



Beyond Oral Participation: A Typology of Student Engagement in Classroom Discussions

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Abstract

Classroom discussions represent a common learning activity for students in schools. The prevailing discourse has focused on how to encourage as many students as possible to participate actively in classroom discussions with the assumption that only vocal students are engaged learners. The present essay critically challenges this position by drawing attention to how silent students may be similarly, if not more, engaged emotionally and cognitively than vocal students in classroom discussions. It uses the conceptual apparatus of the integrated perspective of student engagement to hypothesize a typology of six student learning patterns in discussions, namely, Silent-Acting, Silent-Feeling, Silent-Cognizing, Vocal-Acting, Vocal-Feeling, and Vocal-Cognizing. The typology is derived from examining interactions between the three dimensions of student engagement (behavioural, emotional, and cognitive engagement) and two types of student participation in classroom discussions (vocal versus silent participation). Implications for building a more inclusive classroom learning environment and suggestions for future research are discussed.

Keywords Student engagement · Classroom discussions · Silent students · Typology

Introduction

Student engagement has been investigated from myriad perspectives—psychological, educational, sociolinguistics, or sociocultural—for decades (Fredricks et al. 2004; Mercer and Dawes 2014; Wimpenny and Savin-Baden 2013; Zepke and Leach 2010) and many studies have provided support for its relationship with student learning (Applebee et al. 2003; Kuhn et al. 1997; Mercer et al. 1999; Resnick et al. 2015; Webb and Mastergeorge 2003; Wells and Arauz 2006; Wilkinson et al. 2015). In particular, some scholars focus on class-level student engagement because

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classrooms are proximal settings that can shape students' self-perceptions. Therefore, classroom discussion, a fundamental academic activity, constitutes a crucial platform for investigating student-centred teaching and learning.

Three features underscore the significance of classroom discussions. First, it is a fundamental means by which students develop their cognition and learn (van der Veen et al. 2015). Second, in the process of engaging in classroom discussions, students can acquaint themselves with social adaptation skills such as coping with challenges and collaborating with others. Third, participation in classroom discussions enables students to understand and identify their own learning styles (Skinner and Pitzer 2012). Therefore, student engagement in classroom discussions is an important area that deserves research attention.

However, a review of the extant literature shows that previous studies fail to capture the complexity of student engagement in classroom discussions. For example, some scholars maintain that talking in class is the prerequisite of learning (e.g., Wilkinson et al. 1965) and regard quiet or "silent" students as problematic and passive learners (Cheng et al. 2011; Chi and Wylie 2014; Olaussen 1999). This premise is problematic because discussion-based pedagogy is rare in practice (Cazden 2001) for the multifaceted set of demands it entails. Challenges like how to manage clarity content, equal opportunity for student participation, and time pressure simultaneously are faced by many classroom teachers (O'Connor et al. 2017). Furthermore, findings from some empirical studies (e.g., Stahl and Clark 1987) question if oral participation is the prerequisite to effective student learning in class. For example, results from Mazer's (2012) study demonstrate that students could learn either vocally (asking questions, discussing with teachers and peers) or silently (taking notes, listening, and giving the speakers full attention) in class.

Therefore, this article critically challenges the position of conceiving speaking as the only route to effective learning and clarifies different learning patterns in classroom discussions by addressing two problems. The first is to go beyond oral participation and identify various indicators of student engagement in classroom discussions that are associated with different types of student learning patterns. The second is to derive a typology of student engagement in classroom discussions characterized by differences in students' form of participation in classroom discussions and students' learning engagement. In the sections that follow, the article will first review before synthesizing the separate but related literature on student engagement and classroom discussions. Then the explanation will be made for the development of a typology of student engagement in classroom discussions based on myriad indicators. The article will conclude with a discussion of the implications arising from the typology.

Student Engagement

Student engagement, being synonymous with other constructs such as effortful involvement in school (Astin 1984; Terenzini et al. 1982), academic engagement and learner engagement (Christenson and Reschly 2012), investment/commitment (e.g., Tinto 1975), and participation (Kuh et al. 2007), has been defined in different ways.

For instance, McWilliam et al. (1985) conceptualized engagement as the amount of time students spending in an appropriate manner with the context of an activity. Newmann (1992) defines it as “the student’s psychological investment in and effort directed toward learning, understanding, or mastering the knowledge, skills, or crafts that academic work is intended to promote” (p. 12). Trowler (2010) juxtaposes student engagement with the multiple aims of improving the student learning experience, development, and outcomes, and the reputation of the institution. In essence, student engagement is characterized by student interest, effort, and investment in learning and school activities.

Dimensions of Student Engagement

Scholars have conceptualized student engagement as comprising two, three, or four dimensions, but the emerging consensus is that there are at least three dimensions: behavioural, cognitive, and emotional/affective aspects of engagement (Alrashidi et al. 2016; Deci and Ryan 1985; Skinner and Pitzer 2012). Behavioural engagement refers to students’ levels of participation and involvement in learning activities such as speaking up in class, nodding their heads, taking notes, collaborating with classmates, and making eye contact (Abdullah et al. 2012; Fredricks et al. 2004; Hussein 2010). Emotional/affective engagement refers to students’ emotional reactions to learning, teachers, peers, and school in general (Lei et al. 2018; Lester 2013; Trowler 2010). Specifically, it pertains to the levels of students’ attitude, interest, anxiety, and enjoyment in learning activities, and their relationships with other individuals (e.g., sense of belonging, relatedness, and individual identity) involved in the learning process (Archambault et al. 2009; Green et al. 2008; Hirschfield and Gasper 2011; Wimpenny and Savin-Baden 2013; Witkowski and Cornell 2015). Cognitive engagement refers to students’ use of self-regulation strategies and their investment in learning processes as exemplified by their motivation, persistence, and deep learning (Fredricks et al. 2004; Lester 2013; Richardson and Newby 2006; Walker et al. 2006).

Classroom Discussions

Types of Classroom Discussions

Classroom discussions constitute a specific aspect of classroom learning as compared with other learning activities such as an in-class game, doing-exercise-on-whiteboard, and learning-by-oneself. Two types of discussions may occur in classrooms: whole-class and group discussions (Bean and Peterson 1998; Khong et al. 2017). They both represent group platforms for open and free exchanges of ideas as contrasted with teacher-directed lectures and recitations. In whole-class discussions, students can freely talk with the guidance and support of the teacher as exemplified by exploratory talk (Barnes 1976), accountable talk (Michaels et al. 2002), collective argumentation (Brown and Renshaw 2000), dialogic teaching (Alexander 2006),

and Philosophy for Children (P4C, Lipman 1991) approaches. Group discussions can be classified into three types (Galton et al. 2009): “designated collaborative,” “cooperative,” and “seated” groups, and its pedagogical approaches are like collaborative reasoning (Waggoner et al. 1995) and collective argumentation (Brown and Renshaw 2000).

Both whole-class and group discussions have distinct advantages for teaching and learning. Whole-class discussions are useful for teachers developing new concepts and problem-solving skills in students to develop students’ higher-order thinking abilities and social communication skills. Group discussions provide interactional opportunities for students to improve the quality of their arguments (Anthony and Hunter 2017). They also afford opportunities for reserved or inexpressive students to communicate with peers (Hunter and Anthony 2011). In some cases, group discussions prevent students from being bored by changing the organization of learning from “class” to “groups” (Kutnick et al. 2006). There are different interactive patterns in classroom discussions, including student-to-student, teacher-to-student, teacher-to-students, and student-to-students interactions (Applebee et al. 2003).

Importance of Classroom Discussions

Classroom discussions represent a distinctive type of classroom learning activity. First, they foster a respectful and collegial classroom learning atmosphere. In classroom discussions, the teacher is not the only initiator of the talk, but students can do as well (Atkinson 1981; Hillman 1997). Words like “agree/disagree” rather than “right/wrong” in idea exchanges are used both from/for teachers and students in classroom discussions to provide a mutually respectful learning climate (Dillon 1994). Six values undergirding classroom discussions are underscored by Dillon (1994, p. 10): “reasonableness,” “peaceableness and orderliness,” “truthfulness,” “freedom,” “equality,” and “respect for persons.” Students internalizing these values will be more effective in collaborating with others in the future.

Second, the collective learning processes embedded in classroom discussions help students with their knowledge-building and problem-solving through collaboration with their peers. This function works across subjects, grades, and cultures. Research has found that students learn faster (Perlmutter and de Montmollin 1952) and more effectively (e.g., in memory tasks; Yunker 1955) with their classmates than when they are learning alone. Engagement with peers in learning processes also helps students develop friendships, especially with whom they could relate intellectually (Riley and White 2016).

Third, classroom discussions encompass time for students’ understanding and reflection. When a discussion is ongoing, the initiator of a question may pause to get feedback from the others. This pause is a waiting time for understanding the question and for deliberating on answers and feedback. Besides, there is no predictable sequence of talk moves in classroom discussions as we will expect in recitations such as Initiation-Response-Evaluation (Mehan 1979) or Initiation-Response-Feedback (Coulthard and Sinclair 1975). Therefore, classroom discussions are more congenial to student-centred teaching and learning.

Fourth, classroom discussions contribute to the development of students' higher-order thinking skills, given that questions asked in discussions are usually open-ended. These questions provide opportunities for students to share and elaborate on their reasoning, as opposed to close-ended questions seeking right or wrong answers (Larson, and Parker 1996; Roby 1988). Meanwhile, students' learning approaches may evolve in this daily learning environment and impact on their lifelong development (Jurik et al. 2014; Mayer 2004; Mortimer and Scott 2003).

Lastly, classroom discussions can promote students' self-awareness (Howard 2004). For example, in the progressing process from silent thinking to oral participation, students can monitor their growth in the ability to articulate informal ideas, to be able to respond to a changing interactive environment, and finally to be able to voice and defend controversial ideas they may have (Applebee et al. 2003; Byram 1997). Therefore, classroom discussions can provide at least three kinds of environments: the social/cultural environment, the cognitive environment, and the pedagogical environment (Khong et al. 2017; Mercer et al. 1999).

Student Engagement and Classroom Discussions

Broadly speaking, student engagement includes both observable (behavioural) and unobservable (emotional and cognitive) aspects of instructional and learning processes in class (Bryson and Hand 2007; Schindler et al. 2017; Wimpenny and Savin-Baden 2013). Therefore, teacher-student communication is more complicated than we may assume. A burgeoning body of studies show that the quality of classroom discussions (e.g., deeper understanding, reasoning and justifying; Osborne et al. 2014) matters more than the quantity of oral participation (e.g., the amount, time and frequency of participation) for student learning (Meyer 2009; Virtanen et al. 2015). These perspectives and results are supportive for investigating both the physical and psychological learning characteristics of vocal and silent students in classroom discussions.

Vocal Participation in Classroom Discussions

Student engagement in classroom discussions comprises vocal and silent participation (O'Connor et al. 2017). Vocal participation (e.g., asking questions, responding to the class, and contributing to class discussions; Fredricks et al. 2004) is often included in the research as an indicator of student engagement. It has sometimes been equated with student engagement, even though the two constructs are not equivalent (Frymier and Houser 2016). This is because vocal participation is but only one way students can participate and be engaged in classroom learning (Fredricks et al. 2004). Vocal participation happens when students have opportunities to speak up in classroom discussions and can happen if they volunteer themselves or if teachers are approaching them.

Silent Participation in Classroom Discussion

In contrast to vocal participation, students can also participate in classroom discussions silently. This is exemplified in Fritschner's (2000) study which found that quiet students construed "attendance, active listening and being prepared (for the class) as primary elements of participation" (p. 352) while "talkers" interpreted participation as "actively speaking in class" (p. 352). Therefore, when students remain silent during classroom discussions, they may experience no less engagement than the vocal students in multiple aspects, such as behavioural (e.g., taking notes), emotional (e.g., being happy to follow the discussions), and cognitive engagement (e.g., thinking actively) meanwhile.

Reasons for Silent Participation

Students may be silent participants in classroom discussions for various reasons. First, students may be silent participants because of their cultural backgrounds (Cheng et al. 2011; Clark and Gieve 2006; Dahlin and Watkins 2000). Indeed, some studies reported that Asian students (e.g., Chinese, Japanese, Korean and Singaporean) tend to be more focused on listening and note-taking (Furneau et al. 1991), to be quieter, and to exhibit compliance and obedience (Cheng et al. 2011; Olausen 1999). For example, "not speaking" is valued positively in Japanese culture (Clancy 1986) because indirect rather than direct communication can help individuals to avoid disagreements (Loveday 1982). In Vietnamese society, arguments are eschewed to maintain "face" for an individual with a higher social status (Jones 1999). Chinese students remain silent in classroom discussions to show their respect to the teacher (as a symbol of authority). In fact, some students may even wait to be approached by their teachers before they will speak up in class (Braddock et al. 1995). Interestingly, there is an underlying assumption that the conception of student engagement can be transferrable in English-speaking countries, for example, from the US to the Australian and New Zealand educational context (Hagel et al. 2012). However, some scholars (e.g., Trowler 2010) argue that even the terms related to the discussions on student engagement might have different traditions in US vs. UK (and hence, Australia, and NZ). Therefore, these cultural nuances contrast with the conclusions that students' vocal participation should be valued, encouraged, and even recognized more in course grades than other learning patterns across different educational systems (Brog and Comer 2013; Fredricks et al. 2004; Jones 1999).

Second, the classroom environment may also contribute to the patterns of student participation in classroom discussions. For example, Gavala and Flett (2005) found that Maori students would probably reduce their enjoyment and motivation of academic engagement when they experienced negative senses in their courses (e.g., stress and discomfort). Bartholomew et al.' (2018) study show that controlling teaching behaviours (both externally and internally) can undermine students' motivation in engaging in classroom learning whereas supportive teacher-student relationships can increase student participation in classroom activities (McPhail 2013; Sameroff et al. 1993). Classmates can also affect an individual student's participation in classroom discussions (Chiu and Chow 2015), and his/her motivation,

emotion, and behaviour in class (Cappella et al. 2013). Students may also have fewer opportunities to speak up during discussions if the class size is large (Blatchford et al. 2011; Majid et al. 2010).

Third, students' individual characteristics may affect their engagement styles in classroom discussions. For example, efficacious students may be more participative in class (Fassinger 1995; Siti Maziha et al. 2010), while introverted students may be more reserved in their participation (Condon and Ruth-Sahd 2013). The pattern of participation may also vary with student gender. Some studies conducted for Western samples showed that boys scored lower than girls on engagement constructs, especially for behavioural engagement (Martin 2007; Skinner et al. 2009) because of low autonomy support from their teachers (Lietaert et al. 2015) and different teacher-student relationships (Greene et al. 2004). However, in Asian countries, classes with more girls than boys may encounter more silent participation because girls may be expected to be quiet in the public arena (Townsend and Fu 1998). Other factors that may cause silent participation in classroom discussions are low levels of students' expressive ability (Connell et al. 1995) and learning motivation (Reeve and Lee 2014).

Lastly, the application of mobile devices in classrooms may influence student engagement. Although mobile technology, for example, the use of the Ipad and the responder in classroom learning, may create a student-centred learning community and increase the communication opportunities in collaborative learning, it may also provide students the opportunity for disruption and distraction (Fang 2009). Therefore, students may reduce their engagement through discussion, eye contact, and gesturing (Heflin et al. 2017).

Silent Participation and Learning

Students who are silent during classroom discussions are not necessarily lacking in knowledge or engagement in learning (Balas 2000). There may be several kinds of student silence. Some students have the ability to participate in discussions but prefer to learn in silent ways (Meyer and Hunt 2004). Other students may find that they benefit more from listening to different opinions in classroom discussions (Meyer 2007) instead of concentrating on speaking or trying to answer questions (Meyer 2009). Indeed, as Wood (1996) has argued, when students are listening attentively during classroom discussions, they are likely to be learning as much as peers who are talking.

Studies by Stahl and Vancil (1986) and Pittelman et al. (1985) demonstrate that discussion contributions are not significantly related to students' vocabulary learning. Stahl and Clark (1987) organize fifth-grade students into three groups. One group was told that they were to learn from listening and not to participate in classroom discussions (Listening group). The second group was told that they would be called on to contribute to the discussions (Called-on group), and the last group was ignored (Ignored group). They found after three days of intervention that there were no significant differences among the three groups of students in their test scores. In another study, Hatano and Inagaki (1991) assert that silent students learn as much from classroom discussions by trying to find another student (agent) to speak on

their behalf. If they cannot find such an agent, they would incorporate the challenging arguments with their own ideas and elaborate on the explanations they have in mind. Therefore, silent students can acquire higher-order thinking processes without oral participation. Inagaki et al.'s (1998) study of whole-class discussions in Japanese elementary school students showed that more than $\frac{3}{4}$ of silent students could recall ideas shared by more vocal peers and there are no significant differences between vocal and silent students in the mean percentages of correct writing and manipulations of mathematical expressions. Therefore, both silent and vocal students can learn how to solve mathematics problems through whole-class discussions.

Remedios et al.'s (2008) study compared the experiences and responses of overseas (Asian-educated) and local (Australian) silent students in collaborative learning contexts. Results showed that an individual student's choice to be silent in discussions is not inevitably linked to passive learning, and silence can be viewed as listening to learn in collaborative discussion contexts. O'Connor et al. (2017) explored the relationship between the engagement of vocal versus silent students in whole-class mathematics discussions and students' learning outcomes by contrasting student participation under "academically productive talk" (APT) and "direct instruction" conditions. They found that silent students did no worse than vocal peers in their cognitive achievement.

The Typology Model of Student Engagement in Classroom Discussions

The literature review suggests that vocal participation in classroom discussions per se is insufficient for either differentiating between "an active learner" and "a passive learner", or for predicting students' cognitive achievement. This assertion is more evident when we elucidate the different learning processes in classroom discussions using the construct of student engagement. The myriad indicators in the literature of student engagement in classroom learning inform our development of a typology (Fig. 1) comprising six students' learning patterns premised on the interaction between three dimensions of student engagement (behavioural, emotional and cognitive engagement) and two types of student participation in classroom discussion (vocal vs. silent participation). The six types of student learning patterns in classroom discussions are named Vocal-Acting (VA), Vocal-Feeling (VF), Vocal-Cognizing (VC), Silent-Acting (SA), Silent-Feeling (SF) and Silent-Cognizing (SC). Each of these types of learning patterns is discussed below.

The first type is Vocal-Acting (VA) engagement. Students in this type are assumed to behaviourally engage in classroom discussions with vocal engagement. For example, when a student in this type is taking notes, he or she can also vocally participate in discussions. This learning pattern is easy to be observed and noticed by the instructors. Therefore, these students' learning confusions and problems (if they have) may be addressed in real time in the classroom.

The second type is Vocal-Feeling (VF) engagement. VF students are those who vocally participate in classroom discussions with emotions. Various communicative

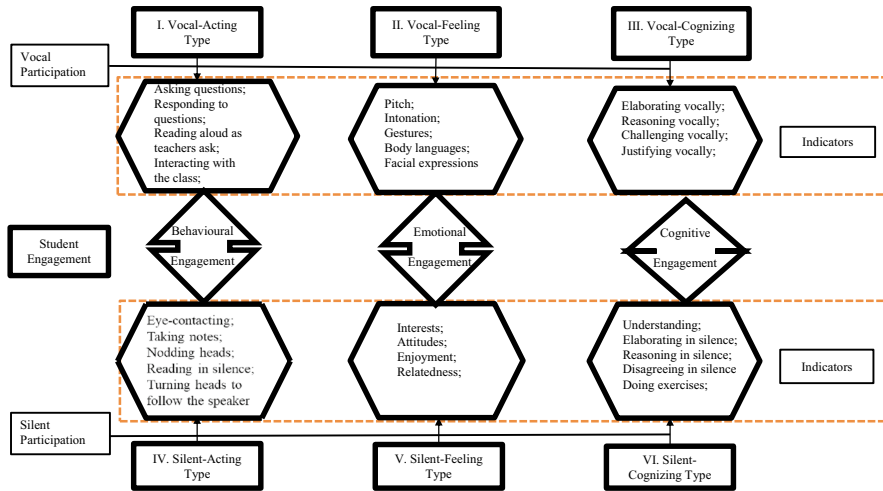


Fig. 1 Typology model of student engagement in classroom discussions

and cognitive purposes (e.g., emphasis and accentuation of their opinions) can be expressed through their pitch, loudness, duration, and intonation (Vroomen et al. 1993). For example, a student in this type may be very excited to share his or her ideas in classroom discussions. Of course, this student may be nervous about doing this if he or she is worrying about the correctness of responses.

The third type is Vocal-Cognizing (VC) engagement. Students belonging to this group are those who are vocally participating in classroom discussions with cognitive strategies. For instance, a student in this type may articulate his or her thinking process loudly in classroom discussions. This is a process of transforming silent engagement into vocal engagement through verbalizing the learners’ information processing steps by using the skills of elaboration, reasoning, justification, and challenging (Sfard and Kieran 2001).

The fourth type is Silent-Acting (SA) engagement. Students belonging to this type are those who silently engage in classroom discussions with observable learning behaviours. For example, a student in this type can nod his or her head silently when listening and thinking to follow class discussions. Other behaviours include the student taking notes, reading in silence, and turning heads to follow other students who are speaking.

The fifth type is Silent-Feeling (SF) engagement. SF students are quietly engaged in classroom discussions with emotions. For example, a student in this type may be thrilled to hear the same ideas from his or her classmate’s sharing in discussions. It means that although this group of students do not speak up, they can find the agent(s) to speak for them in the discussions and to find out if their understandings are accurate.

The last type is Silent-Cognizing (SC) engagement. Students belonging to this type silently participate in classroom discussions with cognitive skills. For example, a student in this type may keep thinking but does not speak up during discussions.

This situation may occur in class because when an individual student is speaking up, other students may be expected to listen to this student attentively. In this silent listening process, the cognitively engaged students may be thinking critically and testing their ideas in their heads.

In the proposed typology, silent students refer to those who seldomly talk and respond, or those who never speak up during classroom discussions (although they exist, Clarke 2015). The typology focuses on students with different levels of engagement instead of disengagement. For instance, students who are vocal but not engaged in classroom discussion (e.g., interrupting the speakers) and students who are silent but not engaged (e.g., day-dreaming in class) are not included in our typology.

We aim to illustrate the potential types of student learning patterns occurring in classroom discussions with the caveat that there are no clear boundaries for these types in reality (Fig. 1). Indeed, students may move across more than one of the six types of learning patterns naturally and frequently in the course of authentic classroom discussions. For example, an active speaking-up student (behavioural engagement) may simultaneously be emotionally and cognitively engaged. This is because the student may experience excitement/enjoyment or even worries that his or her responses are wrong in the midst of sharing thoughts with classmates. Therefore, while responding to classroom discussions (behavioural engagement), the student may be thinking very actively and carefully (cognitive engagement) to express his or her ideas as clearly as possible.

In the same vein, when a silent student is learning in the context of classroom discussions, he or she may be emotionally and cognitively engaged even without utterances. To be specific, a student can listen to the discussion in class and follow classmates in higher-order thinking without communicating with others. Some high achievers may experience this when they want to display an impression of modesty. They do not volunteer to answer questions or participate in discussions even if they know the answers.

Therefore, given that student engagement in classroom discussions may be observable or latent, it is misleading to summarily classify active students as active learners and silent students as being passive (or even disengaged) learners (Balas 2000; Bean and Peterson 1998). It is perhaps more accurate to characterize discussion participants as demonstrating active behavioural engagement and nonparticipants in discussions as being potentially passive in their behavioural engagement.

Conclusion

This article highlights the unique features of classroom discussions in learning and explores how different aspects of student engagement may be associated with student learning patterns. The integrated model of student engagement has been employed to understand different aspects and levels of student involvement and performance in classroom discussions. The interpretation shows that there may be six potential types of student learning patterns in classroom discussions.

Therefore, student engagement and learning patterns in classroom discussions may be more complicated than a simple distinction between silent or vocal students.

The present article contributes to theory by challenging the myth that silent students are disengaged/passive in their learning. It unravels the complicated relationship between student participation and engagement in classroom discussions. The practical implication arising from the discussion is that, given the different types of learning patterns among students, teachers should perhaps cater to different students' learning needs rather than focusing on verbal students. This inclusive approach will mitigate the risks of devoting educational resources to students who display active behavioural engagement but probably passive cognitive engagement to the detriment of students who are silent but trying very hard to learn with the class. Indeed, if silent but engaged students were to get little understanding or support from their teachers and peers, they may gradually become negatively engaged and learn less in class.

Our focus on student engagement in the conceptualization of student learning points the way forward for the need to unpack student disengagement in the context of classroom discussions. Accordingly, the research agenda can first empirically investigate the types of student learning patterns in classroom discussions. Second, future research can evaluate subjective (learner-self) and objective (classroom context) factors impacting on classroom engagement. Third, it is equally imperative to examine if teachers have professional knowledge in catering for learner diversity in classroom discussions. Some suggestions for the indicators, data-collection, and data-analysis are summarised in Table 1. The data for the types of student engagement in classroom discussions can be classified into two groups: vocal or silent student data.

Therefore, for Types VA, VF, and VC, the vocal data of student engagement can be audio- or video-taped before transcribing or be observed and coded directly by the researchers in the field. The coding scheme for participants' talking moves and voice quality are needed to explore the cognitive process of students (Blankson and Blair 2016; Hennessy et al. 2016; Soter et al. 2006). To collect the data of silent engagement in Types SA, ST and SC, video-taping, and a coding scheme for the participants' silent actions are necessary (e.g., facial expressions, body language, and eye-tracking areas). The supportive instruments are computers and some related software like Eye-tracking software and Gaze-tracker software (Goldberg et al. 2002; Li et al. 2006). In addition to the above observable data, unobservable data for analysing students' emotional and cognitive engagement can be collected through questionnaires (self-reported or perceived) and interviews (face-to-face or telephone). Grounded theory (Glaser and Strauss 1967), Latent Class analysis (LCA; Hagenaars and McCutcheon 2002), and Cluster analysis (Kaufman and Rousseeuw 2009) are suggested for generating insights and testing the research results. When it comes to the development of instruments, the statistical analysis methods might be needed, such as exploratory factor analysis (EFA; Thompson 2004) and confirmatory factor analysis (CFA; Thompson 2004).

Table 1 Future study on student engagement in classroom discussions

Typology	Indicators	Research methodology	Data-collection method	Data analysis method	Apparatus
Type I. VA	Asking questions Responding to questions Reading aloud Interacting with the class	Quantitative method; qualitative method	Video-taping the class; observing the class; self-report questionnaire; interview	Text coding; coding in the field; EFA/CFA	Computer
Type II. VF	Pitch Intonation Gestures Body languages Facial expressions	Quantitative method; qualitative method	Observing the class	Coding in the field	Computer
Type III. VC	Elaborating vocally Reasoning vocally Challenging vocally Justifying vocally	Quantitative method; qualitative method	Video-taping the class; observing the class; self-report questionnaire; interview	Text coding; coding in the field; EFA/CFA	Computer
Type IV. SA	Eye-contacting Taking notes Nodding heads Reading in silence Turning heads to follow the speaker	Quantitative method; qualitative method	Eye tracking software; gaze tracker software; video-taping the class; observing the class; self-report questionnaire; interview	Gaze Tracker 8 software; Text coding; coding in the field; EFA/CFA	Computer; eye response; technologies
Type V. SF	Interests Attitudes Enjoyment Relatedness	Quantitative method; qualitative method	Self-report questionnaire; interview	EFA/CFA	Computer

Table 1 (continued)

Typology	Indicators	Research methodology	Data-collection method	Data analysis method	Apparatus
Type VI. SC	Understanding Elaborating in silence Reasoning in silence Disagreeing in silence Doing exercises	Quantitative method; qualitative method	Self-report questionnaire; interview	EFA/CFA	Computer

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