A Classroom-Based Study on the Antecedents of Epistemic Curiosity in L2 Learning

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Abstract
This classroom-based study investigated the antecedents of epistemic curiosity among 25 Thai university students in an English oral communication course. Using a whole-class survey and focus group interview, we recursively asked the students to describe a time in class when they experienced epistemic curiosity and the reasons behind it. A modified version of constant comparative analysis suggested seven thematic factors as the antecedents of epistemic curiosity and positive affect linked to its experience. Utilizing descriptions of the lessons kept in the teacher’s record, we provide contextualized accounts of how and why the students experienced epistemic curiosity in class. We conclude by offering pedagogical suggestions for creating learning environments that inspire language learners’ epistemic curiosity.

Keywords Epistemic curiosity · Emotion · Classroom-based study

Introduction
Epistemic curiosity is a type of epistemic emotion that learners can experience in relation to knowledge-generating cognitive tasks (Pekrun et al., 2016). It motivates students to gain
new ideas, learn, and resolve intellectual problems (Litman, 2005, 2008; Litman & Jimerson, 2004; Litman & Spielberger, 2003; Markey & Loewenstein, 2014; Shin et al., 2019). In recent years, epistemic curiosity has received increasing attention in the fields of general education and educational psychology, showing its beneficial roles in learning (Arnone et al., 2011; Eren & Coskun, 2016; Gurning & Siregar, 2017; Kang et al., 2009; Rotgans & Schmidt, 2014). In the field of Second Language Acquisition (SLA) on the other hand, epistemic curiosity is an under-researched emotion. Despite an ongoing call for investigation into a wider range of emotions (Nakamura, 2018; Dewaele, 2015; Dörnyei & Ryan, 2015), SLA has long limited emotion research to anxiety, and to a much lesser extent, enjoyment (e.g., Dewaele & MacIntyre 2014; Dewaele et al., 2018) and boredom (e.g., Nakamura et al., 2021a; Pawlak et al., 2020).

Epistemic curiosity has been widely described as “the drive to know” (Berlyne, 1954, p. 187). Based on previous work on curiosity (e.g., Berlyne 1954; Loewenstein, 1994) and a series of his own studies (Collins et al., 2004; Litman, 2005; Litman & Jimerson, 2004; Litman & Spielberger, 2003). Litman has defined epistemic curiosity as “a desire for knowledge that motivates individuals to learn new ideas, eliminate information gaps, and solve intellectual problems” (Litman, 2008, p. 1586). Epistemic curiosity, based on contemporary curiosity models, is a multifaceted construct consisting of distinctive yet highly correlated dimensions. Berlyne (1960) initially proposed divergent and specific dimensions (see, e.g., Berlyne, 1966), which Litman & Spielberger (2003) later found to be highly correlated (0.56). A year later Litman & Jimerson (2004) introduced a new dimension of epistemic curiosity, the feeling of deprivation. Taken together, Litman (2005) proposed that epistemic curiosity involves two dimensions, labeled as Interest-type (I-type) and Deprivation-type (D-type). I-type epistemic curiosity, which corresponds to Berlyne (1960)’s diverse and specific dimensions, refers to “a desire for new information anticipated to increase pleasurable feelings of situational interest,” whereas D-type epistemic curiosity involves “a motive to reduce unpleasant experiences of feeling deprived of new knowledge” (Lauriola et al., 2015, p. 202). Accordingly, epistemic curiosity should be distinguished from other types of curiosity such as interpersonal curiosity (Litman & Pezzo, 2007), self-curiosity (Aschieri et al., 2018), and social curiosity (Renner, 2006). We also subscribe to the notion that interest and curiosity are two distinct phenomena (Eren & Coskun, 2016; Markey & Loewenstein, 2014). Interest can be defined as “a psychological state that involves a desire to become engaged in an activity or know more, in general, about a subject” (Markey & Loewenstein, 2014, p. 231). This implies that interest most likely, but not necessarily, involves positive affect. Curiosity on the other hand, could involve an aversive feeling generated by deprivation of knowledge. Another feature that distinguishes curiosity from interest is that curiosity often emerges from an information gap, whereas individuals can feel interest without such a gap.

Educational studies have indicated a wide range of positive learning variables associated with epistemic curiosity, including school performance (Eren & Coskun, 2016), engagement (Arnone et al., 2011), perceived value (Rossing & Long, 1981), knowledge acquisition (Rotgans & Schmidt, 2014), self-regulation, (Lauriola et al., 2015), memory enhancement (Kang et al., 2009), and goal orientation (Eren, 2009). Furthermore, epistemic curiosity is suggested to have the potential to reduce boredom (Berlyne, 1960; Eren & Coskun 2016; Keller, 1987). In fact, a study by Eren & Coskun (2016) showed a mediating role of epistemic curiosity in the relationship between boredom and graded performance. This is a useful
insight, as boredom is an increasingly recognized issue in L2 language learning (Nakamura et al., 2021a, b; Pawlak et al., 2020). SLA research has also contributed a small number of studies that have shown a positive role for epistemic curiosity in L2 learning, such as its positive link to willingness to communicate, reading comprehension, L2 development in linguistic, social-cultural, and pragmatic areas (Gurning & Siregar, 2017; Mahmoodzadeh & Khajavy, 2018; Takkaç-Tulgar, 2018). These positive roles highlight the importance of understanding what makes learners curious. Although there are limited data examining this question, extant theories of curiosity and recent empirical work provide insights into the antecedents of epistemic curiosity.

Theoretically, epistemic curiosity has by and large been argued to be evoked by discrepant information perceived by individuals, originally suggested by the information gap theory by Loewenstein (1994). At the same time, different aspects have been emphasized by different theories. For example, drive theorists (e.g., Loewenstein 1994) argued that the uncertainty arising from this information gap can be an unpleasant experience, the reduction of which thus is rewarding. Optimal arousal theorists (e.g., Spielberger & Starr 1994) argued that when this experience involves interest rather than uncertainty, curiosity induction is rewarding. Reflecting on these views, Litman & Jimerson (2004) proposed that individuals experience epistemic curiosity when they perceive to have been deprived of information and wish for the reduction or elimination of their ignorance as well as when they simply enjoy learning new things without particularly experiencing the deficiency of the information. Boekaerts and Pekrun (2015) and Pekrun et al. (2016) also advocate the notion of discrepant information while adding another construct, learner appraisal, as a proximal antecedent. They postulate that students can experience epistemic curiosity when they are engaged in cognitive tasks that are novel and non-routine, which contain unexpected information and cognitive incongruity. They can also experience epistemic curiosity as a result of giving positive appraisals of the cognitive tasks.

Contrary to the extensive theoretical arguments on what can evoke learners’ curiosity (Arnone et al., 2011; Litman, 2005; Shin et al., 2019), empirical investigations into the antecedents of epistemic curiosity are surprisingly scarce. One of few is a study by Rossing (1981) with adult learners enrolled in community courses. His results showed a statistically significant positive correlation between perceived value and epistemic curiosity. This perceived value was also found in a study by Palmer (2018) who investigated curiosity experience among 20 tertiary students enrolled in a teacher education program in Australia. He used interviews and a questionnaire and found that personal interest in the topic, confidence for the subject, perceived value of the subject, liking the teacher, expected enjoyment, expected understanding of the lesson, and expected interestingness of the lesson as factors influencing curiosity. Zhao et al., (2011) investigated the antecedents of curiosity among high school students in China from the self-determination theory perspective using a survey. Their structural equation modeling showed that teacher support, peer encouragement, and self-efficacy had a significant influence on the students’ curiosity in using the Internet.

Curiosity in language learning has been investigated only recently by a handful of studies. In a study by Mahmoodzadeh and Khajavy (2018), antecedents of language learning curiosity, defined as “an affective-cognitive variable specific to language learning which reflects an inquiry-driven interest and desire to learn and use a foreign language” (p. 13) were investigated through a content analysis of the participants’ responses to an open-ended item in the questionnaire. They thematized the findings into three categories; self-related
(e.g., personally curious about learning L2 grammar and vocabulary), teacher-related (e.g., kind, encouraging, motivated, and interesting teachers), and peer-related (e.g., curious about how peers processed L2 and made progress over time). Takkaç-Tulgar (2018) discussed several elements of the learning situation that contributed to curiosity experiences. One of them was the specific learning environment that offered exposure to the target language. She reflected that the participants were exposed to a number of opportunities to observe the ways in which the target language was used both inside and outside the classroom, and this environment raised their curiosity to learn more about the language. Another was the social and cultural characteristics of the target community. She explained that the participants had a great number of opportunities to learn about the social and cultural side of the community while learning the target language, and this became a source for their curiosity to learn more about these context-specific aspects of the target society.

What the above literature highlights is firstly the scarcity of research into epistemic curiosity in language learning despite its great potential benefits indicated in research in education. Secondly, it points to the importance of contextualized approaches to understanding the antecedents of epistemic curiosity. Looking across the studies investigating antecedents of epistemic curiosity (e.g., Takkaç-Tulgar, 2018), we can gain a richer and more comprehensive picture about how and why learners increase curiosity toward certain objects and topics. This suggests the importance of delving into not only the subject of the curiosity (e.g., what learners felt curious about) but also the reasons behind it (e.g., why learners have become curious about the subject). Such insights can be of particular value in creating the type of learning environment that generates learners’ epistemic curiosity. This article aims to contribute to the further understanding of L2 learners’ epistemic curiosity by reporting on a small-scale classroom-based study that investigated the antecedents of epistemic curiosity among Thai university students studying in an English oral communication course. The following research question was addressed:

What antecedents of epistemic curiosity in the L2 classroom do learners report?

Methods

Context and Participants

This study was conducted as part of a two-phased, 15-week practitioner research project to enhance the first author’s students’ boredom regulation through strategy instruction in her English oral communication (EOC) course. The students’ epistemic curiosity experiences were investigated during the first phrase (i.e., from Class 1 through Class 7), for ethical, theoretical, and methodological reasons. By including epistemic curiosity, shown to be associated with positive learning experiences (Eren & Coskun, 2016; Kang et al., 2009; Lauriola et al., 2015), we sought to avoid exclusive discussions on boredom, which may involve negative learning experiences (Pawlak et al., 2020; Zawodniak et al., 2017). Related to this point, we aimed to create an environment where students could talk about both negative and positive aspects of the lessons associated with each emotion. Lastly, based on the literature that epistemic curiosity has the potential to reduce boredom (Berlyne, 1960; Eren & Coskun, 2016; Keller, 1987), we intended to utilize the information about epistemic curi-
osity experiences to provide context-specific, personalized strategy instruction in the second phase\(^1\). For the investigation in this second phase, see Nakamura et al. (2021b).

The students were second-year Thai university students (16 males and nine females) majoring in Computer Science-Multimedia (n = 15) or Engineering (n = 10). Their L2 proficiency was between B1 to B2 on the Common European Framework of Reference based on the mastery skills of the English courses that the students had completed the previous year. The EOC course was structured around the course textbook (Unlock Listening and Speaking Skills Level 4, Cambridge, 2015) and a range of communicative tasks and projects. The class met once a week for three hours.

**Data Collection**

Before embarking on the data collection, we sought to develop a shared understanding of epistemic curiosity. In order to achieve this, in Class 2 the first author held a short session on epistemic curiosity. She first introduced epistemic curiosity, by using the general description, as the drive to know. Next, she illustrated the two dimensions (i.e., interest and deprivation) through visual aids (e.g., online information about popular comic books worldwide). She and her students then agreed that epistemic curiosity is the drive to know which can rise from interest or deprivation of knowledge. This served as a working definition of epistemic curiosity, based on which data were collected.

We used three instruments, a whole-class survey, focus group interview, and teacher record, to recursively collect data and triangulate them. The whole-class questionnaire was used to collect data to generate patterns and salient themes as the antecedents of epistemic curiosity. Focus group interviews were conducted to gain further insights into students’ experiences of epistemic curiosity. The teacher record was used to complement the students’ reports referring to certain task names or textbook units. Each instrument is further described below.

**Whole-class Survey**

In order to elicit students’ epistemic curiosity experiences in the classroom and the reasons behind it, we administered a semi-structured questionnaire four times in Classes 3, 4, 6, and 7 by using Google Forms. At the end of each class, students were asked to think about a time in class when they felt curious and describe the experience by filling in the following blanks:

*In today’s class, I felt curious when ___ because ___ .*

We sought to gain data sufficient enough to be analyzed, and at the same time, we were concerned with the burden on the students continuously responding to the questionnaire after the three-hour class finished. Prior to the project, we had conducted a series of pilot studies and settled on this particular prompt as being both succinct and accurate enough to gain the information we sought. The students were encouraged to use whichever language

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\(^1\) One such example was to show the contrasting experiences reported by students where positive appraisals lead to the experience of epistemic curiosity, accompanied by positive learning experiences, as opposed to where negative appraisals lead to the experience of boredom, resulting in disengagement from the learning opportunity. This example was used when introducing the impact of appraisal and reappraisal strategies for regulating boredom.
(English, Thai) that they felt comfortable with. Except for a few cases, the reports were written in English. Students were also reminded of an option to state that they did not experience epistemic curiosity in class. The first author read the students’ responses every time the questionnaire was returned. Whenever she was uncertain about her understanding of students’ descriptions, she went to talk to students in the following class and asked for clarification or elaboration.

**Focus Group Interview**

The first author conducted focus group interviews with five (three males and two females) of the students who volunteered to participate in the discussions. Three of them were from the mechanical engineering department, and they had known each other for a year. Two of them were from the chemical engineering department, and they had known each other for a year. Five sessions were conducted after class. In the sessions, the first author asked the students to share their epistemic curiosity experiences, namely, when, how, and why they experienced it during the particular class after which the interview was held. The discussions were done in English, with the presence of an interpreter, a native Thai speaker, who offered language support when there was a difficulty in communication.

**Teacher Record**

After class every week, the first author entered detailed information about the class into a teacher record using a Google Doc. The record contained information such as classroom activities, textbook sections, the use of supplemental materials. This information helped to specify and provide further information to the tasks that students mentioned in their students’ epistemic curiosity reports.

**Data Analysis**

A total of 91 responses (hereafter, quotations) were collected from the questionnaire. They were entered into ATLAS.ti Version 8 for Mac, and a modified form of constant comparative analysis (Leech & Onwuegbuzie, 2007) was used to analyze the data. Constant comparative analysis is a qualitative data analysis method that uses data-driven approaches to generate a set of themes by coding and analyzing the data simultaneously. In our analysis, the first author read through the entire data set while retrieving the necessary information from the classroom record when a particular classroom task was mentioned in the report. Next, descriptive coding and in vivo coding (Saldaña, 2009) was used to assign each response with as many codes as possible that represent ideas, elements, and concepts expressed in the quotations. She went through this coding cycle several times and assigned as many codes as possible to each quotation while discussing with the other authors. She also kept analytic memos (Saldaña, 2009) recording code choices and operational definitions; emergent patterns, categories, and themes; possible networks; related existing theories; and related concerns and questions. Next, the three authors discussed possible thematizations of these codes. Using pattern coding (Saldaña, 2009), the first author grouped the codes into themes and constructs, discussed them with the two authors, and made modifications until the three authors reached an agreement on thematization. The memos were also utilized during the
discussions. Code descriptors were then created for a reliability test. Twenty quotations (20% > entire data set) were coded by an applied linguistics researcher who was familiar with coding but not involved in this study. The agreement (Krippendorff’s $\alpha = 0.933$) was above the required value (Krippendorff, 2004). Using the thematic factors emerged from this questionnaire data analysis, the transcripts were read through and coded.

Results

The analysis of the survey data generated seven thematic factors as the antecedents of epistemic curiosity (underlying desire, positive appraisal, peer, cognitive puzzle, novelty, comprehensibility, exploration of the future self) and positive affect linked to it (liking and positive emotions). Table 1 lists the seven factors together with their representative quotations, maintaining students’ original wording. Occasionally, two or more factors were mentioned in one quotation. Thus, frequency counts (i.e., the number of quotations that mentioned the antecedent) as well as the number of students who mentioned the antecedent are reported in the table. Description of the classroom activities and materials mentioned in the quotations is provided in the table notes.

Underlying Desire

The analysis indicated that individual student’s desires, related to either L2 or communication, were the most frequently mentioned antecedent. L2 related desires included improving L2 skills and performing well in class. For example, students reported that they felt curious about what was presented to them in the lessons (e.g., textbook units, videos, PowerPoint slides) because they wanted to gain more L2 knowledge and improve their L2 skills or hoped to use the resources to perform well in class. Communication-related desires included the desire to express and share feelings, opinions, and stories with peers, understand and be understood, as well as choose appropriate responses. Students described, for example, that they were curious about what their conversation partner was telling them because they wanted to respond to the partner and tell their opinions.

Positive Appraisal

The second most frequently discussed factor was learners’ positive appraisal. Students explained that they had become curious about the learning content that they found interesting, useful, and self-relevant. For example, students reported being curious about the information in a video because it was about tips on studying for exams. Students also reported experiencing epistemic curiosity while studying with the textbook because they found the content useful for their subsequent performance, such as useful phrases for debates.

Peer

The third most frequently mentioned factor was peer. It was shown that the contents and the L2 produced by peers generated epistemic curiosity. Students explained that they wanted to know more about their peers, were curious to learn about peers’ ideas of given topics for
| Factor                     | FC* | n** | Representative quotations                                                                                                                                                                                                 |
|----------------------------|-----|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  Underlying desire       | 27  | 21  | I felt curious when I write about my new innovation about using English in daily life because I wanna practice to present in English and use in correct grammar and good accent.     |
| 1-1 L2 related             | 16  | 12  | I felt curious when my friends are saying because I want to know what my friends are saying and be able to express my feeling.                                                                                               |
| 1-2 Communication related | 11  | 9   | I felt curious when I learn about elevator pitch because it very interesting.                                                                                                                                             |
| 2  Positive appraisal      | 16  | 11  | I felt curious when I was doing the speaking task which the topic is Your Dream Job because I have a question with myself. That is “what is my dream job actually?”                                                    |
| 3  Peer Contents           | 13  | 9   | I felt curious when Before/during/after exams activity because I’m curious what my friends are going to present.                                                                                                          |
| 3-1 Contents               | 10  | 7   | I felt curious when another student will speaking because I want to know how to speak fluently in English.                                                                                                               |
| 3-2 L2                     | 3   | 2   | I felt curious when I was watching video about 10 things we should do before exams because the topic is not too difficult and I can understand more than 60%.                                                             |
| 4  Cognitive puzzle        | 9   | 7   | I felt curious when Unlock Unit 3 because I can’t remember how to use the conjunction some words + phase but some words + sentence/phase.                                                                               |
| 5  Novelty                 | 7   | 7   | I felt curious when elevator pitch because it was a new topic to me.                                                                                                                                                     |
| 6  Comprehensibility       | 4   | 4   | I felt curious when I was doing the introduction to the time expression activity discussed above. A speaker in the video talked about what students should and should not do before examinations. |
| 7  Exploration of the future self | 3   | 3   |                                                                                                                                                                                                                       |

Note. FC* = Frequency Counts (i.e., the number of quotations that mentioned the antecedent)  
n** = The number of students who mentioned the antecedent.  
* This activity was to suggest means to improve L2 skills. Students were given preparation time to choose one aspect of L2 learning (speaking, vocabulary, etc.) and present the idea in a way that their classmates would be interested in trying.  
* This activity was to learn about connecting events using time expressions (e.g., before, after). As the last stage of this activity, each student created sentences to describe what they usually do before, during, and after an examination and presented this in a group.  
* This unit introduced how to use adverbs and connectors to describe events in sequence. The class first read the explanations with example sentences. The teacher also added that certain words can only be used with noun phrases while others can be used to connect clauses. The students then completed a fill-in-the-blank exercise in the textbook.  
* This video was played as the introduction to the time expression activity discussed above. A speaker in the video talked about what students should and should not do before examinations.  
* This activity involved talking about dream jobs. Students discussed in pairs what they would like to do after graduating from university.
discussion. Students also reported that they wanted to study why the classmate could speak so fluently and learn from them, such as their word choice and grammar use. In such reports, admiration for peers was often expressed. Students wrote that they wanted to “think like” and “become like” their peers as the reasons for them to become curious about the peers’ output. Other times, students explained that they wanted to know how similar or different their opinions were.

**Cognitive Puzzle**

The fourth factor was a cognitive puzzle, typically evoked from solving problems in the textbook that contained unknown words or newly learned target language features. Students reported that they wanted to figure out how to solve the quizzes in the textbook. Some students more specifically pinpointed that they felt epistemic curiosity when the class was about to check the answers in the quizzes.

**Novelty**

Novelty was identified to have played an important role in the emergence of epistemic curiosity. Students wrote they experienced epistemic curiosity when they were presented with topics, activities, and tasks, because they were new. They described such experiences as “I have never done before” and “it makes me feel excited.”

**Comprehensibility**

Being able to understand given content (e.g., videos, audio, texts) was provided as the reason to want to know more about it. For example, a student wrote that she felt curious while watching a short video clip and explained it was because she was able to understand the speaker’s language. Students also discussed comprehensibility while listening to their peers and their teacher, such as “when I understand what teacher or friends talk” and “understand the vocabulary or conversations.” They further explained that by being able to understand the input, they would know how to respond.

**Exploration of Future Self**

An exploration of uncertain ideas, typically initiated by tasks, was shown to be the antecedent of epistemic curiosity. Students described their epistemic curiosity arising when they

| Positive Affect       | FC* | n**                      | Representative quotations                                                                 |
|----------------------|-----|--------------------------|------------------------------------------------------------------------------------------|
| Positive emotions    | 6   | 6                        | I felt curious when I was debate with friends because I feel excited.                     |
| Liking               | 5   | 5                        | I felt curious when listen the short story and answer the question because I like it      |

*Note. FC* = Frequency Counts (i.e., the number of quotations that mentioned the antecedent)  
*n** = The number of students who mentioned the antecedent.
were asked to think about topics that were relevant to them but that they had not yet formulated clear ideas about, such as their future plans and dream jobs.

**Positive Affect Involved in Epistemic Curiosity Experiences**

It emerged from the analysis that positive affect was frequently expressed in the description of epistemic curiosity experiences. Such affect was composed of positive emotions and liking, as shown in Table 2. Students explained that they experienced epistemic curiosity during classroom activities or while performing tasks because they felt excited, happy, or enjoyment. Similarly, liking a given topic or task was also mentioned as the reason for experiencing epistemic curiosity.

These elements discussed above, except for the factor, exploration of the future-self, also emerged from the analysis of group interview data. Two excerpts are presented here to illustrate how these elements appeared in the students’ discussions. The first one, in Table 3, is from the interview session that took place after Class 7. The students all referred to one of the speaking activities, debate, that they had engaged in the class, and expressed how they experienced epistemic curiosity during this activity.

| Table 3 Focus group interview students’ discussion about their epistemic curiosity during debates |
|---------------------------------------------------------------|-----------------------------|
| Transcript | Emerging factor |
| G: Debate in my class was my favorite. It was fun. Y: Me, too. I felt curious during the debate in the table. | Positive appraisal |
| P: [In the activity] we learned about persuasive language, and we have to debate to each other in the class, so I want to express the beautiful and perfect words to debate. And I don’t have enough knowledge to express. So I searched in the dictionary, not only the meaning of it but I also searched how to use this word in a sentence. | L2 related desire |
| N: For me, I love the debate. My friend besides me, he says everything he thinks about smartphone and talk everything. I love the scene. I love the argument with my friends. Talk together. Oh it’s so much fun. | Positive affect |
| N: I felt curious to know what he said, to agree or what should I say, to persuade. I didn’t do this before. This is my first time to debate in English. It makes me curious. T: I felt curious during debate because I really would like to know what he thinks so much, so I try to listen and feel curious about my friends’ thinking. So all of the debate makes me curious so much. | Peers |
| G: I love to hear other ideas and I love to share my ideas, too. I want to know others’ ideas. And I want to share mine, too. Y: For me the activity made me curious because in our table we have to separate A and B, and I have to debate with other group, so I want to know what they come up with, so that I can debate, so I feel more curious. | Communication-related desire |

*Note.* Alphabets are used as a replacement of the focus group interview students’ nicknames.
The discussion above captures students’ curiosity toward peers’ production, which was generated by their desire to discuss, communicate, and debate with peers. This type of desire also led a student to search for L2 words to use in her speech. Positive affect was also expressed along with the experience of epistemic curiosity.

The second excerpt in Table 4 is from the interview session held after Class 6. Students discussed their epistemic curiosity experiences while watching a video in which a speaker discussed 10 things students should and should not do before the exam.

The discussion above captures the students’ epistemic curiosity toward the video, of which they made positive appraisal for its usefulness, relevance, and novelty. The discussion shows that these positive appraisals were linked to the experience of epistemic curiosity.

**Table 4** Focus group interview students’ discussion about their epistemic curiosity while watching a video

| Transcript | Emerging factor |
|------------|----------------|
| N: The video was fun. Yeah <everyone agrees> | Positive appraisal |
| P: In video it presents many ways that we can learn from it and it’s concise and short. They have good present. | Positive appraisal |
| T: It’s a good presentation right. | |
| Y: For me I like the content of the video because it contains the facts that I never know before and it makes me realize the points that I never think about it before. | Positive affect Novelty |
| T: For me, too. It’s useful for me too because that time is coming to me soon. | Positive appraisal |
| N: It’s like your opinion. I see that’s something I do but the video says we shouldn’t do. | |

Note. Alphabets are used as a replacement of the focus group interview students’ nicknames

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**Discussion**

This small-scale classroom-based study has demonstrated that students experience epistemic curiosity in response to various characteristics of classroom activities and peers, by identifying seven thematic factors as its antecedents. Such antecedents and students’ descriptions of their epistemic curiosity experiences seem to largely reflect extant theories of curiosity and previous empirical work. For example, the finding that students felt curious about learning materials that they appraised positively lends support to claims by Boekaerts and Pekrun (2015) and Pekrun et al. (2016) that students can experience epistemic curiosity when they are engaged in knowledge-generating tasks and that epistemic curiosity can emerge from their positive appraisals of such tasks. Furthermore, this finding is in line with the control-value theory of achievement emotions (Pekrun, 2006; Pekrun et al., 2007), according to which learners’ control and value appraisals about their learning activities and outcomes are the primary antecedents of achievement-related emotions. Although epistemic curiosity is not included in the achievement emotions proposed by Pekrun (2006), this finding indicates that the theory may apply to epistemic curiosity in the L2 classroom learning context. Furthermore, the importance of usefulness and self-relevance in driving curiosity has been recognized in extant theories of curiosity (Dubey & Griffiths, 2020) and been documented in previous empirical work (Dubey et al., 2019; Rossing & Long, 1981). Students’ per-
ceived value as one of the primal antecedents also supports the recent research showing that attribute-specific anticipatory utility determines individuals’ information-seeking behavior (Kobayashi et al., 2019; Sharot & Sunstein, 2020).

The second most frequently mentioned antecedent, peers, seems to resemble I-type epistemic curiosity in the dual dimensions of epistemic curiosity proposed by Litman (Litman, 2005; Litman & Jimerson, 2004). Students explained, as the reasons for becoming curious, that they were interested in learning more about peers’ ideas and L2 use. This finding further corroborates recent empirical work on curiosity that has documented the social nature of curiosity (Dubey et al., 2021; Paranjape et al., 2018). Through cognitive puzzles, typically evoked by textbook exercises, students in this study appeared to have experienced D-type epistemic curiosity. Interestingly however, their experiences seem to differ from the theoretical description of D-type epistemic curiosity, which is viewed as an uncomfortably intense “need-like” state involving unpleasant and aversive feelings of uncertainty (Lauriola et al., 2015, p. 203; Litman 2008; Mussel, 2010). When students discussed their epistemic curiosity experiences in relation to wanting to know the answers in the textbook quizzes, their provided reasons were that they liked or enjoyed learning English, that they were happy to get correct answers, or that they wanted to improve their English skills. In other words, it seems that their being deprived of knowledge was positively characterized by their general interest in and positive feelings toward L2 learning.

The finding that comprehensibility was shown to be one of the antecedents, lends support to the self-determination theory perspective on epistemic curiosity (Zhao et al., 2011), according to which epistemic curiosity can be enhanced by experiencing a sense of competence, i.e., being capable of performing a task. The finding about comprehensibility is also consistent with theories of curiosity that consider the effect of task difficulty on curiosity (Dubey & Griffiths, 2020; Oudeyer et al., 2016) with empirical work showing that learners are more curious about moderately difficult tasks (Geana et al., 2016; Ten et al., 2020).

This study appears to offer new insight into epistemic curiosity in L2 classroom learning, that is, a striking role of individual students’ underlying desires behind the manifestation of their epistemic curiosity. Toward the same object (e.g., a speaker) with which students reported their epistemic curiosity experiences, they discussed varying reasons for becoming curious. Some explained that they wanted to examine how a speaker was able to speak so fluently, while some explained that they wanted to compare their ideas with those of the speaker. Some also elaborated that they wanted to fully understand what the speaker was saying so that they could respond appropriately. This implies that it is not the unexpected information or cognitive incongruity (Boekaerts & Pekrun, 2015; Pekrun et al., 2016) per se that generates students’ epistemic curiosity, but it is the desire that individual students hold for communication and their L2 development that drives them to learn more about what they encounter in the L2 classroom. This further suggests the need to adopt more situated, context-specific approaches to understand ID factors (Ryan, 2020), inducing emotions. Epistemic curiosity is an object-focused emotion, meaning that individuals experience epistemic curiosity to a certain object (i.e., information). At the same time, investigations should not focus merely on the objects; they need to take into account why learners have experienced epistemic curiosity toward the object in the first place if the goal of the research is to inform practice and suggest pedagogical implications to generate epistemic curiosity in the L2 classroom.
Several limitations of this study need to be acknowledged. First, the antecedents were generated from a small number of participants. Although we employed repeated data collection to capture various situations in the L2 classroom, some of the factors can be attributed to the characteristics of the course in which this study was conducted. A bigger sample size or longer data collection period may confirm the findings from this study. It would also be useful to attempt to replicate these findings in another classroom and potentially with another instructor. We also recognize the impact of the first author’s dual teacher-researcher roles in this study. Although we believe that the first author was able to cultivate an open relationship with the students, we recognize the possibility that students’ reports may not be entirely bias-free. We also acknowledge the possible bias on the part of the first author, which may have affected the interpretation of the data, despite various means (e.g., repeated discussions with the other authors, inter-rater reliability checking) taken to question her viewpoints and enhance confirmability of the data interpretation. Despite its limitations, this study offers several pedagogical implications. The antecedents identified in this study indicate a range of approaches to creating learning environments that inspire students’ epistemic curiosity. For example, teachers can provide tasks and topics that students find interesting, relevant, or useful for them, or present content in a way that generates cognitive puzzles. Various communicative tasks that offer students opportunities to share and discuss ideas and learn from each other can be a locus of epistemic curiosity, as indicated by this study. It is also useful to be aware that individual learners’ motivation toward their L2 improvement can play an important role in the emergence of epistemic curiosity. This implies that finding out students’ goal orientations can be a good starting point to create a curiosity-generating classroom.

Conclusions

This study has offered contextualized accounts of how and why L2 learners experience epistemic curiosity in the classroom. The analysis of students’ reports on their epistemic curiosity experiences demonstrated how a range of factors in the L2 classroom such as tasks and peers come into play in the emergence of epistemic curiosity and how individual learners’ desire for communication and L2 improvement fueled their curiosity. While a positive role of epistemic curiosity has been researched in the fields of general education and educational psychology, investigations into epistemic curiosity in L2 learning are scarce. We hope that this study will generate interest in and further explorations of this positive emotion in the field of SLA.

List of Abbreviations

| Abbreviation | Meaning               |
|--------------|-----------------------|
| L2           | Second/foreign language. |
| I-type       | Interest-type.        |
| D-type       | Deprivation-type.     |
| EOC          | English oral communication. |

Authors’ Contributions  This research was designed collaboratively by the three authors. Sachiko Nakamura collected the data and took the leading role in the data analysis, and was a major contributor in writing the
manuscript. Pornapit Darasawang and Hayo Reinders contributed to the data analysis, from the initial coding development to the finalization of the coding. All authors read and approved the final manuscript.

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**Code Availability** NA.

**Declarations**

**Conflicts of Interest/Competing Interests** The authors declare that they have no competing interests.

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