai et al., 2009a, 2009b, 2009c). Considering this information, it is logical to conjecture that teacher motivations shape how teachers interpret effective teaching practices, as teacher motivations set the value framework for what teachers consider good teaching. Therefore, a comprehensive understanding of teachers' perceptions of good teaching should consider their professional backgrounds and teacher motivations. This study addresses this gap by responding to the following research questions:

- What motivations do secondary mathematics teachers in Vietnam have when choosing this career?
- How do the teachers perceive good mathematics lessons?
- What factors are associated with these perceptions?

## 2 Methods

### 2.1 Instrument

We conducted an open-ended survey to avoid social desirability bias (Krumpal, 2013) as providing options for teachers might force them to choose opinions they consider valued by the researchers. We used a ranking technique, asking teachers to decide what they valued most. This study investigates teacher perceptions of good mathematics lessons; therefore, we asked teachers to nominate their top three goals, in order of decreasing importance, when teaching a good mathematics lesson. Their goals for good lessons indicate what teachers aim for and what they perceive an effective class to be. Teachers also provided the criteria for judging their colleagues' lessons, showing what they considered good practices when evaluating others' teaching. Data from these two questions illuminated multiple perspectives about teachers' perceptions of good mathematics lessons. We collected teacher motivation and demographic data (gender) and professional background, including teaching location, school level taught, highest qualification, and teaching experience, as these variables might impact participant perceptions. The survey, presented below, was designed and piloted with a group of mathematics teachers before being sent to the participants.

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1. Identify the best reason that motivates you to be a mathematics teacher
  2. What are your top three goals/purposes when teaching a good mathematics lesson? Please place them in the order of decreasing importance. Use examples to illustrate your point
    - a. Goal 1
    - b. Goal 2
    - c. Goal 3
  3. What criteria do you use to judge your colleagues' mathematics lessons? Use examples to illustrate your point
-

The survey was distributed nationally through targeted networking and snowball sampling. All participants were informed that their data would be used for research purposes. After distributing the survey for three months, 632 responses from 43 cities and provinces (out of 63) in Vietnam were collected.

## 2.2 Coding

We coded the data in two phases, first for teacher motivations and then for goals and evaluation. To code for teacher motivations, we applied Watt et al.'s (2012) coding scheme to code the statements related to motivation, including (a) perceived teaching abilities, (b) intrinsic value, (c) job security, (d) time for family, (e) shaping future, (f) enhancing social equity, (g) making social contribution, (h) working with children, (i) prior teaching and learning experience, (j) social influence, and (k) fallback. After this round of a priori coding, we found that some categories had far fewer responses than others. For the latent class analysis, we combined (c) and (d) into personal utility (as done by Watt et al., 2012), and (b) and (h) into loving teaching and children, as both loving teaching and loving working with children relate to intrinsic values. We observed instances in which teachers referred to *loving mathematics*, which is similar but not identical to intrinsic value (loving teaching). Many statements related to interest, passion, and dreams, without further elaboration, were coded as *interest*. Finally, we did not find statements related to (e), (f), (g), and (j). Therefore, seven coding categories (including others) were used for analysis (see the Supplementary document for the coding framework).

To code for the focus of goals and evaluation, we began by coding each statement using the pedagogical triangle, which refers to student-learning, teacher-teaching, and content to examine their focus. The triangle provides a heuristic structure that exemplifies the inter-relationships and interactions among the vertices in a pedagogical situation (Cohen et al., 2003). The student-learning code refers to student learning or outcomes, the teacher-teaching code refers to teaching approaches or teacher professional skills and knowledge and the content code relates to the quality of content or content itself. In a few cases, we were unable to determine which vertex the teacher referred to; therefore, it was coded as "Other." For instance, "mathematical exploration" could refer to the process students engage in (student-learning code), the teaching approach (teacher-teaching code), or a type of content in a lesson (content code).

As student-learning codes appeared overwhelmingly more often than the others, we applied a further emerging coding scheme, yielding four themes of criteria: student-understanding-mathematics, student-attitudes-toward-learning-mathematics, student-solving-real-life-problems, and student-attributes-and-competencies. Student-understanding-mathematics refers to instances where teachers discussed students' grasp, understanding, and application of mathematical knowledge and skills. Most teachers used the adapted Bloom's taxonomy introduced in Vietnam (Nguyen, 2006), including three overall verbs: *remember*, *understand*, and *apply*, with their associated descriptions and examples. Student-attitudes-toward-learning-mathematics relates to students' development of positive attitudes in mathematics lessons. Student-solving-real-life-problems links to applying mathematical knowledge in real life, including using mathematical thinking. Finally,

student-attributes-and-competencies refers to attributes and competencies discussed in the curriculum. The 2018 Vietnam education reform (Vietnam Ministry of Education & Training, 2018) identifies *attributes* as “qualities expressed in people’s attitudes and behaviors, along with their ability to form human personality” (p. 37). The document includes five main attributes: patriotic, compassionate, hardworking, honest, and responsible. The document defined *competencies* as:

personal features formed and developed through inborn abilities and learning and training, allowing people to use and synthesize knowledge, skills, and personal attributes, such as interest, belief, and will, to successfully perform an activity, achieving desired results under specific conditions. (p. 37)

The document outlines three general competencies—autonomy and self-learning, communication and collaboration, and problem-solving and creativity—as overall goals for all school subjects. It also discusses specific mathematical competencies, including mathematical thinking and reasoning, mathematical modeling, mathematical problem-solving, and using mathematical tools. The teachers surveyed rarely elaborated on attributes and competencies.

The unit of analysis is a single teacher response to each of the questions in the survey (so a total of a maximum of  $5 \times 632$  units of analysis). For reliability checking, six researchers met several times to discuss a coding scheme using a randomly chosen 5% of the data. We noted what the teachers referred to in each statement, compared notes, and used a constant comparative analysis until we reached consensus. After agreeing on the coding scheme, two groups of three coded the remaining data. When the subgroup failed to reach consensus, additional meetings were held among all researchers. Therefore, the results represent 100% agreement between members of the research team.

### 2.3 Data analysis

We applied descriptive analysis to the demographic data (gender) and teachers’ professional background (teaching location, school level taught, highest qualification, and teaching experience), and used frequency to examine teacher motivations and the foci of their goals and evaluations.

We then conducted a ranking analysis of the three goals to determine teachers’ priorities (see Table 1). The most frequently cited criterion within each goal received the largest weight. In Goal3 (Column 4), *student understanding mathematics* received a weight 6 out of the six criteria. Because the teachers ranked the three goals in decreasing order of importance, Goal1 was assigned a higher weight than Goal2, and in turn Goal3. Consequently, *student understanding mathematics*, which was ranked first in all three goals, received weights of 8, 7, and 6, respectively. After assigning weights to each criterion within the goals, we calculated the total weight for each criterion. Finally, the criterion with the largest total weight was ranked first overall to indicate the priority.

We conducted chi-square tests to investigate pairwise associations between each variable (gender, teaching location, school level taught, highest qualification, and teaching experience) and the goals. Next, we performed latent class analysis, a method suitable for categorical data, to examine teachers’ profiles—characterizing multi-variable associations.

Statistics such as BIC (Bayesian information criterion), SSA-BIC (sample-size adjusted BIC), AIC (Akaike information criterion), entropy,  $\chi^2$ , and pLMR (Lo–Mendell–Rubin adjusted likelihood ratio test) (see Kline, 2016), were used to consider the number of classes that best distinguish the data. Smaller AIC, BIC, SSA-BIC, and  $\chi^2$  indicate a better-fitting model; there is no clear-cut rule for choosing between SSA-BIC and BIC. Additionally, entropy should be closer to 1, and the pLMR should be significant when a new class is added. Simultaneously, the number of classes should be conceptually justified. Therefore, to make the decisions, we relied on both the statistics and the model's interpretation. All analyses were run in R with the poLCA package (R Core Team, 2025).

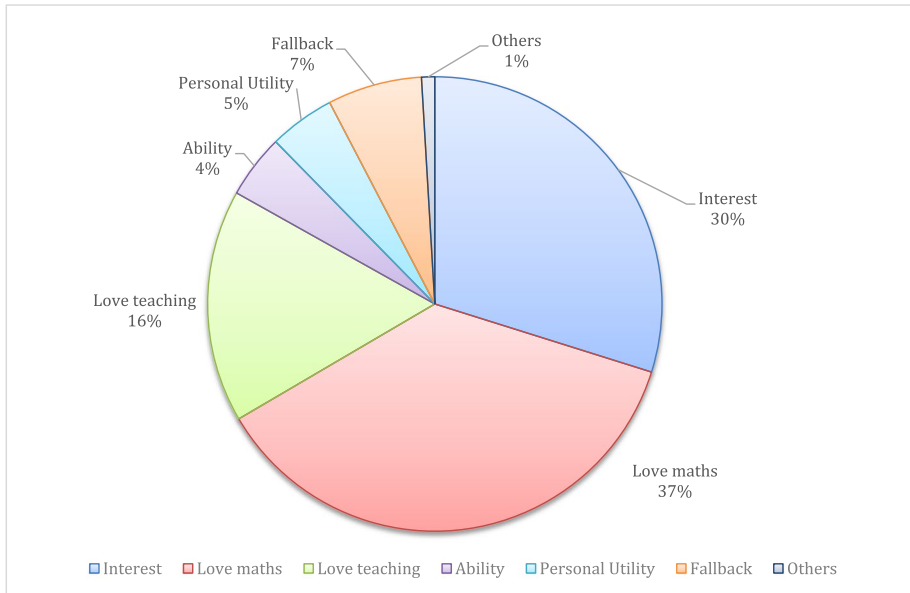
### 3 Results

Of the 632 teachers, 332 were female, and 300 were male; 232 taught in urban or metropolitan areas, while the rest taught in non-urban areas. Slightly more high school teachers (51%) responded to the survey. About 49% of the teachers held an associate bachelor's degree—a three-year teacher education qualification generally required for teachers at the middle school; 35% of the teachers graduated with a four-year Bachelor's degree in mathematics teaching; the remaining 15% held a Master's degree. Their teaching experience ranged from 0 to 35 years.

#### 3.1 What motivates you to become a mathematics teacher?

Figure 1 shows the distribution of teacher motivations reported by the teachers.

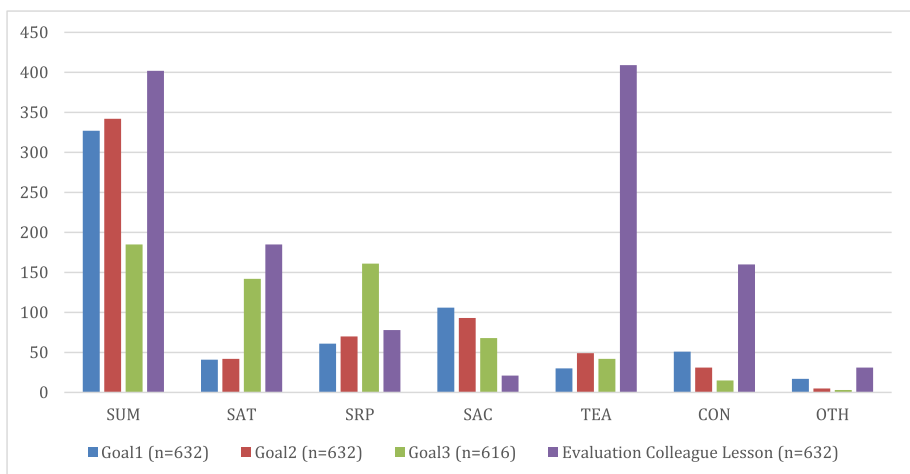
About 37% of the teachers said that they chose to be mathematics teachers because they *loved mathematics*, including loving to teach mathematics and considering that “Mathematical knowledge and skills help people solve real-life problems systematically and accurately” (T147). This motivation is followed by 30% of the teachers reporting being driven by passion, interest, or a dream of becoming a teacher, without further elaboration, citing *interest* as the reason for entering the profession. About 16% of the teachers cited *loving teaching and students*, including liking teaching, loving students, wanting to transfer their knowledge, and helping educate students. Less cited motivations included *fallback*, which was cited by 7% of teachers who did not choose this career as their first option; some because they were not accepted to their preferred programs or because they had family resource constraints. *Personal utility* was reported by 5% of the teachers citing that this job was high-need, highly regarded by society, convenient “to work close to home,” and “allowed time for their family” (T241). *Ability* motivation was reported by 4% of the teachers who indicated feeling that “teaching suits [my] competence” (T142). Finally, about 1% of the teachers cited other reasons, such as “teaching helps develop life skills” or “it is just a job.”



**Fig. 1** Motivations to be a mathematics teacher ( $n = 632$ )

### 3.2 What is a good mathematics lesson: own vs. colleagues'

Figure 2 summarizes the focus of three goals and evaluations of a colleague's lesson, noting that it is more appropriate to interpret the relative frequencies within goals and evaluations, as teachers were asked to nominate only three goals for themselves but had no restrictions on the number of criteria they could apply to evaluations.



**Fig. 2** Distribution of focus of goals for own lessons vs. colleagues' lessons. Note: SUM, student understanding mathematics; SAT, student attitudes; SRP, student real-life problem-solving; SAC, student attributes and competencies; TEA, teacher and teaching; CON, content; OTH, others

### 3.2.1 Student understanding mathematics

The majority teachers considered a good lesson to be the one that helped students understand mathematics—focusing on learning outcomes. Student understanding was cited as a criterion in evaluating colleagues' lessons (402, 64%), followed by Goal2 (342, 54%) and Goal1 (327, 52%), and less frequently, by Goal3 (185, 29%). While many teachers placed high priority on student understanding, they expressed understanding in different ways. T35 responded that her goal was to "help students grasp the knowledge of the lesson." They sometimes referred to components of mathematical understanding, such as "mathematical skills or knowledge" (T100). A few teachers discussed that a good lesson was primarily "studying math for exams" (T625). Others used the adapted Bloom's terminology (i.e., *remembering*, *understanding*, and *applying*) to express students' understandings. For example, T188 stated, "Remember each unit of knowledge, understand, and apply it to solve mathematical problems." Some teachers provided more elaborate statements:

Students understand mathematics when they first master the basics and know how to apply them in exercises, then explore and solve more advanced problems. For example, when teaching sets (Grade 6), students grasp the concept and apply it to write the set of natural numbers. (T6)

Nearly all these statements related to the ability to "solve mathematical problems that are similar to or more advanced than ones discussed in class" (T300).

### 3.2.2 Student attitudes toward learning mathematics

About 29% (185) of the teachers judged their colleagues' lessons' development of students' positive attitudes toward learning mathematics, followed by 23% (142) who set this criterion in their third goal. For example, T523 said a lesson needed to "stimulate students' imagination and interest in mathematics." Some teachers discussed positive classroom engagement, while others addressed the dispositions to engage with mathematics in the future.

### 3.2.3 Student real-life problem-solving

About 25% (161) of the teachers set their third goal to help students "connect mathematics with real-life applications" (T496), and develop students' "mathematical thinking to deal with problems in their life, and critical thinking for looking at the problems from different perspectives" (T602). Some teachers elaborated on this point, providing examples:

When learning how to calculate area and perimeter, you must understand how those formulas are applied in practice. For example, when my family needs to renovate bedrooms and floor, I need to know how to calculate their areas and how many tiles I need to cover the floor without wasting materials. (T288)

The application aspect of mathematics was cited relatively infrequently (78, 12%) in colleagues' lesson evaluations.

### 3.2.4 Student attributes and competencies

About 17% of teachers indicated that their lessons should develop students' attributes and competencies, especially in their first goal. It was used less frequently to evaluate

colleagues' lessons (21, 3%). Some teachers aimed to "develop the main attributes and general competencies appropriate to the grade level" (T531). However, they rarely elaborated on attributes and competencies; some (a) referred to the curriculum document, "developing the main attributes and general competencies appropriate to the subject as required in Section IV, the first part of common issues in teaching and learning at the middle school level" (T73); (b) listed the main attributes and general competencies discussed in the curriculum (T584), mentioning the famous Vietnamese saying that "talented but not virtuous is useless"—referring to attributes; or (c) included the mathematical competencies (T434).

### 3.2.5 Teacher-teaching

Approximately 65% (409) of the teachers evaluated colleagues' teaching approaches or professional knowledge and skills, rather than discussing this aspect of their own lessons (8%, 49 teachers set Goal2). Most often, they considered how others created an interactive classroom environment for students to engage with mathematics, citing "a student-centered approach to promote students' autonomy" (T61), "using learning materials to help students make sense of mathematics" (T10), and "using technology to stimulate student engagement" (T564). Regarding this student-centered discussion, they emphasized the importance of differentiation, addressing students' misconceptions and learning difficulties by using "appropriate interventions" (T66).

While only 8% of the teachers discussed strong knowledge and skills, 14% discussed how teachers plan lessons, and 14% discussed design and implement assessment practices. T337 wrote that a good lesson "helps learners know how to self-evaluate their progress." When discussing planning, they considered the quality of the lesson, its design, the alignment of learning intentions with the curriculum, and its structure.

About 15% of the teachers focused on classroom structure, including organizing student activities, sequencing learning activities, and timing the lesson, without focusing on discipline issues, such as "creating group activities and suggesting learning tasks that meet lesson goals within the allocated time" (ID 429).

### 3.2.6 Content

About 25% of the teachers judged the content of others' lessons more than setting goals for themselves. The teachers expressed that the content needed to address essential ideas, be precise, be practical, and align with the curriculum. T459 wrote, "The lesson content is precise and focused." Others discussed "the suitability, engagement of the content" (T23).

### 3.2.7 What do teachers prioritize in their quality lessons?

The ranking analysis revealed that developing student understanding was the primary criterion for teachers' own lessons (Table 1). This criterion was followed by assessing whether the lesson adequately developed students' attributes and competencies and then real-life problem-solving. Next, a good lesson fostered students' positive attitudes toward learning mathematics. Teacher-teaching ranked fifth, followed by content.

**Table 1** Ranking analysis of lesson-quality goals based on weighted criteria

| Criteria                               | Goal1<br>Rank(weight) | Goal2<br>Rank(weight) | Goal3<br>Rank(weight) | Sum of<br>weights | Overall Rank |
|----------------------------------------|-----------------------|-----------------------|-----------------------|-------------------|--------------|
| Student understanding mathematics      | 1 (8)                 | 1 (7)                 | 1 (6)                 | 21                | 1            |
| Student attributes and competencies    | 2 (7)                 | 2 (6)                 | 4 (3)                 | 16                | 2            |
| Student real-life problem-solving      | 3 (6)                 | 3 (5)                 | 2 (5)                 | 16                | 2            |
| Student attitudes toward learning math | 5 (4)                 | 5 (3)                 | 3 (4)                 | 11                | 4            |
| Teacher-teaching                       | 6 (3)                 | 4 (4)                 | 5 (2)                 | 9                 | 5            |
| Content                                | 4 (5)                 | 6 (2)                 | 6 (1)                 | 8                 | 6            |

### 3.3 Teacher profiles regarding good mathematics lessons

The results in Table 2 suggested that gender was only associated with Goal2 ( $p < 0.05$ ). Location and teacher motivation were associated with Goal1 and Goal2. School level and highest qualification were associated with all goals. However, teaching experience was not associated with any goal.

We first ran a model with all the six variables listed above; however, gender, location, and teaching experience were uniformly distributed among the classes, making them indistinguishable. Therefore, we re-ran the analysis using school level, highest qualification, teacher motivation, Goal1, Goal2, and Goal3, making the models interpretable. Each of the following models with the remaining three variables (one-class model, two-class model, etc.) was associated with the number of classes.

The two-class model's (Model 2) AIC, BIC, and SSA-BIC statistics are the smallest (Table 3 and Fig. 3). The entropy is closer to 1, and pLMR is less than 0.01; hence, Model 2 exhibits the best fit statistics. However, with a sample size of less than 1000, SSA-BIC is preferable over BIC (Chen et al., 2017); therefore, the six-class model should be considered. The result showed that the maximum likelihood was not attained for the six-class model; therefore, the five-class model, with fewer classes, was considered as an alternative.

**Table 2** Association between demographic, professional background variables, and three goals ( $p$ -value)

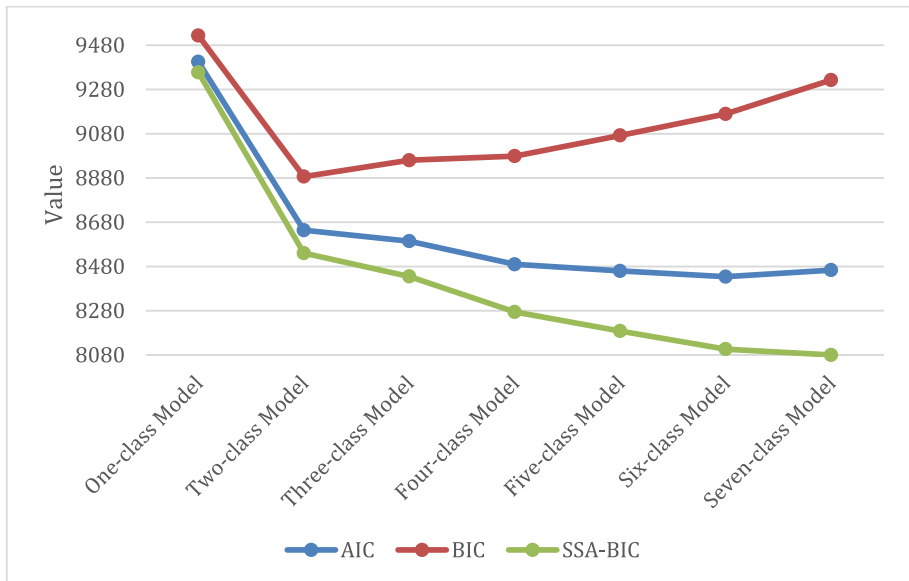
|                       | Goal1 | Goal2 | Goal3 |
|-----------------------|-------|-------|-------|
| Gender                | 0.07  | 0.02  | 0.60  |
| Location              | 0.03  | 0.02  | 0.82  |
| School level          | <0.01 | <0.01 | 0.03  |
| Highest qualification | <0.01 | <0.01 | 0.04  |
| Teaching experience   | 0.38  | 0.75  | 0.22  |
| Teacher motivation    | 0.02  | 0.03  | 0.47  |

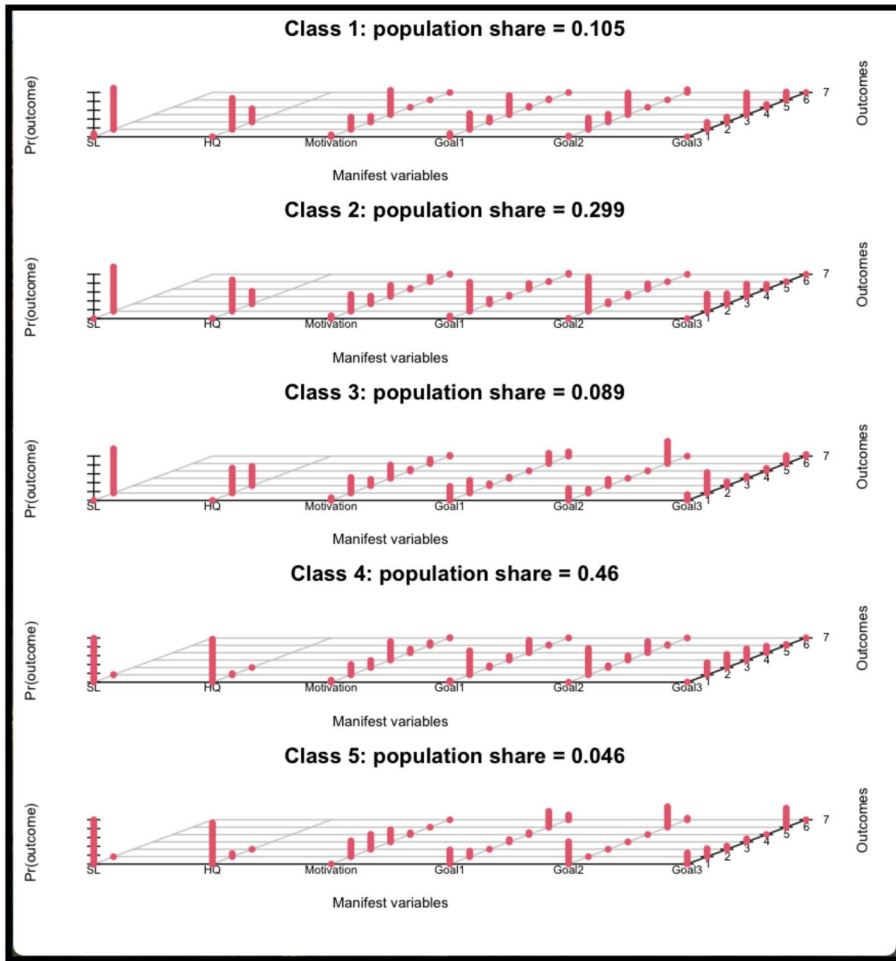
**Table 3** Relevant latent class analysis statistics

|                   | AIC         | BIC         | SSA-BIC | $\chi^2$    | Entropy | pLMR  |
|-------------------|-------------|-------------|---------|-------------|---------|-------|
| One-class model   | 9405        | 9524        | 9357    | 34,103      |         |       |
| Two-class model   | 8644        | 8886        | 8540    | 23,816      | 0.98    | < .01 |
| Three-class model | 8594        | <b>8960</b> | 8435    | 19,528      | 0.90    | < .01 |
| Four-class model  | 8490        | <b>8979</b> | 8274    | 24,029      | 0.93    | < .01 |
| Five-class model  | 8460        | <b>9072</b> | 8188    | 5827        | 0.92    | < .01 |
| Six-class model   | 8434        | <b>9170</b> | 8106    | 5673        | 0.93    | < .01 |
| Seven-class model | <b>8464</b> | <b>9324</b> | 8080    | <b>6591</b> | 0.86    | 0.56  |

Note: Entries in bold indicate that the statistics started to increase

Conceptually, the two-class model differed mainly by school level, so it did not capture the nuances of teacher profiles. Therefore, we interpreted model 5 (Fig. 4). Each plane in Fig. 4 represents a class of teachers, with a profile of the specified variables. The horizontal axis is the same, and it represents one of the variables included in the class analysis (listed in the Note). The number of categories is given by the vertical (flat) axis, and it goes from 1 to 7 (i.e., 1 refers to ‘ability’ and 2 to ‘interest’ in Motivation). Each bar indicates the probability for each variable category. The analysis yielded the proportions of teachers with the specified profile, shown as population shares (of 632 teachers). In the next sections, we interpret each of these classes.


**Fig. 3** Elbow plot for latent class analysis



**Fig. 4** A five-class model ( $n=632$ ). Note: SL, school level (1: middle school, 2: high school); HQ, highest qualification (1: associate bachelor, 2: bachelor, 3: postgraduate); motivation, teacher motivations (1: ability, 2: interest, 3: love teaching and students, 4: love mathematics, 5: personal utility, 6: fallback, 7: others); Goals (1: content, 2: student understanding mathematics, 3: student attitudes, 4: student real-life problem-solving, 5: student attributes and competencies, 6: teacher and teaching, 7: others)

### 3.3.1 High school teachers enjoying mathematics prioritize real-life problem-solving and attitudes

Class 1 (11% of the sample) mainly consisted of high school teachers (93%), with approximately 70% holding a bachelor's degree and 30% holding a master's degree. They came to teaching for loving mathematics (55%), career interest (28%), and loving teaching (13%). For these teachers, a good mathematics lesson was judged by student real-life problem-solving (over 40% across three goals), followed by student understanding (36% in Goal1 and 26% in Goal2). This class sometimes considered students' attitudes; however, student attributes and competencies, teacher-teaching, and content were not their primary focus.

### 3.3.2 Career-oriented high school teachers prioritize mathematical understanding and student attributes

Class 2 (30% of the sample) included all high school teachers, with two-thirds holding a bachelor's degree as their highest qualification (71%). This class entered teaching for career interest (38%), for loving mathematics (25%), for loving teaching (18%), and as a fallback (11%). These teachers overwhelmingly responded that a good mathematics lesson was judged by student understanding across three goals (highest at 77% for Goal2). They then focused on student attributes and competencies (13%, 12%, and 10%), and sometimes considered student attitudes in Goal1 (11%) and Goal3 (23%). A proportion of the teachers (28%) cared about student real-life problem-solving in Goal3; they did not prioritize teacher-teaching or content.

### 3.3.3 Career-interested high school teachers focus on content and teaching

Class 3 (9% of the sample) included all high school teachers, with the highest proportion among the first three classes (43%) holding a master's degree. This class entered teaching for career interest (35%), for loving mathematics (30%), for loving teaching (14%), and as a fallback (9%). They judged a good lesson on content (32% in Goal1 and 27% in Goal2) and teacher-teaching (23% in Goal1, 50% in Goal2, and 18% in Goal3). This class also assessed student understanding (29% in Goal1 and 46.5% in Goal2). They did not prioritize student attitudes, nor attributes and competencies.

### 3.3.4 Middle school teachers enjoying mathematics prioritize understanding, competencies, and real-life applications

Nearly all teachers in Class 4 worked in a middle school and held an associate bachelor's degree (97%). This class (46% of the sample) came to teaching for loving mathematics (42%), career interest (23%), and loving teaching (16%), with a smaller proportion (6%) having fallback motivations. This class prioritized student understanding (over 50% in the first two goals and 29% in Goal3), attributes and competencies (across three goals), and real-world problem-solving. This class did not prioritize content, nor teacher-teaching.

### 3.3.5 Middle school teachers liking teaching prioritize content and teaching

Class 5 (5% of the sample) consisted of only middle school teachers, with their highest degree being an associate bachelor (93%). This class came to teaching for career interest (36%), for loving teaching (34%, the highest among the five classes), and for loving mathematics (27%). This class based their judgment on teacher-teaching (over 35% across the three goals) and content (32% in Goal1, 50% in Goal3, and 25% in Goal3) but placed less emphasis on student understanding. This class did not prioritize attributes and competencies or attitudes.

## 4 Discussion

This survey examined how mathematics teachers in Vietnam perceived good mathematics lessons by investigating their goals for good lessons and their evaluation of colleagues' lessons as well as analyzed the relationship their goals have to their professional backgrounds and teacher motivations.

The results on teacher motivation reflected most of the categories identified by Richardson and Watt (2014) in their international comparison. However, we found a related motivation—loving the subject—that was not identified in their study. The emergence of this category may be significant for future research on teacher motivation, especially to support out-of-field teachers who enter the profession not because they love the subject and those who pursue master’s teaching degrees after completing a bachelor’s degree in a related subject area. For out-of-field teachers, supports should be in place to encourage a love of the subject, such as making mathematics more accessible to them. In contrast, for teachers who started with a love of mathematics, support could be provided to create a meaningful experience of working with and shaping students’ futures. In addition, the current study did not include primary teachers who also taught mathematics. The exclusion is because primary teachers also teach other subjects and do not necessarily consider themselves mathematics teachers. Future studies could investigate whether a love of mathematics motivates this group of teachers, as research has reported that primary teachers are motivated by child-centered factors and secondary teachers by subject-centered factors (Book & Freeman, 1986). As primary school teachers might experience mathematics anxiety (e.g., Pahmi et al., 2025) despite not inherently “loving” mathematics, they might be motivated by a deep “love for children” to spare their students from similar negative experiences.

The results suggest that teaching is a highly regarded career for some teachers in Vietnam, as found in previous studies on Asian cultures (e.g., China, Indonesia, Korea, Malaysia, and Taiwan) (Dolton et al., 2018). In contrast, the fallback motivations were insignificant. Previous studies have linked fallback motivations to non-positive teaching practices and teacher attrition (Richardson & Watt, 2014), a problem observed in countries such as Australia, the UK, and the USA (Brandenburg et al., 2024). The results may explain why teacher attrition is not a significant issue in some educational systems, such as in Vietnam.

The findings showed that teachers prioritized student-learning when stating goals for a good lesson over goals related to teacher-teaching and content. The results showed that good lessons were judged mainly by learning outcomes: a lesson was good if students understood its content (i.e., it worked)—focusing heavily on *qualification* (Biesta, 2015). This finding corroborates the results of studies conducted in various countries such as Australia, China, Germany, Hong Kong, Switzerland, and the US (e.g., Cai & Wang, 2010; Cai et al., 2009a, 2009b, 2009c; Lim, 2009). However, the Vietnamese teachers interpreted successful in a variety of ways, not just exam success, as found in Lim’s (2009) study. Many teachers used the adapted Bloom’s taxonomy to express understanding, which might be explained by its influence in the discourse in Vietnam’s planning and assessment movement since 2006 (Nguyen, 2006). Teachers, metaphorically, expressed understanding as grasping a device’s operation (e.g., knowledge, skills) and putting it into use. Research has suggested nuances in understanding, such as conceptual and procedural (e.g., Hiebert & Lefevre, 1986); relational and instrumental understanding (Skemp, 1976); and, at times, lack of clarity among scholars themselves (Star, 2020). However, we were unable to reliably detect these nuances in the data. Teacher discourse in Vietnam rarely distinguishes between these types of understanding; instead, it focuses on approaches to teaching definitions, theorems, and problems. Mathematical learning is primarily judged by students’ ability to solve problems, which might involve the use of concepts and theorems. The survey data captured the voices of Vietnamese teachers as intended. Future studies could unpack teachers’ discourses of understanding and how they relate to the nuanced types of outcomes, and, in turn, to teacher perceptions of effective teaching.

Teachers prioritized helping students use mathematics in real life. This finding may be explained by the 2018 curriculum’s focus on mathematical modeling (Vietnam Ministry of Education & Training, 2018). Previous studies have indicated that connecting mathematics to real

life is effective (Cai & Wang, 2010; Hemmi & Ryve, 2015), consistent with Vietnamese teachers' perceptions. However, the studies considered real-life experiences as an effective means to an end, whereas the Vietnamese teachers regarded them as an end in themselves, focusing on learning outcomes. Future research could investigate effective teaching that supports students in achieving the application outcome.

Teachers considered developing students' attributes and competencies to be good goals, although very few elaborated on this criterion. This relatively new finding has not been explicitly discussed in the literature on effective teaching (Blazar & Pollard, 2023; Cai et al., 2009a, 2009b, 2009c; de Jong et al., 2023; Wang & Hsieh, 2017). Teachers' discussion of competencies alignment with the 2018 Vietnamese curriculum could be considered part of *qualification* (Biesta, 2015), as the competencies relate to preparing students to be successful in their tasks (either in school or later in life). *Attributes* (as stated in the Vietnamese curriculum) related to human personality in relation to norms and values (e.g., patriotic) could be mapped to *socialization* (Biesta, 2015). Interestingly, the teachers often used these two terms (attributes and competencies) in combination. Similarly, this unique outcome (attributes-and-competencies) might be associated with distinct effective teaching practices that have not been investigated; in turn, research can broaden the view of effective teaching, highlighting Biesta's (2015) comprehensive educational purposes.

Teachers emphasized students' positive attitudes toward learning mathematics. They used it as an end and as a means to develop student engagement. The finding is consistent with those reported in Cai and colleagues (2009a, 2009b, 2009c) regarding students' active engagement and students' interests, as well as with Kuntze and Rudolph-Albert (2009) on the features of successful classrooms. Additionally, the result aligns with broader learning outcomes rather than just the mastery of subject knowledge. Blazar and Pollard (2023) noted that teachers often encounter conflicting effective teaching approaches when aiming for different outcomes, including performance and non-cognitive aspects. Further research could explore how teachers prioritize these types of outcomes in their perceptions. Not surprisingly, Biesta's (2015) *subjectification* purpose was not found in teachers' responses, as it cannot be reduced to the desired outcomes someone has for students.

Teacher-teaching was less frequently mentioned than student-learning when teachers set their goals for good lessons. The student-learning focus corroborates the findings of Li et al. (2009), analyzing teachers' essays on good lessons. Vietnamese teachers, however, discussed teacher-teaching more when evaluating colleagues' lessons. Kuntze and Rudolph-Albert (2009) conjectured that "the situation of having to judge on instructional quality observing the lesson of a colleague might differ from the situation in which factors for the success of one's own lesson" (p.73). We found empirical evidence to support this conjecture. The argument that perceptions are episodically organized and are context-dependent could explain this finding. Locally, the critique culture and teachers' tendency to evaluate colleagues' lessons during observations (Nguyen & Tran, 2023) may help account for the findings: teachers tend to discuss colleagues' teaching more than their own.

Teachers employed balanced perceptions about practices that combined student-centered (e.g., differentiation, meeting students' needs, and student autonomy) and teacher-centered approaches (e.g., rigid planning and clear explanations). However, they did not discuss specific characteristics that could be associated with good teachers (e.g., strong knowledge, good explanation skills) like Chinese teachers (Cai & Wang, 2010; Huang & Li, 2009), or listening skills and techniques to stimulate discussion like US teachers (Cai & Wang, 2010). The findings related to the balanced perceptions refer to the coexistence of teacher-directed and student-centered practices in participants' accounts, highlighting how these approaches are combined in practice rather than presented as oppositional.

Finally, content received less attention than student-learning and teacher-teaching, which aligns with Li et al.'s (2009) findings. However, Vietnamese teachers discussed essential content, broad and deep content coverage, and coherence similarly to Chinese teachers (Cai & Wang, 2010). The lesser attention to content compared with student-learning and teacher-teaching could be attributed to the centralized curriculum in Vietnam, as teachers usually do not select *what* to teach but focus more on *how* they teach it (Nguyen & Tran, 2023).

Overall, the results highlighted a greater emphasis on student-learning when teachers were setting goals for their own lessons and a greater emphasis on teacher-teaching when evaluating others'. Research has examined alignment and misalignment between beliefs and practices (Beswick, 2005) and between espoused and enacted beliefs (Ernest, 1989). Espoused beliefs reflect teachers' theoretical perceptions of effective teaching. Enacted beliefs, on the other hand, represent what they demonstrate in the classroom. This study added another dimension by examining how effective teaching differs between self-evaluation and the evaluation of others, which might relate to espoused and enacted beliefs. This finding might imply that when teachers evaluate their own lessons, they reflect their espoused beliefs, and when they consider others' lessons, they may instead express their enacted beliefs. Therefore, various approaches may be necessary regarding the level of specificity and whether to examine teachers' perceptions of effective teaching through their own lessons or those of colleagues.

The results showed that location, school level, highest qualifications, and teacher motivations were associated with perceptions of good lessons. In addition, the latent class analysis allowed for the distinction between teacher profiles. The five-class results revealed that school level, highest qualification, and teacher motivation collectively accounted for how teachers described goals for good mathematics lessons. This finding suggests that future research on perception of good teaching and teaching effectiveness (the extent to which a teacher's instructions successfully promote student-learning) may need to give closer attention to educational levels beyond primary and secondary education.

The teachers in Classes 2 and 4 who came to the career for the love of mathematics perceived that a good lesson should focus on student understanding. The love of content is associated with student understanding of the content. However, the high school teachers considered student-real-life problem-solving and attitudes to be more important than the middle school teachers, who focused on student attributes and competencies. These were new features in the 2018 curriculum, and thus, it is not surprising that they emerged in the data. Yet, teachers in different classes focused on different criteria; while middle school teachers as a whole tended to prioritize the cross-curricular aspect, and only Class 4 emphasized both. The results could be explained by the fact that about a third of the high school teachers held master's degrees in programs that emphasize real-world problem-solving and attitudes (Nguyen & Tran, 2025; Tran, 2026; Tran et al., 2018). Therefore, in professional development for these classes, more emphasis could be placed on discussions of teaching approaches and content in relation to their goals, particularly in linking cross-curricular goals to content-specific goals for the middle school teachers.

Three classes of teachers (Classes 2, 3, and 5) came to teaching due to career interest. However, teachers in Class 5 expressed a stronger love of teaching than the teachers in other classes (Classes 2 and 3), which emphasized teacher-teaching and content. Teachers in Class 3 high school focused more on student understanding than their middle school colleagues did. Those who entered the profession with some interest (e.g., passion, love of teaching, or love of mathematics) tended to focus more on teaching approaches and content than teachers in other classes (Classes 3 and 5). Having an interest was a good starting point, as teachers considered teaching approaches and had agency in determining the most appropriate content to achieve

educational outcomes. Therefore, with these teachers, explicitly linking their foci to nuanced educational purposes (including student-learning) might be helpful. For teachers in Classes 3 and 5, more discussion of different types of learning should focus on the reform curriculum features and linking them to teachers' existing emphasis on content and teacher-teaching.

#### 4.1 Implications

We argue that investigating perceptions of good lessons and teaching effectiveness should emphasize the purposes of teaching (cf. Biesta, 2015) and the actors who set those purposes. These considerations have implications for teacher education and development—making the purposes of education explicit and attending to teacher motivation. For example, in professional development, experiences with different teaching approaches and content types, and with how these factors relate to their goals of developing students' attitudes, attributes, and competencies, as well as real-life problem-solving, might be helpful. Additionally, fostering teacher reflections on their personal motivations and how these relate to their perceptions of good teaching is necessary to inform their practice. For example, teachers who strongly value mathematics may be more inclined to emphasize content coverage. Such reflections can help make explicit the rationale behind this emphasis and prompt consideration of how it supports students' learning.

This study has been conducted with mathematics teachers who teach mathematics exclusively in Vietnam. Three findings related to good lessons are mathematics-specific, including mathematical topics that teachers used as examples when explaining their goals for developing mathematical understanding, real-world applications of mathematics (e.g., using mathematical modeling), and content such as its logic and precision. The other three criteria, namely attributes and competencies, attitudes, and teacher-teaching, arguably could be applicable to other subjects (e.g., physics, chemistry). Future studies could further investigate how these perceptions apply to other subjects, thereby highlighting the *content* dimension (Biesta, 2015).

Perceptions are shaped by experience and culture, and are relatively stable (e.g., Cai et al., 2009a, 2009b, 2009c). However, we see evidence of perceptions associated with the 2018 reform and the 2006 movement in the Vietnamese education system. We suspect perceptions could be changed, especially in a centralized system like Vietnam's, which uses a top-down approach. Future studies can investigate how teachers in other cultures change their perceptions, for contrasting purposes.

Given our focus on associations among professional backgrounds, teacher motivations, and perceptions, we adopted an overall quantitative approach. We acknowledge the limitations of the data regarding the depth of interpretation, recognizing that additional data could be added, such as in-depth interviews and classroom observations. However, we used qualitative data in the form of open responses to achieve our research purposes. Intensive data, such as interviews and observations for a large sample, are not viable unless the focus is on cases, as conducted in previous studies.

This study contributes to research on teachers' perceptions of effective teaching in the following ways. First, we used an open-ended survey to allow teachers' voices to be heard. Second, we asked teachers to prioritize their motivations and goals, making them the agents of their own voices rather than succumbing to social desirability. Moreover, this is one of the few studies to examine the associations among perceptions, professional background, and teacher motivations using latent class analysis. This study focused on the agent in the classroom, investigating teachers' perceptions about effective teaching, and highlighted the critical dimension of educational purposes. The findings

help examine how and why evidence-based teaching practices are implemented in classrooms, as these practices are not directly applied but instead interpreted by teachers.

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**Data availability** Raw data cannot be shared to protect participants' privacy. However, deidentified data could be shared upon request.

## Declarations

**Ethics approval** Ethics were waived in Vietnam.

**Consent to participate** The researchers explained how the data would be used. However, the consent to participate was not collected as it was waived in Vietnam.

**Consent for publication** The plain language statements provided details of participation and use of data in publications.

**Competing interests** The authors declare no competing interests

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