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

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Abstract

Epistemic curiosity is an emotion described as a desire for knowledge. While research in educational fields has increasingly highlighted the important role that epistemic curiosity plays in learning, there is little empirical evidence to help understand this emotion in the L2 learning context. This classroom-based study investigated the antecedents of epistemic curiosity among 25 Thai university students studying 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 six thematic factors as the antecedents of epistemic curiosity, three groups of underlying desires behind its manifestation, and positive affect linked to its experience. It also emerged from the analysis that certain types of classroom activities were associated with epistemic curiosity. 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 L2 learners' epistemic curiosity.

Introduction

In the second/foreign language (L2) classroom, learners experience a wide variety of emotions, ranging from being anxious about presenting their ideas in class to feeling proud of their accomplishments. These emotions—both positive and negative—are suggested to be a driving force behind L2 learning (Dewaele, 2015). However, the field of SLA long limited emotion research to anxiety (and to a much lesser extent, enjoyment). It is only recently that other types of emotions have been given due attention (Authors, Sampson, 2018). On the contrary, the fields of general education and educational psychology have made rapid advancement in this domain of research over the last decade (Linnenbrink, 2007; Pekrun, 2006; Pekrun, Goetz, Titz, & Perry, 2002; Schutz & Pekrun, 2007). A wide range of students' emotions in the educational context has been researched, and their potential advantages and disadvantages in learning have been discussed. One emotion that receives increasing attention for its positive role in learning is epistemic curiosity. 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, Litman, & Spielberger, 2004; Litman, 2005; Litman & Jimerson, 2004; Litman & Spielberger, 2003), Litman (2005, 2008) 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). Accordingly, epistemic curiosity should be distinguished from other types of curiosity such as interpersonal curiosity (Litman & Pezzo, 2007), self-curiosity (Aschieri, Durosini, & Smith, 2018), and social curiosity (Renner, 2006).

Epistemic curiosity, based on contemporary curiosity models, is a multifaceted construct consisting of distinctive yet highly correlated dimensions. Berlyne (1960) initially proposed *diversive* and *specific* dimensions (see, e.g., Berlyne, 1966), which Litman and Spielberger (2003) later found to be highly correlated (.56). A year later Litman and 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, Litman, Mussel, De Santis, Crowson, & Hoffman, 2015, p. 202). Both types of epistemic curiosity have been shown to have positive associations with learning, including school performance (Eren & Coskun, 2016), knowledge acquisition (Rotgans & Schmidt, 2014), self-regulation, (Lauriola et al., 2015), and memory enhancement (Kang, Hsu, Krajbich, Loewenstein, McClure, Wang, & Camerer, 2009). When positive effects of epistemic curiosity have been suggested, a question arises as to what makes students curious.

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 and 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. This conceptualization indicates that L2 classrooms have various opportunities for students to experience epistemic curiosity because learning, whether it be about peers or new linguistic features, often entails seeking and gaining new knowledge.

Contrary to an increasing number of theoretical arguments on what can evoke learners' curiosity (Arnone, Small, Chauncey, & McKenna, 2011; Litman, 2005; Shin, Lee, Lee, & Kim, 2019), empirical investigations into the antecedents of epistemic curiosity are surprisingly scarce. One of few is a study by Zhao, Lu, Wang, and Huang (2011). They investigated the antecedents of curiosity from a self-determination theory perspective and found teacher support and peer influence affected high school students' curiosity in using the Internet. Palmer (2018) found that personal interest in the topic and the interesting elements of the lesson were the main influencing factors of curiosity among tertiary students. This line of inquiry needs pursuing further, particularly in the area of language learning. Furthermore, such inquiry should not merely focus on finding out what triggers learners' epistemic curiosity but also the reasons underlying it: why learners have become curious in the first place. Such insights can be of particular value in creating the type of learning environment that generates learners' epistemic curiosity.

Motivated by the above literature review, 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 in the first of a two-phased 15-week classroom-based project undertaken to enhance learners' boredom regulation through strategy instruction. The project was implemented in an English oral communication (EOC) course and the first author was the course instructor. During the first phase (i.e., from Class 1 through Class 7), the first author asked her students to share their epistemic curiosity experiences in order to utilize the information to provide context-specific, personalized strategy instruction in the second phase (For the investigation in this second phase, see Authors, in preparation). The students were second-year Thai university students (16 males and nine females) majoring 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. Because English was not the first language of the students or the first author, cultivating a mutual understanding of the English term was a crucial first step. In order to achieve this, in Class 2 the first author gave a short presentation on epistemic curiosity using visual aids and discussed with the students about their epistemic curiosity experiences.

We used three instruments, a whole-class survey, focus group interview, and teacher record, to recursively collect data and triangulate them. More specifically, 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 (English, Thai) that they felt comfortable with. Except for a few cases, the reports were written in English. 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, first, the first author went through the entire data set and used *descriptive coding* (Saldaña, 2009) to assign each response with as many codes as possible that represent ideas, elements, and concepts expressed in the quotations. Next, the three authors examined the codes and discussed possible thematizations of these codes. Using *pattern coding* (Saldaña, 2009), the first author grouped the codes into themes and constructs, discussed with the two authors, and made modifications until the three authors reached an agreement on the thematization. Finally, in order to establish reliability, 20 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 $\kappa = .933$) 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 suggested six thematic factors as the antecedents of epistemic curiosity, three groups of underlying desires behind the manifestation of epistemic curiosity, and positive affect linked to the manifestation of epistemic curiosity. It also emerged from the analysis that certain types of classroom activities were frequently mentioned in relation to epistemic curiosity experiences. In this section, therefore, we first present the activities in order to offer a broader picture of the students' epistemic curiosity experiences. Next, we discuss the thematic factors, linking these with the activities. Lastly, we discuss the underlying desires and the positive affect.

Activities associated with experiencing epistemic curiosity

It emerged from the survey data that certain types of activities were frequently mentioned in students' descriptions of epistemic curiosity experiences. Table 1 lists these activities together with their representative quotations, maintaining students' original wording. A short description of the specific tasks mentioned in the quotations are provided in the notes. As shown, the most frequently mentioned activities were oral communication activities. These activities were further categorized into two types. The first of these involved speaking with peers about given topics, sharing stories and ideas, and discussing and debating over given topics. The second type involved listening to peers who were not playing an interlocutor role but speaking to the whole class, such as when giving a presentation. The second most frequently mentioned activities were knowledge-generating activities consisting of teacher talk, lessons introducing new topics, and videos (e.g., YouTube) played to show examples of these topics. Equally frequently mentioned activities were idea-generating activities that instructed students to think about a given topic, such as their own future, hobbies, and course projects. Textbook exercises involving solving problems and completing listening quizzes were also mentioned in relation to the arousal of epistemic curiosity.

Table 1
Four Types of Activities Frequently Mentioned in Relation to Epistemic Curiosity Experiences

Activity type		FC	Representative quotation
1	Speaking activities	36	
	1–1. Exchanging stories, ideas, opinions with peers	29	I felt curious when I debate with my classmate because it challenges me and I want to share my opinions.
	1–2. Listening to peers	7	I felt curious when practicing a pitch ^a because I want to listen what my friends going to talk about. It's fun comparing somebody else's ideas to your own, to see what the others are focusing on.
2	Knowledge-generating activities	16	
	2 – 1. Teacher talk/Lessons	10	I felt curious when I learning about meaning comparison between discussion and debate because I want to know the differently of the word.
	2–2. Videos	6	I felt curious when I watching the elevator pitch video because I want to speak like that.
3	Idea-generating activities	12	I felt curious when we doing the prioritizing stuff ^b I was thinking about myself in the future which is real related to me and I don't really know what I want.
4	Textbook exercises	11	
	4 – 1. Problem solving in the text	8	I felt curious when I answer the question in the textbook correctly because I'm happy if I answer correctly.
	4 – 2. Listening quiz	3	I felt curious when I don't know the meanings of some vocabs in the audio activity ^c because I don't know the meaning and I want to know it for answering the problem and also I can learn new vocabs.
<i>Note.</i> FC = Frequency Counts. i.e., the number of quotations that mentioned antecedent;			
^a In this activity students learned about an elevator pitch, and as the final step, each student created their own pitch about a solution to a problem/challenge about learning English and delivered it in front of their classmates.			
^b This was a task in the textbook where students were given a list of job criteria (e.g., salary, location, office environment) and instructed to rank order them by importance.			
^c This was a listening quiz in the textbook. Students were instructed to listen to a conversation between a college student and career adviser and choose 'true' or 'false' in response to statements about the conversation.			

In the focus group interviews, speaking activities and knowledge-generating activities commonly appeared in the students' discussions about their epistemic curiosity experiences. Students named activities such as debates and video watching as the situations where they experienced epistemic curiosity. We present this further in the proceeding sections, together with the thematic factors identified as curiosity antecedents.

Thematic factors as the antecedents of epistemic curiosity

The analysis indicated seven thematic factors as the antecedents of epistemic curiosity, which are listed in Table 2 with representative quotations. As shown, the most frequently discussed factor was learners' positive appraisal. Students explained that they had become curious about the learning contents that they found interesting, useful, and self-relevant. The second most frequently mentioned factor was peers. It was shown that the contents and the L2 produced by peers generated epistemic curiosity. For example, students reported they felt curious when their classmate was about to give a pitch in front of the class because they wanted to know what ideas would be pitched. In the same situation, some students reported experiencing curiosity because they wanted to study why the classmate could speak so fluently. The third factor was a cognitive puzzle, typically evoked from solving problems in the textbook that contained unknown words or newly learned target language features. Students described 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 was identified to have played an important role in the emergence of epistemic curiosity. Students wrote they felt curious when they were presented with topics, activities, and tasks, and explained that it was because they were new. The fifth factor was comprehensibility. Being able to understand given content (e.g., videos, audio, texts) was provided as the reason to want to know more about it. Lastly, 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 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.

Table 2
Thematic Factors as the Antecedents of Epistemic Curiosity

Factor		FC	Representative quotations
1	Positive appraisal	16	I felt curious when I learn about elevator pitch because it very interesting.
2	Peers	13	
	2 – 1. Contents	10	I felt curious when Before/during/after exams activity ^a because I'm curious what my friends are going to present.
	2–2. L2	3	I felt curious when another student will speaking because I want to know how to speak fluently in English.
3	Cognitive puzzles	9	I felt curious when Unlock unit3 ^b because I can't remember how to use the conjunction some words + phase but some words + sentence/phase.
4	Novelty	7	I felt curious when Elevator pitch because it was a new topic to me.
5	Comprehensibility	4	I felt curious when I was watching video about 10 things we should do before exams ^c because the topic is not too difficult and I can understand more than 60%.
6	Exploration of the future self	3	I felt curious when I was doing the speaking task which the topic is Your Dream Job ^d because I have a question with myself. There is 'what is my dream job?', actually. I don't even know what I want to be.
<i>Note.</i> FC = Frequency Counts. i.e., the number of quotations that mentioned antecedent.			
^a This activity was to learn 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 them in a group.			
^b 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.			
^c 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.			
^d This activity involved talking about dream jobs. Students discussed in pairs what they would like to do after graduating university.			

Underlying desires behind epistemic curiosity

The analysis suggested that there were three groups of desires that manifested themselves within individual students that lead to the emergence of epistemic curiosity, as shown in Table 3. The first was

L2 related desire, further broken down into four categories. The first category was the desire for good performance, such as producing good pronunciation, L2 sentences, and grammar, and performing as well as peers. For example, students described they searched to find out what words or grammar to use in order to write good English sentences. Similarly, students explained that they felt curious about their peers' performance, such as during presentations, because they wanted to perform as well as their peers did. The next category was the desire for L2 related knowledge, and this desire led students to become curious about two types of objects; learning materials and peers' output. Students explained that because they wanted to gain more knowledge, they felt curious when they studied with the textbook and other learning materials such as videos, and the teacher's PowerPoint slides. Similarly, students described that they felt curious about their peers' L2 spoken production because they wanted to understand how the peers were speaking so fluently and learn from them, such as their word choice and grammar use. The third category was the desire for L2 improvement. Students described this desire as the reason for them to become curious when they were presented with activities or learning topics. The last category was peer admiration. Students explained that they wanted to "think like" and "become like" their peers as the reasons for them to become curious about the peers' output. The second group was concerned with communication-related desires. Such desires included the desire to express and share feelings, opinions, and stories with peers, desire to be understood, and the purpose of choosing 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 share their opinions. The last group related to comparison purposes, namely, students wanted to compare themselves, such as their ideas with those of others, and this generated their epistemic curiosity toward the information presented to them. For example, students reported that they were curious about what their peers shared during a debate because they wanted to know how similar or different their opinions were.

Table 3
Underlying Desires Behind the Manifestation of Epistemic Curiosity

	Underlying desires	FC	Representative quotations
1	L2-Related desire	16	
	1–1. Desire for good performance	7	I felt curious when I write and present about my new innovation about use English in daily life ^a because I wanna practice to present in English and use in correct grammar and good accent.
	1–2. Desire for L2 related knowledge	5	I felt curious when I try to create elevator pitch because I have to find the word that I want to use in the sentence and I know some new words.
	1–3. Desire for L2 improvement	3	I felt curious when the class have speaking activity because I want to make new friends and improve my English skill.
	1–4. Peer admiration	3	I felt curious when Debate ^b because I have a chance to listen to my friends' opinions about how they think and how each of them think differently. It helps me to think like them.
2	Communication-related desire	11	I felt curious when I do not know what my friends are saying because I want to know what my friends are saying and be able to express my feeling.
3	Comparison purpose	5	I felt curious when Debate of your choice because I want to know what other people think about the content. Are they think the same with me or not. If they has different opinion, what they are thinking.
<i>Note.</i> FC = Frequency Counts. i.e., the number of quotations that mentioned antecedent.			
^a This activity was to suggest a way 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.			
^b The class focused on learning how to persuade people and use appropriate language for discussions, and students had debates on various topics.			

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 4. 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.

Table 4
Positive Affect Involved in Epistemic Curiosity Experiences

Positive Affect	FC	Representative quotations
Positive emotions	6	I felt curious when I was debate with friends because I feel excited.
Liking	5	I felt curious when listen the short story and answer the question because I like it
<i>Note.</i> FC = Frequency Counts. i.e., the number of quotations that mentioned antecedent.		

These elements discussed above, except for the factor, exploration of the future-self, also emerged from the analysis of group interview data. We use two excerpts to illustrate how these elements appeared in the students' discussions. The first one, in Table 5, 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 5
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.	Positive appraisal
Y: Me, too. I felt curious during the debate in the table.	Desire for good performance
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.	Desire for L2 related knowledge
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 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.	Positive appraisal
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 Communication-related desire
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.	Novelty
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.	Peers Peers Positive affect Communication-related desire Peers Communication-related desire
<i>Note.</i> 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 6 is from the interview session held after Class 6. During that class, students watched a video in which a speaker discussed 10 things students should and should not do before the exam. The teacher played the video to make a link to the subsequent textbook exercise to learn about words to express time and sequence (e.g., before, after, while). She also believed the content could be of

relevance to the students as their midterm examination was approaching. During the interview, students discussed their epistemic curiosity experiences in relation to the video and explained why they felt curious.

Table 6

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
T: For me, too. It’s useful for me too because that time is coming to me soon.	Novelty
N: It’s like your opinion. I see that’s something I do but the video says we shouldn’t do.	Positive appraisal
<i>Note.</i> Alphabets are used as a replacement of the focus group interview students’ nicknames	

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.

Discussion

This small-scale classroom-based study set out to identify the antecedents of epistemic curiosity in L2 classroom learning. To this end, our results show that students experience epistemic curiosity in response to various characteristics of classroom activities and peers and that students’ accounts of their epistemic curiosity experiences largely reflect the theoretical conceptualization of D-type and I-type epistemic curiosity (Litman, 2005; Litman & Jimerson, 2004). For example, the second most frequently mentioned thematic factor, peers, well depicts I-type epistemic curiosity. Students reported that they were curious about peers’ talks because they were interested in their ideas and L2 use. Cognitive puzzles, the third most frequently mentioned thematic factor, resemble the description of D-type epistemic curiosity: Students reported that they wanted to figure out the answers and find out whether their answers were correct. One notable characteristic of the antecedents identified in this study in reference to I/D-type

epistemic curiosity is that students' descriptions of their epistemic curiosity by and large entailed positive experiences. Students described that they wanted to know more about their peers, respond to the ideas that their peers expressed, improve their L2 skills, felt excited, and enjoyed tasks, as the reason for them to become curious. Even when students attributed their epistemic curiosity to the cognitive puzzles given by the textbook exercises, students' descriptions about the deprivation of knowledge and seeking to find out answers did not contain unpleasantness, which are typically the case according to the theoretical descriptions of D-type epistemic curiosity. Instead, such cognitive puzzles described by the students were accompanied by their desire to increase and their L2 knowledge.

Another notable finding is the role of learner appraisal in the experience of epistemic curiosity. Students attributed their epistemic curiosity to positive appraisals of classroom activities, by describing that they felt curious about the activities because they thought they were useful, interesting, and relevant to them. This lends support to the control-value theory of achievement emotions (Pekrun, 2006; Pekrun, Frenzel, Goetz, & Perry, 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.

This study also suggests a striking role of individual students' underlying desires behind the manifestation of their epistemic curiosity. The results showed varying desires held by individual students led to the experience of epistemic curiosity and that these desires were largely characterized by the communicative nature of the L2 classroom learning environment. Students discussed their desire to learn and communicate as the reasons for their epistemic curiosity to have emerged, such as wanting to improve their L2, learn more about and from peers, and communicate better with peers. This finding offers a new insight into the conceptualization of epistemic curiosity: students' desire, whether it is related to L2 learning or communication, can result in becoming curious about what they encounter in the L2 classroom.

Caution must be taken, however, before generalizing these findings. 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. Despite its limitations, this study offers a number of 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.

Conclusion

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.

Abbreviations

L2: Second/foreign language

I-type: Interest-type

D-type: Deprivation-type

EOC: English oral communication

Declarations

Availability of data and materials

The datasets used during the current study are available from the first author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

This research was designed collaboratively by the three authors. SN collected the data and took the leading role in the data analysis, and was a major contributor in writing the manuscript. PD and HR

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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