Electronic Devices as a Resource for Getting 'On-Task' and Deepening Group Knowledge: A Multimodal Conversation Analytic Investigation of a Self-Organized Learning Environment at a UK University

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Abstract

Mitra's concept of Self-Organized Learning Environment (SOLE) has gained worldwide attention after receiving the $1 million TED prize in 2013[1]. In SOLE environments, students interact with each other, often using internet-enabled electronic devices (IEEDs) such as a tablet or laptop, and learn in a collaborative manner with little or no input from the teacher. While there is a growing body of theoretical and perception-based research discussing the affordances of SOLE environments (e.g. Mitra and Dangwal, 2010; Dolan *et al.*, 2013; Mitra, 2014), only very few studies investigate unfolding interactions amongst students in such environments (e.g. Burgess, 2006). Using a Conversation Analytic methodology (CA) with a particular focus on multimodal resources, this study deepens our understandings of the ways IEEDs are utilized by students in a SOLE environment at a British university.

The data collected for this study comprises of 12 hours of video-recorded SOLE sessions where small groups of Chinese Masters' degree students in the UK collaboratively investigate topics related to 'British culture'. In these sessions, students rely on both Chinese (Mandarin) and English and routinely use an IEED. Analysis reveals that students make use of various affordances of the laptop during the SOLE discussion. Firstly, IEEDs are manipulated to help carry out social actions. Students routinely use the device as a resource for ending non-pedagogical activities and getting back on-task. Secondly, the IEED is used as a resource for knowledge to the SOLE topic question. Additionally, though, it presents various challenges. The linguistic and/or topic-related contents presented on the IEED frequently prompts students to display 'unknowing' or 'less knowing' (K-) epistemic positions. Students' claims of K- epistemic positions can trigger the relatively more knowledgeable (K+ epistemic status) student to offer assistance, with them serving as a resource for knowledge to the students with K- epistemic status. In the absence of a participant with 'knowing' (K+) epistemic status, the group can use the relevant contents presented on the IEED screen as a resource to work towards achieving a group understanding.

[1] https://blog.ted.com/a-school-in-the-cloud-sugata-mitra-accepts-the-ted-prize-at-ted2013/

In summary, this thesis argues that without the presence of a teacher, interpreting and internalising information activated by an internet-connected device is a collaborative endeavour, in which participants draw on multimodal resources, including the employment of linguistic and bodily resources, the manipulation of artefacts, the use of technology, and a transition between different spatial realities. These findings add to the body of CA and Multimodal research in SOLE context, as well as the growing body of educational technology-related research and research on the uses of objects in interaction.

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Chapter 1. Introduction

1.1 Introduction

This opening chapter will establish the objectives of this thesis by firstly describing the context of this study in Section 1.2, and offering an overview of the research in Section 1.3. Then, the objectives of this study will be explained in Section 1.4. An outline of the organisation of this study will be provided in Section 1.5.

1.2 Background

In the 1990s, in response to the increasing use of information and communication technology in education, computer-supported collaborative learning (CSCL) emerged as a new field of study (Stahl *et al.*, 2014). Referring to the collaborative learning that is facilitated (e.g., face to face) or mediated (e.g., distance learning) by computers and internet-enabled devices, CSCL research focuses on the interactional meaning-making in groups units, coinciding with other theories that share the similar focus on group interaction and learning theories (e.g., Lave and Wagner, 1991; Scardamalia and Bereiter, 1991). Inspired by constructivist learning theory and CSCL pedagogy (Mitra, 2014; Mitra, 2015), the Self-Organized Learning Environment (SOLE) emerged in the 2000s and draws increasing attention in education research.

A SOLE is a student-centred learning environment where students explore a topic question in small groups with internet-enabled electronic devices (IEEDs). This educational setting is part of the concept of "Minimally Invasive Education (MIE)" where the learning environment minimises the influence of the teacher and promotes learner's autonomy (Mitra, 2004). The idea of MIE and SOLE inspired the writing of Oscar-winning movie 'Slumdog Millionaire' and garnered a great deal of global media coverage (e.g., Economic Times, 2009; Konigsberg, 2013). Mitra's work on SOLEs and him winning the $1 million TED Prize in 2013[2], have been encouraging teachers around the world, to experiment with this unique pedagogy.

[2] https://www.ted.com/participate/ted-prize/prize-winning-wishes/school-in-the-cloud

With the growing practice of SOLEs around the world across different subjects, education research has focused on testing the learning outcomes of students in the SOLE. They have found that there is indeed a significant increase in students' subject knowledge (e.g., Dolan *et al.*, 2013; Mitra and Crawley, 2014), and sometimes language knowledge (e.g., Mitra and Dangwal, 2010), after participating in a SOLE. While these studies offer evidence of the increase in students' learning outcomes, the knowledge of how does students' knowledge increases in the process of participating in a SOLE, or the role of the IEEDs in a SOLE, is still underdeveloped. Despite the fact that SOLEs are an interactional setting, and that the idea behind the design of a SOLE is to provide students opportunity to 'actively construct their knowledge rather than simply absorbing ideas spoken at them by teachers' (Mitra and Rana, 2001, p. 224), there is a scarcity of interaction-based research investigating the interaction of peer-interaction and using the IEEDs in SOLE (e.g. Burgess, 2016).

1.3 Research Overview

This study investigates students' interactional practices with IEEDs in a SOLE when conducting activity shifts and in epistemic search sequences (ESSs). The setting is a series of twelve British culture-related SOLE sessions in a UK university. Participants are Chinese students studying various MA programs, working with one experienced British teacher. This study adopts conversation analysis (CA) as the methodology, in particular, multimodal CA. As the pedagogical goal for students in a SOLE is to come up with an answer to the topic question, the setting of the current study is student-student interaction in an educational setting. The three central aspects of this study; *interacting with objects*, *epistemics*, and *conversation analysis*, will be introduced below.

Interacting with objects is a crucial aspect of this study as this study examines the interactional practices involving IEEDs in students' interaction. The video recordings of the classroom, the screen recording of the IEEDs, and the clear audio capture of participants' talk and other sounds in the environment provide detailed empirical data for this study. Previous research studying objects in interaction has found that objects can be referred to or used in interaction, and participants' interactional practices with an object can structure the ongoing activity (Streeck, Goodwin, and LeBaron, 2011;

Mondada, 2014; Hazel, Mortensen and Rasmussen, 2014). While these studies grounded the critical themes of objects' affordances in interaction, such research calls for more attention on interacting with technological objects (Streeck, 1996; Heath and Luff, 2000; Nevile *et al.*, 2014). Similarly, while previous research on objects has conducted in various settings in everyday life and institutional settings, only a small proportion of this has focused on the use of IEEDs in student-student interaction (Jakonen, 2015; Jakonen and Morten, 2015; Engeness and Edwards, 2017). Among these, even fewer studies have mentioned the constraints of technological objects and their impact on these interactions (Çakır *et al.*, 2009; Bierema *et al.*, 2017).

Epistemics is essential to consider in this study as this study also investigates IEEDs in relation to students' knowledge, which is displayed and demonstrated through their interaction. Comparing to other sociological theories of knowledge, Heritage (2012c; 2012a; 2012b) takes a CA approach to social interaction and argues that an epistemic imbalance among interlocutors is the drive for conversation. He claims that one participant's indication of lack of knowledge in the conversation may suggest information imbalance among participants, and this drives the sequence forward until epistemic equilibrium is achieved. Within a growing amount of research building on Heritage's notion on epistemics in interaction, Jakonen and Morton (2015) codified a type of sequence and named it as epistemic search sequence (ESS). The ESS aims to search for epistemic issue(s) and is initiated by an information request (IR) in students' group interaction when working on pedagogical tasks with task sheets. Despite this, knowledge of ESS is rather underdeveloped in terms of the different actions performed through sequence initiation (besides IR) and other objects' (e.g., IEED) role in ESS.

The present study addresses the above gaps in the research by focusing on the interactional practices involving the IEEDs and taking its research setting in the underdeveloped student-student interaction in the educational context. An introduction to the methodology chosen for this study is introduced below.

This study analyses the aspects of the students' interaction by using *conversation analysis* (CA) with a focus on *multimodality* as research methodology. CA in itself is a theory of interaction and at the same time can be used as a methodological tool for studying social interaction. Based on Garfinkel's (1967) ethnomethodology framework, CA as a methodology studies the structural organisation of social interaction (Schegloff and Sacks, 1973; Sacks *et al.*, 1974; Schegloff 1979). Taking a 'radically emic

perspective' (Kasper, 2006, p. 84), CA studies the interaction from participants' perspectives by examining the ways participants orient to their talk and each other through interaction. With the development of technology, audio-visual recordings have been able to capture more modes of interactional practice than talk. These include, but are not limited to, body movement and manipulation of objects. The amount of multimodal CA studies has significantly increased. *Multimodal analysis* (e.g., Streeck *et al.*, 2011; Mondada, 2012; Nevile, 2015) under CA principles has become a powerful tool and a more standard practice for studying interaction, as its rich data enables researchers' better-informed understanding on participants' multimodal interaction from participants' perspective. With CA methodology and multimodal analysis, the present study analyses students' interactional practices, i.e. talk and embodied actions with the IEED, to analysis the actions conducted and the sequential organisation of students' use of IEEDs and in ESS in SOLE.

1.4 Research Objectives and Relevance of This Study

The primary aim of this study is to examine the affordances and constraints of the IEEDs, as well as the ways in which students make IEEDs relevant in their peer-interaction in the SOLE settings. More specifically, this study examines the interaction taking place in students' small-group discussions with a particular focus on the first instances in the session in which students use the IEEDs and also on students' interactional practices involving the IEEDs in the epistemic search sequences. When applying standard CA practice, research questions emerge through the research process (Ten Have, 2007). The phenomena and patterns in interaction emerge through data analysis and become the focus of the investigation, and only then will the research question be addressed through the data analysis (see discussion on data analysis in Section 3.5).

This study examines the interaction taking place in SOLE group discussion. Using CA as the research methodology, the naturally occurring interaction among students, including talk, embodied actions with IEEDs and other interactional resources are collected for this study. This study adds to the growing body of SOLE research taking an emic interactional-based approach. As discussed in the previous sections, despite being an interactional setting, there is a severe imbalance between the growing practices

and the interactional-based research on SOLE. This study contributes to SOLE research, particularly in how students in SOLEs use IEEDs in relation to the pedagogical task and their displays and claims of knowledge in a SOLE.

Additionally, this study contributes to research concerning CA and multimodal analysis by examining the interactional practices of students using IEEDs in small-group peer-interaction. As stated above, the lack of research on student-student interaction involving technology necessitates further investigation into technological objects' affordances and constraints in student-student interactions. By analysing the interaction where participants first use the IEEDs in their discussion, this study contributes to the knowledge of action formation and sequential organization of using IEEDs in student-student interaction. In addition, there is an imbalance between the growing practice of CSCL and student-centred pedagogies and multimodal studies that investigate the epistemic-related sequences with the use of technology among students. By examining the ESSs that involve students' embodied actions with IEEDs, this study addresses this research gap and contributes to the understanding of the IEED's constraints and affordances in interaction regarding the epistemics.

In consideration of the research setting of SOLE and the previous CA research on interacting with objects and epistemics in interaction, this study adds to the knowledge of how IEEDs can be involved in interaction and structure the ongoing interaction in the growing body of CSCL and student-centred educational settings.

1.5 Thesis Organisation

This section provides an overview of the chapters of this thesis. Chapter 2 reviews the research literature relevant to the study, under three main themes: SOLEs, interacting with objects, and epistemics in interaction. It also introduces CA, particularly multimodal CA, as the methodological tool for studying these themes. It gives a detailed review of relevant findings from the previous research and identifies the research gap. Chapter 3 explains the research methodology of this study, including the research design, data collection, ethics, data transcription and analysis procedures.

Chapters 4, 5 and 6 will present the conversation analysis of the objectives of this study. Chapter 4 focuses on the analysis of participants' first use of IEEDs in their discussion in SOLE. Analysis of these occasions shows that participants use verbal

and/or embodied actions with IEEDs for activity shifts in interaction, particularly for getting on-task from the off-task activities, and also when obtaining information about something they cannot resolve through talk alone. Chapters 5 and 6 examine the ESSs triggered by participants' claims of lack of knowledge about the information displayed on the screen. Chapter 5 examines the ESSs with responses from a more knowledgeable participant. It argues that participants' claims of insufficient knowledge can trigger participants' claims of insufficient knowledge and prompt help from more knowledgeable participants. Chapter 6 examines the ESSs in the absence of a knowing participant. The findings reveal that while other aspects of information on the IEED screen can serve as a resource for students' knowledge on the epistemic issue and to collectively achieve the group understanding, whether or not to use this opportunity depends on the students.

Chapter 7 discusses how the analytic findings of Chapter 4, 5, and 6 relate to the relevant existing research literature. Additionally, the overall findings are further considered with regards to the IEEDs' affordances and constraints in interaction, and also IEEDs and epistemics in student-student interaction. Finally, Chapter 7 concludes with a summary of the findings, the contributions this research makes to various research communities, and recommendations for future research.

Chapter 2. Literature Review

2.1 Introduction

This study contributes to the body of research reviewed below that seeks to understand interactions in which participants use technology in a learning environment without an institutionally-designated teacher. This study also adds to multimodal and conversation analytic studies that investigate technology-in-interaction and epistemics in group interaction. In this chapter, the research literature on the pedagogy known as the 'Self-Organized Learning Environment' (SOLE) is reviewed in Section 2.2. Interactional studies in educational settings, Conversation Analysis (CA) studies within this scope of the study are reviewed in Section 2.3. In line with the two major themes of this study, objects and epistemics, research on the interactional use of objects is reviewed in Section 2.4, and the interactional practices relating to participants' epistemics are reviewed in Section 2.5. Finally, the small number of studies focusing on IEEDs and their interactional features regarding epistemics are identified. The research gap is discussed in Section 2.6. A summary of this chapter is presented in Section 2.7.

2.2 Self-Organized Learning Environment (SOLE)

In recent years, widespread technological innovation has significantly impacted on educational practice. For instance, as studies continue to uncover the ways students' learning can be facilitated by computers (Bloomfield *et al.*, 2010; Ecalle *et al.*, 2013; De Witte *et al.*, 2015; Lai *et al.*, 2015), computer-assisted learning in classrooms has been widely promoted by governments and stakeholders in many countries. There is also a trend in adopting various forms of online learning and blended learning in institutions. An increasing number of courses are designed to be delivered entirely online, or to have both online and face-to-face components. Studies suggest that these designs offer new opportunities to learn when compared to traditional co-present face-to-face settings (McCutcheon *et al.*, 2015; Harasim, 2017; Stephenson, 2018). Outside the classroom, other types of educational technology is designed to promote students' learning. For instance, studies show that educational games and online group work can support

students' learning with peers and at home (Curtis and Lawson, 2001; Squire and Jenkins, 2003; Gros, 2007; Smith *et al.*, 2011).

In general, the body of research on educational technology is growing, particularly with regards to measuring students' learning outcomes after using this technology. However, the interactional processes involved in students' use of technology in educational contexts receives much less attention. For instance, the ways in which students use educational technology such as laptops or tablets in a pedagogical task, is underexplored. This study will focus on a Self-Organised Learning Environment (SOLE), to address the underexplored interactional process of students undertaking pedagogical tasks involving laptops and tablets. The following paragraphs will introduce SOLE with a detailed review of the existing literature.

A Self-Organising Learning Environment (SOLE) is an educational environment that is minimally supervised by the teacher, where students with access to the internet and technological devices explore a "big question" (Mitra and Dangwal, 2010; Mitra, 2012). Teachers' intervention in a SOLE is kept minimal namely, the teacher only gives a minimal introduction to the topic question before students' collaborative learning, and the teacher will not intervene or even leave the classroom when students get in groups and learn collaboratively with the technology.

The idea of SOLE is developed from Mitra's 'Hole-in-the-Wall (HiWEL)' experiment[3] (Mitra 2006a, 2006b), which was designed to promote equality of education in areas of India affected by poverty. The HiWEL experiment was designed to investigate how much children living in poor and remote areas can teach themselves and understand the use of technology with minimal teacher intervention when working in groups and given access to the internet.

The HiWEL experiments were first conducted in Kalkaji, a poor and remote area in India in January 1999, where researchers observed and used notes and video clips to document that process. Later, the experiment was replicated in four more locations in India, with different socio-economic and geographic locations, some with enhanced documentation process for the experiments, for example, interviews and machine log files for experiments undertaken in Sindhudurg. Researchers observed the process of

[3] Conceived experiment presented at annual conference of the All India Association for Education Research in 1988. Experiments conducted from 1999 to 2005, under the Hole in the Wall Education Limited (HiWEL), a joint venture company set up by an International Finance Corporation funded project in collaboration with NUT Limited.

discovery and peer tutoring among children and their development in computer literacy as well as English language (Mitra and Rana, 2001; Mitra, 2003). It was found that 'English is not a barrier' for Indian children in their peer learning and development in computer literacy (Mitra, 2003, p. 369). Although observation and interview are unobstructive ways of collecting data, these qualitative methods have two limitations. Firstly, the analysis is sensitive to the researchers, and the data collected from interviewees (parents and teachers) provide their own perspectives on what happens in the process, not necessarily the reality (Van Lier, 1988; Jorgensen, 2015). This means that the research is conducted from an *etic* approach, in which researchers study children's behaviour from outside the HiWEL as outsiders (Pike, 1967). Secondly, the researcher and the video equipment were only able to capture part of the process due to availability and technical constraints (Queirós *et al.*, 2017).

With further funding, a new HiWEL experiment was undertaken in 26 locations with over 100 computers and used by an estimated 40,000 children. This new qualitative experiment was conducted over nine months, and the test result of the children's' computer literacy raised 40% at the end of the experiment. Mitra (2004, p. 5) concluded this result as having 'proof of self-regulated learning' and decided to call this method 'Minimally Invasive Education (MIE)'. Mitra and Dangwal (2010) found that Tamil-speaking village children (Kalikippam, India) can gain knowledge of molecular biology through English language materials without an instructor and can achieve similar test scores to children studying in local state schools. In addition, with the encouragement of a friendly adult mediator who has no subject knowledge, these village children studying on HiWEL kiosks can achieve a similar average test score to privileged private urban schoolchildren in New Delhi, where the children can speak fluent English and are taught by qualified subject teachers. Similarly, Dangwal *et al.* (2014) find that in addition to formal schooling, HiWEL pedagogy can help students perform better in mathematics and English at primary schools in rural India. The test scores in the above studies of HiWEL experiments prove Mitra's theory that unsupervised learning can take place at these HiWEL kiosks, yet how these developments are made and whether they are 'self-regulated' cannot be concluded from the experiment with these tests (Atieno, 2009).

Building on the HiWEL findings and Mitra's proposal of a reconceptualised education system, MIE and SOLE emerged out of Mitra's hypothesis of whether the

unsupervised learning environment found at HiWEL kiosks could be replicated inside the traditional classroom. The key elements to building a SOLE are an interesting question from the teacher, devices with an internet connection, and groups of students (Mitra *et al.*, 2008). To conduct a SOLE requires:

1) The teacher provides students with a question to explore for the class;
2) The students work in groups with internet-connected devices;
3) The students present their answers to the question. (Mitra, 2014)

It is worth noting that the teacher does not guide or interfere with the students after giving the question, as this gives the students space to self-organise and answer the question themselves. Although the 'teacherless' feature of SOLE has raised doubts and provoked debates about whether the teacher's role can be replaced in education (see discussion at the end of this section), the idea behind this is not to replace the teacher but to answer the bigger research question – what can children learn by themselves (Mitra, 2015).

With the emerging practice of this new pedagogy, researchers and educators are drawn to one particularly interesting feature of the SOLE - the learning outcomes in SOLE studies. Similar to children in India achieving a much higher computer literacy or academic performance after studying in original HiWEL pedagogies, Year 4 pupils in England can learn knowledge that is usually taught in higher educational stages. They are able to study school-leaving exam questions (normally taken at Year 12) in SOLE, with subjects like physics and biology (Dolan *et al.*, 2013; Mitra and Crawley, 2014).

This said, learning, at the centre of SOLE pedagogy, has an underdeveloped definition in Mitra's work. In the early work of HiWEL experiments, Mitra and Rana (2001, p. 224) take a constructivist view and describe that children as 'actively construct their knowledge rather than simply absorbing ideas spoken at them by teachers'. That is, learning is a *process* of constructing knowledge, as knowledge is constructed, and learning is a process of construction (Collins *et al.*, 1989; Savery and Duffy, 1995). In his later work, however, Mitra (2012) views students' learning as an 'emergence', an *outcome* of students' experience in the self-organising system (pp. 25-32). The self-organising system, originating from chaos theory in physics, is then adapted in the philosophical underpinning for SOLE (Mitra, 2014; Mitra and Crawley, 2014). Viewing learning as an outcome from students' self-organising system, SOLE encourages the 'edge of chaos' effect, which is defined as 'neither strictly ordered nor totally chaotic',

where a student 'seems to create and maximise meaning out of the information content of what they are researching' (Mitra, 2014, p. 556). While Mitra's (2008) study found that Tamil speaking learners' knowledge of English can be promoted after their 'self-organized learning', Dellar (2014) argues that a great deal more reinforcement and practice are needed to allow learners to make advanced linguistic development. This also brings us to the discussion of the under-developed definition of learning in much SOLE research to date (see also Section 2.5.1). In terms of the 'emergence' learning outcome, Topping (2005) argues that 'collaborative learning can result in the blind leading the blind or pooling ignorance or one person doing all the work' and 'structure' is suggested to reinforce the learning objectives learnt in SOLE experiments (pp. 632-633).

The above different views of learning, as the process and the outcome, are in contradiction with each other in some aspects. On top of this, the under-developed philosophical conceptualisation of SOLE (constructivism and self-organised system), have led to some limitations in the existing studies of SOLE. Firstly, although the experiments and quasi-experiments' data regarding test results suggest very good learning outcomes following the SOLE sessions, Dangwal *et al.* (2014) argue that researchers still need a larger sample across more locations to obtain truly conclusive results. Secondly, Mitra (2012, pp. 22-25) admits the difficulty of finding a suitable test for measuring students' 'deep learning' in his studies. Mitra (ibid) describes 'deep learning' as when the 'learner analyses new information and links it to what he or she already knows with the goal of long-term retention and understanding'. Thirdly, Mitra (2012) asks 'How do these devices affect, and even improve, how we absorb information?' in the introduction of his book '*Beyond the Hole in the Wall: Discover the Power of Self-Organized Learning*', yet little information on the potential ways devices such as computer can affect the absorbing of information can be found in this book or other SOLE studies. Finally, while findings of the quasi-experiments with pre- and post-tests suggests great potential for certain aspects of learning outcomes in SOLE, such as group reading performance and language learning (also supported by teacher and parents' observation), but little evidence of how students improve their performance has been provided by these studies.

Critiques and questions from other literature also call for further investigation into SOLEs. For instance, there are some doubts about the claim that students effectively

work together and learn when experiencing learner autonomy in SOLE sessions, as studies find that unsupervised environments are likely to result in a lower completion rate (Ho *et al.*, 2014; Jordan, 2014). In addition, during the process of undertaking the SOLE task, the absence of the teacher can result in lack of instruction, facilitation, and evaluation, even social exclusion and isolation (Arora, 2005; Sowey, 2013; Harmer, 2014). Finally, apart from the under-studied "deep learning" mentioned in Mitra's (2012) own work, researchers like Burgess (2016, p. 29) have pointed out that the possible 'shallow learning' in SOLE and HiWEL pedagogies has been overlooked. He argues that there needs to be more clarification on SOLE's perspective on learning, whether learning is seen as a process or a product. Although existing studies demonstrated the quantitative knowledge increase in SOLE students, the extent to which students understand the knowledge gained from a SOLE is still unclear.

Thus, with most of the previous research focused on learning outcomes from SOLE, further research is needed to provide deeper insights into the learning process occurring in SOLE sessions. In particular, an investigation is necessary into the ways in which students interact with each other using technological tools with an internet connection, and when and how they acquire knowledge in SOLE session. Essentially, SOLE involves students' interaction among themselves and with the technology during learning, but experimental or quantitative designs can only provide limited help in studying interaction. Therefore, a research methodology that investigates interaction should be employed.

2.3 Conversation Analysis (CA) for educational settings

This section introduces CA as an alternative approach to studying SOLE, when compared to the vast number of studies using experimental and quantitative methods reviewed in the previous section. It will start with a general introduction of CA and its application in an educational context (Section 2.3.1). Then, multimodal approaches to CA and its key principles will be discussed (Section 2.3.2).

2.3.1 *CA for educational settings*

Different from many linguistics views on language that human beings have an innate ability to understand the abstract rules of language and thus enable communication, Conversation Analysis (CA) is a study that treats talk-in-interaction as a fundamental social domain, which can be studied as a discipline in its own right (Goffman, 1983; Heritage, 2009). Rejecting Chomsky's claim that talk is too chaotic to analyse (1965), CA practitioners view the interaction as 'systemic and highly organised' (Sacks *et al.*, 1974) and having a 'massive order and regularity' (Heritage, 2009, p. 303). Therefore, although interaction can be studied in and of itself, CA is widely used to inform practice and theory across educational settings such as second language classrooms (Seedhouse, 2004).

In contrast to the etic perspective employed in most teaching/learning studies, ethnomethodological CA (EMCA) takes an *emic*, participant-based, perspective (Goodwin, 1984; Heritage, 1995; Ten Have, 2007) on what teachers and students make relevant knowledge to inform teacher practice and learning (Seedhouse, 2004a; Wooffitt, 2005). Originating from ethnomethodology, a discipline that views social practices and procedures as situated and context-bound (Garfinkel, 1967), CA's main objective is to study the order and organisation of particpants' social actions in interaction (Psathas, 1995). From this perspective, social actions are accomplished through participants' situated practices and the same practice can also be deployed to perform different social actions (Schegloff, 1997). To study the participants' locally-managed social actions, CA establishes an emic perspective by using recordings of naturally-occurring talk as the data source, and uses micro-analytic tools to examine sequential organisation and turns-at-talk within the interactions. (Sacks *et al.*, 1974; Seedhouse, 2005; Schegloff, 2007).

Many interaction-based studies of these settings are teaching-focused, aiming to inform the teacher's classroom practices to promote learning (r.g., Koshil, 2002; Macbeth, 2004), as teaching and learning are the two fundamental aspects of the majority of classroom settings. For example, Koschmann (2013) discusses teachers' instructional talk and its effects in the classroom. Forrester and Pike (1998) study the learning process by analysing teaching instructions and students' understanding of mathematics classroom interaction. CA has also informed Second Language

Acquisition (CA for SLA) studies and been used to examine the learning process of language learning (Firth and Wagner, 1997). For example, studies have found that IRF (Initiation-Repair-Feedback) structure in teacher-student classroom interactions are commonly applied in L2 vocabulary or grammar learning (e.g. Kasper, 2006; Gardner, 2013; Waring, 2008), as it provides empirical insight into which interactional resources are used for in the process of the teacher eliciting answers from students, students displaying understanding to teachers, and teachers enabling a better understanding of a teacher-designed learning objective (Koshik, 2002; Seedhouse, 2004b; Macbeth, 2011).

Reflecting the changes from teacher-fronted classrooms to teaching pedagogies with a more leaner-centred, task-oriented perspective, a growing body of CA studies of student-student interaction has been emerging in recent decades (Gardner, 2013). Mori (2004) studies the sequential organisation of pair work in the L2 classroom and how students shift their activity within the pedagogical task itself and the problems (i.e. lexical and phonological knowledge) arising in the course of completing the task. Hauser (2009) focuses on how students collaboratively orient to and manage the primary speakership, and he finds that there is usually only one primary speaker at a time in students' discussion. Besides the sequential organisation of group interaction, CA research has also been investigating other norms in student-student interaction, to better understand what students do in these settings. For instance, Olsher (2004) looks at how students use embodied resources to complete their utterances in interaction in L2 classroom group discussion. Markee (2005) finds empirical evidence of students producing off-task talk in group discussions, and the analysis of these sequences suggests that it is difficult for these participants to keep doing off-task activities while other participants in the classroom are on-task.

The growing body of CA research on student-student interaction provides more detail about what students actually do and how their interactions unfold in classroom settings. Nonetheless, the number of these studies is far outnumbered by teacher-focused research. As Seedhouse (2004b) argues, the interactional characteristics, especially in terms of turn-taking and sequence organisation, of classroom interaction vary when the pedagogy focus or the educational settings various. The existing CA research on classroom interactions and other educational settings sheds light on the empirical and emic perspectives of student-student interaction. The current CA-informed SOLE study will contribute to the study of SOLE regarding both the pedagogy

and educational setting. It will also contribute to the body of CA research with the systematics of student-students interactions in this particular learning environment, without the teacher's physical presence.

2.3.2 ***Multimodal CA***

The term 'Conversation Analysis' does not fully encapsulate the various aspects of interaction that CA is able to investigate. Besides conversation, all forms of spoken interaction and other non-spoken forms of interaction can be the objects of analysis in CA (Schegloff, 1984; Sacks and Schegloff, 2002). Since the 1970s, CA's body of research has been developed from spoken interaction to a wider scope including other conduct during social interactions, such as gestures, body movements, and manipulation of objects (Schegloff, 2007). This was made simpler with the development of video recording technology. Within the CA framework, the term *multimodality* is used to refer to 'the various resources mobilised by participants for organising their action' (Mondada, 2016, p. 338) and *multimodal CA* addresses the inclusion and focus of the study of multimodality in interaction based on the principles of CA.

Within multimodality, the embodied conduct with involvement of participants' body, are referred to particularly as e*mbodiment* (Streeck *et al.*, 2011; Nevile, 2015). The categories of multimodality and embodiment are not necessary but indicate their different focus of what is relevant to the co-construction of meaning, in comparison with the interactional resources in linguistics and verbal forms, as human interaction involves more than just talk and is 'fundamentally embodied' (Hazel *et al.*, 2014, p. 3). In the present study, the terms of embodiment and multimodality are used with a different focus on the types of interactional resources that participants use (Heath and Luff, 2000; Luff *et al.*, 2014). Embodiment and its related terms such as embodied actions are used to describe participants' interactional practices of non-verbal and embodied resources such as facial expressions and movements of the body. Multimodality and its related terms are used when refer to a wider range of interactional resources that participants' use, not only just participants' embodied resources but also other material resources such as physical and technological objects (e.g., pens, IEEDs).

As discussed above, the multimodal CA adopted in the present study heavily draws on and adds to traditional CA research. The following paragraphs will discuss the

key methodological and theoretical underpinnings of multimodal analysis, in relation to its relationship with CA.

Firstly, in terms of sequentiality, multimodal analysis reveals the various modes of interactional resources used by the participants, in the form of verbal and non-verbal actions. As a result, multimodal transcriptions with multi-layered interactional details may seem more complex compared to talk-focused transcriptions. Yet, the plurality of 'modality' in this term treats these resources as constructively intertwined and without *a priori* hierarchy (Mondada, 2014). That is, the ways in which participants perform social actions through the sequential organisation of multimodal turns are found through the microanalysis of these granular multimodal data, where turn-construction is informed by not only participants' verbal activities but also the mutual recognition of multimodal activities (Goodwin, 1980).

Secondly, in terms of data presentation and analysis, multimodal transcription presents rich data and this affects the analysis when compared to the transcription and analysis of talk-only data (Knoblauch *et al.*, 2006; Hindmarsh and Heath, 2007; Mondada, 2008). In particular, the researcher needs to carefully select the captured interactional resources from the rich video-recorded data, depending on which ones are made relevant by the participants in the interaction in relation to the phenomena being studied (Mondada, 2007). This, in turn, provides a fuller record of the scene in which the interaction takes place and enables the researcher to obtain a better understanding of the multimodal phenomena, for example coordination of the body and talk (Mondada, 2009). Further, with a fuller body of interactional resources captured in the data, the analysis and findings may differ from the ones conducted on conversation-based data. More discussion of multimodal data collection and analysis in relation to the present study is presented in Sections 3.3 to 3.5.

Thirdly, in terms of the proof procedure (Sacks *et al.*, 1974), the multimodality recorded in video data can potentially contribute to analysts' understanding of participants' understanding. This is because participants sometimes use embodied resources to display their coordination of other's turn or to project and advance their own activities (Goodwin, 2003; Heath and Luff, 1992; Streeck and Jordan, 2009).

Finally, in terms of the adaptations of CA within a multimodal framework, it is argued that while multimodal interactional practices can be designed as a turn or part of the sequence organisation, they are also sensitive to the specific context of the

interaction (e.g. Goodwin, 2007; Mondada, 2009; Mondada, 2013). This is only revealed through the analysis of multimodalities in interaction, such as participants' embodied actions and the affordances and constraints of the objects in the interaction, which are not available in audio-only data. By applying the micro-analytic principles of CA in examining the video-captured detailed multimodal data, multimodal analysis studies enable the researchers to closely examine participants' situated use of multimodal interactional resources in performing social actions and sequence organizations in interaction. These would be largely unavailable to discover by analysing the spoken interaction alone.

In summary, as Deppermann (2013) and Mondada (2014) both argue, a multimodal perspective, with the detailed inspection of relevant multimodality in interactions, helps CA researchers to uncover how meaning is co-constructed by participants in a situated and indexical way with multiple resources alongside spoken utterances.

2.4 Objects in Interaction

In many classroom settings, students have access to various objects, such as textbooks and handouts, among others. In SOLE classroom settings, students use computers with internet access, and it is computers that Mitra argues provide students with interactional affordances for collaborative learning (Mitra, 2003; Mitra, 2005; Mitra, 2012). However, there is little understanding of how students systematically use computers during SOLE sessions. As the devices with internet access used in SOLE can be in different forms (i.e. computer, laptop, tablets), this study will use the abbreviation Internet-Enabled Electronic Devices (IEEDs) in referring to these devices.

The review below concerns research on the various uses of objects in interaction. Section 2.4.1 gives a broad review of studies on objects in interaction. Section 2.4.2 will review the concept of affordances and studies looking at affordances of various objects, including technological objects such as IEEDs. Section 2.4.3 will focus on the interactional research of objects used in educational settings. It will conclude that with the increasing focus on embodied actions with objects and the objects' affordances in interactional studies, more empirical studies are needed to contribute to the knowledge

of technological objects' use in student-student interaction in the educational environment.

2.4.1 *Interaction and Objects*

With the development of video recording technology, the numbers of CA studies investigating talk and other modes of interaction has increased dramatically (Mondada, 2008; Li, 2014b). Termed 'multimodal analysis', this recent focus in CA studies includes vocal interactions as well as other modes of interaction such as body movement, gaze, and the surrounding artefacts when they are made relevant in the interaction (e.g. Mondada, 2014, 2016 and 2018; Hazel, Mortensen and Rasmussen, 2014). As Mortensen (2012, p. 5) describes, artefacts and surrounding objects are made relevant as 'tools' in the interaction. That is, they serve as interactional resources when being included and used in the interaction, and structure the ongoing activity alongside the progression of talk. Although CA studies start with the 'primordial site of sociality: interaction between persons' (Schegloff, 1987, p. 208), multimodal CA studies looking into participants interacting with objects will provide a fuller scope of understanding of social interaction. These studies can provide additional information regarding how participants include and use objects in an interaction, and how these interactions with objects structure the ongoing activity.

Interaction-based studies have found two occasions of objects being made relevant in interaction the first is when objects are being referred to in the interaction and the second is when they are being used as a resource to construct the social action in the interaction. When objects are being referred to in the interaction, participants can mobilise multi-resources such as gaze, pointing and language for joint attention (Schegloff, 1984; Kendon, 2004). For instance, De Stefani (2014) finds that when shopping together, one participant may employ embodied resources like touching and lifting to guide other participants' attention when verbally referring to commercial objects. Mondada and Sorjonen (2016) find that the buyer and seller in a convenience store co-coordinate their verbal and embodied (e.g. pointing) conduct, or both, to request or sell products. Sakai *et al.* (2014) find that in a pipe configuration interaction, a map of piping design is being pointed to and touched on assisting participants' shared recognition of objects before physical work. Goodwin (2007) proposed an 'embodied

participation framework', in which a parent and the daughter create an organised environment that presupposes the use of paper, talk and gestures as the relevant forms and resources to create a shared focus when discussing a problem occurring in homework. Goodwin (ibid) also analyses how the daughter can refuse to align with this shared focus by using a posture to exclude herself from the visual access of the paper.

Indeed, apart from being referred to in actions, objects can also be employed as a resource for action within the interaction. For instance, Richardson and Stokoe (2014) study the semiotic resources of tables and their physical locations, which are employed in customer-bartender interactions to co-construct the action of ordering at the bar. Ticca and Traverso (2017) found that at social centres in France, interpreters can manage overlapping activities such as looking for information in documents alongside their professional interpretation work of assisting migrants. Schmidt (2018) finds that participants in theatre rehearsals place objects to project and prepare the next action and create time-enduring structures in interaction for the preparation of subsequent actions. Glenn and LeBaron (2011) find that by interacting with objects such as appraisal forms, participants can display their current cognitive activities like assessing information and triggering talk. In addition, several studies such as Deppermann *et al.* (2010) and Mondada (2015) argue that manipulation of objects is received as a symbolic act by other participants in interaction and this manipulation can carry the activity forward.

Objects such as papers and documents are frequently found to be used as a resource for activity shifts in interaction. For instance, Dolata and Schwabe (2017) argue that this type of object is more than a medium for presenting information but can be mobilised in various ways in interactions to achieve different social actions. In their study, they find that financial advisors manipulate the paper document in different ways to structure the financial advisory interaction with the client, like moving and pointing at the paper for a topic shift or closing. Mikkola and Lehtinen (2014) find that appraisal forms are used in similar ways in interviews, as the interviewer demonstrates embodied orientation (i.e. gazing, lifting, putting on reading glasses) to the form or written text on it for initiation of the next activity. Weilenmann and Lymer (2014) also find that in journalists' morning meetings, the meeting agenda is regularly incorporated in the verbal and embodied actions as a material resource for accomplishing topic and activity shifts.

These practices related to the structure of the interaction depend on a different feature of the paper. For instance, in financial advisory encounters, moving the papers away to suggest closing of activity is related to the prerequisite existence of these papers to accomplish the activity. On the other hand, pointing to one agenda item printed on the paper to initiate the next activity in interviews is related to the specific information being indicated, not the paper. This brings us to the discussion of affordances in next.

2.4.2 *Affordances and the Analysis of Objects in Interaction*

The notion of 'affordance' is at the centre of understanding both the relation to material culture that surrounds our daily life and the ways that objects are utilised in social interaction. Gibson (1979), who first use the term 'affordance' in '*The Theory of Affordances*', argues that animals and human determine what their material surroundings can offer;

> "The *affordances* of the environment are what it *offers* the animal, what it *provides* or *furnishes,* either for good or ill. The verb *to afford* is found in the dictionary, but the noun *affordance* is not. I have made it up. I mean by it something that refers to both the environment and the animal in a way that no existing term does….As an affordance of support for a species of animal, however, they have to be measured *relative to the animal.* They are unique for that animal. They are not just abstract physical properties. They have unity relative to the posture and behavior of the animal being considered. So an affordance cannot be measured as we measure in physics."
>
> (Gibson, 1979, pp. 119-120)

Later studies on physical objects, such as commercial goods and documents, and on technologies (Streeck, 1996; Hutchby, 2001; Heath *et al.*, 2002) have also suggested that artefacts both shape and are shaped by the social interaction practice. That is, they find that the way participants use an object in an interaction depends on the intended social action. Concurrently, the interactional practice of object manipulation seeks a certain response from the next turn and thus shapes the upcoming interaction practice. These findings are highly aligned with interactional systematics (Sacks, Schegloff and Jefferson, 1974), which treats conversation (instead of the artefacts' affordances) as the fundamental resource for interaction and turns-at-talk as the recognition of the prior turn.

One aspect of the study of interacting with objects has pertained to technology-in-interaction (Hazel *et al.*, 2014). This was based on Hutchby's (2001) influential work, which proposes to apply Gibson's (1979) notion of affordance to study technology and human agency intertwined social interactions.

> "…I want to propose an approach to the study of technologies and social life which offers a reconciliation between the opposing poles of constructivism and realism. This involves seeing technologies neither in terms of their 'interpretive textual' properties nor of their 'essential technical' properties, but in terms of their *affordances* (Gibson 1979). I will argue that affordances are functional and relational aspects which frame, while not determining, the possibilities for agentic action in relation to an object. In this way, technologies can be understood as artefacts which may be both shaped by and shaping of the practices humans use in interaction with, around and through them. This 'third way' between the (constructivist) emphasis on the shaping power of human agency and the (realist) emphasis on the constraining power of technical capacities opens the way for new analyses of how technological artefacts become important elements in the patterns of ordinary human conduct."
>
> (Hutchby, 2001, p. 444)

Using Hutchby's notion of technological affordances, technology is seen as 'technological artefacts' that have both physical and technological capacities. These capacities are made relevant by participants in interaction, and participants have the agentic power to shape artefacts' interactional affordances in social actions. In summary, technology, though 'smarter' in some ways compared to non-technological physical objects, is still treated as an artefact that has no agency, in terms of its own capacity for action in interaction. In other words, technology is manipulated by human agents in interaction to accomplish interactional actions.

Technology in everyday interactions has been motiving CA practitioners to study it as social conduct in everyday life. For instance, Mondada (2012) looks at how participants, while playing video games, utilise their visual and body orientation towards the TV screen to transfer in and out of two temporalities - the video game they are playing and the co-participant interaction. In addition to the construction of and transition to temporality and social space, interactional studies such as those by Ryave and Schenkein (1974), Mondada (2009) and Mortensen and Hazel (2014) also investigate movement in and through physical spaces. In particular, a socio-technological situated practice, the interaction in driving a car, has also motived some

studies, such as those by Laurier (2005), Laurier *et al.* (2008), Haddington and Keisanen (2009), and Mondada (2012b).

Studies focusing on the use of the IEEDs can be found in workplace studies pioneered by Luff *et al.* (2000) which focuses on the ways people use technology to constitute interaction in institutional settings. For instance, Nielsen (2014; 2019) looks at the ways doctors use the computer in medical consultations and find that the computer is used as a resource for doctors retrieving patients' medical information. In addition, doctors use embodied actions with the computer to index different actions in interaction; that is to say, doctors use different types of glances to enact the reference for their talk or actions. Oittinen and Piirainen-Marsh (2015) study videoconferences in an international company, where all meeting spaces (local and distant) are equipped with large screens projecting the meeting agenda and each participant have their own laptop in front of them on the meeting table. This study finds that the chairperson utilises verbal instructions to initiate the shift to agenda-related talk at the beginning of the meeting, and local participants show their alliance with the shift initiation by utilising gaze and body gestures to orient to the screen. However, it is not always so easy when getting distant participants in the videoconference to transition from the other activities to agenda-related ones. The chairperson scrolls down the shared agenda, visually available to both local and distant participants, to indicate an activity shift and facilitates co-orientation of the distant participants. Therefore, their study also implies the interactional constraints of using technology to achieve social goals in certain types of interaction.

Another popular stream of research that studies embodied human engagement with IEEDs is the study of Human-Computer Interaction (HCI). Different from the interactional studies aiming to inform the study of multimodal interaction, HCI studies aim to guide IT designers developing more user-friendly systems in the computer and other forms of technology (Heath and Luff, 2000; Suchman, 2007; Luff *et al.*, 2014b). For instance, Greatbatch (1992) examines a computer system used in medical consultation interactions, where patients make efforts to, but sometimes fail to synchronise their talk with the doctor's typing on the computer keyboard. Button and Dourish (1996) discusses the constraints and possibilities of applying ethnomethodological studies on the design of HCI systems on the computer. They argue that the interactional system proposed by Sacks *et al.* (1974) studies how interaction is

sustained in human interaction but constrains the design of computer systems, particularly when establishing the abstract of procedures on the computer that aims to predict the human interaction.

Rather than intending to improve the computer system of the IEEDs in SOLE, this study will focus on the affordances and constraints that the IEEDs place on the interactions, as there is no specific interface or system required for the IEEDs employed in a SOLE. The technology-related studies reviewed in this section concerning social interaction contribute to our understanding of the technology affordances, especially in terms of social practices, as technology offers numerous potentials in our work, life and learning. The next section presents a review of interaction-based studies of objects, including IEEDs, in educational settings.

2.4.3 ***Objects in Interaction: Educational Settings***

In the last two decades, CA practitioners have been conducting studies considering objects in interaction in educational settings. However, the number of these studies are small in this rather new scope of the study. As Guerrettaz and Johnston (2013, p. 780) argue in their work, *Materials and Classroom Ecology*, 'while materials are a key player in most classrooms, they are frequently overlooked in classroom-based research.' That is, objects such as texts, papers and documents are used frequently in classroom interactions but have seldom been studied in *de facto* use by teachers or students in interaction. This section first reviews the CA literature of physical objects' use in educational settings, including classroom interaction and meetings in education institutions (studies shown in Table 1). Next, it reviews the emerging focus of the technological artefacts used in training sessions and classroom interactions (studies shown in Table 2).

Table 1 below is a review of studies concerning physical objects in educational interactions. Roth and Lawless (2002) study the lecturer's use of teaching materials in scientific lectures. In particular, they look at the teacher's bodily orientation, proximity and gestures towards these materials as resources in teaching. They also find that different types of teaching materials have different affordances when used as a reference in teaching. For instance, when the teaching material is a photo which provides the illusion of a three-dimensional effect, the teacher can extend it to the classroom space

and use different body orientations, types of gestures and distance from the inscription in the course of explaining the scientific concept.

Participants and settings	Authors, Year	Object(s)
lecturer and students in lectures	**Roth and Lawless (2002)**	teaching materials (e.g. text, diagrams, photos)
teacher and students in classroom interaction	**Tanner *et al.* (2017)**	texts in reading task materials
teacher and students in classroom interaction	**Tainio and Slotte (2017)**	classroom materials
teacher and students in classroom interaction	**Jakonen (2018)**	classroom objects (i.e., pen, map)
teacher and students in whole-class interaction	**Matsumoto (2019)**	textbook, worksheet, a projection screen
supervisor and student in academic supervision encounters	**Svinhufvud and Vehviläinen (2013)**	the document (i.e., student's writing)
counsellor and student in counselling meetings in a university	**Hazel and Mortensen (2014)**	paper (notebook /notepad) and pen

Table 1 Relevant CA studies on physical objects used in educational settings

Examining classroom interaction, Tanner *et al.* (2017) look at the ways in which teachers and students work with texts in the reading task. They find that texts can be used for three main purposes:

(1) To establish a shared focus for attention by participants annotating certain parts of the text, or holding up the paper
(2) As a resource for organising turn-taking
(3) To promote activity shifts, such as from talking to reading.

In addition to moving the paper, Tainio and Slotte (2017) find that reading the text aloud can also create a shared focus with turn-organisation, epistemic displays and can even promote learning in classroom interactions. Jakonen (2018) finds that embodied actions with classroom objects, such as posters and maps, are used alongside the teacher's talk for instructional purposes. Embodied actions include the teacher walking towards and reading the poster text aloud, pointing actions and resting the pen on a map to guide students' attention to a particular part of these teaching/learning materials.

Matsumoto (2019) studies whole-classroom interaction in L2 classrooms and finds that in addition to participants using pointing to create shared attention, the teacher skilfully employs cut-off, silence and gaze shifts to prepare for the use of different material, as an alternative teaching strategy. In addition, Matsumoto (ibid) found that if the teacher fails to coordinate with students' unexpected embodied actions with materials, this may cause them to misunderstand students' talk, and it is argued that material objects may constrain teaching if the recipient of the talk was unable to understand its interactional actions.

For meetings in educational settings, Svinhufvud and Vehviläinen (2013) study academic supervision encounters where the document (student's writing) is seen as a necessary resource for the interaction, and participants use gaze and body orientation towards the document to display their intention to shift into the joint activity of discussing the document. Hazel and Mortensen (2014) studied counselling meetings at a Danish university. Their findings indicate that counsellor manipulates the paper and pen not to project a writing activity but as an act of writing as part of the embodied display (e.g., gestures, gazes) to initiate a particular sequential position at the beginning of the counselling session.

To sum up, the objects in these studies are (1) used to establish a shared focus for attention in both teacher-instruction and student-student interaction and thus (2) used as a resource for organising turn-taking; or (3) to promote activity shifts. For instance, shifting from talking to reading activities (i.e. group discussion in Tanner *et al.*, 2017), and from pre-meeting activity to the meeting business (i.e. academic supervision in Svinhufvud and Vehviläinen, 2013; and counselling sessions in Hazel and Mortensen, 2014).

It is important to note that the physical objects studied in the educational settings detailed in Table 1 mostly concern papers and documents. Dolata and Schwabe (2017) propose that new technologies may potentially replace the paper's role in their studied setting. As discussed at the beginning of this section, CA research concerning objects in educational settings is still under-developed. As the above study show, as apart from traditional classroom materials like paper and text, educational technology has become increasingly common used in educational settings yet a scarce number of studies are conducted to investigate how it is used in interactions within these settings. In addition,

the findings of the constraints of objects' use in educational settings are rare comparing to the affordances.

To better understand the technological objects' use in education, a review of studies concerning technological objects' general interactional features in educational settings has been conducted. A summary of relevant studies is outlined in Table 2 below. The few studies focusing on participants' interactional practices involving the technology concerning epistemics will be reviewed separately in Section 2.6.

Participants and settings	Authors, Year	Object(s)
a highly experienced surgeon, a surgeon in training, and a medical student in a surgical operation (residency program)	**Koschmann *et al.* (2011)**	endoscopic monitor
trainer and trainees in Air Traffic Control (ATC) training	**Arminen *et al.* (2014)**	ATC units
pairs of students conducting computer tasks (school project)	**Levy and Gardner (2012)**	computers (IEEDs)
teacher and student(s) in physical and virtual classrooms	**Gynne and Persson (2018)**	classroom materials, *Showbie* software (on IEEDs)

Table 2 Relevant CA studies on technological objects used in educational settings

Beginning with studies concerning training programs and sessions, Koschmann *et al.* (2011) study interaction in the context of a surgical operation which is part of a residency program. It finds that when the surgeon in training operates on the patient, the experienced surgeon instructs the less-experienced medical staff and students on how the operation should be done. By paying attention to and evaluating the post-operative scene displaying on the endoscopic monitor, the experienced surgeon employs the monitor as a mediational resource for instruction. He also stares intently at the monitor to suggest a recognition-in-process. Arminen *et al.* (2014) study Air Traffic Control (ATC) training sessions which take place in a simulated environment. They find that trainees demonstrate their understanding of the task with embodied actions involving technological ATC objects, in response to the requests by the trainer.

In school contexts, Levy and Gardner (2012) study how pairs of young students working collaboratively at the computer for web-based tasks and multitasking. They find that in general, participants can perform routine computer tasks that involve using

mouse and keyboard without disruption to their talk. However, complex tasks involving making multiple-choice selections on the computer (e.g. using drop-down menus) are normally accompanied by silence. If recipients of the talk are typing or using the mouse, the amount of recipient actions to the speaker falls dramatically. Gynne and Persson (2018) study the affordances in physical and virtual classrooms that are made relevant by the teacher to students in lower secondary schools. They found that in physical classrooms, the teacher routinely uses physical tools, such as writing on whiteboard and projection images, and bodily actions in relation to actions projected or conducted in teacher-student interactions. These actions include questioning, requesting information and discussing. By contrast, in the virtual spaces, the teacher uses the technological affordance of sharing information in uploading information (e.g. exercises, links to useful webpages, textbook examples) and collecting documentation from students (students' work).

As discussed above, the subject of technology-in-interaction has motivated some studies in the last two decades in relation to interaction in educational settings, though they are scarce when compared to the studies looking at physical objects in interaction. In the above studies, researchers have found that technology can be used as a mediational resource for instruction or for sharing information between the instructor and the learner. Additionally, embodied actions with technological artefacts (i.e. monitor, units) can serve as displays of participants' recognition-in-process or demonstrate understanding in the interaction. Although most participants in these studies demonstrate their capability of coordinating talk and embodied actions with the technology in interaction, there are occasions where there is liminality in performing these activities at the same time (Levy and Gardner, 2012).

The literature reviewed in Table 2 in relation to the use of technology in educational settings is a starting point for CA researchers to study the various affordances made relevant by participants for teaching and learning purposes. However, the majority of these studies focus on teaching practice and just one study (Levy and Gardner, 2012) focuses on student-student interaction. Also, compared to the extensive studies on classroom objects like papers and pens, more attention should be paid to the use of IEEDs in educational settings. In particular, it would be useful to examine the affordances of the mice, touchpads, keyboards and screens of computers, as well as the different types of technological devices (i.e. laptops, desktop computers, and tablets).

Internet-enabled features of IEEDs, which are primarily designed for searching for information on the internet, are often overlooked in these type of studies, as the majority of the IEEDs in teaching and learning are focusing on particular educational software.

There should be more attention paid to studying IEEDs in relation to learning in educational settings, with a focus on student-student interaction rather than teacher-dominant interaction. More research is needed to contribute to the understanding of the manipulation of various types of IEED, including participants' embodied actions (e.g. glances, reading, pointing) with different IEED peripherals.

2.5 Epistemics, Knowledge and Interaction

Previous studies of SOLE have employed quantitative experiments and qualitative observations of SOLE sessions, and suggest that children read better in unsupervised groups with the access to the internet (Mitra and Dangwal, 2010; Mitra and Crawley, 2014). However, how and why the students improved their reading and comprehension in the SOLE sessions did not receive enough attention in SOLE research. Aiming to contribute to the knowledge of students' practices that was suggested in previous studies, this section introduces the social interactional perspective that CA researchers take on epistemics. This perspective is different from other approaches taken by the majority of existing SOLE research, such as cognitive perspective. This section reviews CA studies from the aspects of knowledge and epistemics in interactions (Section 2.5.1), and epistemics in educational settings (Section 2.5.2).

2.5.1 *Epistemics in Interaction*

Knowledge, or information, indexing in the interaction, is within the scope of *epistemics* within CA studies. Epistemics refers to the interactional display of participants' claim, access, and relevant positioning of 'territories of knowledge' (Labov and Fanshel, 1977; Stivers and Rossano, 2010; Heritage 2012a). Three works published by Heritage in 2012 (Heritage, 2012a; Heritage, 2012b; Heritage, 2012c) further contribute to the theme of epistemics in interaction by systematically discussing epistemics in conversation. First, these works argue that the *epistemic engine* is the driving force of sequence organization. Second, regarding the territories of knowledge, *epistemic status*

and *epistemic stances* are important concepts in understanding participants' epistemic positions indexed in their turns-at-talk. Finally, the action formation of epistemic-related social actions is related to turn-construction in interaction. This section reviews the research literature relating to these three aspects of epistemics in conversation and discusses the criticism of epistemics in CA.

2.5.1.1 Epistemic Engine

Before the attention on epistemics in conversation analysis, CA practitioners describe the sequence organisation of epistemic-related interaction in general terms. For example, 'sequence closing thirds' (Schegloff, 2007) like 'oh' in registering the receipt of information and suggesting the end of the current sequence (e.g. question-answer adjacency pair). While clearly states that there are general principles in sequence organisation, Schegloff (ibid) also admit the difficulties in tracing principles in the sequential or topic term.

Heritage (2012a) propose an alternative principle to the sequential analysis in interaction: the information imbalance indexed by participants is a warrant of sequence and term of this motivation of the sequence is *epistemic engine* as one of the most common driving forces of interaction is the information imbalances between participants' epistemics (Heritage, 2012a; Heritage, 2012b; Heritage, 2012c). Looking at how participants make interactional efforts to index what and how much information is known to each other, Goodwin (1979) and Terasaki (1976/2004) are one of the first CA researchers to draw attention to epistemics in talk. Working just like its name, the epistemic engine will lose its driving force when the information imbalance is equalised, and the sequence will close. One contribution to this principle is Heritage's (1984a) study of 'oh' which can serve as a *change-of-state token*, not only registering the recipient's acknowledgement of the conveyed information but also suggesting the information was informative to the recipient. Thus, the speaker and recipient reach epistemic equilibrium due to the conveyed information, and the sequence closes having achieved the practical purpose (see Section 2.5.1.3). This demonstrates the information imbalance is the driving force of sequence organisation. It also adds a better understanding to the general principles of sequence organisation, such as sequence closing thirds in sequence closing.

2.5.1.2 Epistemic Status and Epistemic Stances

In information imbalance in interaction, each participant has their own territories of knowledge, also called epistemic domains (Labov and Fanshel, 1977; Kamio, 1997; Stivers and Rossano, 2010). The specific information shared in the interaction may or may not fall into speakers' territories of knowledge, with different degrees of knowing. Heritage (2012 a,b,c) describes the access to the knowledge as *epistemic access*, the relative positioning of the speakers to the knowledge as *epistemic status* and *epistemic stances*.

Epistemic status and stance are locally managed by interlocutors through interaction and can vary from time to time and in different domains of knowledge. Epistemic status is the established recognition of speakers' relative access or rights to the domain of knowledge, and the epistemic stances encode these relative positionings on the moment-by-moment basis in turn designs. As Heritage (2012c, p. 376) puts it, epistemic status is:

> 'a relative positioning [which] involves the parties' joint recognition of their comparative access, knowledgeability, and rights relative to some domain of knowledge as a matter of more or less established fact. This relative positioning may vary from nearly absolute inequality to nearly absolute equality."

For instance, speakers can lay claim at an absolute epistemic advantage such as 'I forgot to tell you the two best things that happen to me today' (Terasaki, 2004, p. 176), to index a 'knowing' epistemic status claim and project an 'unknowing' epistemic status of the hearer. In this case, the listener is treated as ignorant of the information given, as the knowledge within the domains of experience, emotions, and thoughts are normally treated as the speaker's to possess. Between the 'knowing' and the 'unknowing' epistemic status, which implies nearly absolute epistemic advantages, are the 'more knowledgeable' and 'the less knowledgeable' epistemic status referring to a claim of relative epistemic advantage. In general, K+ and K- are used to describe participants' the relevant advantaged and disadvantaged epistemic positions, such as K+ epistemic status and K- epistemic status.

A participant's indexed epistemic status usually remains the same throughout the interaction as it is projected and recognised at the initiation of the sequence. However, epistemic stances are conceived as the moment-by-moment expressions of a

participant's real-time epistemic positions towards referent knowledge. Epistemic stances are managed through turns-at-talk, normally moving from a lower position to a higher position in terms of the epistemic gradient (Heritage, 2010).

In English, the expressions of epistemic stances can be recognised through the speaker's selection of a range of linguistic forms in conversations (Heritage, 1998; Raymond, 2003; Heritage, 2007). For example, 'You are married, aren't you?' indexes a lower epistemic stance than 'You are married.' (Heritage, 2012a, p. 377). CA studies of other languages, such as Chinese, Japanese, Finnish, Danish and Swedish, also suggest that the territories of knowledge and the expressions of epistemic stances can be designed and recognised through the use of a range of linguistic forms (Kamio, 1997; Wu, 2004; Heinemann, 2010; Asmuß, 2011; Hakulinen and Sorjonen, 2011).

In general, epistemic status and epistemic stances are preferred to be in congruence as the social norm, and linguistic forms are a reliable tool to determine speaker's epistemic stances and the social action encoded in the turn. However, it is not always the case. One example is the queclaratives, which is an utterance that has the form of a question (an interrogative sentence) but the force of a statement (a declarative sentence). In most of the cases, the epistemic status is the 'central pragmatics resource' and it 'dominants the linguist form in this regard' (Heritage, 2013, p. 560) in determining the action formation of a turn in the systematics of epistemic in conversation.

2.5.1.3 Action Formation

This section will review the studies on action formation concerning the principle of conversation systematics. This section explores the ways in which participants encode each other's epistemic status, and the use of linguistic (and embodied) resources in turn design which projects the social action in interactional practice. To better understand the link between epistemic positions and action formation, a table of summarising epistemics and action formation regarding turn-design and linguistic forms is shown below.

Epistemics and Action Formation

Turn Design Feature	*K+ Epistemic Status (Within Speaker's Epistemic Domain)*	*K− Epistemic Status (Not Within Speaker's Epistemic Domain)*
	Action Interpretation (Given the "known in common" epistemic status of speaker and recipient relative to the targeted state of affairs)	
Declarative Syntax	Informing (5)	Declarative/B-event question (6), (7), (8), (9), (10), (11)
Declarative Syntax with Final Rising Intonation	Continuing (13)	Questioning (14)
Tag Questions	Mobilizing support for an assertion (18), (19)	Seeking confirmation (15), (16), (17)
Negative Interrogative Syntax	Assertion (cf. Bolinger's [1957] "Blinds up") (20), (21), (22)	Request for information (cf. Bolinger's [1957] "Blinds down") (23), (24)
Interrogative Syntax	Preinforming question (26) Known answer question (27) Rhetorical question (28), (29), (30)	Request for information (25)

(Heritage, 2012b, p. 24)

In particular, CA studies of two major types of action formation, information request (IR) and confirmation seeking (CS). These are both commonly found in learning environment interactions.

It is perhaps not surprising that interrogative syntax is widely relied upon for sense-making in interaction. Stivers and Enfield (2010) code questions in question-response sequences in conversation into three categories: wh-(or Q-word) questions, polar questions (yes/no interrogatives) and alternative questions. In English, *wh-interrogatives* (questions with words such as
what, when, where, who, which, whom, whose, why, and how) such as 'What's your name?' are commonly used for IRs in conversation. In CA studies, turns constructed with wh-interrogatives from the unknowing/K- epistemic status speaker is generally heard as a request for information (Heritage, 2012b). This request for information suggests an imbalance of information between the participants, advances the sequence, and motivates the K+ status speaker to provide the corresponding response containing the information requested. The IR-initiated sequence will close when all parties reach epistemic equilibrium: the K- status initiator displays their receipt of the information and may add a demonstration of their understanding of the referent epistemic issue. Linguistic resources such as the change-of-state token 'oh' (Heritage, 1984a), a repetition of the K+ status speaker's (partial) information given (Greer *et al.*, 2009), or embodied actions like nodding can serve as the receipt of the requested information,

(Schegloff, 1987) to close the sequence. Of course, other linguistic forms including, but not limited to, final rising declarative, negative interrogative syntax and interrogative syntax used by K- status speakers are often treated as a request for information (Heritage, 2012b).

Another important action usually recognised in K- status speakers' turn-design is confirmation seeking (CS). Often indexing a less knowledgeable rather than an unknowing epistemic status, the speaker seeks confirmation about the referent knowledge from the participant of more knowledgeable epistemic status, through a variety of syntactic resources such as polar interrogatives, tag questions and questions presenting alternatives. Under the general principle of conversation systematics that a type-conforming response is preferred in question-answer sequences (Raymond, 2013), polar interrogatives and tag questions usually require a yes/no answer and alternative questions require a choice between the alternatives. Although in the linguistic form of a question, these turns' social action is generally recognised as confirmation seeking, when the speaker displays some degree of knowledge on the referent with a downgraded epistemic stance. Questions such as 'Is it Wednesday today?' (polar), 'It's Wednesday today, isn't it?' (tag) and 'Is it Wednesday or Thursday?' (alternative) index a lower epistemic status, with the aim of seeking confirmation from the recipient. The epistemic status indexed through these actions will be confirmed by the recipients' response such as 'Yes, it is.' or 'It's Wednesday.', preferably type-conforming with the question, as the response indexes a higher epistemic status which confirms the information in question. Similar to the IR initiated sequences regarding epistemics, CS initiated sequences close when the K- status initiator acknowledges receipt of requested knowledge.

Studies of other languages also found linguistic forms in terms of question formation serves social actions like IR and CS, like the ones in English. Final particles including 'me 么/ma 吗/a 啊' in Chinese, which placed after the declarative clause can form the turn into a question. These questions can be treated as a request for information or seeking confirmation in consideration of the speaker's epistemic status (e.g. Lin, 1998; Wu, 2004; Li, 2014, etc.).

2.5.1.4 Critiques of CA research on Epistemics

As discussed in Section 2.5.1, Heritage's work on epistemics in CA has been widely recognised and has inspired an increasing number of studies focusing on the social organisation of knowledge in interaction. However, some researchers (Button and Sharrock, 2016; Lynch and Macbeth, 2016; Macbeth *et al.*, 2016) have criticised Heritage's research. Principally, it has been claimed to be somewhat out of sync with the 'social' principles CA, which reject the etic superior social science theory in favour of the emic analysis of participants' practice. For instances, Lynch and Wong (2016) argue that Heritage's study on epistemics takes an informationist view on interaction and is beyond the scope of CA, as its emphasis is on the information exchange between speakers. They argue that Heritage's work on the 'epistemic engine' views information transmission between individuals as the underlying driver for sequence organisation, which is an etic sociological theory that is incompatible with CA's emic, ethnomethodological viewpoint. In another critique, Lindwall *et al.* (2016) suggest that Heritage's work on epistemics and action formation, to some extent, returned to the analytic stances of speech-act theory. They argue that this is divergent from CA analytic views, particularly where Heritage examines the epistemic status encoding in various grammatical formats in turn designs (Heritage 2013, p.564). These are, however, misunderstandings of the study of epistemics in CA. In Heritage's work on epistemics (e.g., 2012a, 2012b, 2012c), he looks at the *social* organisation of knowledge in interaction, not the knowledge of the individual. The research on epistemics in CA focuses on the ways interlocutors manage social claims of epistemic status and stances in turn design and sequence organisation. In addition, study on action formation in CA has been based on the understanding that participants' methodical use of linguistic and embodied resources to produce and recognize social actions. Therefore, Heritage's examination of participants' use of various grammatical forms in turns, and action formation, is within the consequential topics of turn design, sequence organisation, and action formation in CA.

As a result, it is crucial to understand that in the study of epistemics in CA, participants' claims, displays, and asymmetries of knowledge, as well as their epistemic status and stances, are relevant to themselves, and the analysis of this is emic and sequential (Heritage, 2018; Raymond, 2018). In other words, the study on epistemics

applies the same ethnomethodological and analytic principles of CA to investigate the social realms of knowledge (Drew, 2018).

2.5.2 *Epistemics in educational settings*

From the discussion in previous sections, it is clear that CA in social epistemics plays a central role in the study of interaction in educational settings, as epistemics is closely related to participants' display of knowledge in interaction. Apart from Heritage's influential work on epistemics (2012 a; b; c), Sacks (1992) differentiated two types of understanding displayed by participants in interactions; *claims* and *exhibits* (pp.252-253). That is, a speaker can simply claim an understanding or do 'some sort of analysis' (ibid, pp.253) to further demonstrate their understanding in talk. This is pertinent in the analysis of the participants', especially students' talk in relation to their displayed epistemic status in classrooms and other learning environments.

In addition to Sack's (1992) notion of claims and demonstrations of *understanding*, Koole (2010) focuses on classroom interaction and argues that there is a different epistemic modality from understanding, *knowing*, which speakers choose to display their epistemic access in different sequential positions. In particular, 'do you know…?' type questions often ask for hearer's display of when and how he/she gained the access of knowing while understanding checks like 'yes?' and 'do you understand?' seek claims and exhibitions of understanding. In this study, Koole (2010) finds that in teacher-student interaction, students not only can use simple claims such as 'oh' or 'yes' but also exhibit their understanding in extended explanations in answering yes/no interrogatives of understanding checks from the teacher. Furthermore, students also display their epistemic access to the answer to the teacher's 'do you know' questions, to display having known the knowledge before the question. In contrast to students' display of having previous knowledge, teachers design eliciting questions for students to respond with the correct answer immediately, and students display the acquisition of the knowledge as a result of the question.

The findings in Kole's (2010) study, like many others, is part of a growing body of research on teacher-student classroom interaction aiming to inform teacher practice and describe the teaching-learning process in the classroom (e.g. Macbeth, 2004; Hindmarsh *et al.*, 2011). For instance, in one-to-one teacher-student interactions, Koole

uses CA approach to investigate the ways in which a teacher localises the epistemic domain of a student's problem (Koole, 2012), and how they work out students' epistemic access to the referent knowledge (Koole, 2010) . Hindmarsh *et al.* (2011) look at student dentists and their supervisors' training interaction, which takes places in formal education settings in the medical teaching-learning environment. They find that bodily conduct, timing and talk are employed as resources in interaction for students claiming and exhibiting understanding, as well as in their supervisors' assessment of these understandings. In whole-classroom interactions, CA studies find that students initiate interrogatives to display knowledge (Solem, 2016a) and negotiate their epistemic rights to make assertions with the teacher (Solem, 2016b). Studies also found the various ways in which students display their lack of knowledge in whole-classroom interactions (Sert, 2011; Sert and Walsh, 2013). Team-teacher interaction also contributes to this area of study. Examples include non-native speaker English teachers using native speaker teachers as an epistemic resource for language (Leyland, 2013), and teachers using post-formulation explanations as a way to treat the recipient as being at the K- epistemic status (Greer and Leyland, 2018) in intercultural team-teacher interactions.

Comparing to the research on teacher-student interactions in classrooms, the research focusing on student-student interaction is rather under-explored. Jakonen (2015) studies how students use textual task sheets to handle knowledge in peer interaction. He finds that when seeking help locating the relevant information as the task required, students use verbal and non-verbal (i.e. handling the task sheets) resources to create a mutual orientation on the task sheet. It also shows that an English word on the task sheet triggers Finnish students' K- epistemic status claim on the epistemic domain of the word's meaning. In these cases, the K+ peer can use relevant information on the task sheet as a resource to help with understanding the word meaning, by using gaze, pointing and displaying the text. In these tasks, gazing at a peer's writing on a task sheet, in the absence of the talk, can be treated as a request for information about the peer's written answer to the task. The work of Jakonen and Morton (2015) focuses on the interactional properties and affordances of epistemics in student-student interaction, rather than the teacher-led interactions, in a content-based language classroom. Their study defines Epistemic Search Sequences (ESS), in which 'Students in peer interaction collectively resolve emerging knowledge gaps while

working on pedagogic tasks' (p.73). Jakonen and Morten investigate the ESS that are initiated by information requests (IRs) in the study and note the emergent quality of the knowledge gaps triggering IR. That is, the knowledge gaps emerge in the process of completing the pedagogical task of a gap-fill exercise.

Although the above two studies' findings suggest that classroom materials (i.e. task sheets) are related to students' epistemics in completing pedagogical tasks and in group discussions, the affordances of the classroom materials are not the focus of the study. Furthermore, few studies have looked into the technology used in educational settings and their relationship to students' epistemics indexed in their interaction. The next section identifies and discusses the studies that focus on epistemics in student-student interaction, particularly in relation to participants' interactional practices with technological objects.

2.6 IEEDs, Epistemics, and Interactions

As argued through Sections 2.2 to 2.4, although technology use in educational settings is increasingly popular, the CA studies focusing on the technological objects themselves (not just educational software programs but other technological features of the device) and their general interactional affordances and constraints are still relatively few, as reviewed in Section 2.4.3. With the CA research literature (reviewed in Section 2.5) suggesting that the importance of epistemics in interaction, this section argues that even though epistemics is the key phenomena in student-student interactions in educational settings (discussed in Section 2.5.2) technological objects' (i.e. IEEDs') interactional features concerning epistemics have received little attention in the studies conducted.

This section discusses the existing research literature which focuses on IEEDs and their interactional features concerning epistemics in different interactions. The focus then narrows to student-student interactions (Section 2.6.1). Then, a summary of a few studies will be presented (Section 2.6.2), as these studies are the only few conducted in the underexplored research area of IEEDs' affordances and constraints in student-student interaction in the learning environments.

2.6.1 *IEEDs and epistemics in interaction*

Seven CA studies conducted in various interactional settings focusing on the nexus between IEEDs and participants' epistemics in interaction are identified through reviewing the research literature during this study (summarized in Table 3 below). To the best of author's knowledge at the time of submission, these studies are the only ones sharing the same focus of the current study, with three looking at in student-student interaction. This section will first review four CA studies conducted outside educational settings, and one on teacher-student interaction, to provide an overview of the IEEDs' affordances and constraints found relating to epistemics in various interactional settings. Then, three studies focusing on the student-student interaction in educational settings will be reviewed and their findings of IEEDs' interactional affordances and constraints concerning epistemics will be discussed.

Author(s), Year	Settings	
Nielsen (2014)	doctor-patient interaction	
Nielsen (2019)	doctor-patient interaction	
Piirainen–Marsh and Tainio (2009)	L2 computer gaming interaction	
Piirainen–Marsh and Tainio (2014)	computer gaming interaction	
Gosen (2018)	teacher-student interaction	
Engeness and Edwards (2017)	science classroom interaction	**student-student interaction**
Bierema *et al.* (2017)	undergraduate STEM courses	
Çakır *et al.* (2009)	Virtual Math Teams (online interaction)	

Table 3 CA studies on interaction involving IEEDs concerning epistemics

Since the number of studies focusing on IEEDs in student-student interaction is relatively low, it is worth drawing on the knowledge provided by related research exploring the use of IEEDs in interactions among other types of participants, or other settings, as this may also shed light on the current study.

Nielsen's work (2014; 2019) is based on a medical setting, and studies doctor-patient consultation interaction focusing on the doctor's use of the computer. In his earlier study (Nielsen, 2014), it was found that the doctor uses the computer as a resource to gather patients' medical information and uses verbal turns as well as body

orientation and head turns to suggest activity shift before turning away from the patient and looking at the computer screen. In a later study (2019), Neilson found that glances and pointing gestures are used to refer to the relevant medical content on-screen. In particular, Nielsen (2019) found that glances at the screen can project an activity shift and this projection of forthcoming activity can sometimes index the doctor's willingness towards a certain proposition when conducted during the talk. In addition, continuous pointing to the computer is used to maintain the computer's relevance with particular activities when the doctor is producing talk.

Examining the interactional setting of playing computer games, Piirainen–Marsh and Tainio (2009; 2014) conducted two studies focusing on players playing computer games in front of a single screen. They find that when the game is in the players' second language (L2) (Piirainen–Marsh and Tainio, 2009), players use the game characters' voice-over or subtitles displaying on-screen in the game as resources for L2 language acquisition. They also reproduce these game dialogues, demonstrating their game knowledge. When the game is in the players' L1 (Piirainen–Marsh and Tainio, 2014), the player with K+ epistemic status of the game knowledge claim their expertise and guides the K- player. These epistemic status claims are triggered by certain game scenario appearing on the computer screen.

Examining educational settings, Gosen (2018) focuses on one-to-one teacher-student interactions and the different ways in which teachers display their epistemic access to students' problems when using an educational application on a tablet in which teachers can access information such as students' work, time log and practice information. It is found that the teachers can demonstrate their epistemic access to student's problems by displaying their epistemic access to the app and the information provided by it. Teachers can verbally refer to the name of the app or parts of the information displayed in the app on-screen, or simply look at the tablet screen to display their access to the information concerning the students' work.

The studies reviewed above contribute to the research on a wider and more general use of IEEDs in different interactional settings, in relation to epistemics. IEEDs' affordances of being used as resources for knowledge are made relevant by the participants in the interaction. In particular, information displaying on the IEED screens is referenced with verbal and embodied resources, and incorporated in talk, to serve as a resource for knowledge. Participants can also re-produce the L2 language accessed from

IEED and demonstrate their knowledge of the referent content. Participants can also display their epistemic access to the information on-screen with verbal and non-verbal resources.

Next, three studies of student-student interactions in educational settings which focus on various affordances of IEEDs, and considering epistemics in interaction will be reviewed (summarized in Table 4).

Author(s), Year, Title	Setting(s)	Finding(s)
Engeness and Edwards (2017) The Complexity of Learning: Exploring the Interplay of Different Mediational Means in Group Learning with Digital Tools	science classroom interaction	(1) student use the educational software on iPad and task sheets as **resources** for knowledge to achieve group understanding and complete the pedagogic task; (2) students can rely on the diagrams provided on task sheets to **demonstrate** their understanding in group discussion;
Bierema *et al.* (2017) Engaging undergraduate biology students in scientific modeling: Analysis of group interactions, sense-making, and justification	undergraduate STEM courses	students verbally refer to the video (course material) as a **resource** for knowledge to justify their understanding in disagreement.
Çakır *et al.* (2009) The joint organization of interaction within a multimodal CSCL medium	Virtual Math Teams (online peer-interaction)	(1) the order of online live drawing actions of the math object serves as a **visual resource** on the computer screen to display participants' reasoning process; (2) the shared drawing of the math object on-screen **trigger**s participants' claims of existing knowledge of relevant math concept in the course of solving the math problem at hand.

Table 4 CA studies on IEEDs in student-student interaction concerning epistemics

Focusing on students' peer-interaction in the classrooms, Engeness and Edwards (2017) conducted their study in science sessions, and focus on students' interaction when they work in groups to complete a pedagogical task. They find that students use both digital information (i.e. information provided on education software) and paper

material (i.e. task sheets) as resources for knowledge in order to achieve group understanding and complete the pedagogical task. In particular, students make use of the diagrams provided on the task sheets to demonstrate their understanding. Furthermore, students elicit their own understanding as a resource for knowledge to assist participants with relative K- epistemic status. Also focusing on students' peer-interaction in the classrooms, Bierema *et al.* (2017) examine undergraduate students making scientific modelling in STEM sessions. They find that the video, provided on tablets as course material, was verbally referred to as a resource for knowledge when students were justifying their position in resolving a disagreement based on the scientific knowledge studied.

Focusing on interaction in the virtual world, Çakır *et al.* (2009) study the online group interaction of a Virtual Math Team (VMT) where students in different physical locations use online text chat and an online whiteboard to solve mathematical problems. Their study finds that students demonstrate the drawing actions of the math object to display their reasoning process. In particular, the order of these drawing actions serves as a visual resource for other students to understand the drawer's reasoning. These on-screen drawings also trigger other participants' claims of their existing knowledge of relevant math concept in the course of collaboratively solving the math task.

In summary, in these physical or virtual educational settings, students working in groups use physical objects (i.e. task sheets and paper materials) and digital tools (i.e. education software, video, and online whiteboard) as resources for knowledge in demonstrating understanding and resolving disagreement to achieve group understanding and complete the pedagogical task. Conversely, the information displayed on paper and IEED screens can trigger participants' K- or K+ epistemic status claims, to request or provide information. However, in these studies, the students do not have the autonomy to use the other general features of the IEEDs apart from the software or particular IEED features specifically designed for their sessions or tasks. Therefore, more study, focusing on the use of IEEDs in student-student interaction in educational settings without these software limitations, would be beneficial.

2.6.2 *Identifying the underexplored research focus: IEEDs' affordances and constraints in student-student interaction in the learning environment*

The research focus of IEEDs' interactional affordances and constraints in student-student interaction warrants further study, as only four studies are found through reviewing the existing research literature concerning this research focus (i.e., Levy and Gardener, 2012 in Section 2.4.3, and three studies in Section 2.6.1). These studies identify the general impact of students interacting with IEEDs while collaboratively working on pedagogical tasks. The small number of such studies indicate the imbalance between the emerging student-centred pedagogy with technology in education and the interactional research that studies the systematics of this type of interaction. In this section, the key findings of the four studies (Çakır *et al.*, 2009; Levy and Gardner, 2012; Bierema *et al.*, 2017; Engeness and Edwards, 2017) will be summarised and reviewed in relation to this research focus (summarised in Table 5 below).

Author, Year	**IEED's affordances and constraints in student-student interactions**
Çakır *et al.* (2009) Levy and Gardner (2012) Engeness and Edwards (2017) Bierema *et al.* (2017)	(1) overall, participants are able to conduct routine tasks on the computer **without disruption to the talk**; (2) doing complex tasks on the computer together normally accompanies by the **silence in talk** and recipient actions to talk will fall dramatically if recipients are using the keyboard or mouse. (3) student use the information from educational software on IEEDs as a **resource** for knowledge to achieve group understanding and complete the pedagogic task; (4) students verbally refer to the information from educational software on IEEDs as a **resource** for knowledge to justify their understanding in disagreement; (5) the content displayed on the screen **trigger**s participants' claims of existing knowledge of relevant math concept in the course of completing the pedagogical tasks; (6) students elicit their own understanding as a **resource** for knowledge for the less knowledgeable peers.

Table 5 CA research on IEEDs in student-student interactions

The findings of these four studies suggest that IEEDs have interactional affordances, including being used as a resource for knowledge, triggering epistemic claims, and being used in participants' demonstration for reasoning and understanding.

It is also argued that while IEEDs can be used as a resource in interaction, they also have constraints. That is, when doing complex tasks on the computer, there is a decline of numbers in students' recipient behaviour in interaction. These four studies have shed light on the IEEDs use in the educational settings (i.e. classrooms or group studying environments) from different perspectives (e.g. embodied actions, object's affordances, epistemics). Using the micro-analytical principles of CA and multimodal data of SOLE interaction, this study will address the gap in the literature concerning interactional research of IEED's interactional features in educational settings. In particular, the constraints and affordances of IEEDs in student-student interaction, and the epistemics that students display to each other when learning in SOLE will be addressed.

2.7 Summary

In this chapter, the research literature of SOLE and the related interactional studies has been discussed. Section 2.2 reviewed relevant literature in relation to SOLE and identified imbalance in the amount between the interactional studies and experimental studies of this emerging pedagogy. Section 2.3 discussed the potential of CA research for the study of SOLE, identified the unique interaction setting of SOLE and concluded that the foci of IEEDs and student-centred pedagogy should be examined to contribute the knowledge of both CA and SOLE research. It also introduces multimodal CA and emphasizes the focus on multimodality in recent CA studies. Section 2.4 reviewed CA research on objects and argued that the number of studies looking at IEEDs as a technological object in CA study of student-student interactions is scarce. In addition, Section 2.5 reviewed the literature of epistemics in interaction and discussed the research on epistemics in educational settings. Section 2.6 reviewed the small number of existing studies that have explored IEEDs' use in interaction in relation to epistemics. At the end of Section 2.6, the research gap in the study of IEED's use in student-student interaction was identified. This chapter concludes that by applying the theoretical and analytic tool of CA to SOLE research, this study will contribute to the body of knowledge of the international affordances and constraints of IEEDs when being used by students learning in groups.

Chapter 3. Research Methodology

3.1 Introduction

This chapter will reflect the key principles and procedures of multimodal CA methodology discussed in Literature Review, with a focus on its application on the current study. It will start with the discussion of the research design (Section 3.2), including the research setting and the recruitment of the participants. Then, the data collection procedures under CA principles will be explained, in consideration of the ethical issues (Section 3.3). Later, the data transcription process will be provided, as regard to the general multimodal CA transcription principles and the conventions used in the current study (Section 3.4). Finally, the data analysis procedures and research question will be discussed (Section 3.5).

3.2 Research Design

In this study, a 12-session SOLE programme outside of the curriculum was designed by the teacher of this study in response to a call out in Chinese students' communities for their lack of opportunity to learn more about British culture during their intensive one-year masters level programmes in the UK. These sessions, each with a topic related to an aspect of British culture, were set up by the researcher and delivered weekly by an experienced language teacher, who volunteered for the teaching in SOLE during her part-time PG-CERT study. The teacher was born and raised in England. At the time of the study, she had three years' teaching experience across a wide range of contexts. This includes teaching English for teenagers and young adults in a secondary school in France, and teaching French and Spanish for senior citizens in the UK. Her cultural background and teaching expertise make her qualified to facilitate students' study relating to British culture in a SOLE context.

To recruit the student participants, a one-page flyer about the study and the 12 SOLE sessions was posted on Chinese social media *WeChat*. Although the flyer clearly stated that there would be no credit awarded to the participants, the post received many responses. In total, 34 Chinese students who were studying on Master's degree programmes at the time took part in this study. They expressed interest in taking this

opportunity to study British culture and to make new friends. On average, the participants attend more than half of these sessions. All 34 student participants were studying business or social sciences at a university in England, UK. They had all met the English language requirements for university entry (an overall IELTS score of 6.5 and above), and they used both English and Mandarin Chinese (Chinese hereafter) in their discussions during the sessions.

Each of these 12 sessions are divided into four parts—introduction, discussion, presentation, and feedback. At the beginning of each session, the teacher introduces a British Culture-related topic question, designed in relation to the current topic in the UK or China at the time (see Table 6 below), to students and asks what they know about the topic. She usually writes the topic on the whiteboard during the introduction. The teacher made clear that students can enjoy the autonomy of language use in their discussion, but they do need to speak English in other stages of SOLE so that the teacher can understand what the students say.

Session	Topic question
1	UK in EU, in or out?
2	Does 'lad culture' exist?
3	What is Britain's favourite food?
4	What does the royal family do?
5	What happens on April Fool's day in the UK?
6	What are the traditions surrounding death in the UK?
7	What is the NHS's role in the UK?
8	Do British people like to talk about the weather?
9	What does this mean? 
10	What is the UK?
11	Is UK a religious country?
12	What is the role of the BBC in the UK?

Table 6 Topic questions used for the SOLE sessions

Next, the student discussion. On average, each SOLE session has around 8 participants. This results in an average of two or three groups in discussion. During the discussion phase, the teacher sits at the back of the classroom and does not influence the group discussion. At the start of their discussion, students self-select groups and choose one IEED for the group. The IEEDs are already switched on and waiting to be collected at the back of the classroom. The screen displays the standard desktop (on laptops) or Safari app (on iPad). In some cases, when participants decide to use the desktop

equipped in the classroom, they stand around the rostrum and operate the desktop computer. The discussion part of the SOLE usually takes about 20-25 minutes.

The third part of the session is the presentation, in which students present their answer to the question. Each group has five minutes of presentation time, and the presentation can be made by one participant or the whole group. Finally, after all the groups present their findings, the teacher gives feedback to the students' presentation and have a whole-class discussion with the students. This may include discussing the questions that students may have during their group-discussion or presentation.

All sessions were conducted in a classroom equipped with a computer, a projector, whiteboards and other classroom essentials. It also has the movable NODE chairs (see image 3-1) that enable the 'self-organising' part of SOLE in terms of seating arrangements, as these chairs can be moved around easily with their wheels when participants shift from whole-classroom teacher-students activities to small-group peer-interaction.

Image 3-1: NODE chair

In the group discussion, participants can choose to use one IEED from a range of devices in their group discussion, including MacBook Pro, *Windows* laptops, iPad, and desktop computer in front of the classroom. There is no specific learning software on the devices provided. However, both Chinese (Simplified) and English language inputs are available, and browsers such as *Safari*, *Internet Explorer* and *Chrome* are also available on the IEEDs.

Although students are given a specific pedagogical task, which is finding the answer to the topic question with peers and an IEED, they are not given any further guidance as to how they should complete the task. For example, when and how students

start the task and how they use the IEEDs all depends on the students themselves. As such, what students choose to is 'self-organised' and their interaction is naturally occurring. The investigation of this type of interaction can enhance the research into small group interaction in educational settings, as well as into the use of technology in interactions.

3.3 Data Collection and Ethical Considerations

The data for this study is made up of video recordings, audio recordings, and IEED-screen recordings. These forms of data were collected from each of 12 SOLE sessions from March to June 2016. A total of 80 hours of recording were made, resulting in 12 hours of interaction.

To capture the multimodality in interaction as much as possible, recording devices are placed at different places in the classroom. All recordings start prior to the sessions starts to make them as unintrusive as possible. There are four video recorders at each corner of the room and one wide-angle video recorder for recording the whole room. Audio recorders are placed on the *Node* chairs so that they can collect the audio of participants in a closer range when participants speak. In addition, all IEEDs provided (iPad, MacBook Pro, HP laptop, Dell laptop and Dell desktop) were had a screen, webcam, and audio recording software programs to capture participants' activities on IEEDs.

For interactions taking place at the discussion phase of SOLE, the audio and video recordings are synced by the researcher to obtain a better understanding of all the modes of resources participants use at the same moment, such as talk, body movement, what's happening on the IEED screen. These recordings were categorised by groups and marked with its participants. Discussions in each SOLE session were 20-25 minutes in length, and there were 28 groups in total over 12 sessions. Therefore, 10 hours of recordings of group discussion (computer and students' interaction) were collected.

During recordings, and in subsequent watching and listening, notes were made to the seating, placement of the IEEDs, and names of participants in the groups. This is used to help with the researcher obtaining an emic perspective in transcribing and analysis, particularly in identifying the voice of the participants and gaining a better understanding of participants' surrounding environments in interaction.

With regard to ethical considerations to all participants, all participants are fully informed about the recordings before their participation, and the consensual approval of using these data in the research are collected before data collection. Within this study, all participants are referred to with pseudonyms to ensure their anonymity.

3.4 Data Transcription

All the video, audio and computer recordings were listened to and watched through. In particular, the 10 hours of group interaction were transcribed using *Transana*, a CA transcription software. In the transcription, the conventions are developed on Jeffersonian CA transcription conventions and Mondada's convention of multimodal analysis (see Appendix A). This section will describe the transcription of this study in relation to the general principles of CA and multimodal transcription.

CA transcriptions of interaction serve one of the proof-procedure principles, as the recordings can be presented in the form of multimodal transcription, unaltered to readers, without access to original recordings (Ten Have, 2007). As discussed in Chapter 2, the multimodal transcription of the present study includes spoken interaction as well as the other modes of interactional practices like body movements and manipulating objects. Other forms of interaction are also presented in the excerpts, where participants make them interactionally relevant. These include but not limited to pointing, gazing, typing and clicking on the IEEDs. As Mondada (2007) pointed out, compiling multimodal transcription is a reflexive and interpretive process. In the present study, stills of video-recorded participants' bodily movement are embedded in the transcription with the highlights and marks indicating the bodily orientation. Screenshots are taken from the IEED screen-recordings when participants use verbal or embodied actions with the content on the IEED screen. Pictures of participants invoking other physical objects in the classroom are also included in the transcription, as well as their use of IEEDs.

One interesting feature of this data is the use of English and Chinese languages across all interactions. That is, to best represent the interaction, the transcription is not only multimodal but also multilingual. Due to the "self-organising" nature of SOLE, students could use both Chinese and English in all sessions. Both Chinese (Putonghua, also known as Mandarin) and English languages were used in talking and on computers.

Participants use Chinese search engine *Baidu* as well as *Google UK*. Chinese students are very familiar with *Baidu* as it is the most used search engine in China while *Google* is blocked in Mainland, China. With regards to transcription of non-English interactions, there are different methods used in CA, in terms of the use of original transcription, literal (or word by word) translation and idiomatic translation. For example, Bergmann (1992) uses only translations in the transcription and has the original language (German) transcription in appendix while researchers like Sorjonen (1996) includes the original language (Finnish), word by word translation and idiomatic translation in the transcription. Others use only original language and idiomatic translation in the transcription. In the present study, in order to best represent the sound and meanings of languages used in interaction, three lines are used when transcribing Chinese interaction. These lines are the phonetic transcription of Chinese language (Chinese Pinyin), word by word translation into English, and idiomatic translation into English. A glossary of Chinese conventions is also included in the study (Appendix B).

3.5 Data Analysis

The analysis of CA data starts with 'unmotivated looking' (Schegloff, 1996), as it is one of the fundamental principles of CA. That is, the examination of the interaction shall not be prompted by prespecified analytic goals but by the researcher's noticing of initially unremarkable features of interactional conduct. This principle of CA has been applied in the preliminary stage of data analysis in the present study. It starts at the first stages of data analysis, the listening to and synchronising of various recording data, and continues in the data transcription and building collections of excerpts with initially noticed features of interactional practices. After an initial transcribing of all students' interaction in their group discussions, the noticed features of these interactions are marked in Transana, and excerpts of the same features are built into collections. Although it is a time-consuming process, it becomes very useful when the particular interactional features are to be identified and returned to from the large data set (Heath *et al.*, 2010).

During the preliminary stage of data analysis, especially during the stage of building the collections of excerpts, the theme of students using IEEDs as the interactional tool in peer-interaction emerged. Comparing to other themes that emerged

from the data, this theme was consistent with the initial aims of the present study; exploring the systematics behind participants' use of IEEDs in peer-interaction in SOLE (as discussed in Chapters 1 and 2).

At this stage of the analysis, the collections with marked features of participants' interactional practices with the IEED clearly emerged as an area of interest. This is because this data gives clearer insight into the particular systematics in interaction (Hutchby and Wooffitt, 2008). As a result, the data was further categorised according to the various interactional functions of participants' practices with the IEED; *activity shift* and *epistemic search*, and the variations within these categories.

Therefore, two research questions arose from the transcription and initial analyses of the data. These questions are:

1. In what way(s) do students use IEEDs in order to carry out activity shifts in their group discussion?
2. In what way(s) are IEEDs used in epistemic search sequences during students' group discussions?

Consequently, the situated use of participants' interactional practices, verbally, embodied, and with IEEDs, are examined closely under CA principles through the excerpts in the related collections. These include but not limited to; adjusting the details of interaction presented in transcriptions according to the analytic focus, reanalysing and reorganising the excerpts depending on the emerging findings of different interactional features, and adding and deleting the analysis of the excerpts that become candidates for detailed analysis in the later analytical chapters (Chapters 4 to 6).

For instance, excerpts in Chapter 4 were selected during the observation of students' first use of IEEDs in their group discussion. These excerpts show the ways in which students use IEEDs to achieve two types of activity shifts; getting on-task and searching for information. In Chapter 5 and 6, all excerpts are selected from the collection, which includes the epistemic search sequences (ESSs) triggered by one student displaying insufficient knowledge of on-screen content. These excerpts indicate that information on screen can trigger participants' displays of their less knowledgeable epistemic status in relation to the on-screen information, and their request for help from peers. These excerpts of ESSs are divided into two chapters depending on whether or

not there is a participant with more knowledgeable epistemic status in the group to assist. Chapter 5 presents the ESSs where participants of the less knowledgeable epistemic status received an answer from the established more knowledgeable peers, while Chapter 6 presents the ESSs where no participant displays or claims a more knowledgeable epistemic status to initiation of the epistemic search.

3.6 Summary

In this chapter, the setting of the technology-assisted Self-Organised Learning Environment has been described, in terms of the research settings and the recruited participants in Section 3.2. Additionally, the data collection procedure is also described in terms of data recording and ethical considerations in Section 3.3. The transcription of the recorded data is described in Section 3.4, and the analysis procedure is explained in Section 3.5.

Having examined the research design and discussing the emergence of the analytic themes, it is appropriate to move on to the presentation of the data and its analysis. This will be done over the course of the next three analytic chapters.

Chapter 4. Activating the IEEDs for achieving key activities: getting ‘on-task’ and obtaining information

4.1 Introduction

This analysis chapter aims to shed light on the ways that the first time participants’ make the IEEDs relevant to their discussions in their group work. Typically, in these sessions, each group shares one IEED, with each student in the group having visual and physical access to it. Combining a range of vocal and embodied actions, participants in this study routinely rely on the shared IEED in two sequential environments: 1) when getting ‘on-task’ (i) and initiating the topic-related discussion (ii), and 2) when initiating a search for information when none of the participants knows (during topic-related tasks). The activation of the IEED in these two sequential environments serves different social functions in their interaction—getting ‘on-task’ and obtaining information. Their intention of participants using the device as a search tool becomes very clear after they include IEEDs in the interaction when they open the search engine websites like *Google* or *Baidu* (a Chinese search engine). This chapter is divided into two sections. The first section will focus on the use of the IEED when participants (i) initiating a pedagogical task, including the convergent actions such as coordinating embodied actions with vocal turns and (ii) getting back on task following ‘off-task’ activities. The second section will focus on the ways participants use the IEED to search for information when no one in the group can answer the topic-related questions emerges in their talk.

4.2 Activating the IEED to get ‘on-task’ with the pedagogical activity

This section will look at occasions when participants’ activate the IEED to shift from casual conversations to getting ‘on task’ with topic-related activities. As will be examined below, to achieve this acitivity shift, participants make use of a series of interactional strategies: vocal instructions or indications to initiate the task, body torque towards the IEED, and opening the browser/application. When using the device, participants explicitly state that they are doing so or just open a search engine (such as *Google* or *Baidu*) and type in keywords relating to the session topic.

4.2.1 *Activating the IEED to get 'on-task: a coordination of embodied and vocal actions*

To initiate the pedagogical task and search for information by using the IEED, participants typically undergo physical and verbal preparation. That is, in addition to frequent verbally announcing their forthcoming activation of the IEED, participants need to arrange their bodies into a position in which they can see the IEED screen and physically access the IEED to perform computer tasks, such as open an internet browser or a search engine webpage such as *Google*. Excerpt 1 below takes place at the very beginning of their group discussion. The group has three participants: Amelia, Frank, and Joanne. The transcribed interaction below begins after Amelia brings the laptop from the back of the classroom, and all three students arrange their seating to have visual and physical access to the IEED. This excerpt focuses on the vocal and embodied actions that participants use to initiate a movement to 'on-task' pedagogical activities. For clarity, the screenshots of the IEED screen and images of the participants have been embedded in the transcript. Red circles with yellow highlights are used to show the location of the cursor on the IEED screen, and yellow arrows and circles are used to show participants' physical movements. Additionally, an arrow (→) is used to show the moment when a participant initiates the use of the IEED.

Excerpt 1 let's start

¤FRAnk ⊕JOAnne ∆AMElia ※laptop screen


```
001     AME   wo yao ba zhe bian dengzi (.)#∆wo ye-

              I want to this way chair        I too
              I want to move the chair,       I want
        ame                                   ∆ moves chair forward ---->>
        fig                                  #fig.1
```


1

002 (1.2) Δ
ame >>---> Δ
003 JOA ((*tai bang le*)) *wo zai zhe houmian huzhe ta*#
very good CRA I at this behind protect 3SG
Very good. I will protect it from behind.
fig #fig.2


2

004 AME *en*↓
yes
yes
005 (0.4)
006 → FRA #⊕*kaishi ba*#⊕s
start PRT
Let's start.
→ joa ⊕ right palm up
fingers pointing
to the keyboard⊕
fig #fig.3 #fig.4


3


4

007 Δ⊕#(0.9)⊕ * #(0.5)*Δ
joa ⊕ looks at *right hand
FRA->⊕ signals the
laptop--->*
ame Δ leans forward and reaches
her hands towards the laptopΔ
fig #fig.5 #fig.6


5


6

008 AME *kaishi* [*yingyong* Δ((#*yixia*))] Δ
start application once
Start the application.
ame Δ clicks on
Chrome icon Δ
fig #fig.7
#fig.7a


7


7a

009 FRA [*yao zenme sou*]
should how search
How should we search?

010 AME *sou shenme*
search what
What to search?

011 JOA *jiu- zhijie sou wenti ba*
just direct search question PRT
Just search the question directly.

012 (0.5)

013 AME [*enm↓*]
yes
yes

014 FRA [*wo ye juede*]
I too think
I agree .

015 JOA ※⊕[*enm↓*]#⊕※
yes
yes

scr ※ *Chrome* win-
dow opens ※

In lines 1 to 4, Amelia and Joanne are arranging their sitting positions and the placement for the IEED. Amelia's verbal turn in line 1 indicates her desire to move the chair, and she starts the movement at the end of her turn. After Amelia stops moving her chair forward (line 2), in line 3, Joanne places her hands at the back of the IEED screen (fig.2) and utters '***wo zai zhe houmian huzhe ta***' (I will protect it from behind.) Both Joanne and Amelia verbally express their movements explicitly when adjusting their physical positions around the IEED. At this point, all three participants are sitting in a group together, and they are in physical positions that provide them with visual access to the IEED screen.

In lines 6 to 8, the participants initiate the pedagogical task as they get on-task from the off-task activity of arranging seats. In line 6, Frank's vocal turn and Joanne's body movement coincide. Frank's verbal instruction '***kaishi ba***' (Let's start.) tells the group to start the pedagogical task though without the clear indication of how to start it. At the same time, Joanne reaches her right hand forward (to Amelia) with palm up and

fingers pointing towards the laptop keyboard, which directs her peers' attention on the laptop and displays her intention for inviting them to use the laptop as the upcoming activity. Next, Amelia leans her upper body forward and reaches her hands towards the IEED (fig.6) as a clear response to Joanne's invitation to use the IEED. At the same time, after Joanne and Frank's turns (line 6) taking place at the same time, Joanne looks at Frank and repeats her hand gesture. Joanne's repeated gesture after Frank's verbal instruction demonstrates the non-conflicting designs of their turns—to initiate the pedagogical task.

In addition, Amelia announces her first action on the IEED as '***kaishi [yingyong ((yixia))]***' (Start the application.) at line 8, in align with Frank's earlier instruction 'Let's start.' (line 6). Therefore, both Joanne and Amelia use embodied resources to suggest using and use the IEED, and it coordinates with Frank's verbal instruction. What is more, Amelia's verbal turn in line 8 explicitly identified the group's first time activating the IEED, when the IEED is used not as a physical object to move around but as a technical object to assist the pedagogical task directly. Then, Amelia clicks on the *Chrome* icon in the taskbar on desktop (fig.7a). At this point, all three participants' postures change with their upper body lean forward toward the IEED and looking at the screen (fig.7). This shift of upper body orientation, body torque, is a sign of a shift in the interactional focus (Mondada, 2012), which now has turned away from talking to each other face-to-face to the interaction that includes the IEED.

In line 9, Frank asks the question '**[*yao zenme sou*]**'(How should we search?) after Amelia starts the *Chrome* application on the IEED, treating Amelia's action as trying to search for the session topic. This question displays Frank's alignment on searching for the session topic on the IEED as the initiation of pedagogical task, confirming the three participants' coordinated verbal and embodied actions and their projecting 'search' action. Later, they discuss what to search while the application is loading (lines 10-15) and carries the search after the loading completes.

Excerpt 1 shows an example of participants coordinated verbal and embodied activities which enables them to get on with the pedagogical task at the beginning of their group discussion. Although three participants take different approaches to initiate the pedagogical task—Frank gives verbal instructions, Joanne uses hand gestures suggesting to use the IEED, and Amelia activates the IEED, they are in concert with each other when proceeding the IEED activation in various ways and later making its

projecting 'search' activity explicitly in talk. It also shows how participants transit in different interactional spaces (line 3 fig.7), when the group interaction moves from face-to-face among participants to another one that includes the IEED.

4.2.2 *Using the IEED to get back on task following an insert expansion*

The transitions to pedagogical tasks by activating the IEED can be more complex than the above excerpt. Indeed, this section will look at instances where a task-related question or a technological delay occurs during the process of activating the IEED in an attempted initiation of the pedagogical task. On these occasions, participants withdraw themselves physically from the IEED and shift back to the conversational interaction where they bodily orient to each other until the task-related question is clarified or the technological delay disappears.

Excerpt 2 and 3 below demonstrate the instances where the participant(s) type and make clicking noises on the IEED to get back on-task following a clarification sequence initiated by another participant. These excerpts include participants seeking clarification of the topic question or the pedagogical task, in the process of other group member activating the IEED. During the clarification sequence, the use of the IEED is halted but is later activated when the clarification is achieved. The analysis below will focus on how these clarification sequences arise, how participants respond to them and some ways that the IEED is physically oriented to so as to get back on-task. Excerpt 2 is an example of how a first-timer participant, Bethany, checks with the group about the task requirements and initiates an insert-expansion seeking for clarification after William types in the *Google* search box. The transcription starts after the teacher introduced the topic question '*What is the NHS role in the UK?*' to the students and announces the beginning of students' group discussion.

Excerpt 2 so, we just answer that question?

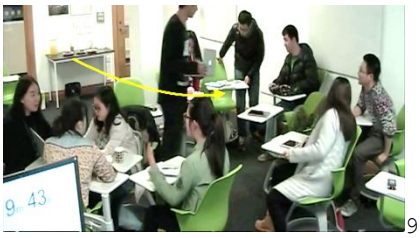
◇BEThany ⊕WILliam ⊥JAMes ※ MacBook screen

001 Φ #(2.6)# Φ

wil Φ walks towards his seat with MacBook Φ

fig #fig.8#fig.9


8


9

002 Φ#(1.0)Φ *# (1.4) * ^#(2.7)^

wil Φ sits down with MacΦ

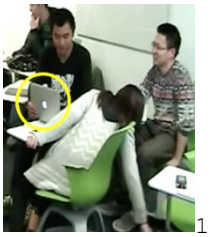
* puts Mac on BET's table *

^ adjusts the screen^

fig #fig.10 #fig.11 #fig.12


10

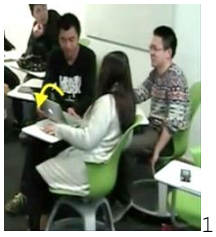

11


12

003 BET ◇ ah↓ ◇#

◇ sits up & sees MacBook on her table◇

fig #fig.13


13

004 Φ#(1.0) Φ * (1.2) * ^#(0.4)^

wil Φturns rightΦ

moves his table to-wards Mac

^turns upper body to-wards Mac^

fig #fig.14 #fig.15


14


15

005 → WIL Φ so: #Φ

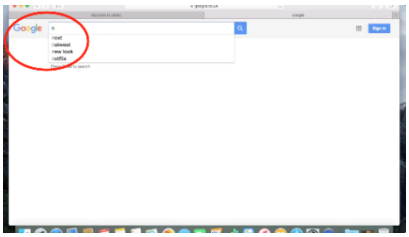
→ wil Φ types "n"

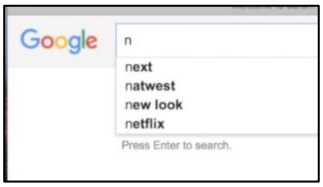
in *Google*
search bar**Φ**

fig #fig.16

#fig.16a

16





16a

006 **BET** **◇[we ju:st-] er: answer that question↑**

bet ◇ points to the whiteboard---------->>

007 **WIL** **[emmmm]**

008 **(0.5)**

009 **WIL** **yes**

010 (.)

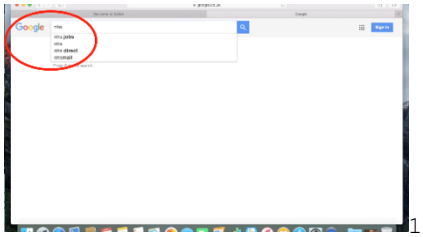
011 **BET** **okay↓ ◇**

bet ---->> ◇

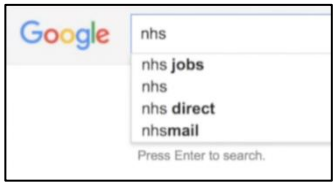
012 **Φ# (2.0) Φ**

wil **Φ** types "hs"
in *Google*
search bar **Φ**

fig #fig.17



17



013 **JAM** **((*shenme shi en eich es*))**

what is n h s
What is NHS?

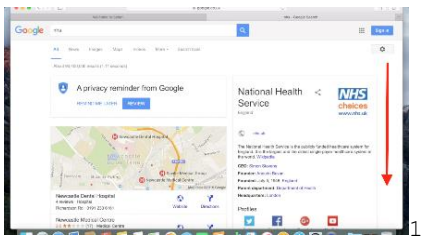
014 **(3.0)**

015 **WIL** **emmm**

016 **Φ (0.2) Φ #(1.0)**

wil **Φ** presses
"enter" key **Φ**

fig #fig.18



18

This excerpt begins with William walking from the back of the classroom back to his seat, holding the MacBook laptop in his hands (line 1). Then, he sits down and puts the IEED on Bethany's table (line 2). In line 3, Bethany sits up from picking her pen on the ground and with a notification token '**ah↓**', she expresses her noticing of the IEED placed on her table. Later, William adjusts his seats and turns his table towards the IEED (line4). Therefore, in lines 1 to 4, all three participants adjust their seating and bodies around the IEED and its screen. This preparation for the future use of the IEED comes ready at the end of line 5, where all three of participants are settled in positions with visual access to the IEED screen (fig. 15). During this time, the IEED is being manipulated as a physical object where the visual access to its part (i.e. screen) is a priority, and the IEED's technological capacity to search the Internet do not show any relevance in the interaction for now.

In line 5, William takes the floor with a stretched transition marker "**so:**" indicating a shift in focus and types the letter "n" in *Google*. William's action on the IEED is the very first time in the group when the IEED is used as a technological object to search for information, shifting from using the IEED as a physical object in seating arrangement earlier. At the same time, William's typing initiates the searching activity on the IEED. In addition, all three participants are looking at the screen (fig. 16) now after William's verbal and embodied actions, directing their attention to the IEED screen. The shift of participants' gazes indicates their transition into a new temporality and interactional space that includes the IEED and its screen.

From lines 6 to 11, Bethany initiates an insert-expansion and interrupts William's typing on the IEED. In line 6, Bethany to takes the floor and interrupts William's typing activity by asking '**[we ju:st-] er: answer that question↑**' and pointing to the whiteboard, where the session's topic question is written. It overlaps with William's hesitation marker '**emmmm**' in line 7, which is designed and fails to hold William's embodied turn of typing actions in interaction. Since Bethany's interruption takes place after seeing William typing in *Google* in line 5 (fig. 16), it is safe to infer that Bethany's treats William's typing as the pedagogical task initiation, and her insert-expansion is to enable her, as the first-timer participant, to understand the pedagogical task and ensure the progression of the task.

After a short pause in line 8, William provides a positive answer '**yes**' (line 9) to Bethany's question. In turn, Bethany acknowledges his response with acknowledgement

token '**okay↓**' in line 11 and put down her hand, which has been pointing at the whiteboard from line 6. Both of Bethany's verbal acknowledgement and withdraw of her hand indicate her acceptance of Williams' response and thus closes her initiated clarification sequence (insert-expasion).

With the insert-expansion closed, William's typing resume in line 12. He types on the IEED and finishes the keyword "nhs" in the *Google* search box. However, the search on the Internet will not be carried out without a click on the search icon or press the enter key on the IEED. This action of command on the IEED is not happening until line 16 as another group member, James, initiates another question in line 13. James's question 'What is NHS?' could be designed as a simple repetition of the session topic or a question that requires answers from peers. Follows by a 3-second long pause (line 14), this question does not receive any answer but a hesitation marker '**emmm**' from William (line 15), before William continues the search action on the IEED by pressing the 'enter' key (line16).

In this excerpt, William answers Bethany's question but gives little response to James' when responding to their questions during his search action. On the one hand, Williams holds the ongoing searching activity and response to Bethany's clarification request of the task requirement to ensure the progression of the pedagogical task. On the other hand, he does not respond to James's question; instead, he uses the IEED to get back to the pedagogical task and continues the search.

***

The above excerpt demonstrates the interactional sequence of one participant (William) takes control of the laptop before and after the insert-expansion, while the next one shows an example of different participant initiates and resumes the process of activating the IEED. Excerpt 3 takes place at the beginning of the group discussion of '*What is the NHS' role in the UK?*' among Elizabeth, Frank and Jack. Jack's activation of the iPad is halted after Frank's request for clarification of the topic question written on the whiteboard. After clarifying, Elizabeth presses the *Google* icon in *Safari* on iPad and resumes the activation of the iPad.

Excerpt 3 what is written on the board?

§ELIzabeth ¤FRAnk ±JACk ※ iPad screen

001 §# **(3.2)** §#

eli §walks back to seat with iPad§

fig #fig.19 #fig.20

19


20

002 **JAC** ***na*** **(0.2)** **[*women*:]** **[*san ge*:]**

so we three CLS

So, we, three

003 **ELI** **[>okay↓<]** §#**[shall we]** ¤**be a group↑**¤

eli § looks at FRA

fra ¤ nodding------->¤

fig #fig.21


21

004 # **(3.2)** #

all participants moves the chair towards the group center

fig #fig.22 #fig.23


22


23

005 **FRA** #°***heiban shang xie de shenme ya mei kandao***°

blackboard on write ASC what Q not see

What's written on the blackboard? I can't see.

fig #fig.24

24

006 ±# **(1.0)** ±

→ jac ± picks up the iPad ±

fig #fig.25

25

007 **ELI** **im so§#rry↑**

eli §leans forward--->>

fig #fig.26

26

008 **FRA** **±¤ *heiban*#± *shang xie de shenme¤ dong*[*xi a*]§**

blackboard on write ASC what thi[ng Q]

What is written on the balckboard?

fra ¤ head turns towards the whiteboard ----> ¤

jac **±** heads up-> **±**

eli >>----------> §

fig #fig.27

27

009 **ELI** **[oh↓] en eich es**

010 **(0.3)**

011 **ELI** §**nae-# national health service**§

eli § points her pen towards whiteboard-------> §

fig #fig.28


28

012 (1.0)

013 JAC role↓ in the uk↑

014 (0.5)

015 ELI em↓ huh↑

016 (1.0) ¤(0.5)#¤ (1.8) § (0.2)# § ※(2.6)※ ± (2.0)# ±

fra ¤ nods ¤

→ eli §press *Google* icon on iPad§

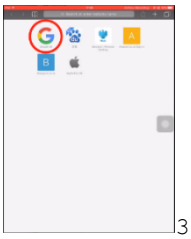
scr ※*Google* homepage opens ※

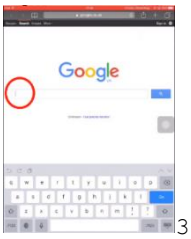
→ jac ± puts cursor in *Google* search box ±

fig #fig.29[4] #fig.30 #fig.30a #fig.31

29


30


30a

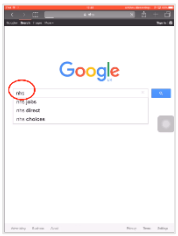


31

017 JAC ɬen eich es#±

jac ± types "nhs" in *Google* search bar±

fig #fig.32



32

[4] The first person on the left in Figure. 29 is the teacher in SOLE sessions. She is passing by.

Excerpt 3 starts with Elizabeth taking the iPad from the back of the classroom to her seat and putting it down on the table (line 1). Then, Jack initiates the talk and suggests that the three of them should form into a group (line 2), overlapping with Elizabeth's same suggestion in line 3. After verbally expressing their intention to form into a group, all three participants move their chairs towards the centre of the group in line 4 (figs.22 and 23).

In line 5, Frank asks for help with reading the words written on the whiteboard (fig.24), where the teacher wrote the session topic '*What is the NHS' role in the UK?*' before the discussion. As fig.24 illustrates, it is difficult to see the whiteboard from Frank's position and therefore, his request for information. Unfortunately, Frank produces the question in a rather low volume in line 5. Likely, because of this, there is a lack of response from Jack and a repair initiation from Elizabeth indicating trouble for hearing (line 7 and fig.25). Jack picks up the iPad in front of him (line 6) immediately following Frank's turn. It is not until Frank repeats his question (line 8) that Jack notices that Frank was speaking. Jack, therefore, lifts his gaze from the iPad screen (fig.27) and shifts his focus from the iPad to the interaction with his co-participants, thus putting the initiated action of activating the iPad (fig.25) on hold.

The beginning of this question-answer sequence is occurring concurrently with Jack's activity on the IEED. However, without responding to Frank's information request, the topic question and task from the teacher would still be unclear for Frank and may lead to potential issues for the group to start and work on the pedagogical task. Therefore, it is not only reasonable from interactional perspectives for Jack and Elizabeth to answer Frank's question before activating the IEED and initiate the pedagogical task, but also pedagogically wise for all participants to understand the session topic as part of the pedagogical task in order to complete it.

While Frank repeats his question (line 8) in response to Elizabeth's hearing check, he also uses body resources with head turn and pointing to the whiteboard to locate the origin of his problem (fig.27). Next, Elizabeth uses the change-state-token '**oh↓**' in line 9, demonstrating her recipient of Frank's question and then reads part of the writing on the whiteboard '**en eich es**' (line 9) and '**nae-# national health service**' (line 10). At the same time, her upper body has changed from leaning forwards (indicating trouble for hearing from line 7) to the neutral position (fig.28), indicating the end of her hearing check activity. Later, Jack makes up the rest of the writing Frank requests with

'**role↓ in the uk↑**' (line 13) and receives Elizabeth's acknowledgement in line 15. After a 1 second pause, Frank displays his receipt of the information by nodding (fig.29 in line 16) and looks down to the IEED screen. Frank's shift of gaze also implies his shift of focus from the face-to-face interaction to the use of the IEED.

After Frank's nodding to acknowledge the information and close the information request initiated sequence, Elizabeth reaches her left hand to the IEED in Jack's hands and presses the *Google* icon (line 16, fig.30). Until this moment, the IEED is not used in the interaction by anyone since Jack's attempt in line 6. By pressing the *Google* icon, Elizabeth displays her intention to use the iPad as a technological object and using *Google* to search for information. Coordinating with her action on the IEED, Jack clicks (fig.26) and types "nhs" in the *Google* search box (fig.32, line17) and read-aloud his typing to the group.

In this excerpt, the activation of the IEED has been put on hold to clarify a group member's information request of the session topic. Group members withhold the ongoing sequence of activating the IEED as a search tool to get every member of the group on the same page about the pedagogical task. It is clear for all three participants that activating the IEED is the opening to the pedagogical task in their group. This can be found in three places in the excerpt, 1) Jack's pre-enactment of the iPad after group formation and resumes search on it after the interruption sequences; 2) Frank's body orientation to iPad after displaying his receipt for information; and 3) Elizabeth pressing the *Google* icon on iPad after the end of the interruption sequence.

Both Excerpt 2 and 3 demonstrate instances where participants' treat the use of an IEED as a trigger for initiating topic-related discussions. Getting back on-task following insert-expansion sequences is achieved by using embodied actions on the IEED such as clicking and pressing buttons on the IEED. However, using the IEED is not the only way found in this study to initiate a pedagogical task or get on-task.

***

Excerpt 4 demonstrates two types of task-initiation in the discussion; (i) searching for information related to the session topic on the IEED and (ii) discussing the session topic with peers. Two participants, Amelia and Michelle, attempt to initiate the pedagogical task of finding the answer to the topic question in these two different ways.

A technical delay takes place in this excerpt, as the *Chrome* software loads up during the activation of the IEED (i.e. *Windows* OS laptop). Amelia, who initiates the activation of the IEED, joins the topic discussion activity (initiated by Michelle) of the session topic '*What does royal family do?*' with Michelle, during this technical delay but manages to get back to the IEED and search for information on the session topic once the IEED is ready.

Excerpt 4 what do they do?

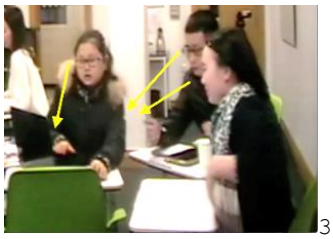
⊙MIChelle ΔAMElia ±JACk ※laptop screen

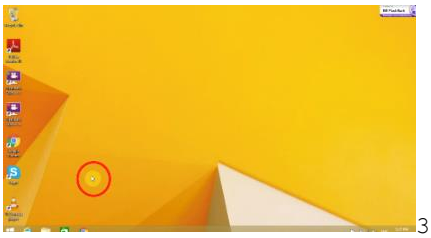
001 #※ **(1.5)** #※

→ scr ※AMEmoves the cursor-->※

fig #fig.33 #fig.34 #fig.34a


33


34

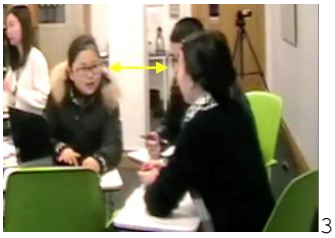

34a

002 **MIC** ※#**what**※ **do they do**↓ #

scr ※AME cli-cks Chro-me icon ※

fig #fig.35 #fig.36 #fig.35a


35


36


35a

003 AME .hhhh#

fig #fig.37


37

004 MIC do you have Δ any ideas ↑ #

ame Δ looks at MIC----->>

fig #fig.38


38

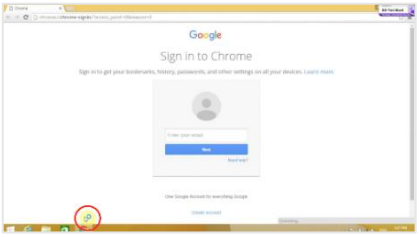
005 AME ※ emm:: ※ last time i saw- i: watched the news abou:t the

scr ※new window opens-->※

006 AME ※you know the※# william and the kate went to the france and

scr ※*Google* sign in page opens ----------> ※

fig #fig.39



39

007 AME .hhh they published their (.) price and princess

008 AME the pictures in the france in the(.)* it's very Δ beautiful# Δ

ame >>----------->>* Δ turns to screen Δ

fig #fig.40


40

009 AME Δ have you seen that ↑ # Δ

Δ gazes at MIC----------> Δ

#fig.41

41

010 (0.4)

011 MIC no

012 AME Δ i- i# Δ will show you↑ its very ※ (0.2) ※# beautiful

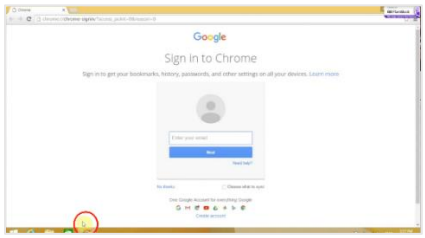
→ ame Δ turns to screen Δ

scr ※ AME clicks on new tab※

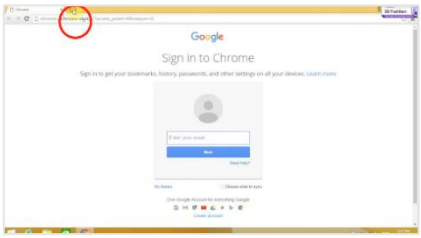
fig #fig.42 #fig.43

#fig.42a

42



42a



43

013 AME but (.) its (0.2) ※#isn:t※ didnt related to the topic

scr ※ new tab opens-->※

014 AME I think we need to: Δ err look into a lot of aspects to

ame Δ looks at MIC---------->>

fig #fig.44

44

015 AME for example the politics or the environment o[r:] Δ

ame >>----------> Δ

016 MIC [ri]ght↓

017 AME Δ※ yeah # ※Δ

ame Δ looks at screen Δ

scr ※ AME clicks in search bar ※

fig #fig.45

#fig.45a

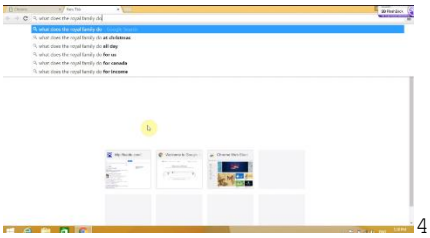

45

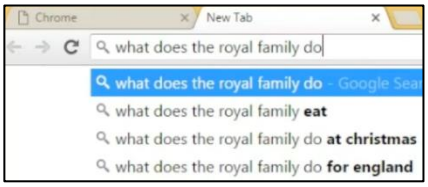
45a

… ((8 lines of transcription omitted teacher placing the voice recorder on the table while amelia types 'what does the royal family do' in adress bar))

025 **(0.5)** #

fig #fig.46


46



Excerpt 4 starts with Amelia, Jack and Michelle finishing the arrangement of their seats, and then they raise their upper bodies to face the IEED screen (fig.33). At the same time, Amelia touches the touchpad and activates the cursor on desktop (fig.34a) with Jack and Michelle looking at the screen (fig.34). Seeing Amelia's body orientation to the IEED, Michelle initiates a question '**what do they do↓**' on the session topic at the same time as Amelia clicks the *Chrome* icon (fig.35a) in line 2. Michelle's action could be a simple repetition of the topic question or a question seeking a response. While the former serves as a supporting turn for Amelia's searching action in next, the later one is initiating a competitive activity which attracts or splits participants' attention away from the IEED.

At the end of Michelle's turn, Amelia shifts her gaze from the IEED screen to Michelle (fig.36), showing her receipt of the question. Then she takes an in-breath at line 3, indicating her being ready to take the floor. At the end of her in-breath, Amelia turns back to the screen (fig.37) to check the progress of *Chrome* loading, which bodily demonstrates her engagement in two types of interactions—with peers and with the IEED. Seeing the display on the screen is not changed (same as fig.35a), Amelia must realise the *Chrome* software is still loading and thus unable to use at this moment.

Watching Amelia's embodied movements and orientation back to the IEED screen (fig.37), Michelle takes the floor in the next turn and reforms her first question into a polar interrogative '**do you have any ideas↑**' (line 4). By looking at Amelia (fig.37) to select her as the next speaker and the reformulation of the question, Michelle clearly displays her intention in discussing the topic. In response to Michelle's next speakership selection and with the confirmation of the software loading (fig.37), Amelia turns her gaze at Michelle (fig.38) and engages in the talking activity from line 5.

After producing a long answer to Michelle's question in describing the news of royal family's visit to France from line 5 to 8, in line 9, Amelia shifts her gaze from Michelle to the screen (fig.40), checking the progression on the IEED. At this point, the *Chrome* window has been displaying the *Google* sign-in page on the laptop from line 6 (fig.39). Knowing the laptop is ready, Amelia turns back to Michelle in line 10 and asks whether Michelle has seen the news pictures before. This is a pre-offer that prefers a negative answer so that the offer of using the IEED and showing new pictures for Michelle can come later. With Michelle producing the preferred answer '**no**' in line 11, Amelia turns to the IEED screen and offers to show the picture (line 12). Her body orientation towards the IEED (fig.42) and opening the new tab in *Chrome* (fig.43), demonstrates her re-engagement with the IEED since line 4.

In line 13, Amelia changes her mind of showing the news pictures on the IEED in relation to Michelle's question. With the reason of '**its (0.2) ※#isn:t※ didnt related to the topic**', suggesting that showing the news pictures is not session-topic-related or task-related, Amelia shifts the topic and activity from Michelle's discussion on the session topic back to her initiated activity—searching ('**look into a lot of aspects to**') the session topic (line 14). Amelia's turns (lines 13 to 15) successfully shifts the focus of their interaction from discussing the news about the royal family to the search of the session topic on the IEED. After Michelle's agreement in line 16, Amelia produces a sequence closing third—agreement token '**yeah**' to their earlier topic on the royal family while turns to the IEED and clicks on the address bar (line 17). At this point, Amelia closes the question-answer sequences initiated by Michelle and gets back on her initiated activity of searching on the IEED. After a few lines, she types in the topic question and executes the search in *Google* (line 25).

This excerpt shows an example of participant putting the course of searching on the IEED on hold while the software is loading as well as Amelia's effort to get back on

it from the competitive task-initiation activity (discuss the session topic among peers) once the IEED is ready. Being different from Excerpts 2 and 3 where IEED being ready when the insert-expansion takes place, participants in Excerpt 4 are not able to move forward with the search while the software is loading. Apart from that, all three excerpts in this section show how participants use the IEED to get back on the searching activity on the IEED as the pedagogical task initiation after the insert-expansion or software loading (technological delay) completes. In short, in these interactions, the IEED is planned to be employed as a search tool at the beginning of students' group discussion, and it is also used as a resource to get back on-task after interactional problems occur.

4.3 Activating the IEED as an epistemic resource to obtain information

As displayed in Excerpt 4, apart from searching for the topic question on the IEED, participants can start the pedagogical task by brainstorming and discussing without any use of the IEED. In this section, two excerpts will be analysed in which participants start the pedagogical task by sharing their knowledge about the session topic by merely talking, before activating the IEED. In other words, participants initiate the discussion by just talking about the topic question, but then progress its development by activating the IEED as an additional resource for knowledge. On these occasions, an IEED is only activated when a question occurs in the group discussion, which cannot be answered by any of the participants, as a new epistemic resource to search the answer to that question. That is, the IEED can be utilised when the knowledge resource of the speaking participants are treated as being insufficient to reaching epistemic equilibrium (Heritage, 2012c). This enables participants to achieving higher epistemic positions on the referent knowledge by working as a group after reaching the limits of their pre-existing knowledge.

The spatial arrangement of participants' seating is different in this section. Although they sit around the IEED, the visual accessibility of the IEED screen in these interactions is not essential until the IEED is invoked, as participants are interacting face-to-face until they need to use the IEED. When the question arises during their discussion and the information needed cannot be found by the talk alone, participants will initiate the search activity on the IEED and shift their focus and physical orientation towards the IEED screen.

To offer a detailed analysis of participants' transition from talking to each other to invoking the IEED, this section will analyse two instances in the following, which both display the requests and actions to search on the IEED after a problem arises. Excerpt 5 below takes place where three participants, Jack, James and Helen, are discussing the topic question '*What does this mean?* 🏴'. James initiates a question on the St. George's flag in the session topic and neither Elizabeth nor Jack can provide an affirmative answer to it. Helen then uses body and verbal resources to suggest searching it on the iPad, the IEED in their group. This is the first time that the IEED is used in this group. The initiation of using the IEED as a technological object has been highlighted with an arrow → in the transcription.

Excerpt 5 just search, just type

±JACk ⊥JAMes ☆HELen ※iPad screen

011 **JAM** ***zhe ge shi:*** ⊥#***yinggelan de guo qi me***⊥
this CLS be England ASSC nation flag Q
Is this the national flag of England?
jam ⊥ head turns to JAC----------> ⊥
fig #fig.47


47

012 **HEL** ***eii***±#**[*ii*::]**#
ummmm
ummmm
jac ± heads up the turns towards JAM---->>
fig #fig.48#fig.49


48

49

013 **JAC** #**[*ta shuo*] *shi jiu shi le***±☆
3SG say be just be CRS
She (the teacher) said so, so I guess so.

jac >>----------> ±
hel >>----------> ☆
fig #fig.50


50

014 → HEL ☆±#*cha* *yixia lo* (.)± *jiu shu*-☆
search once PRT just type
Just search, just type.
→ hel ☆upper body turns left and points her pen on iPad☆
jac ±head turns to neutral position±
fig #fig.51


51

015 HEL *kankan* ±#*yinggelan guo* *qi* *shibushi*± *zhe* *ge*
have a look England nation flag whether this CLS
Let's have a look whether the national flag of England is like this.
→ jac ±turns iPad towards himself----------> ±
fig #fig.52
#fig.52a


52


52a

016 ±# (0.6) ±
jac ± clicks in address bar±
fig #fig.53
#fig.53a
#fig.53b


53


53a


53b

Excerpt 5 starts with line 11, where James initiates a question that seeks the confirmation on his understanding of the St. George's Cross in the session topic—whether it is the national flag of England. Unfortunately, Helen's hesitation marker (line 12) and Jack's reference to the teacher (line 13) shows that neither of them has the knowledge to answer James' question. While Helen produces a hesitation marker to hold the floor and bodily engaged in the note-taking activity, Jack looks at James and responds to his question with '**[*ta shuo*] *shi jiu shi le***' (She (the teacher) said so, so I guess so.) in line 13. Jack's response to the question is not a confirmation but a deduction based on the teacher's epistemic authority on British culture.

In line 14, Helen proposes the group to '***cha yixia lo (.)jiu shu-***' (Just search, just type.), while she stops the note-taking activity and shifts her upper body's orientation—turning to the iPad and pointing her pen at the iPad screen (fig.51). It is clear that at this point that none of the participants in the group displays sufficient knowledge to answer James' question. This is when participants' own epistemic resource, their own knowledge, can no longer help them answer the question. Helen employs both verbal instruction and embodied resources to invoke the iPad in their interaction during her turn in line 14, thus initiating the transition of the interaction from face-to-face to a different temporality that includes the IEED. During her talk in line 14, Jack turns his head from facing James (on Jack's right side) to the neutral position, from which he can see Helen's body torque and pointing.

In line 15, Helen continues her turn and explains how and why they should invoke the IEED and carry out the search—'Let's have a look whether the national flag of England is like this.', in Chinese. That is, her aim to use the iPad is to use it as an additional epistemic resource to obtain new information. Jack takes action in the middle of her explanation and turns the IEED towards himself (fig.52). This action displays his agreement with Helen's proposal and pre-enacts his future use of the IEED. At this moment, all three participants are looking at the IEED, and their body engagement with the IEED is clear. In line 16, Jack continues to use the IEED and clicks the address bar in the browser, *Safari* (fig.53), clearly displaying his intention to use the IEED to search, as Helen suggested.

The above excerpt is a clear example of participants' engagement in the process of the pedagogical task, as they discuss the session topic among themselves, not resorting to the use of the IEED, until they encountered a question, they cannot answer

with their own pre-existing knowledge. When initiating the use of the IEED, participants transit from face-to-face interaction to a different spacial environment that includes the IEED. This transition is demonstrated through verbal turns and embodied actions, such as pointing, touching and pressing the IEED. They also demonstrate their joint attention to the IEED screen with gazing and body torque, after invoking the IEED in their interaction.

***

The following excerpt shows a similar circumstance where participants use the IEED (i.e. a *Windows* OS laptop) for the first time in their discussion to obtain information when they do not display sufficient knowledge to answer a question in the course of their task progression. Chloe, Jack and Frank were discussing the potential aspects which they can explore the session topic—'*What are the traditions surrounding death in the UK?*' in Excerpt 6, where Jack indicates that he does not know much about the hospital system in the UK. Chloe initiates the use of the IEED during Jack's indication of having insufficient knowledge and later proposes to search for it on the IEED.

Excerpt 6 what do you want to look for?

◎CHLoe ¤FRAnk ±JACk ※ laptop screen

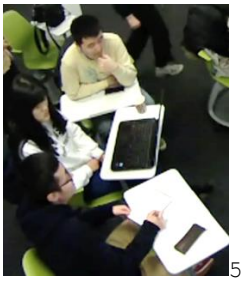
001 CHL ***zanmen ◎#zhe dou shi guanyu zangli de#◎***

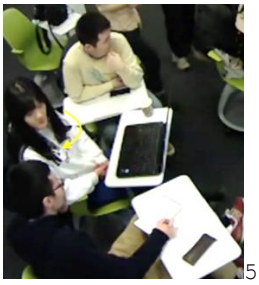
we this all be about funeral ASSC

What we have talked are all about the funeral.

chl ◎head turns to JAC---------->◎

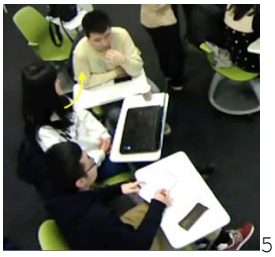
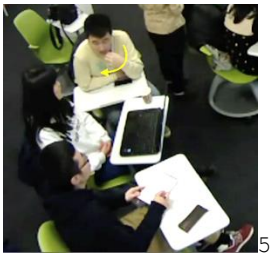
fig #fig.54 #fig.55


54


55

002 (0.6)

003 CHL ◎*en*↓ # ***dui*** ¤[***zangli***◎#***ranhou***] ¤
yes right funeral then
Yes, right, funeral, then
fra ¤ head turns to CHL---> ¤
chl ◎head turns to FRA--------->◎
fig #fig.56 #fig.57


56

57

004 JAC [*en*↓ ***dui*** ***dui***]
yes right right
Yes, right, right.

005 (0.2)

006 FRA ±err[rrr:]

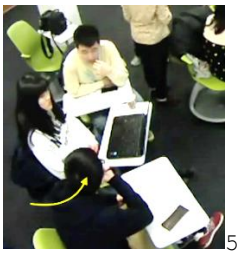
jac ±leans forward and looks at FRA--->>

007 CHL [***zhihou***] ◎# ***zhihou*** ±◎
then then
then then

chl ◎turns to JAC◎

jac ------->>±

fig #fig.58


58

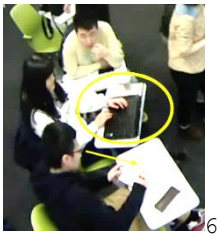
008 (0.8)

009 JAC ***tamen zhe- yiyuan*** °#***yiyuan***° ±***yiyuan*** ***de*** ◎#***tizhi***±◎
they here hospital hospital hospital ASSC system
The hospital, hospital, hospital system here,

jac ± looks down to notes------> ±

→ chl ◎hands on touchpad◎

fig #fig59 #fig60
#fig59a


59

60

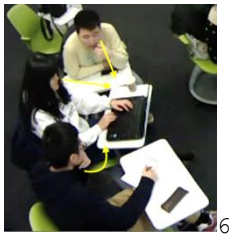

59a

010 JAC ◎#***wo ye bu tai qing[chu]***◎
I too N very clear
I am not very clear.
chl ◎moves cursor to *Chrome* icon--> ◎
fig #fig.61


61

011 → CHL ◎# [en] en◎ ***ni shuo ni yao¤ *cha #shenme****
okay okay you say you want search what
Okay. Okay. Tell me, what do you want to search?
chl ◎moves cursor towards *Chrome* icon ◎
fra ¤looks at the laptop-->>
chl *clicks on *Chrome* icon *
fig #fig.62 #fig.63
#fig.62a


62


63


62a

At the start of the excerpt, Chloe summarises what the group has just discussed as '***dou shi guanyu zangli de*** (all about the funeral)' (line 1) and turns her head to Jack during her talk (fig.55). Her body torque and gaze select Jack as the next speaker, in turn, seeking agreement from him. However, Jack is looking down at his notes and is not aware of her gaze. Meanwhile, Frank seems distracted and looks away from the rest of

the group (fig.55) therefore, the lack of response in line 2 comes as no surprise. Chloe then continues with a self-confirmation and two transition markers 'then' to advance their progression of the discussion (line 3). During her talk, Chloe turns her head towards Frank, who has now brought his attention back to the group turning his upper body back to a neutral position (fig.57). Agrees with Chloe's summary in line 1, Jack's delayed response to her comes in line 4, overlapping Chloe's repeated transition marker. After a micro-pause (line 5), Frank produces an elongated hesitation marker '**errrrr:**' to hold the floor (line 6) and this overlaps with Chloe's self-repaired transition marker '**[*zhihou*] *zhihou*** (then, then)'. Both Frank's hesitation marker and Chloe's self-repair indicate trouble while demonstrating their attempts to take the floor and advance the progression of their topic-question-related discussion.

In line 9, Jack takes the floor and initiates a new topic of 'hospital system here' to progress the discussion from the 'funeral' aspect (line 1) of the topic question 'death'. The three repetitions functioning as self-repairing of the word '***yiyuan*** (hospital)' indicates trouble in his speech. At the same time, Jack starts to look down to his notes to find some information supporting his talk (fig.60). Seeing Jack's verbal and embodiment turns suggesting trouble on the new topic 'hospital system here', Chloe moves her hands to the touchpad on the IEED (fig.60) and bodily displays her intention to use the IEED, possibly in support of Jack's topic. In line 10, Jack explicitly expresses the problem in his earlier interaction (line 9) on the new topic as '***wo ye bu tai qing*[*chu*]**' (I am not very clear.) At the same time, Chloe moves the cursor icon on the IEED screen towards the *Chrome* icon (fig.61) and later verbally display her receipt of Jack's problem with talk, two acknowledgement tokens '**[en] en**' (Okay. Okay.), as well as her intention to use the IEED to search for information for Jack—'Tell me, what do you want to search?' in Chinese (line 11). When her turn comes to an end, Jack turns his gaze from his notes to the laptop screen. At this point, all three participants are looking at the screen. Their orientation has shifted from each other to joint attention on the laptop.

From line 7, Chloe's upper body has turned to Jack, indicating her engagement in the interaction with Jack and her receipt of Jack's verbal and embodied actions with the body torque. In line 9, she stretches her hands to the IEED's touchpad when Jack said the word '***yiyuan*** (hospital)' for the third time. In addition, she starts to move the cursor to *Chrome* icon on the screen when Jack's turn comes to an end in line 10. Her action of reaching for the IEED (line 9) indicates her recognition of trouble before Jack makes it

explicit in line 10 when he admits he is not clear about the hospital system. By using the IEED and moving the cursor icon towards *Chrome* icon, she displays her intention to solve Jack's problem by searching for information on the IEED. In addition to the embodied actions, Chloe verbally implies her intention to search for the question Jack raised '***ni shuo ni yao cha shenme***' (Tell me, what do you want to search?) and bodily initiates the search by clicking *Chrome* icon on the IEED (line 11).

In this excerpt, there is a clear division in the participants' body movements before and after Jack's topic shift. The interaction from line 1 to 8 is mostly conversation-based, and the embodied actions demonstrate participants' body orientation towards each other, such as head turns and gaze. Although the IEED (laptop) is opened (physically) and is placed in front of all three participants from the beginning of this excerpt, it is not immediately included in the interaction. It is from line 9 where the laptop is used for the first time. After Jack's self-repair, low volume speech and repetitions of the word '***yiyuan*** (hospital)' indicates his hesitation and uncertainty of the information, Chloe uses embodied resources to invoke the IEED, then making her intention to use it as a search tool clear through her talk. At last, all three participants turn to the IEED screen and bodily demonstrate their engagement in the new activity of using the IEED as the additional epistemic resource to search for information.

4.4 Summary

This chapter examines participants' first use of the IEED in their group discussion. Two patterns are found when participants activate the IEED for its technological affordances. The first pattern is to use the IEED to search for the topic question at the very beginning of their discussion. Interactionally, this process of IEED activation also serves as the initiation of participants undertaking the task. In the process of activation, the IEED can also be used as a resource to help participants get back on-task when an interruption occurs. The second pattern of IEED activation is after participants have begun discussing the topic question. The IEED is activated when a question arises, and the information cannot be obtained through talk alone. In these cases, the IEED is activated as an additional resource for information and participants transit from a more conversational based interaction to one that includes the IEED. Participants'

demonstrate this transition from mostly head turns and gazes towards peers when discussing, to body torque and gazing towards the IEED screen when searching.

Chapter 5. '*How to understand it?*': On-screen information triggering participants' epistemic claims and prompting other participants' help

5.1 Introduction

The previous chapter investigated the ways in which participants utilise the IEED at the beginning of their discussion as a resource for getting 'on-task' and searching in the search engine for new information. In this chapter, the focus is on participants' reaction to information being presented on the IEED screen that they treat as being 'unknowing' or 'less knowing'. These claims of 'unknowing' or 'less knowing' (K-) epistemic status, triggered by aspects of the on-screen contents, in turn, prompt help from the participants with 'knowing' or 'more knowing' (K+) epistemic status. This chapter argues that new information on-screen is a clear drive for the epistemic engine (Heritage, 2012) and a series of interactions in which students display their levels of understanding and prompt the (possible) more knowing students providing the sought after information to achieve a group understanding. Section 5.2 examines the ways in which an 'unknowing' (K-) epistemic status claim serves as a request for information from participants who potentially have the K+ epistemic status regarding the referent on-screen content. Section 5.3 uncovers the ways participants invite confirmation from the 'less knowing' (K-) epistemic stance on their understanding of certain content on the screen, as discussed by Raymond and Heritage (2006).

5.2 IEED screen contents triggering unknowing epistemic status claims and information requests (IRs)

This section examines the epistemic search sequences (ESSs) (Jakonen and Morton, 2015), in particular, where participants claim the unknowing (K-) epistemic status and project their lack of knowledge about the referent contents on the screen. The epistemic domains in this section are the English language (Excerpt 7, 8 and 9) and 'Scottish culture' (Excerpt 10) related knowledge. Participants claiming K- epistemic status use wh-interrogatives (Heritage, 1984b) to both (i) index an unknowing epistemic status/insufficient knowledge of the content and (ii) request information from the other

participants. After the K+ status participants provide information, the K- initiators acknowledge their receipt by repeating and demonstrating understanding.

In Excerpt 7, Jack, Joanne and Lauren are reading from the IEED screen at the beginning of the transcribed interaction below. The topic question of the session is '*What happens on April Fool's day in the UK?*' Lauren initiates the epistemic search sequence in Excerpt 7 with a K- epistemic status claim relating to her (lack of) understanding of an English language clause displayed on the IEED screen. Her initiation of an ESS halts the group's ongoing activity of scrolling down and reading the contents of the screen. Indeed, it prompts help from Frank, a participant with K+ epistemic status. For clarity, screenshots of the IEED screen are embedded in the transcript. Emphasis has been placed on the relevant parts of the screen (as shown in the embedded screenshots) with red rectangles highlighting the parts of the screen to which participants are referring to. The onset of the K- epistemic status claim has also been highlighted with an arrow: →.

Excerpt 7 how to understand it?

±JACk ⊕JOAnne ƕ LAUren ※ laptop screen

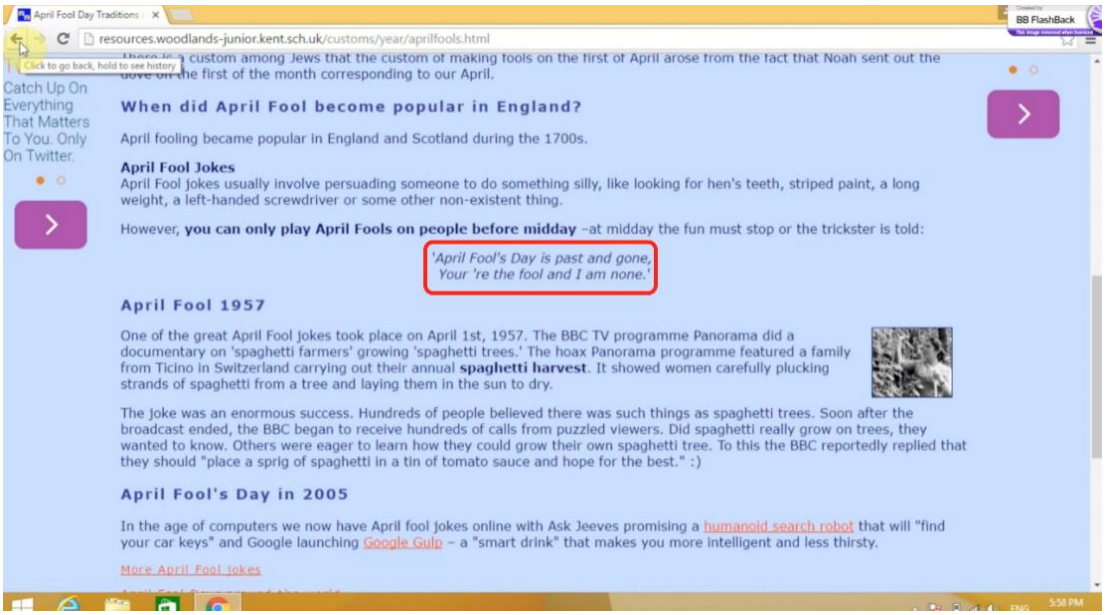


Figure. 64a

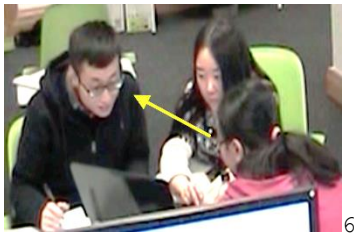
001 → **LAU** ŧ※ #***na zheige*** **%im none%** ***shi zenme zenme lijie a***#
then this %im none% is how to how to understand Q
Then, this, **%im none%,** how to, how to understand it?

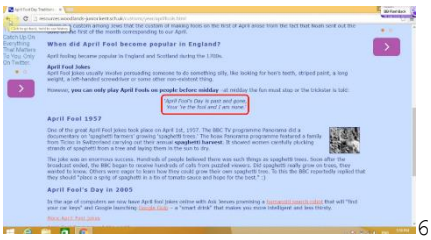
lau ŧ heads up and looks at JAC ---------->>

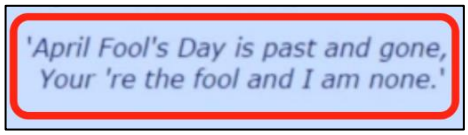
scr ※ JOA scrolls down the webpage------>>

fig #fig.64 #fig.64a #fig.65


64


65


64a



002 # ±**(0.2)** ※ **(0.8)**± #***(2.0)***

scr ---------- >>※

jac ± looks at lau------->> ±
***looks at
the screen***

fig # fig.66 #fig.67


66


67

003 **JAC** ***wo bu shi wo bu shi shabi***
I N be I N be fool
I am not, I am not a fool.

004 **(0.3)** ŧ

lau ------>>ŧ

005 **LAU** #ŧ **huhuhuh.** ***wo bu shi sha°bi°*** **hehe**
I N be fo°ol°
I'm not a fool.

lau ŧ looks at the screen-------->>

fig #fig.68


68

006 **JOA** ***kanyixia kanyixia kan hai you mei you biede***
have a look have a look look also have N have other
Have a look. Have a look. Let's have a look at whether there are also other information.

In line 1, Lauren takes the floor with a Chinese transition marker '***na*** (then)' when all participants are looking at the screen (figs.64 and 64a). This indication of topic shift is followed by the demonstrative pronoun '***zheige***' (this) and the later read aloud '**%im none%**'. Here Lauren identifies 'I'm none' as being the subject of her talk— clearly linking her talk to part of the contents of the screen (see fig.64a). Lauren continues her turn with '***shi zenme zenme lijie a***' (how to, how to understand it?). Lauren's 'wh-interrogative' (Raymond, 2003) draws attention to her displayed lack of knowledge, unknowing epistemic status, in relation to this formulation that lies in the domain of English language. By uttering this wh-interrogative, Laura initiates the ESS and invites help from a potential K+ participant. Moving her gaze away from the IEED screen and looking at Jack during her turn (fig.65), Lauren performs a multimodal, non-verbal next speaker selection, as she treats Jack as a potential K+ participant in relation to '**%im none%**'.

In line 2, in response to Lauren's turn, Joanne stops scrolling down the IEED. In the same line, Jack first looks at Lauren and meets her gaze (fig.66) as a receipt of her question, then turns his gaze back to the screen (fig.67)—most likely towards the written words on the screen that Lauren is referring. In line 3, Jack responds to Lauren's information request (IR) with '***wo bu shi wo bu shi shabi***' (I am not, I am not a fool.), hereby providing his explanation of the written formulation '**%im none%**'. By explaining here, Jack demonstrates his knowing (K+) epistemic status on the meaning of the English formulation. At this point, Lauren's (K-) IR is responded to.

After a micropause in line 4, Lauren shifts her gaze away from Jack and looks back to the screen (line 5). Without any indication of receiving Jack's response, Lauren first changes her bodily orientation, which suggests her preparing re-engagement with the IEED screen. Her subsequent laughter in line 5 suggests her understanding of the saying and a treatment of it as being humorous, displaying her upgraded, 'knowing' epistemic stance. This is corroborated by her later repetition of Jack's answer, '***wo bu shi sha°bi°***' (I'm not a fool). followed by more laughter, which further indicates her receipt and understanding of the humour in Jack's answer. Her repetition also serves as a sequence closing third (Schegloff, 2007) to her initiated ESS. At this point, both Lauren and Jack clearly demonstrate their knowing epistemic positions on the contextual meaning of the English clause '**%im none%**', and the epistemic imbalance no longer exists. Thus, the epistemic engine lacks driving force and the ESS closes. In line

6, with all participants orienting their bodies to the IEED screen (fig.68) and epistemic equilibrium achieved, Joanne proposes to resume their interrupted activity (line 1 and fig.64) of reading the screen and looking for more information for the topic question.

Excerpt 7 demonstrates an ESS for the contextual meaning of the English clause 'I'm none' displayed on the IEED screen. The K- indicator involves multiple resources in the process of initiating and advancing the ESS, including the linguistic resource of reading the information on the screen to identify the referent content, as well as embodied actions of gazing to select the next speaker and laughing to demonstrate understanding. The K- participants' IR initiation is responded with the requested knowledge, and the ESS has a minimal post-expansion demonstrating the stepwise shift of the K- participant's epistemic stances.

***

Participants can use more than linguistic resources (e.g. read-aloud) to identify on-screen referent and treat it as being new/unknown information. Excerpts 8 and 9 below demonstrate two examples where participants manipulate the IEED's cursor and use their embodied resources to identify contents on the screen as triggers for their K- epistemic status claims. In Excerpt 8 below, Jack, Joanne and Lauren are looking at a webpage (Figure. 69) about April Fool's Day. Joanne employs vocal and embodied resources to draw her peers' attention to the English lexical item 'monarchy' on the screen and requests help in relation to its pronunciation. Emphasis has been placed on the relevant parts of the screen (as shown in the embedded screenshots) with yellow circles and red arrows to show the cursor's location and the parts of the screen to which participants are referring to.

Excerpt 8 how to pronounce this word?

±JACk ⊕JOAnne ƀ LAUren ※ laptop screen

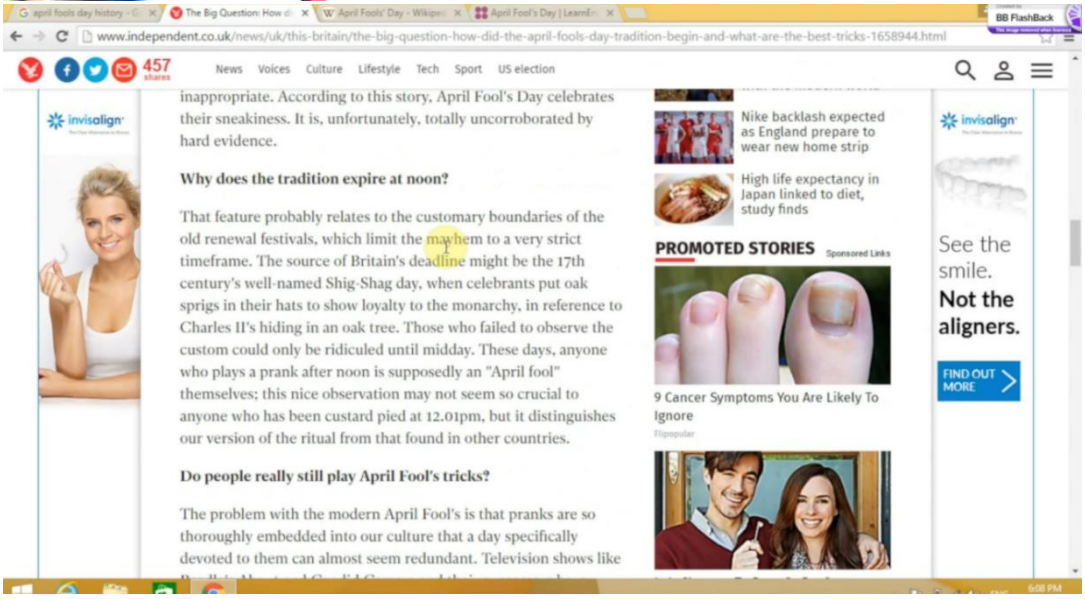
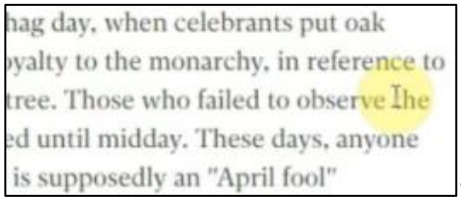


Figure. 69

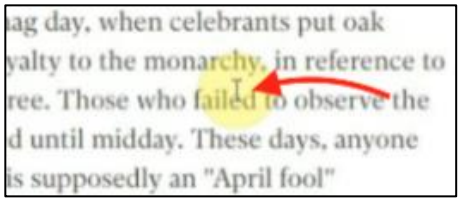
joa #reading the screen in a very low volume
fig #fig.69

001 **JOA** **the #m: (0.6) monar↑ (0.9) erm**
fig #fig.70



70

002 **# (1.0)**
scr joa moves back and places the cursor under 'monarchy'
#fig.71



71

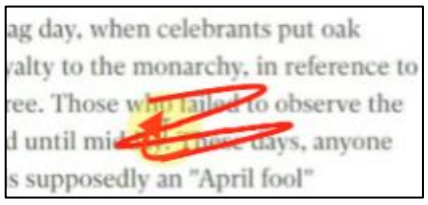
003 **JOA** **±# monar (0.2) ° chy↑?° ± no#**
jac ±JAC draw back ---------- >>±
fig #fig.72 #fig.73


72

73

004 → JOA ※±***zhege zi ze#nme du laizhe#***±※
this word how to pronounce Q
How to pronounce this word?

scr ※cursors moves under the word 'monarchy'---------- ※
jac ± Jack leans towards the screen---------- ±
fig #fig.74 #fig.75


74


75

005 (0.5)
006 JOA ***kanyixia*** **mon:nar:chy mon:nar:chy hhhh**
Have a look.
007 JAC **MOnarchy::**
008 JOA **°MOnarchy°**

Before the transcribed interaction above begins, all three participants are looking at the screen (fig.69) while Joanne reads the content quietly and moves the cursor along with the words she reads. In line 1, Joanne appears to be partially uttering the word 'monarchy', as she holds the cursor over this word. However, she stops before its completion, issues a micro-pause and files pause '**monar↑ (0.9) erm**'. This may be designed as the start of a self-repair or an indication of K- epistemic status on the pronunciation and thus an IR. With no follow-up self-repair or other repair by another student forthcoming in line 2, Joanne moves the cursor under the word 'monarchy', drawing particular attention to this lexical item on the screen. Joanne's subsequent attempt to pronounce the word is delivered with word-ending rising intonation, with an embedded micro-pause and '**no**' as she expresses some kind of trouble with pronouncing the word. This appears to confirm her unknowing of the pronunciation as well as attempting to deliver a more explicit request for help (Heritage, 2012a, p. 33).

In line 4, Joanne continues to pursue help from the other students as she switches to Chinese and issues wh-interrogative '***zhege zi zenme du laizhe***' (How to pronounce this word?), thus clearly indicating her K- epistemic stance. By switching to Chinese at this point, Joanne is orienting to this language as being a shared resource for

requesting English language help. Additionally, by asking 'How to pronounce this word?', Joanne narrows down the relevant epistemic domain to the more specific, the pronunciation of this lexical item. This turn could be designed as a self-addressed question for recollection or as an explicit request for help. In either case, Joanne makes public her disadvantaged epistemic stance. In response, Jack orients to himself as potentially having the relevant expertise to provide Joanne with the requested help by physically moving towards the screen and focusing his attention on the word in question – guided by Joanne moving the cursor around '*monarchy*' (fig.74). This potentially allows Jack to obtain a contextual understanding of the word that Joanne is struggling with. However, with no vocal response from any of the students provided during an extended transition relevance place of 0.5 seconds in line 5, Joanne requests that Jack take a look at the IEED screen, promoting a continued focus on this word, uttering '***kanyixia***' (Have a look.). By then uttering 'monarchy' slowly twice, with an elongated delivery of each syllable, Joanne very explicitly draws attention to the verbal delivery of this word, one that she has already highlighted as being a source of pronunciation difficulty.

In line 7 Jack pronounce the word 'monarchy' as he utters '**MOnarchy::**' with an emphasis placed on the initial phoneme and the elongated final phoneme, thus indicating his understanding of English language pronunciation as being the relevant epistemic domain in question. This also demonstrates that Jack treats Joanne's previous turn as an IR and the initiation of an ESS. Additionally, through the act of providing help following a request and Joanne's expressions of K- status, Jack takes the mantle of being the relative expert, as having K+ status in the epistemic domain of English language pronunciation. This provision of pronunciation help is acknowledged by Joanne as she accepts in line 8, with a quietly delivered near repetition of 'monarchy'.

In summary, Joanne (K-) incorporates vocal and embodied resources to draw her peers' (possible K+ speakers) attention before making the explicit request for information. These embodied resources, including attempts to pronounce and moving the cursor under the word, are the pre-expansion of her explicit K- claim (line 4) and IR initiated ESS. Jack (K+) responds to the IR in the next turn by pronouncing the word, which displays his higher epistemic status on the pronunciation (line 7), and Joanne's later repetition (line 8) demonstrates them achieving the epistemic equilibrium at the end of the ESS.

***

A more complex ESS is presented below (Excerpt 9). This interaction is more complex as there are more than one K- initiator displaying their lack of understanding of an English lexical item 'etiquette' and are in search for its pronunciation and meaning, as well as the sentence's meaning. The interaction takes place in a session with the topic question '*Do British people like to talk about the weather?*' Frank and Amelia display their K- epistemic status of 'etiquette' on the IEED screen and request information. Emphasis has been placed on the relevant parts of the screen (as shown in the embedded screenshots) with red rectangular and underlines for the parts of the screen that participants are reading and referring to.

Excerpt 9 what does this etiquette mean?

¤FRAnk ⊕JOAnne ∆AMElia ※ laptop screen

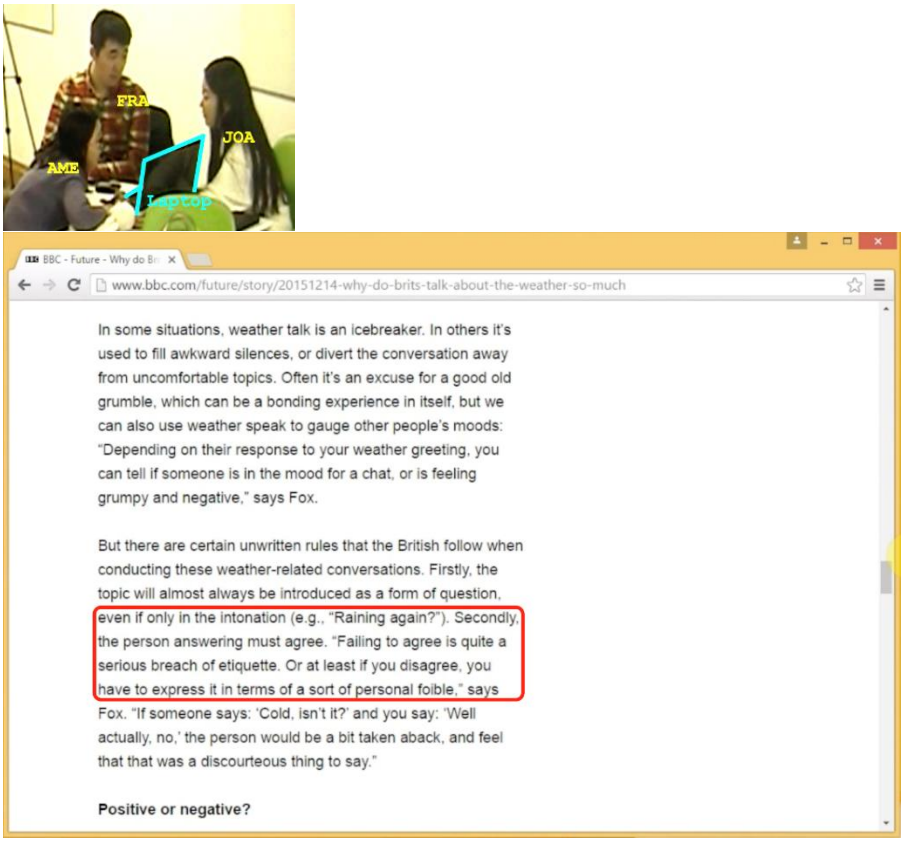


Figure. 76

001 **FRA** ¤ #**[£hhhh.£]** ¤#
fra ¤ turns to the screen¤
002 **JOA** ⊕ **[£ hhh.£]** ⊕
joa ⊕turns to the screen⊕
fig #fig.77 #fig.78

 77  78

003 (3.8)

004 → FRA ¤*na zhege* #%etiquette% [*shenme yisi a*]¤#
MP this what meaning Q
What does this %etiquette% mean?
fra ¤ leans forward and points to screen---------->¤
fig #fig.19 #fig.80
#fig.80a

 79  80

even if only in the intonation (e.g., "Raining again?"). Secondly, the person answering must agree. "Failing to agree is quite a serious breach of etiquette. Or at least if you disagree, you have to express it in terms of a sort of personal foible," says 80a

005 AME Δ[*yiban dou shi*]#%agree%
usually all be
Usually, they all
ame Δ leans forward and points to screen-->>
fig #fig.81
#fig.81a

 81

even if only in the intonation (e.g., "Raining again?"). Secondly, the person answering must agree. "Failing to agree is quite a serious breach of etiquette. Or at least if you disagree, you have to express it in terms of a sort of personal foible," says 81a

006 AME *ta shuo shenme* %the person answer must agree%#
it says that
fig #fig.82

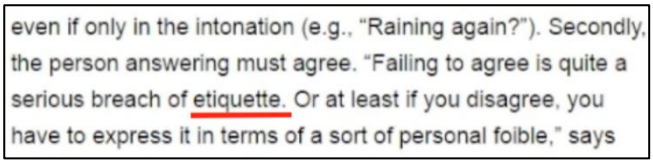
even if only in the intonation (e.g., "Raining again?"). Secondly, the person answering must agree. "Failing to agree is quite a serious breach of etiquette. Or at least if you disagree, you have to express it in terms of a sort of personal foible," says 82

007 → AME .hh *ruguo shi- (0.4) zheju hua wo kan bu dong*
if be- this sentence I read N understand
I don't understand this sentence.

008 (0.3)

009 → AME %eTik%# zhe shenme yisi a

this what meaning Q
What does this mean?
fig #fig.83



83

010 (0.3)
011 FRA ***cha yixia le*** ∆
search once PRT
Let's search for it.
ame >>--------> ∆
012 JOA **emmm:**
013 FRA **>*wo* [*juede*<]**
I think
014 JOA **[*liyi*]**
etiquette
015 (0.4)
016 JOA ⊕***liyi***
etiquette
joa ⊕ looks at FRA--->>
017 # **(0.3)** ⊕
joa >>--> ⊕
fig #fig.84

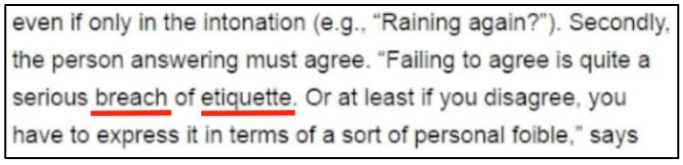

84

018 FRA **oh:**
019 JOA ⊕ **uhm↓** #⊕ **(.)**#
Etiket
joa ⊕looks at AME->⊕
fig #fig.85#fig.86


85

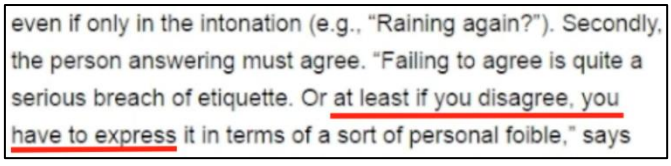

86

020 (0.7)
021 AME **ah↓**
022 (0.3)
023 FRA **%*pohuaile liyi*%#**
breach etiquette
fig #fig.87



87

024 AME **en↓ (0.3) %*ruguo* ∆*zhishao ni bu tongyi ni xuyao biaoda*%#**
yes if at least you N agree you have to express
yes, % at least if you disagree, you have to express %
ame ∆ leans forward and points to screen---------->>
fig #fig.88



88

This excerpt starts with Frank and Joanne's suppressed laughing in lines 1 and 2, while they shift their gazes away from each other and looks toward the IEED screen, displaying an article named '*Why do Brits talk about the weather so much?*' on a webpage (fig.76). Frank and Joanne's bodily orientation indicates their focus shift from

interaction with peers to the content displays on the IEED screen. Reading silently for 3.8 seconds (line 3), Frank leans forward, points to the screen, and launches a wh-interrogative—'***na zhege*** **%etiquette% [*shenme yisi a*]**' (What does this **%etiquette%** mean?). The forward movement of his upper body demonstrates a closer engagement with the IEED and his pointing to 'etiquette' on the screen locates the source of his understanding difficulty. As shown by his question, Frank seeks the lexical meaning of 'etiquette' and initiates the ESS with an IR. However, the response does not come immediately.

Amelia takes the floor in line 5 with her turn partially overlapping with Frank's question. Her talk and continuing read-aloud of '**%agree%**' '**%the person answer must agree%**' in lines 5 and 6, along with her pointing gesture, guides others' attention to the content that she is currently reading, which is prior to Frank's referent 'etiquette' (figs.81a and 82). Without any noticeable address to Frank's turn in line 4, Amelia continues to hold the floor until line 7, where her talk becomes hesitant with cut-off '***shi-***'(be) and a micro-pause, indicating a potential problem. Later, in the same line, Amelia announces the problem— '***zheju hua wo kan bu dong***' (I don't understand this sentence.) The 'I don't know' claims of insufficient knowledge (Beach and Metzger, 1997) and explicitly displays Amelia's unknowing epistemic stance of the sentence meaning. She also demonstrates with this utterance that she is seeking help from potential K+ participants. After a short pause in line 8, Amelia tries to pronounce the word 'etiquette' as '**%eTik%**' and requests the meaning of it— '**zhe shenme yisi a**' (What does this mean?) in line 9. Her wh-interrogative not only identifies the meaning of the word 'etiquette' as the source of her incomprehension of the sentence but also narrows down the epistemic domain of the sought-after information: English language vocabulary. Her turn serves as another IR that searches the knowledge relating to the word 'etiquette'. Considering Amelia's lines of ongoing talk (lines 5 to 9) and no acknowledgement of Frank's same IR (line 4), it is possible that Amelia does not hear Frank's turn in line 4.

Frank responds to Amelia's question in line 11 by proposing a different activity—'***cha yixia le***' (Let's search for it.)Which implicitly suggests his unknowing stance on the referent lexical item. In response, at the end of Frank's turn (line 11), Amelia retrieves her right hand, which had been pointing at the screen the whole time since her

talk in line 5, coordinating with Frank's proposal by preparing both of her hands for typing and searching for the word on the IEED.

Then, after both Frank and Joanne's attempt to hold the floor in line 12 and 13, Joanne gives the lexical meaning of 'etiquette' in Chinese—'**liyi**' in line 14, explicitly displaying her existing knowledge of and K+ epistemic status on the lexical meaning, which was unknown to both Frank and Amelia. When received, this information would enable both Frank and Amelia to achieve the K+ epistemic status on the meaning of 'etiquette' and in turn eliminate the need for searching for it on the IEED as Frank suggested (line 11). Without receiving any response in line 15, Joanne looks at Frank (fig.84) and repeat the word meaning again in line 16, bodily identifying him as the recipient of this repeated information. Next, Frank acknowledges his receipt with a change of state token '**oh**' (line 18) which in turn receives Joanne's acknowledgement '**uhm↓**' in the next line. After Frank's receipt of the information, Joanne turns to Amelia (fig.85) and pronounces the word '**Etiket**' in line 19. This asserted pronunciation displays Joanne's K+ status in the epistemic domain of the lexical item's pronunciation and responds to Amelia's earlier attempt (line 9) at pronouncing the word. Amelia exchanges a glance with Joanne during the demonstration of pronunciation (fig.85) and acknowledges her receipt in line 21. At this point, Joanne displays her K+ epistemic status on both the pronunciation and meaning of this lexical item, and Frank and Amelia give receipts in relation to the information provided by Joanne.

What is more, Frank builds on the translation provided by Joanne and explains the phrase 'breach of etiquette' on the screen in Chinese (line 23) and further demonstrates his newly achieved knowledge by this display of understanding. His turn also serves as an explanation for Amelia, who identified the problem of understanding the sentence earlier in line 7. With an acknowledgement '**em↓**' (yes) in line 24, Amelia shows her receipt of Frank's explanation. Then, she reads the next sentence displays on the screen, moving the focus of interaction from requesting information to another content.

Excerpt 9 demonstrates a more complex ESS compared to those shown in Excerpts 7 and 8, as there are two K- participants, Frank and Amelia, requesting the meaning of 'etiquette' at different times in Excerpt 9. Amelia also verbally demonstrates her unknowing stance in different epistemic domains, namely the pronunciation of 'etiquette', the meaning of the item, and the broader sentence's meaning. The information from Joanne (the relative 'knowing' participant) successfully

helps the K- participants achieve the epistemic equilibrium for all information sought, evidenced by participants' use of change-of-state tokens and other displays of understanding.

***

In addition to claims of a lack of knowledge in the English language epistemic domain, participants also make K- epistemic status claims in relation to some notions of traditional Scottish culture. In Excerpt 10, Frank requests general information and also asks about traditional Scottish food—haggis (displayed on the screen). In response, Amelia and Poppy display their ownership of the cultural experience of eating haggis and higher epistemic status of their knowledge of the food. The topic question of the session is '*What is Britain's favourite food?*'

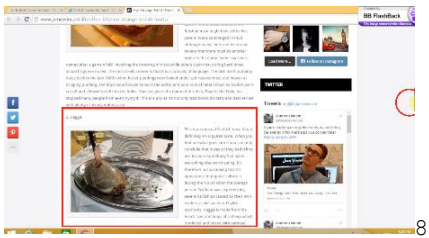
Excerpt 10 what is that?

¤FRAnk ∆AMElia ¢ CLAire ※ laptop screen

001	**POP**	**#AH: ◿ %hag#gis% have you *tried* that ↑**
	pop	◿ points to the screen---------->>
		*looks at AME *
	fig	#fig.89 #fig.90 #fig.89a


89


90


89a

002 AME **oh %haggis% yeah**◿

pop >> ----> ◿

003 **(0.6)**

004 POP **hh. i like ※#that one ※**

scr ※ POP scrolls down the page※

fig #fig.91

91

005 **¤ (0.3)**

fra ¤draws back from the screen--->>

006 → FRA **# na shi sha dongxi a ¤**

That is what thing Q

What is that?

fra >>---->¤

fig #fig.92


92

007 **(0.5)**

008 POP **its like a sausage made of #[er:: blood]**

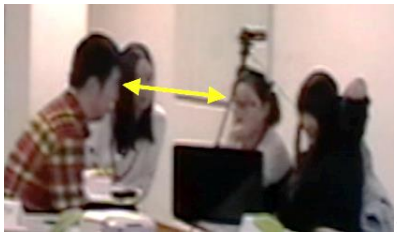
009 FRA **Δ ¤[hao exin a]¤ Δ hhhhhh.**

so gross PRT

fra ¤ looks at ame------- ¤

ame Δ looks at fra---------- Δ

#fig.93


93

010 POP **ande:(0.4) er:(0.5)**

011 AME **the stomach of lamb↑(.) ※# i think↑**

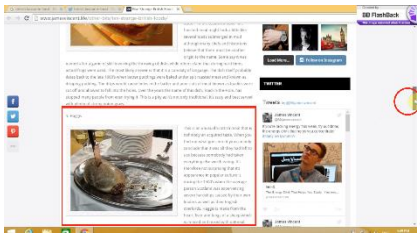
scr ※pop scrolls down->>

012 **(1.2)**

013 POP **%bl[ack pudding%#]※**

scr >>-------->※

fig #fig.94



94

014 → FRA [#na shan[5]bushan] a

that the smell of mutton Q

Does it have the smell of mutton?

fig #fig.95

95

015 POP ◿ **en** ◿

pop ◿nodding◿

016 **¤(0.4)¤**

fra ¤nodding¤

017 POP **okay**※#

scr ※pop scrolls down--->>

fig #fig.96

96

This interaction starts with Poppy and Amelia demonstrating their knowing epistemic status (lines 1-4) on the traditional Scottish food—haggis. Poppy, Amelia and Frank are looking at the IEED screen at the beginning of line 1, where Poppy displays her recognition of certain content on the screen with an epistemic token '**ah**'—indicating her K+ epistemic status of the content. Then, her read-aloud of '**%haggis%**' and then pointing at the screen (fig.90) clarifies the epistemic domain of her earlier epistemic display. In the same line, Poppy's interrogative —'**have you tried that?**' — seeks her peers' experience of eating haggis, which could be designed as a pre-invitation for

[5] The Chinese word 'shan 膻' means the smell of mutton/lamb. This smell can be off-putting to some people.

other participants to share their knowledge or experience. However, Amelia's oh-prefaced response (line 3) indicates her reluctance to talk about the topic (Heritage, 1998), though she follows it with the positive answer '**yeah**' showing her ownership of the experience and knowing epistemic stance of the food. Similar to Amelia's reluctance, neither Frank nor Claire takes the floor (line 3) after the possible TRP, indicating the lack of response to Poppy's invitation (line 1). With both Amelia and Poppy displaying their knowing epistemic stances on haggis and no indication of an epistemic imbalance, there is a lack of drive for the epistemic engine and so the sequence (Heritage, 2012a). In line 4, Poppy makes a positive assessment '**i like that one**' revealing her cultural experience relating to haggis. This assessment also serves as a sequence closing third which signals the ending of the current sequence. In addition, Poppy's embodied action of starting to scroll down the webpage (fig.91) ends the current focus of searching for the cultural experience and indicates her orientation to the content appearing next—Black pudding (fig.91).

In lines 5-11, Frank displays no possession of the knowledge about haggis and thus seeks help from his potentially K+ epistemic status peers. After Poppy's embodied turn (line 4) indicating her proceeding to the next focus, Frank starts to withdraw his upper body from the IEED and looks at Amelia and Poppy (line 6). During this physical movement, Frank utters a "wh-interrogative" in Chinese—'**na shi sha dongxi a**' (What is that?) in line 6, displaying his unknowing stance in relation to haggis and requests information from his K+ peers. The explicit question, ongoing body torque, and the shift of his gaze, all demonstrate that his orientation moves away from the content on-screen to peer interaction. In other words, these verbal and embodied resources were employed to explicitly display his focus on the K- issue and requests for help. Frank's K- claim, compared to his peers' earlier K+ displays, indicates a clear epistemic imbalance between them about haggis and serves as an IR initiation of the ESS. This epistemic imbalance prompts a new sequence to equalise the epistemic gap (Heritage, 2012a).

Poppy responds first to Frank's IR in line 8. In her response, the elongated hesitation marker '**er::**' prolongs her talk further until she names '**blood**' as one of the ingredients of the referent, haggis. However, the crucial information in Poppy's turn '**er#:: blood**' is overlapping with Frank's negative assessment of the food —'so gross' in Chinese (line 9). Therefore, Frank's assessment is more likely an extension of

his last turn (line 6), which is triggered by the content displaying on the screen (most likely the picture of haggis, fig.91), rather than in response to the information provided by Poppy. As a matter of fact, traditional haggis does not use blood as a filling as Poppy described, black pudding (another traditional Scottish food) does.

In line 10, Poppy holds the floor with the elongated '**ande:**' and hesitation marker '**er:**'. Amelia takes the floor in line 11 with the 'correct' ingredient of haggis '**the stomach of lamb↑**', which displays her K+ epistemic stance in the domain of the haggis' ingredient. The uprising tone at the end of the word '**lamb↑**' and '**i think↑**' downgrade her assertion as well as the level of her disagreement with Poppy. Interestingly, Amelia's turn does not receive any response from Poppy, possibly because it could also serve as an alternative completion of Poppy's unfinished turn in line 10, with '**the stomach of lamb↑**' treated as a new piece of information on the list of haggis' ingredients, and the post-positioned '**i think↑**' as a signal for sequence completion (Kärkkäinen, 2003).

Without any verbal responses to Amelia's disagreement or offered alternative utterance completion, Poppy resumes her action of scrolling down the webpage (line 11). Her action of moving on to the next part of the content on the webpage displays her intention for sequence closure, at the time when after both K+ participants response to Frank's IR and the IR-intiated sequence is ready to close. Following the 1.2-second silence (line 12) after the TRP, Poppy's read-aloud '**%bl[ack pudding%]**' (line 13) announces the content on the screen she is looking at (fig.94). Poppy's embodied action with the cursor (line 11) together with her reading of the on-screen content (line 13) is part of her second attempt to guide the group to another content on the screen—'black pudding'.

From line 14 to the end of line 17, Poppy halts her proceeding to 'black pudding' again where Frank narrows down the epidemic domain and requests further information about the smell of haggis. Frank's overlapping turn in line 14 is another question that seeks information on haggis. The question '**[na shan bushan]a**' (Does it have the smell of mutton?) narrows down the epistemic domain from 'haggis' to the 'smell' of it. At the same time, Frank gazes at Poppy (fig.95) and selects her as the recipient of the question. Although Poppy's turn of topic drift (line 13) overlaps with Frank's request for further information (line 14), Poppy pauses her action of scrolling down the webpage, again. Responding to Frank's bodily conducted next speakership selection, Poppy displays

agreement with Frank, both verbally and bodily, by acknowledgement token '**en**' (yes) and nodding (line 15). Frank, in turn, displays the receipt of her response with nodding (line 16), which serves as a confirmation, sequence closing third, and a possible closing for the ESS. Finally, Poppy closes the ESS with an activity-shift token 'Okay' and resumes her action of scrolling down the webpage in line 17.

In this excerpt, Frank's display of no knowledge of the haggis (K-) is in contrast with Amelia and Poppy (K+), who claim to have experience of the haggis. This epistemics imbalance is the drive for the epistemic engine and IR initiated ESS. Frank's first IR ('What is that?') seeks general information/description from his K+ peers. His second IR (for the smell of the food) is specifically designed in relation to K+ participants' culture experience of the food. Frank's IRs are treated as a priority in the group interaction over Poppy's bodily and verbally indicated the intention of moving on to the next part of the website—black pudding.

Section 5.2 finds that the K- participants claim that they lack English language knowledge or access to traditional Scottish cultural experience after encountering the new information displaying on the IEED screen. These demonstrations of unknowing epistemic status, normally in forms of IRs with "wh-interrogatives", initiate the ESSs and prompt the K+ participants' help to achieve the epistemic equilibrium.

5.3 IEED screen contents triggering less knowing epistemic status claims on understanding and confirmation seeking (CS)

When the content on the screen triggers the participant's 'less knowing' epistemic claim, the participant indexes a K- epistemic stance while displaying some degree of knowing or understanding of the referent content. This kind of K- claim is in search of confirmation or agreements from other interactants. This section will investigate the trigger and multimodal display of these 'less knowing' K- epistemic claims, as well as how the participants, both K- and K+, display what their epistemics are and how they index their epistemic positions through talk.

In Excerpt 11, Jack, Helen and James are looking at the iPad and deciding which website they should look at next. The teacher has written the session topic '*What does this mean?*' on the whiteboard with a picture of a St. George's Cross under the question (see fig.100 below). While Jack clicks and opens three tabs on iPad for the

group to choose from, the content from these tabs triggers James' K- epistemic status claim on the nation(s) that 'St. George's Cross' represents.

Excerpt 11 it only represents England, right?

±JACk ☆HELen ⊥JAMes ※ iPad screen

001 JAC ※#***zheli*※ *you sange yemian***
here are three sites
scr ※jac clicks※ ('St. George's flag' tab opens on iPad)
fig #fig.97

97


002 JAC ***zhe shi* %saint georges cross%**
This is %St. George's Cross%

003 JAC ※ #***yige*※ *shi*: **%england%** ***de*** **%flag%**
one is **%England%** ASSC **%flag%**
one is %Flag% of %England%
scr ※JAC clicks※ ('Flag of England' tab opens on iPad)
fig #fig.98

98


004 JAC ***haiyou*: ※#%list※ of english flags%**
and: **%list of English flags%**
scr ※JAC clicks※ ('List of English flags' tab opens on iPad)
fig #fig.99

99


005 JAC ***xian kan na yige***
first look which one
Which one shall we look at first?

006 **(1.4)**

007 HEL **.hhhh *wo juede-* (0.2) *zhe- zhege jiu- tai*: ※ *chang le* ※**
I think- this- this just- too: long CRS

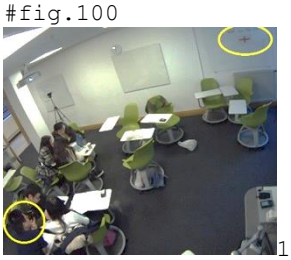
I think, this, this one is just too long.

scr ※ JAC clicks on St. George's Cross' tab-> ※

008 → **JAM** #⊥[***na ta***] ***zhege zhishi*** [***yinggelan de haishi***:] ⊥
then it this only England ASSC or:
[then, it,] Does this flag only represent England, or

jam ⊥looks up and points to the white board----------->⊥

fig #fig.100


100

009 **JAC** [***na kan zheige***]
then look this
Then, we shall look at this.

fig #fig.101

101

010 **HEL** [***dui yinggai: zhijie***:]
yes shall directly
Yes, we shall just look at this.

011 → **JAM** ***ta zhenge de a***(.) #⊥ ***shi: yinggelan de*** [***shi ba***] ⊥
it all ASSC PRT is England ASSC be Q
does it represent all nations the UK? It only represents England, is it?

jam ⊥ head turns left and looks at JAC---------->⊥

fig #fig.102


102

012 **JAC** [***dui***]
right

013 **HEL** [***zhishi***]⊥ ***yinggelan de***
⊥
only England ASSC
It only represents England.

jam ⊥ nods slightly--->
⊥

014 **JAC** ***ta zuihou de miziqi jiushi xian*** [***sugelan weiershi sige***]
it last assc union flag is first Scotland Wales four
The union flag combines four flags from Scotland, Wales,

015 **HEL** [***jiu sange diezaiyiqi dui ba***]
just three overlay right Q
Just three flags overlaid, right?

016 **JAC** °**ah** ***sange diezaiyiqi***°

three overlay

017 ⊥ (0.5) ⊥
jam ⊥nods slightly⊥
018 HEL ***na women jiu zhi yao kan zhege jiuhaole***
so we only need look this okay
So, we only need to look at this page.

In lines 1 to 5, Jack holds the floor, opens three websites consecutively on the iPad, then suggests the group to choose one to look at next. In line 1, Jack's vocal turn '***zheli*** (here) ' draws the participant's attention and introduces his next activity of displaying the '***sange yemian***' (three sites) to other participants. Meanwhile, he embodied action of clicking on the tab— the Wikipedia page of St. George's Cross (fig.97)—carries out his verbally introduced action. He then reports the title of the opened page to his peers in line 2 '***zhe***(this) ***shi***(is) **%saint georges cross%**'. Following the introduction of the first of the three websites, Jack opens the other two sites in lines 3 and 4, reporting the webpage titles '**%england%** ***de***(of) **%flag%**' and '**%list of English flags%**' to the group. Finishing displaying three sites, Jack makes his intention of introducing the websites clear in line 5 by using the question '***xian kan nayige***' (Which one shall we look at first?) as a proposal for the group's next activity. These websites and their titles displaying on the IEED screen, with the different flags and the nations they represent, later triggers the K- epistemics stance claim (lines 8 and 11) in this excerpt.

After a 1.4-second-pause (line 6), Helen takes the floor and gives her assessment of the website they are looking at (fig.99 'List of English flags') as '***tai: chang le***' (too long), implying that it is inappropriate for the group to continue with reading this webpage and look for the answer to the session's topic question on it. Responding to her negative assessment of this page, Jack clicks on another candidate tab 'St. George's flag' at the end of Helen's turn (line 7).

The K- epistemic status claim in this excerpt takes place in lines 8 and 11. Overlapping with Jack and Helen's assessments (lines 9 and 10) of the newly opened tab, James holds the floor with two questions regarding St. George's Cross in lines 9 and 11. His first question 'Does this flag only represent England, or does it represent all nations the UK?' in Chinese indexes a K- epistemic status, as the "***haishi:***" (or) in Chinese makes the turn into an alternative question with two candidate understandings on the St. George's flag's representation. However, the form of alternative interrogative indicates

that he is not uncertain of what the flag represents, but of how many nations it represents (England or all nations in the UK). Therefore, James' first question indexes a 'less knowing' K- epistemic status on two pieces of information—whether the St. George's flag represents England, and if it does, which flag represents the UK. In addition to his verbal turns, James utilises his embodied action to elaborate on the questions, too. At the beginning of James' talk in line 8, he looks up from the iPad and points to the whiteboard, on which are the topic question and a picture of St. George's flag (fig.100). Since the 'St. George's cross' tab is not yet opened on iPad (not until line 9), James utilises another material resource in the classroom as a reference for his upcoming questions by pointing to the flag on the whiteboard.

James continues to take the floor after the TRP at the end of his first question, and launches another one—'It only represents England, is it?' in Chinese (line 11). With the declarative clause displaying his supposed answer to his question and the tag question '***shi ba***' (is it?) seeking confirmation from his peers, James further demonstrates his knowledge but downgrades this assertion with the tag question. While launching his second question and initiating the ESS, James turns to Jack and exchanges a glance with him when he selects him as the next speaker.

Jack responds to James' next speakership selection with the confirmation '***dui***' (right) in line 12, type-conforming with James' second question and treating the tag question as a confirmation seeking (CS). At the same time, in line 13, Helen also responds to James' questions. With '**[*zhishi*]** ***yinggelan de***' (It only represents England.) Helen's turn provides an answer to both of James' questions, type-conforming with the first one (alternative interrogative), and it displays her K+ epistemic status and understanding of the referent. James then acknowledges the responses at the end of Jack's turn (in the middle of Helen's) with nods (line 13).

In line 14, Jack voluntarily elaborates on another epistemic domain of which James is uncertain— which flag represents the UK (see analysis for lines 8 and 11), though this K- epistemic issue is not explicitly requested by James and is rather accessional. In line 14, Jack first affirms that '***miziqi***' (the union flag) represents all nations in the UK and provides information about its composition; flags from the UK nations. Helen then provides information about the UK's national flag, too. In line 15, she explains that the union flag is made of '***jiu sange diezaiyiqi***' (Just three flags overlaied), and the tag question '***dui ba***' (right?) seeks agreement from Jack. After Jack's

agreement in line 16, James acknowledges the information provided by his peers by nodding (line 17). At this time, Jack and Helen both provide information to James' K- epistemics, and the ESS ends. From line 18 onwards, Helen shifts the topic and leads the group back to the previously suspended activity of choosing tabs from IEED to read.

Excerpt 11 demonstrates that the display of three websites of relevant themes on the IEED triggers James' confusion (K- epistemic status claim) and seeking for confirmation. In the form of an alternative interrogative and tag question, James indexes a 'less knowing' (K-) epistemic status on two issues and seeks confirmation on which countries the 'St. George's flag' represents (session topic related). Advancing this CS-initiated ESS, two K+ participants first provide confirmation as requested by James on the 'St. George's flag', and then do the same with the unrequested knowledge of the 'UK flag', which James displayed his uncertainty but did not explicitly request the information. The voluntary information for the unrequested K- epistemic issue confirms the findings of Heritage (2012b) that the imbalances of information drive the conversation, as there was no explicit request for the information.

***

Excerpt 12 below is another example in which the content on the screen triggers a K- epistemic status claim and seeks for confirmation. This excerpt takes place in Frank, Joanne and Charlotte's discussion of the session topic '*Does 'Lad Culture' exist?*' Participants are all looking at the screen (Figure. 103) at the beginning of this excerpt. After reading the content on the screen, Joanne (K-) seeks confirmation from her peers on her understanding of the word 'lad'.

Excerpt 12 so, lad culture, does it refer to young man?

¤FRAnk ⊕JOAnne ♦ CHArlotte ※ laptop screen

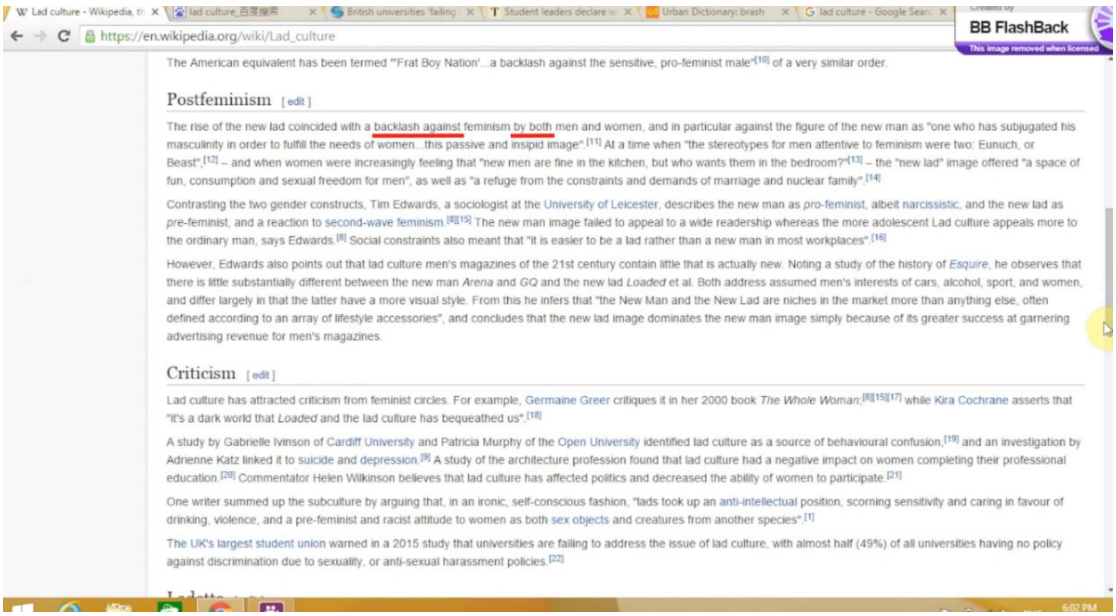


Figure. 103[6]

001 CHA #°<%backlash against%> %by both ↑ %°
#fig.103
002 (1.2)
003 → CHA em: ∮ #so >lad culture< #*shi: zhi:* ∮ *#*nan:sheng ma**
is refer to young man Q
Does it refer to young man?
cha ∮ moves away from the screen----------> ∮
* moves towards the screen----------> *
fig #fig.104 #fig.105 #fig.106


104

105

106

004 (0.2)
005 JOA *en* ↓
yes
006 FRA *en* ↓
yes
007 ∮ (0.6) ∮
cha ∮ nods slightly and slowly ∮
008 FRA *zhege hen zhege: yijing:* ∮ [#*queding le*]
this very this: already: ascertain PFV
This is very, this is already ascertained.
cha ∮ looks away from the screen to FRA---->>
fig #fig.107

[6] Figure. 103 is a screenshot of the computer screen display throughout the interaction in Excerpt 8. The red underlined words in Figure.103 are Charlotte's read-aloud in line 1. The sentence on the screen says 'The rise of the new lad coincided with a backlash against feminism by both men and women, and in particular against the figure of the new man as 'one who has subjugated his masculinity in order to fulfil the needs of women… this passive and insipid image''.

107

009 CHA [*yijing*] ¤*queding le*ɸ¤ [*shi me*]
already ascertained PFV be Q
Already ascertained, was it?

cha >> ---------> ɸ
fra ¤ nodding-----> ¤

010 JOA [*en*↓]
yes

011 CHA °*hao*°
okay

012 ɸ (0.6) ɸ
cha ɸ nods slightly ɸ

013 CHA *zonghe ganjue ha*
general feeling PRT
Generally, it feels like

014 JOA *umm*

015 CHA *you jige*
have several
It has several

In line 1, Charlotte is reading the content on-screen at a low volume—'**°<%backlash against%> %by both↑ %°**'. Her read-aloud begins with a slowed-down '**<%backlash against%>**' and the later '**by both↑** ' ends with a rising intonation. This rising intonation, along with the 1.2-second long pause afterwards (line 2), suggests a potential problem. In line 3, Charlotte holds the floor with a prolonged '**em:**' and then launches a transition marker '**so**', advancing the question '**>lad culture< *shi: zhi: nan:sheng ma*** (does it refer to young man?)'. With the Chinese question particle '***ma***', this yes-no interrogative indicates her uncertainty (K- epistemic status) of the knowledge that closely relates to their session topic—'lad culture', in particular, whether the word 'lad' 'refers to young man'. The question also functions as a confirmation seeking (CS), which prefers a type-conforming response (yes/no), and initiates the ESS. With Joanne's question (line 3) and her suddenly stopped speech (line 1), it is safe to infer that the cause of Charlotte uncertainty comes from reading the content displayed on the IEED screen. That is, the underlined content (underlines added by the author) in fig.103, in which 'both men and women' are mentioned in relation to 'new lad' (lad culture).

While Charlotte is asking the question, she first moves her upper body away from and then back towards the IEED screen (line 3). This bodily movement displays her temporarily disengagement from the IEED when initiating the question and re-engaging with it at the end of her question. Although her gaze does not leave the IEED screen,

this quick shift of bodily orientation indicates that Charlotte's question is designed for a different spacial and interactional temporality other than the IEED screen—the interaction among all group participants.

After a micro-pause of 0.2 second (line 4), both Joanne and Frank provide a type-conforming response to Charlotte's yes/no interrogative with the agreement token '***en*↓** (yes)' (lines 5 and 6). This confirms Charlotte's understanding as well as indexing their K+ epistemic stances on the referent content. In turn, Charlotte demonstrates her receipt by nodding (line 7), which can function as a sequence closing third and close the sequence. However, Frank extends his response in line 8, telling Charlotte that the referent knowledge is '***yijing: [queding le]***' (already ascertained). This piece of information about when and how K+ participants get their epistemic access is not requested by Charlotte (K-), yet Frank volunteers it. Frank's turn explains to Charlotte that he and Joanne discussed the referent epistemic issue ('lad' and young man) in the previous interaction. The turn also implies that Charlotte should have the same access to the understanding as the K+ participants do. Therefore, Frank's turn in line 8 treats Charlotte's lack of epistemic access as a breach of the norm, which, as the major principle of recipient design in social interaction, interactants treat each other responsible for retaining what they have come to know (Stivers *et al.*, 2011).

In fact, Charlotte is unaware of Frank's invoked event of him and Joanne discussing and obtaining the understanding of 'lad'. Although being physically present in the same spacial environment with Frank and Joanne in this event, Charlotte oriented to a different type of interaction— using the IEED, as she was reading the on-screen content while Frank and Joanne were discussing the epistemics of 'lad'.

Near the end of Frank's turn in line 8, Charlotte changes her body's orientation—shifting her gaze away from the IEED screen to Frank (fig.107), and taking the floor at the same time (line 9). Charlotte's verbal turn starts in line 9 with a partial repetition of Frank's earlier turn '***[yijing] queding le***' (Already ascertained) and ends with tag question '***shi me***' (was it?). This tag question invites confirmation of the event in Charlotte's repetition, the K- epistemics being 'Already ascertained', and functioning as a downgrade to Charlotte's asserted right to the event (Heritage and Raymond, 2005).

In response, Frank confirms by nodding (line 9) during her question and Joanne with the type-conforming response '***en*↓** ' (yes) (line 10). Charlotte displays her receipt in turn by nodding (line 12). This time, without any information added by any of the

participants, the nodding serves as a sequence closing third and closes the ESS. Next, Charlotte shifts the topic to summarising the main points they have found for the session topic (line 13) and the discussion continues.

This excerpt demonstrates an IEED-content triggered ESS, which seeks confirmation on the understanding of 'lad' (lines 1 to 7). Interestingly, the K- epistemic status claim is also treated as a break of the social 'norm' since the K- speaker (Charlotte) fails in her responsibility to retain what the interactants have come to know during a prior discussion of the referent knowledge.

Excerpts 11 and 12 presented in this section closely examine the verbal and bodily demonstrated 'less knowing' K- epistemic status claims, triggered by the on-screen content, as well as the careful indexing of participants' epistemic positions. This section argues that the 'less knowing' epistemic claims are treated as CS and the initiation of ESSs, which promotes help from the K+ participants to give the confirmation to K- participants' understanding.

5.4 Summary

This chapter focused on the step-by-step progression of how aspects of the on-screen contents trigger participants' K- epistemic status claims, which, in turn, prompts a sequence in which a relatively more knowledgeable participant (with K+ epistemic status) provides help. Section 5.2 focused on the ESSs of the 'unknowing' epistemic issues, which the K- initiator proposes to have little knowledge of the referent on the screen. Its basic sequence organisation is shown in Excerpt 7, where one participant identifies an aspect of the screen that triggers their K- epistemic status claims and subsequently directs a request for information from his/her co-present peers. The ESS comes to an end when the K- participant displays knowing and the group's topic shifts. Excerpts 8, 9 and 10 examine K- participants' various ways of topicalising the on-screen referent with multimodal resources and request information pertaining to a particular domain of knowledge, and the ways other participants index their epistemic positions in the process of achieving K+ epistemic stances. While the 'unknowing' (K-) contents trigger requests for information, the content that is 'less knowing' (K-) to a participant triggers a search for confirmation of understanding. Section 5.3 examines

two instances, where participants index their ‘less knowing’ (K-) epistemic status and seeks confirmation of their understanding from their K+ peers.

The following, final, analysis chapter, will examine the ESSs in the absence of a K+ participant. In particular, whether and how participants draw on resources from the IEED for knowledge when none of them holds the ‘knowing’ (K+) epistemic status on the on-screen referent.

Chapter 6. On-screen information prompting a group information search on the IEED to gain a group understanding

This chapter will investigate participants' use of the IEED when faced with content that no member of the group understands. This chapter focuses on (1) the ways that participants treat the content on-screen that is not yet understood; and (2) the ways that participants subsequently use the IEED to gain a shared understanding of the information. While on-screen content can trigger participants' K- epistemic claims, the IEED can also be used as a resource for knowledge in displaying and demonstrating participants' upgraded epistemic status. This chapter argues that the information displayed on the IEED screen has interactional affordances and constraints on participants' understanding. Section 6.1 uncovers the ways in which participants use aspects of the on-screen content and gradually achieve a collective state of 'knowing'. Section 6.2 examines the instances in which participants decide not to use the IEED as a resource for knowledge, or those in which they simply move on to the next topic, without display of epistemic stance change after their K- epistemic status claims on some domains of knowledge.

6.1 The stepwise shift from K- to K+ epistemic stances: collaborative use of the IEED as an epistemic resource to reach a collective understanding

This section presents the interactional management of participants collectively employing another source of knowledge, i.e. the shared IEED and the on-screen content, to achieve a group understanding, in the epistemic search sequences (ESSs). The section is divided into two parts. Part 7.1.1 shows two excerpts in which participants seek to gain an understanding of an issue that they claim not to understand. Part 7.1.2 looks at two more excerpts in which participants seek confirmation of their 'less knowing' understanding. The analysis of this section focuses on two themes: (1) the display and stepwise change of participants' epistemic positions of the content on-screen during the interaction; and (2) participants' bodily orientation and their use of the IEED in the interaction.

6.1.1 *Using contents of the IEED screen as an epistemic resource for 'unknowing' (K-) participants to reach a state of 'knowing' (K+)*

This section illustrates the sequential organization of the ESSs and the ways participants use aspects of the contents on the laptop screen as a resource for gaining a collective understanding. Excerpt 13 below is an example of three participants, Frank, Joanne and Charlotte, using the relevant on-screen content to work towards understanding the meaning of '***fanzhizhuyi***', translated into English as 'anti-intellectualism'. The interaction below takes place under the session topic '*Does lad culture exist?*' The participants are looking at a Chinese webpage found through the Chinese search engine *Baidu*.

Excerpt 13 what the heck is anti-intellectualism?

¤FRAnk ⊕JOAnne ɸ CHArlotte ※ laptop screen

001 **CHA** ¤ #%***fanzhizhuyi he nvquanzhuyi de hunhewu***%#¤[7]
anti-intellectualism and feminism ASSC mixture
The mixture of anti-intellectualism and feminism.
fra ¤ turns head towards the screen----------> ¤
fig #fig.108
#fig.108a #fig.109


108


109

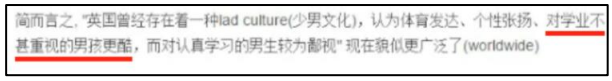
[7] The talk between %% is the speaker's reading of the contents on the screen. Fig.108a underlines these contents in red. The pinyin transcription for those Chinese characters are as follows.

"反	智	主	义"	和	"女	权	主	义"	的	混	合	物 …
fan	zhi	zhu	yi	he	nv	quan	zhu	yi	de	hun	he	wu
anti-intellectualism				and		feminism			ASSC	mixture		


108a

002 CHA **thats why we are talking about this on women's day-**
003 JOA **-oh↓**
004 CHA **%*fanzhizhuyi*% *shi shenmegui***
anti-intellectualism is what the heck
What the heck is anti-intellectualism?
005 **(0.5)**
006 JOA **em↑ m↓**
007 → JOA **⊕>#OH<⊕ (0.5)e::rm (0.3)the s- (.) >the the< er:m**
→ joa ⊕points at the screen⊕
fig #fig.110
#fig.110a


110



110a[8]

008 JOA **the students #who- (0.3) ※ <dont like> studying↑**
scr ※ CHA scrolls down the page-->>
fig #fig.111


111

009 JOA **are much- >are much more< cool↑ cooler↑ (0.3)than others**
010 **(1.4)**
011 CHA **#ohhh: ※**
scr ----- --->>※
fig #fig.112


112

012 **(0.9)**
013 → CHA ***jiushi- ɸ#%fanzhi%ɸ jiushi yisi jiushi shuo***
it's- anti-intellectual it's meaning it's saying
It's, anti-intellectual, it's, meaning, it's saying

[8] The underlined content in Chinese characters (fig.110a) means the same as Joanne's verbal turn from line 7 to 9. The underlined text means 'boys who don't pay much attention to studies are cooler' in English.

→ cha ∮ points at the screen-----> ∮
fig #fig.113
#fig.113a


113

113a[9]

014 **CHA** ∮#%***zhili*%** ***bu shi*: ∮ (0.5) *#mainstream***
intelligence N be
%Intelligence% is not
cha ∮ looks at JOA----------> ∮ * turns to FRA-----*
fig #fig.114 #fig.115


114


115

015 **CHA** ***jiushi qita dongxi ∮gaibei changdao de nazhong∮ *[yisi me] ***
it's other stuff should be advocate PRT kind of meaning Q
They advocate other stuff, does it mean like this?
cha ∮ turns to JOA----------> ∮ * looks at screen*
016 **JOA** ⊕[***en*↓**]⊕
yes
joa ⊕ nods slightly ⊕
017 **CHA** ***jiushi***
it's
018 **JOA** ***bu tai*: *xuexi bu tai hao nazhong***
N very study N very good like that
Not very good at study, something like that.
019 **FRA** **※¤#he lacks the attention of [their]※**
scr ※cha moves the cursor to another tab-------- --------->>※
fra ¤gazing at JOA--->>
fig #fig.116
#fig.116a


116

[9] Fig. 113a shows the sentence that Charlotte is pointing to. The Chinese characters mean 'Watch football. It's the perfect combination of intelligence and physical strength.'


116a

020 JOA [ahh:]

021 FRA academic per[formance] ¤
----------->>¤

022 JOA ※*[#*en* *en*]* ※ yeah
yes yes

joa
& * nodding----> *
cha
scr ※CHA clicks on tab※ ('Baidu search' tab)

023 FRA ※ °*en*° ※
yes
※ CHA clicks
scr on tab ※ ('lad culture Wikipedia' tab)

024 *# (1.4) *
joa * head turns
fra to screen *
fig #fig.117


117

025 CHA £ #well conclu#ded £
cha £ turns to FRA and thumb up £
fig #fig.118 #fig.119


118

119

026 FRA £huhuhhuhhh.£

Excerpt 13 starts with Charlotte and Joanne discussing the design of the session topic (lines 1 to 3). In line 1, Charlotte reads out the exact Chinese characters displayed on the screen (fig.108a), which describes 'lad culture' (the session topic) as '%***fanzhizhuyi he nvquanzhuyi de hunhewu***%', translated into English as 'the mixture of anti-intellectualism and feminism'. In the next turn, Charlotte starts with a stressed demonstrative pronoun '**that**', referring to her earlier out loud, and advances her K+ epistemic status display '**why we are talking about this on womens day**', revoking the relevant context into their talk; having a session topic of '*Does lad culture exist?*' on

International Women's Day. Responding to Charlotte's K+ epistemic claim on the session's topic design, Joanne produces an epistemic token 'oh' (line 3), which indicates Charlotte's prior turn being received as informative. At this point in the interaction, Charlotte and Joanne both display their K+ positions in the epistemic domain of the design of today's session topic. The rest of this excerpt demonstrates the interaction around a different epistemic domain—the meaning of the compound lexical item '***fanzhizhuyi***' (anti-intellectualism), which is the domain of the K- epistemic status claim triggered by the same on-screen content.

In line 4, Charlotte launches a wh-interrogative and displays her unknowing epistemic status on the meaning of '***fanzhizhuyi***'. Triggered by the same on-screen content that Charlotte read earlier (line 1), this turn is the initiation of an ESS and draws attention to the meaning of the Chinese lexical item '***fanzhizhuyi***', and functions as an information request (IR) to her peers who may have a more knowledgeable (K+) epistemic status.

After a short 0.5 second pause (line 5), Joanne produces a modal particle '**em ↑m ↓**' in Chinese. As Joanne does not provide an explanation of the term 'anti-intellectualism' to Charlotte's IR, it implies that she does not know the meaning of the term. However, immediately after her implicitly display of K- epistemic status, Joanne produces a change of state token '**>OH<**', quickly and loudly, as she points to the screen (line 7) to show the content that provided her newly obtained epistemic access.

In lines 7 to 9, Joanne provides an answer to Charlotte's question and demonstrates the origin of the information that caused her change of state. After the turn-initial change of state token '**OH**', indicating her finding of new information for the required knowledge, Joanne provides an explanation on the meaning of '***fanzhizhuyi***'(anti-intelligence) from line 7 to 9. In particular, she reports the relevant Chinese contents on the screen (fig.110a) in English: '*boys who don't pay much attention to studies are cooler'* to her peers. This choice of using English to report the Chinese content on-screen might be related to the later presentation as students are required to present their answers to the topic question in English. In other words, Joanne's English turn may be designed as a potential pedagogical product, which can be used when they perform their pedagogical task in front of the class.

With her extended turn of reporting relevant on-screen content (lines 7 to 9), Joanne displays her newly gained K+ epistemic status on the record. In response,

Charlotte provides a change-of-state token '**ohhh:** ' in line 11, indicating her epistemic position has been upgraded from K- to K+ as a result of receiving Joanne's information. Therefore, at this time, both Joanne and Charlotte express their upgraded K+ stances on the record (line 7 and 11 respectively).

In lines 13 to 15, Charlotte finds another piece of information from the content that contributes to the referent epistemic issue and she displays her understanding to other participants. Charlotte first partial repeats the referent content '**%fanzhi%**' (anti-intellectual) in line 13 as she points to the relevant content on the screen – '智力' (intelligence) in Chinese (fig.113a). Eliciting from the content she is pointing to, Charlotte advances a demonstration of understanding with a focus on the literal meaning of the morphemes of the word '**fan**' (anti) and '**zhi**'(intelligence): '**%*zhili*% *bu shi*: (0.5) mainstream *jiushi qita dongxi gaibei changdao de nazhong* [*yisi***' (%Intelligence% is not **mainstream**. They advocate other stuff.). Shifting her gaze between Frank and Joanne while she talks (figs.114 and 115), Charlotte changes her bodily orientation between the content on-screen and her peers, which prompts them to corroborate her talk. At the end of her turn in line 15, the question suffix '***me*]**' grammatically makes her turn a yes-no interrogative, indexing her uncertainty and K- epistemic status as well as seeking confirmation on her understanding.

Joanne responds in line 16 with an agreement token '***en*↓**'(yes) that confirms Charlotte's understanding. In line 18, she also contributes to the understanding of '***fanzhizhuyi***' by suggesting that 'lads' are '***bu tai: xuexi bu tai hao nazhong***' (Not very good at study, something like that.). Following Joanne's confirmation of and addition to Charlotte's understanding, Charlotte moves the cursor to another browser tab (line 19), indicating her intention to shift the topic. The upcoming sequence closure is foreseeable in two ways. First, the drive of the ESS - the epistemics gap - no longer exists as both Joanne and Charlotte display their incremental epistemic status in the sequential movement (lines 4 to 18). Second, new contributions to this epistemic issue attrite after both Charlotte and Joanne contribute their understanding.

However, a small expansion (lines 19 to 22) postpones the sequence closure as Frank adds to the referent knowledge, too. Despite him not talking during the earlier interaction between Charlotte and Joanne, he explicitly displays his engagement by employing gaze and upper body movements between the content on the screen and their talk (e.g. figs.113 and 115). In lines 19 and 21, he resumes his engagement with the

topic and contributes to the referent knowledge with his understanding of 'anti-intellectualism' concerning 'lad culture' as '**he lacks the attention of their academic performance**'. Looking at Joanne during his talk, Frank selects her as the next speaker in turn. In response, Joanne shows her affiliation enthusiastically in the middle of his turn (overlap) with the recognition token '**ahh:**' (line 20) and at the end of his turn with three agreement tokens— two in Chinese and one in English—as well as by nodding (line 22). Joanne's responses during and after Frank's display of knowing demonstrates her agreement of Frank's understanding strongly. In turn, Frank acknowledges her affiliation with another agreement token '***en***' (yes) in line 23.

In line 23, Charlotte and Joanne nod to show their receipt of his epistemic contribution. At the same time, Charlotte also resumes her action on the IEED, since the ESS comes to an end naturally as there is no new information supply. Next, she clicks on the other tab (line 23) and keeps her engagement with IEED. Both Joanne and Frank then turn to the screen (fig.117, line 24) and display their bodily orientation towards the IEED and their readiness to move on to the next activity. In line 25, Charlotte produces a sequence closing third, giving a positive assessment to Frank's earlier affirmation. This assessment is conducted with verbal and embodied turns: '**well concluded**' and a thumbs up, and thus ends the ESS.

Excerpt 13 demonstrates the ESS of participants using the information on-screen as the resource for knowledge in the absence of a K+ participant, to achieve the collective understanding of the K- epistemic issue triggered by on-screen content. The ESS ends after participants display and agrees with each others' newly-achieved understanding.

***

Although participants can use the on-screen content as a source of knowledge, there are risks, as the interpretation of this content may result in false understanding. The following excerpt is from the session with the topic 'What is the role of the BBC in the UK?' It shows an instance where two appearing-to-be K+ epistemic holders' (Ava, then Joanne) understanding of the aptness of the website they chose and the meaning of the lexical item 'trust' are proved to be false by another participant (Michelle). Michelle

then achieves correct understanding by finding the relevant content on-screen as a resource for knowledge.

Excerpt 14 so it's not BBC, it's the governing body of BBC.

Θ MIChelle ¤FRAnk ⊕JOAanne ‡ AVA ※ laptop screen

001 **AVA** ‡ #**actually #I think this one will be explaining**#‡
ava ‡ points to the screen ----------> ‡
fig #fig.120 #fig.121 #fig.122


120

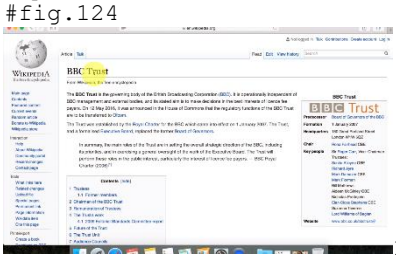
121

122

002 **AVA** ※ **what is bee bee #cee** ※
scr ※JOA moves the cursor to the link※
fig #fig.123


123


003 **JOA** ※ ⊕ ***en*** ⊕ ※
yes
joa ⊕ nods ⊕
scr ※ joa clicks the link --※
004 ※ # **(0.6)** ※
scr ※new page opens ※
fig #fig.124


124

005 **JOA** **but- it's ※⊕ %#bee bee cee #trust% ↓ ⊕※ ° is it the same ↑ ° =**
joa ⊕ tilts head towards ANG----------> ⊕
scr ※ JOA moves cursor under 'BBC Trust'※
fig #fig.125 #fig.126
#fig.125a


125


126


125a

006 MIC =i thinK- the ROLE of it (.) em mea:ns what they do right?
007 (0.8)
008 → AVA ‡is this #right? (.) *[<%british%>]
→ ava ‡ points to the screen---->>
fig #fig.127


127

009 JOA [>*EN EN EN*<]
yes yes yes
010 AVA %#broadcast%
ava #fig.128

128

011 JOA ahh
012 AVA yes it's right *‡
ava >>-------- -->*‡
013 (2.0)
014 MIC %bee bee see TRUST% what is TRUST
015 (1.3)
016 MIC hhh.
017 (2.5)
018 → MIC %#governing body%
fig #fig.129

129

019 (0.6)
020 MIC so it is not bee bee cee it's the-
021 MIC %the governing body of Θ #bee bee cee#% ↓ Θ
mic Θ move away from screen Θ
fig #fig.130 #fig.131

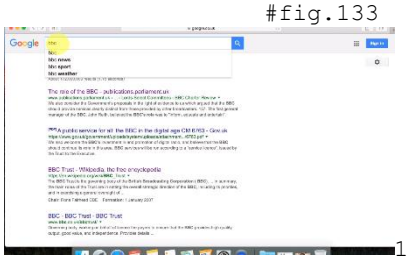

130

131

022		**(5.2)**
023	**JOA**	**oh**
024		**⊕ (0.5) ⊕**
	joa	⊕reaches her left hand to touchpad⊕
025	**JOA**	**so ※< #bee ※ bee cee >**
	scr	※JOA clicks on 'go back' icon------>※
	fig	#fig.132


132


026		**※ (1.7) ※ * (0.1) #***
	scr	※ JOA types 'bbc' in google search box ※ * JOA presses 'ENTER' key*
	fig	#fig.133


133


In lines 1 and 2, Ava points at the screen and assesses the link (fig.121) as '**will be explaining what is bee bee cee**'. Her turn is designed as a pre-request to click on the link and look for information about the session topic '*What is the role of the BBC in the UK?*' Joanne, who is controlling the cursor in this session, moves the cursor towards the indicated website at the end of Ava's turn in line 2. After Ava's turn completes, Joanne provides an agreement token '***en***' (yes) and nods as she clicks on the suggested website (line 3). Joanne's verbal turn and her nod display her agreement with Ava's assessment of the link, and her clicking action on the IEED treats Ava's assessment as the pre-request to do so. However, after the webpage opens in the following interaction, Joanne becomes uncertain about the previously agreed assessment of the website.

In line 5, Joanne makes the first unknowing epistemic status claim in this interaction. Starting with the contrast marker 'but' displaying her doubt on the aptness of the webpage, Joanne tilts her head towards Ava (fig.126) and reads out the webpage title '**%bee bee see trust%** ↓ (BBC Trust)' displaying on the screen. Joanne then asks the question '**°is it the same↑°** ' serving as an IR on whether the BBC trust is the same as the BBC, to initiate the ESS and validate the relevance of this website with the session topic they are researching. She also moves the cursor under the webpage title 'BBC Trust' and localises the source of her incertitude. Joanne's stress on '**trust**' before the interrogative indicates her K- epistemic stance is of the word 'trust'.

In line 6, Michelle initiates a side-sequence seeking clarification on the focus of the session topic. Although the tag question '**right**' is inviting the next speaker to response and to provide clarification (Heritage and Raymond, 2005), there is no response to her in the next turn. Instead, Ava responds to Joanne's question after a 0.8-second pause (line 7), by pointing to the screen and asking '**is this #right?**' (line 8), seeking confirmation on the referent content from peers. Her embodied and verbal utterances together direct other participants' attention to the relevant content on the screen, while she advances the read-aloud '**<%british%>**'(line 8) and '**%broadcast%**' (line 10) as supporting evidence to her earlier assessment in lines 1 and 2. After Ava's pointing to the screen, Joanne uses three repeated '***EN***' (line 9) to enthusiastically display her receipt of Ava's bodily conducted reference from the screen and then utters a change of state token '**ahh**' (line 11) treating Ava's prior turn as informative. In the next turn (line 12), Ava self-confirms her earlier explanation with '**yes, it's right**' to her confirmation seeking (CS) in line 8. Thus, at this stage, it is evident that Ava and Joanne agree on Ava's newly achieved understanding of the word 'Trust' and they both appear to achieve the K+ epistemic stance. Both of them believe that the 'BBC Trust' webpage in front of them is indeed about the session topic 'BBC (British Broadcasting Corporation)' since Ava found the same words 'British Broadcasting' (fig.128) displaying on-screen.

After a 2-second long pause (line 13), Michelle repeats the referent epistemic issue with the stress on '**TRUST**' and then challenges Ava and Joanne's agreed understanding with a wh-interrogative '**what is TRUST**' (line 14). Explicitly requesting information on the meaning of 'trust', Michelle's question displays her unknowing (K-) epistemic status about '**TRUST**'. After Michelle's IR, no response is provided after the

transition relevant place (TRP). Also, the long silences in line 15 and 17 also project trouble or dispreferred response, as no one is advancing Michelle's IR initiated ESS.

In line 18, Michelle reads the content on the webpage 'governing body'. This reading of the screen localises the content and draws attention from other group members. After a short pause (line 19) and the non-response following the TRP, Michelle constructed an extended explanation from line 20 to 21 to clarify the difference between the BBC and the BBC Trust (the current webpage). By incorporating words from the content on-screen and reproducing them in her own words, Michelle demonstrates her understanding of the meaning of the word 'trust' and the aptness of using this webpage to look for information regarding the session topic, i.e. that the BBC Trust is the governing body of the BBC; they are not the same. Michelle's assertion (lines 20-21) fully displays her epistemic advantage compared with her peers (Heritage, 2012c). At this stage, her epistemic stance rises from K- to K+. After Michelle's extended explanation and a trouble-projecting long pause of 4.7 seconds in line 29, Joanne produces a change of state token 'oh', indicating her treating Michelle's explanation of the 'BBC Trust' as informative. Her following actions of moving the cursor back to the *Google* tab and changing the search keyword (figs.132 and 133) confirm her agreement with Michelle and closes the ESS. At this point, Joanne realises her previous knowledge of BBC Trust and the webpage was incorrect. Her epistemic stance of the issue changes from K- to K+, too.

Excerpt 14 shows the stepwise change of participants' epistemic positions of the webpage about the 'BBC Trust' in the ESS. Their interactional management of displaying and renegotiation the aptness of the webpage, as well as several IRs for the meaning of word 'trust' displayed on the webpage, advance the ESS. Their asynchronous progression of K- to K+ epistemic stance includes contesting the correctness of the offered response (lines 11and 21), adding incremental information (lines 15 and 17), and seeking further resources to rectify it (line 25).

6.1.2 *Using contents of the IEED screen as an epistemic resource to verify 'less knowing' (K-) participants' understanding*

Apart from the 'unknowing' K- epistemic status that serves as IR, participants sometimes seek confirmation on their 'less knowing' K- epistemic issues. Excerpts 15

and 16 below will demonstrate them using on-screen content as a resource for verifying the 'less knowing' epistemic issues in the absence of a knowing participant.

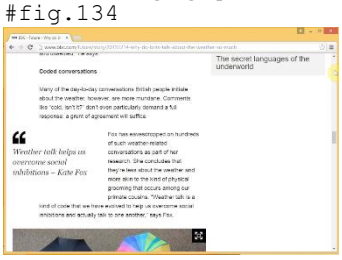
In Excerpt 15, Joanne seeks confirmation of her understanding of previously-discussed content, which is no longer displayed on the screen, from her peers. With no participant in the group claiming a definitive K+ status, Frank suggests the group go back to the referent content and use it as a resource to acquire more knowledge. The referent content triggering the epistemic displays is 'According to recent research, 94% of British respondents admit to having conversed about the weather in the past six hours, while 38% say they have in the past 60 minutes.' (see fig.144 below).

Excerpt 15 shall we have a look at it again?

¤FRAnk ⊕JOAnne ΔAMElia ※ laptop screen

001 **FRA** #***zhexie jiu tai:*** **geographic** ***le***
these just too: PRT
These are too geographic.

fig #fig.134



134

002 **AME** ***dui jiu- bu shuo le***
right just N talk PRT
Right, so, let's not talk about them (in the presentation).

003 **JOA** #***ei nage baifenzhi jiushisi de ren*** ¤***dou shuo***#
PRT that per cent of ninety-four ASSC people all say
So, that, ninety-four per cent of people say

fra ¤looks at JOA----->>

fig #fig.135 #fig.136


818


136

004 **JOA** Δ#***tamen hen xihuan taolun tianqi a*** ¤
they very like converse weather PRT
(that) they like to converse about the weather very much?

ame Δ looks at JOA----->>

fra >>----------> ¤
fig #fig.137


137

005 AME ***tamen [dou you-] Δ***
they all PFV
They all conversed
ame >>----------> **Δ**
006 FRA **[*dou-*] *dou yong* (0.3) *dou hui*:: *taolun tianqi***
all- all use all would converse weather
All, all use, all would converse about the weather
007 AME ***dou hui taolun dou taolun guo zai-***
all would converse all converse PFV in-
all would converse, all conversed in
008 AME **#Δ¤*guoqu de liuge xiaoshi*# *dangzhong*¤ °*haoxiang shi*°**
past ASSC six hour duration maybe is
the past six hours, maybe.
ame Δlooks at FRA ---------->>
fra ¤looks at AME ----------> ¤
fig #fig.138 #fig.139


138


139

009 **(0.2)**
010 JOA ***hai mei you*Δ [*kandao*]**
yet not have seen
I haven't seen that part yet.
ame >>----------> **Δ**
011 → FRA **¤[*yaobu*] *women*¤ *zai kanyikan* #°£*zai kanyikan*# £°¤**
shall we we again have a look again have a look
Shall we have a look at it again? Let's have a look.
→ fra ¤ points his pen to the screen and swings it upwards----------> ¤
fig #fig.140 #fig.141

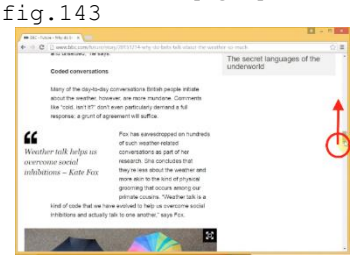

140


141

012 **Δ (0.9) # Δ**
→ ame **Δ** places hands
on the touchpad **Δ**
fig #fig.142


142

013 FRA ※#*jiu: yanjin yi xia hh.*
just precise one CLS
Let's just be a bit precise.
scr ※ AME scrolls the webpage up--->>
fig #fig.143



143

014 JOA **£*qishi bu yanjin ye wusuowei*£**
Actually N precise too doesn't matter
Actually, it doesn't matter if we weren't being precise.
015 FRA ***dui dui dui dui***
yes yes yes yes
016 AME **((°*haishi yanjin*°))**
better precise
Let's better be precise.
017 **(0. 8)**
018 FRA ***fanzheng*※# ((the teacher)) *ye bu zhidao* Δ*.hhhh*£££#**
anyway too N know
Anyway, the teacher won't know.
scr >>--------> ※
→ ame Δ AME points to the screen------->>
fig #fig.144 #fig.145

144


145

According to recent research, 94% of British respondents admit to having conversed about the weather in the past six hours, while 38% say they have in the past 60 minutes. "This means

019 **(0.9)**
020 JOA **[*ao*]*:***
ah
021 AME **%the past% of- (.)%*liushi fenzhong*%**
sixty minutes

According to recent research, 94% of British respondents admit to having conversed about the weather in the past six hours, while 38% say they have in the past 60 minutes. "This means
145

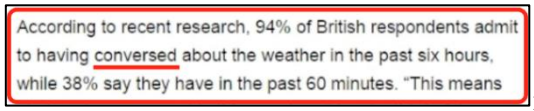
022 JOA **[*ao*↗]**
Ah.
023 FRA **%[*liu*]*ge xiao*[*shi*% *ba*]**
six hours PRT

According to recent research, 94% of British respondents admit to having conversed about the weather in the past six hours, while 38% say they have in the past 60 minutes. "This means
146

024 AME **%[*baifenzhi*] *jiushisi*% *shi* %*zai liuge xiaoshi nei*% *ou***
per cent of ninety-four is at six hours within PRT
% ninety-four per cent % is %in the past six hours%

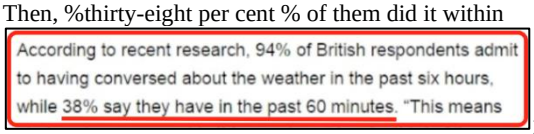
According to recent research, 94% of British respondents admit to having conversed about the weather in the past six hours, while 38% say they have in the past 60 minutes. "This means
147

025 ¤ (0.4)
fra ¤ looks down and takes notes------->>
026 AME %*tanlun guo*%
converse ASP
%conversed%



148

027 JOA *en*↓
yes
028 (0.7)
029 AME *ranhou:* %*baifenzhi sanshiba*% *shi* (0.2) *yijing zai zhelimian zuole*
then per cent of thirty-eight is already at within did
Then, %thirty-eight per cent % of them did it within



149

((10 lines omitted where AME and FRA discuss '38% say they have in the past 60 minutes' on the screen))
040 AME *ei jiezhe wang xia*
so continue towards down
So, let's continue scrolling down.

In line 1, Frank assesses the relevance of the content displayed on-screen (fig.134) as '***tai***:(too) **geographic**', referring its relevance to answering the session topic. Amelia agrees with his assessment in line 2 with an agreement token '***dui***' (right).

In line 3, Joanne initiates her turn with a Chinese particle '***ei***' indicating a topic shift (Wu, 2014), followed by a directive '***nage*** (that)'. Then, she refers to a piece of information discussed by Frank and Amelia earlier[10] as '***baifenzhi jiushisi de ren dou shuo tamen hen xihuan taolun tianqi a***' (ninety-four per cent of people say (that) they like to converse about the weather very much?)' Ending her turn with the Chinese final particle '***a***' in line 4, Joanne seeks confirmation from her peers (Wu, 2004, pp. 129-138) and indexes a relatively K- epistemic status of her memory of the referent content. Without the referent content displaying on the screen, Joanne's K- epistemic status display seeks help from her peers and initiates the ESS. During Joanne's talk, Frank and Amelia shift their bodily orientation in line 3 and 4 respectively (fig.136 and 137), turning their gaze away from the screen to Joanne. Frank and Amelia's bodily orientation demonstrate their engagement in Joanne's talk as well as the recipient of her request.

In line 5, Amelia first responds to Joanne's request with an other-initiated other repair '***tamen [dou you-]***'(They all conversed) in regards to Joanne's '***tamen hen***

[10] Previous discussion between Frank and Amelia (40 lines prior) is not included in this excerpt. The referent content will be relocated later in interaction at line 18, see fig.144, Excerpt 15.

xihuan'(they like very much) in line 4. Overlapping with Amelia's response, in line 6, Frank also initiates a repair to Joanne's turn, starting with '**[*dou-*] *dou yong***'(All, all use,) and then self-repairs into '***dou hui:: taolun tianqi***'(all would converse about the weather), which focuses on the same epistemic domain as Amelia's repair, on the 'converse' action in the referent content. In line 7, Amelia repeats Frank's repair '***dou hui taolun***' (all would converse) as an acknowledgement, and affirms her earlier repair to Joanne (line 5) again '***dou taolun guo zai-***' (all conversed in). From line 5 to 7, Frank and Amelia's affirmative repairs and acknowledgements demonstrate their K+ epistemic status on the 'converse' action described in the referent content.

Contributing additional information of '***guoqu de liuge xiaoshi***'(the past six hours) in line 8, Amelia demonstrates her relative K+ epistemic status of the different but relevant epistemic domain, time, of the referent content. However, the '***haoxiang***'(maybe) at the end of her turn downgrades her assertion and displays her uncertainty. Turning to Frank and looking at him while she talks, Amelia's bodily orientation indicates that Frank is the designed recipient of her talk and is expected to respond in the next turn.

After a 0.2-second micropause in line 9, Joanne is the first to respond to Amelia's turn (line 10), making the unknowing epistemic status claim of '***hai mei you [kandao]***'(I haven't seen that part yet) and explicitly indexes herself at the K- position comparing to Amelia's K+ epistemic status. With Amelia displaying uncertainty and Joanne's unknowing position on the time aspect of the referent knowledge (line 8 and 10), in line 11, Frank suggests the group to look at the referent content again. Upgrading the degree of affirmation from '***[yaobu] women zai kanyikan***'(Shall we have a look at it again?) to a more instructive '***°zai kanyikan°***'(Let's have a look.) turn, Frank's talk implies his uncertainty on the requested information. His turn in line 11 also suggests the group uses the referent content as a resource for knowledge to answer Amelia's question. In line 12, Amelia places both her hands on the touchpad (fig.142), bodily displaying her agreement with Frank's suggestion, until she locates the content from the webpage in line 18 (fig.144).

The group locates the referent content and utilizes it as the resource for the requested knowledge from lines 18 to 27. In line 18, Amelia stops the cursor when the referent content has been relocated on the screen (fig.144) and later points to the screen (fig.145) to draw her peers' attention to it. In line 19, after looking at the screen for 0.9

seconds, Joanne produces an elongated backchannel token '***ao:***' in Mandarin, which usually functions as a continuer or a claim of understanding (Tao and Thompson, 1991; Clancy *et al.*, 1996). Treating it as a continuer, Amelia continues her action by verbally reporting the relevant content (see fig.145) to the group in line 21 '**%the past% of-** **(.) %*liushi fenzhong*%**(sixty minutes)'. Joanne produces the '***ao*↓' again in line 22, this time with a falling intonation, which serves as an acknowledgement and change-of-state token to Amelia's information. Overlapping with Joanne, Frank initiates a repair to Amelia's turn in line 21 with '**%*liuge xiaoshi*% *ba***', which is the Chinese equivalent of 'six hours' displayed on the screen (fig.146) and the correct content relates to the referent knowledge '94% of British respondents' that has been discussed. In line 24, Amelia initiates a self-repair at the near end of Frank's turn with the read-aloud of the content on-screen in Chinese'**%[*baifenzhi*] *jiushisi*% *shi* %*zai liuge xiaoshi nei*% *ou***'(%ninety-four per cent % is %in the past six hours%), finally locating the knowledge they are seeking. Then, in line 35, Frank starts the activity of noting down this information on the screen, implying his receipt of the knowledge.

In the next line, Amelia refers back to their first epistemic domain—the 'converse' action that was discussed in lines 3-7, and repeats '%conversed%' in Chinese '**%*tanlun guo*%**' re-affirming Frank's and her repair to Joanne's initial recall of the content. At the same time, this repetition also confirms Amelia and Frank's K+ epistemic status on this issue. Later, Joanne displays her acknowledgement with '***en*↓'(yes) in line 27. Therefore, at this time, both of the 'converse' and 'six hours' epistemic domains have been clarified in the group by locating the relevant content on the screen, and all participants have displayed or confirmed their understanding. The drive for ESS no longer exists and the ESS closes.

After a short pause in line 28, Amelia initiates the read-aloud and discussion of another piece of information to the group in line 29. They continued to discuss the information located after the referent content (see fig.149, 10 lines omitted from Excerpt 15) before Amelia closes the group action of using this content as a resource for knowledge and scrolls down the webpage in line 40.

Excerpt 15 demonstrates the interactional proceeding of going back to the referent content as a resource for knowledge when all participants display different gradients of K- position of the referent content. The data demonstrates the participants' ability to obtain epistemic access from online content by using the IEED when they need to verify

their newly displayed understanding of the referent knowledge. The next excerpt describes another situation where participants utilise the content found through IEED to verify understandings when participants hold different opinions of one epistemic issue.

***

In Excerpt 16, James, Helen and Jack are discussing the session topic '*What does this mean?*' They are looking at a website explaining the composition of the national flag of the UK (also called 'the Union Flag'). After Helen's comment that the union flag is composed of the flags of three nations in the UK, James initiates the K- epistemic stance claim of whether the union flag includes the flag of Wales and elicits a different opinion from Jack. Later, Jack picks up the iPad and scrolls through the website content to find information about the flag of Wales.

Excerpt 16 ei, which one represents Wales?

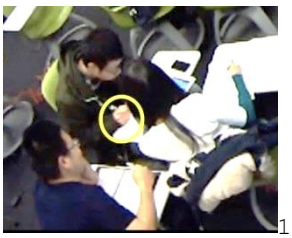
±JACk ☆HELen ⊥JAMes ※ iPad screen

001	**JAM**	#**huhhh. *hao luan a tamen zhege qizi***
		very confusing PRT they this flag
		The union flag of theirs is very confusing.
	fig	#fig.150
		#fig.150a


150


150a

002	**HEL**	***jiu sange jia zai yiqi lou***
		just three add place together PRT
		From just placing three flags together.
003	**JAC**	***wo jide wo yiqian hoaxing kanguo***
		I remember I past maybe seen
		I remember I have seen, in the past,
004	**JAM**	#±***ta shibushi mei you weiershi a***
		it whether N have Wales Q
		Does it not have Wales' flag?
	jac	± takes notes from iPad---------->>
	fig	#fig.151

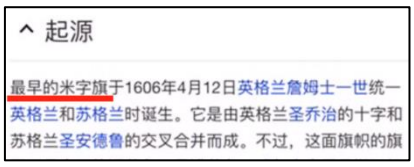

151

005 (0.8)

006 JAC %#*zui zao de miziqi*%
most early ASSC union flag
%The earliest union flag%

fig #fig.152


152



007 JAM *na jiu bu yao weiershi le*
then just N need Wales PRT
Then, let me just delete Wales.

008 (1.0)

009 HEL *ou dui ou± *#haiyou weiershi* ^wo# lao wangji^ [hhhh.]*
oh right PRT also Wales I always forget
Oh. Right! There is also Wales. I always forgot about it.

jac >>----------> ± *looks at HEL---------->* ^looks at iPad----------> ^

fig #fig.153 #fig.154


153


154

010 JAC ±#[*you a*] *weiershi shi:*± *※#er: : : : : : :*
be PRT Wales is:
It has. Wales is

jac ± looks way with thinking face ± *looks at iPad and points at it----->>

→ scr ※ JAC rolls the page up slowly----->>

fig #fig.155 #fig.156


155


156

011 JAC *ei weiershi shi na yi ge*
PRT Wales be which one CLS
Which one represents Wales?

012 (3.7) ※# *(2.6)*# (6.1) ^ (2.4) ^#

scr >>---> ※ *JAC scrolls ^ JAC scrolls
the page the page

down slowly* down slowly^

fig #fig.157 #fig.158 #fig.159


157

158

159

013 → HEL ☆#%*sheng george%* *sugelan gen zhe liangge*☆

saint Scotland and these two

%St. **george%,** Scotland, and these two.

→ hel ☆ points to screen---------->☆

fig #fig.160

#fig.160a


160

160a

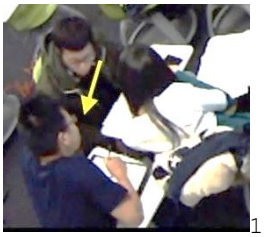
014 JAC ±#*ou zhende mei you weershi*± *#*weershi de qizhi shi*: (0.2)

oh really N have Wales Wales Assc flag is:

Oh, it really does not have the flag of Wales. Wales' flag is

jac ±looks at JAM---------->± *looks at HEL---------->>

fig #fig.161 #fig.162


161

162

015 JAC *shizi de* (0.5)* ±#*gao cuo le*±

lion ASSC get wrong PFV

with lions. I got it wrong.

jac >>---------->* ± looks at JAM ±

fig #fig.163


163

In line 1, James looks at the texts and images on the iPad about the composition of the union flag and comments on it as '*hao luan a*' (very confusing PRT). To help him understand, Helen explains in line 2— '*jiu sange jia zai yiqi lou*' (From just

placing three flags together PRT.) as the union flag is composed of the flags of UK's three nations. While Helen responds to James' comment on the complexity of the union flag, Jack is taking notes from the content on IEED screen and initiates a turn in line 3—'***wo jide wo yiqian hoaxing kanguo***' (I remember I have seen, in the past,) which does not relate to Helen and James' previous talk.

In line 4, James initiates a question '***ta shibushi mei you weiershi a***' (Does it not have the Wales' flag?). Without indexing a clear K+ or K- epistemic stance, this negative interrogative can be understood as James' agreement soliciting (K+) or confirmation seeking (K-) (Heritage, 2012b). Either way, James' turn (line 4) is in response to Helen's turn in line 3 where her talk implies that the flag of UK is composed of the flags of its three nations, but there are four—England, Scotland, Wales and Northern Ireland. Therefore, James turn in line 4 initiates the epistemic search for the knowledge of whether the union flag includes the flag of Wales.

After a 0.8-second pause (line 5), in line 6, Jack reads the content he is looking at—'**%*zui zao de miziqi*%**'(%The earliest union flag) while taking notes from the IEED screen. His read-aloud and bodily orientation indicate that he is conducting the note-taking activity, while James and Helen discuss the flag epistemics. In the next line, James responds to his own question in line 4 and suggests that he will 'delete Wales' from his notes. This turn demonstrates James having an understanding of which the flag of the UK does not have: the elements of Wales' flag. Thus, James negative interrogation 'Does it not have the Wales' flag?' in line 4 is very likely designed to search for agreement from his peers.

In line 9, starting her talk with a change-of-state token '***ou***' (oh), Helen treats James' previous talk as informative and displays her agreement with his understanding. Acknowledging James' mentioning of Wales with '***dui ou***' (right PRT), Helen then recognizes '***haiyou weiershi***'(There is also Wales.) and '***wo lao wangji***'(I always forgot it.). This explains her previous turn that omits the Flag of Wales when talking about the union flag as having the composition of '***sange jia zai yiqi***'(three flags adding together) (line 2). The 'three' she is referring to in line 2 is because of the omission of Wales.

During Helen's talk, Jack raises his head and looks away from his notes to Helen (fig.153). He takes the floor in line 10 at the end of Helen's turn with the affirmation '***you a***' (It has) claiming that the union flag has an element of the flag of Wales and thus contradicts James and Helen's displayed understanding. He continues the turn with

'***weiershi shi:*** (Wales is:)', trying to support his affirmation further. The elongated '***shi:*** (is:)', as well as the thinking face (fig.155), holds the floor as Jack demonstrates he is in the process of completing his turn and thinking. Then, he holds the floor with a prolonged '**er: : : : : : :** ' and leans towards the IEED to roll up the webpage slowly, scrolling through the content. Jack's incomplete turn and the use of the IEED indicates his intention of using the IEED as the help for finding supporting evidence of his turn and turn completion.

After his shift of bodily orientation and the initiation of the use of IEED (line 10), Jack produces a wh-interrogative in line 11 '***weiershi shi na yi ge***' (Which one represents Wales?) while scanning through the content on IEED. His question explicitly displays Jack's K- position and the epistemic sought: the flag of Wales. Jack's turn is an IR that searches for the flag of Wales on the IEED screen. However, with no response to his IR, Jack continues moving and scanning through the content on iPad for 14.8 seconds, and none of the participants produces any talk during this long period (line 12). This long silence indicates that none of the three participants knows the information to the IR.

In line 13, Helen breaks the silence when she spots the content on IEED screen where the information of the union flag's composition is displayed (fig.160a). She points to the screen with her pen and verbally reports the information to her peers—'**%*sheng* george% *sugelan gen zhe liangge***' (**%**St. **george%,** Scotland, and these two.) none of which has the flag of Wales. In line 14, Jack displays the receipt of this information with a change-of-state token '***ou***' (oh) and demonstrates his understanding with an assertion '***zhende mei you weiershi***' (it really does not have the flag of Wales). And he further displays his K+ epistemic stance of the flag of Wales in line 14 and 15 "***weiershi de qizhi shi*:(0.2)*shizi de***" (Wales' flag is with lions.), concerning his newly achieved understanding (line 14). At the end of his turn, Jack explicitly displays his realisation of '***gao cuo le***' (I got it wrong.) admitting his earlier claim that the union flag has the component of the flag of Wales (line 10) was wrong.

This excerpt demonstrates that participants use the content from the IEED as a resource for knowledge when their understanding of an epistemic is in dispute. Although James and Helen have an understanding of 'the Union flag does not have the flag of Wales', Jack is against it. In the ESSs, participants manage to find relevant

content on the webpage (fig.160a) to verify their claims and reach an agreed understanding.

In all four excerpts presented in this section, all participants start with a K- epistemic position (unknowing or less knowing) and proceed to find the relevant information from the IEED content. In the process of finding this knowledge, participants incorporate the on-screen content in their talk to report to their peers or ask for corroboration. The ESSs are driven by the knowledge imbalance among participants and come to an end after participants reaching a collective understanding and display knowing.

6.2 Not reaching a collective understanding: from unknowing epistemic status claim to topic shift

Though finding relevant content from the IEED screen can be used in contributing information to the knowledge sought and drive the ESSs forward to help participants achieve a collective K+ understanding, ESSs will atrophy when K- participants do not use the IEED as a resource for knowledge and no more contributions to the K- epistemic issue are made. This section will demonstrate two instances in which the epistemic topic atrophies in the absence of any participants' display of knowing or finding relevant information with the IEED. Excerpt 17 is a continuation of Excerpt 16, which ends with Jack admitting that the flag of Wales is not included in the union flag. In Excerpt 17, Jack displays his uncertainty of the look of the flag of Wales, particularly 'The flag of Wales seems to have three lions.' in response to Helen's IR on the flag of Wales' design. Jack, Helen and James explicitly express their decision to not use the iPad to look for relevant information and achieve a K+ epistemic stance.

Excerpt 17 uhhh, whatever.

±JACk ☆HELen ⊥JAMes ※ iPad screen

016 #(0.7)
fig #fig.164
#fig.164a


164


164a

017 HEL ☆***weiershi shi shenme***#☆
Wales is what
What's Wales' (flag)?
hel ☆heads up and looks at JAC☆
fig #fig.165


165

018 → JAC ±***weiershi*** #***haoxiang shi***± *#***sange shizi*** **(0.6)*** ^#***aiya buguanle***^
Wales seems be three lions PRT whatever
The flag of Wales seems to have three lions. PRT, whatever.
→ jac ±leans forward and looks at iPad± *touches the iPad-------->* ^ move away from iPad^
fig #fig.166 #fig.167 #fig.168


166


167


168

019 HEL ***jiu zheyangzi ba***
just this way PRT.
We can leave it here.
020 JAM ⊥±#***bu yong guan zhege***
N need mind this
No need to mind this.
jam ⊥looks at JAC---------->>
jac ±looks at JAM---------->>
fig #fig.169


169

021 JAC £huhuhhuhuh£
022 JAM ***bu bi jiujie zhege***
no need bother this
No need to bother about this.
023 JAC ***ni you shenme xiangfa ni yao jiang shenme***
you have what thought you want present what
What thoughts do you have? What do you want to present?

In line 17 of Excerpt 17, Helen looks away from the iPad screen and asks Jack (fig. 165) about the flag of Wales '***weiershi shi shenme***' (What's Wales' flag?). This serves as an IR that initiates the ESS. Jack responds with a downgraded assertion —'***weiershi haoxiang shi sange shizi***'(The flag of Wales seems to have three lions.) (line 18). At this point, with Helen indexing a K- epistemic status claim with her IR and Jack response with a downgraded assertion, none of the participants has displayed a K+ epistemic status on the requested knowledge. Jack reaches for the iPad (figs.166 and 167) and displays his intention to use it as a resource for knowledge. However, he then changes his bodily orientation very quickly (fig.168, line 18) while producing talk— '***aiya buguanle***' (PRT, whatever.) indicating the abandoning of the intended activity of using the iPad.

Agreeing with Jack, the ESS initiator Helen agrees with his decision to not use the iPad and look for her requested information (line 19). James then supports Helen and Jack's decision by exchanging gazes with Jack in line 20 and says '***bu yong guan zhege***'(No need to mind this.) with '***zhege***' (this) referring to the K- epistemic issue. With both his peers displaying their supports, Jack acknowledges them by laughter in line 21. At this point, all three participants verbally display their agreement on not using the iPad as a resource for searching for the knowledge of their K- epistemic issue. Later, James restates his support to Jack in line 22 and the topic of the referent epistemic issue atrophies. In line 2, Jack shifts the topic and asks James what he is planning to say for later presentation.

This excerpt shows participants verbally displaying and agreeing to not use the IEED to look for the K- epistemic after the initiation of the ESS. Although the relative K+ participant Jack displays a higher level of knowing to Helen's (K-) IR, he also displays uncertainty about the knowledge provided. Without any new information contributed from the participants or the IEED, the ESS atrophies and the K- participants move to a different topic without a display of knowing.

***

The participants in Excerpt 18 below do not verbally display their decision to not use the IEED for the K- epistemic issue, rather, they carry out other activities (reading) and move on to different content without any display of knowing of the requested

knowledge. In this excerpt, Frank, Joanne and Charlotte are on their course of answering the topic question '*Does lad culture exist?*' They are looking at *Wikipedia* page for Lad Culture when Frank displays his K- epistemic status on 'postfeminism' displayed on the screen.

Excerpt 18 what is post-?

ǂ CHArlotte ¤FRAnk ⊕JOAanne ※ laptop screen

	fig	#fig.170	
		#fig.170a	
		 170	 170a
	scr	CHA is scrolling down the page---->>	
001	JOA	⊕ **en#m %postfeminism**#%⊕※	
	joa	⊕ points to screen---------- ⊕	
	scr	>>--> ※	
	fig	#fig.171	#fig172
		 171	 172
			
002		**(1.7)**	
003	JOA	**((murmuring))**	
004 →	FRA	**¤sha jiao #hou- ¤**	
		What call post	
		What is post-	
	fra	¤ moves away from the screen and looks at JOA¤	
	fig	#fig.173	


173

005 ¤ (0.8)

→ fra ¤ leans forward to look at the screen---->>

006 JOA em bu zhi#dao

N know

I don't know.

fig #fig.174


174

007 CHA hou ¤ *#xiandai *

Post modern

Postmodern

fra --->> ¤ *glance at CHA*

fig #fig.175


175

008 FRA ¤ hou nv#quan

post feminism

Postfeminism

fra ¤ looks at the screen----->>

fig #fig.176


176

…((8 lines of JOA's reading omitted))

#fig.177


177

017 → JOA #※er %criticism%

scr ※CHA scrolls down the page---->>

#fig.178


178


At the beginning of Excerpt 18, all participants are looking at the *Wikipedia* on the IEED screen (fig.170) while Charlotte slowly scrolls down the page (fig.170a). In line 1, Joanne initiates the interaction by reading '**%postfeminism%**' out loud and pointing to it on the screen. Her verbal and bodily actions are the signposting for other participants of her current activity - the content she is reading and its location on the screen. In response, Charlotte stops her ongoing action of scrolling down the page and stops the webpage at the signposted content (fig.172). In line 3, Joanne continues her reading of the content below 'postfeminism' under her breath.

It is in line 4 where someone in the group displays their epistemics overtly. By formulating an uncompleted wh-interrogative—'**sha jiao hou-**'(What is post-), Frank requests information on the word 'postfeminism' on-screen and displays his unknowing epistemic stance of the word meaning. His body torque, moving away from the screen (fig.173), indicates his shifting orientation from the IEED screen to face-to-face interaction with other participants. Apart from this, his glance at Joanne (fig.173) selects her as the next speaker. After his next speakership selection, Frank leans forward to look at the IEED screen again in line 5, possibly looking for information from the screen.

Although Joanne is the person who guides the group to the referent content and the addressee of the epistemic search question, she indexes a K- epistemic status with '**bu zhidao**' (I don't know) (line 6) to the referent knowledge. In line 7, Charlotte's response does not provide the answer to Frank's question either. Instead, she uses '**hou xiandai** (post modern)' as the response to Frank's question on 'postfeminism'. The two lexical items have the same 'post-' prefix in both Chinese and English and are within similar "post-" philosophies/theories. Charlotte's turn does not display her K+ epistemic status on the requested epistemic 'postfeminism' but provides a possible train of thought to understand it. In line 8, Frank turns his head to the IEED screen and produces '**hou nvquan**' (post feminism), the literal equivalent in Chinese of the word

‘postfeminism’, displaying his K+ epistemic status on the literal aspect of the word. Frank’s turn could be a display of knowing regards to Charlotte’s non-answer response, or simple repetition of the subject in his question. Therefore, the knowledge Frank searches for is not merely the Chinese equivalent of ‘postfeminism’ but the meaning and philosophy behind it.

While there is no indication that their K-epidemic status changed at this point, and none of the participants is able to provide more information on the requested knowledge, Joanne continues the action of reading the on-screen content (8 lines omitted in the transcription) until she advances to different content, ‘**%criticism%**’ (line 17). None of the participants displays a different epistemic position on the ‘postfeminism’ in these lines. With her signposting read-aloud ‘‘**%criticism%**’, Charlotte resumes her action of scrolling down the page (fig.178). It is clear that at this point, the participants shift their interactional focus from the epistemic search for ‘postfeminism’ to reading the ‘Criticism’ relevant content on the screen (fig.178).

Excerpt 18 illustrates an interaction where no participant is able to contribute information to the requested knowledge, nor do they find relevant information from the IEED. All participants interactionally accept Joanne and Charlotte’s later actions of moving on to the next activity (line 17), and to remain with an unknowing epistemic status of the requested information.

The two excerpts presented in the section above start with the K- epistemic status claim and end with no displaying of a collectively achieved K+ epistemics, that is to say, no displaying of knowing/understanding. The atrophy of the ESSs and the topic shifts seems natural when K- participants do not draw on IEED resource for the referent epistemic issues. Why do they not pursue the topics while none of them can display knowing or understanding? Findings in Jakonen and Morton (2015) study suggest that the decision whether or not to pursue the unknowing information may be dependent on its relevance to the completion of the pedagogical task. The data in this section suggests the same. The flag of Wales (Excerpt 17) and the philosophy of ‘postfeminism’ (Excerpt 18) are less crucial in comparison to completing the pedagogical task of answering the session’s topic questions.

6.3 Summary

This chapter looks at two ways of participants responding to K- epistemics in the absence of a knowing participant. Section 6.1. examines the display and the stepwise progression of participants' K- to K+ epistemics positions on the new information found from the internet, including challenges of participants' misunderstanding and contesting knowledge claims, in ESSs. Participants go through interactional efforts to find relevant content on-screen as a resource for knowledge and report their at-the-state understanding to peers to collaboratively achieve K+ understanding. Section 6.2. investigates the epistemic sequence atrophy as the result of participants' lack of contribution to the referent epistemic issues. These instances suggest that some epistemic issues, which are less relevant to answering the session's topic question, remain unknown to the participants, who decide not to use the IEED to look for information.

Chapter 7. Discussion and Conclusion

7.1 Overview of Findings

Using multimodal conversation analysis, this study has explored students' interactional practices involving Internet-Enabled Electronic Devices (IEEDs) during peer-interaction in a Self-Organized Learning Environment (SOLE) setting. The three analytic chapters above have found;

(1) When the IEEDs are used for the first time in the session, participants use embodied resources around the IEED to activate it as an interactional tool for getting on-task, or as an additional resource to search for information when participants in a group have insufficient knowledge relating to a task-related question. Particularly, this study finds that participants treat embodied orientation towards the IEEDs as the initiation of the pedagogical task, the same way as they treat verbal instructions.

(2) When a participant claims K- epistemic status regarding the epistemic domain of certain on-screen content, this can function as an information request (IR) or confirmation seeking (CS) device and thus initiate an Epistemic Search Sequence (ESS). Participants routinely employ embodied resources to draw peers' attention to particular aspects of the on-screen contents and prompt contributions from potentially more knowledgable (relative K+ epistemic status) participants, to achieve a state of epistemic equilibrium.

(3) In the absence of a more knowledgable (relative K+ epistemic status) participant, participants can make use of the affordances of the IEED as a resource for knowledge to the referent epistemic issue. They do this by drawing on some aspects of the on-screen contents to work towards a collective understanding. In other cases, if the epistemic issue is deemed less relevant to the larger pedagogical goal, participants may not seek an understanding and will instead move onto the next activity.

These research findings shed light on technology-assisted interactions amongst students in a formal learning environment with no teacher physically present. As such, this study contributes to CA research on technology-related interaction, epistemics in interaction,

and student-student interaction, as well as educational research into Computer-Supported Collaborative Learning (CSCL) and student-centred pedagogy. The ways the analytic findings above contribute to these areas will be examined below.

Section 7.2 discusses the findings of each of the three analytic chapters, considering the contribution to research on both SOLE and CA studies. Section 7.3 discusses the overall findings in relation to the existing literature reviewed in Chapter 2, in terms of IEED's affordances and epistemics in interaction. Section 7.4 discusses the methodology of this study, including its strengths and limitations. Section 7.5 concludes the thesis, and finally, Section 7.6 discusses some potential directions for further research.

7.2 Discussion of Findings

This section will discuss the findings of the three analytic chapters in relation to the existing literature. Section 7.2.1 discusses the participants' activation of the IEEDs regarding activity shifts in the interaction. Section 7.2.2 discusses the ESSs triggered by on-screen content and responded to by participants with K+ epistemic status. Section 7.2.3 discusses the ESS in situations when no participants in the group have sufficient knowledge to respond to the K- epistemic status claim.

7.2.1 *Activating the IEEDs for achieving key activities: getting 'on-task' and obtaining information*

By examining unfolding interactions in a SOLE setting, Chapter 4 reveals that participants use verbal and embodied resources towards IEEDs to get on-task. This finding contributes to the existing SOLE research, which has not focused on the interactional use of IEEDs. This study finds that participants treat embodied orientation towards the IEEDs as the initiation of the pedagogical task, the same way as they treat verbal instructions. Chapter 4 also provides supporting evidence of the SOLE design that IEEDs can be used to facilitate participants' learning in the absence of a teacher, by examining the sequential organisation of participants explicitly invoking IEEDs as a tool for searching information when they have a question that they cannot answer

themselves. The above findings of Chapter 4 will be discussed in detail in the following paragraphs, in relation to the existing research literature of interactional studies.
The analysis in Chapter 4 set out two ways in which participants first utilize IEEDs in SOLE sessions, using the IEED to initiate an activity shift to get on-task at the beginning of their discussion or to obtain information when no participant has sufficient knowledge about a specific task-related topic. These findings are of particular interest because they provide empirical evidence of when and how participants make use of IEEDs in a group educational setting. To date, such findings have not been produced by previous CA research on the use of technological objects in student-student interactions (Çakır *et al.*, 2009; Levy and Gardner, 2012; Bierema *et al.*, 2017; Engeness and Edwards, 2017) nor in the studies of SOLE (Mitra and Dangwal, 2010; Mitra, 2012; Dolan *et al.*, 2013; Mitra, 2014; Mitra and Crawley, 2014; Mitra, 2015), though participants in other settings are found to use paper and documents in activity shifts (e.g., Svinhufvud and Vehviläinen, 2013; Tanner *et al.*, 2017), and it is behind the design of SOLE to use IEEDs as the search tool for information in the group (Mitra, 2014; Mitra, 2015).

The findings in Section 4.2 shows how participants arrange seating, tables, and body positions to physically orient themselves towards the IEEDs in preparation of the pedagogical activities. Previous interactional research on physical objects has found that participants' placement of their body, gaze and objects in the surrounding environment are used to achieve an 'embodied participation framework' (Goodwin, 2007). These studies revealed the ways participants create joint attention on physical objects, such as commercial objects and papers, in interaction by using verbal and/or embodied resources (Kendon, 2004; De Stefani, 2014; Sakai et al., 2014; Mondada and Sorjonen, 2016). While these studies provide useful insight, the current study adds findings relating to the use of technological objects in achieving an embodied participation framework.

From the analysis in Chapter 4, various uses of the IEEDs are found in different sequential positions in interaction, when participants initiate a shift of activity in the interaction and guide other participants' attention to the IEED. Participants can verbally invoke the IEEDs or use multimodal resources such as typing keywords in the search bar and reading their typing out loud, clicking or tapping on the IEEDs, moving the cursor or touching the touchscreen, opening a new tab, picking the tablet from the table

or turning the tablet towards them, or pointing. This contributes to the knowledge of how participants use technological objects when conducting an activity shift in the interaction. As discussed in Chapter 2, although CA studies of paper and documents have suggested that physical materials can be manipulated to initiate an activity shift (Svinhufvud and Vehviläinen, 2013; Mikkola and Lehtinen, 2014), the understanding of the uses of technological objects for activity shifts is less developed in CA research.

Section 4.2 examines how participants use IEEDS to shift from non-pedagogical activities and get on-task. The analysis found that participants use speech, embodied resources, or both, to prepare and project a shift to the pedagogical task; finding information relating to the topic question set by the teacher. Section 4.2 starts with a single case analysis where verbal instructions (e.g. 'Let's start' in Excerpt 1) are used at the same time as embodied actions towards the IEEDs from different participants to project getting on-task.

Interestingly, later excerpts in Section 4.2 show that embodied actions projecting participants' attention on the IEEDs can be used with or without the verbal turns to get on-task. These include embodied actions towards the IEEDs, such as body torque, moving the chairs, and gazing (Excerpts 2, 3 and 4). This finding contributes to the study of small group interaction with IEEDs. As discussed in Chapter 2, a study on business meetings by Asmuß and Svennevig (2009) found that the chairperson needs to use standard topic transition markers like 'okay' loudly to get other participants' attention and start the business of the meeting, even with the laptops and a projector in front of participants. However, the excerpts in Section 4.2 suggest that embodied actions work as effectively as verbal instructions in small group interaction for getting participants' attention and getting on-task. The difference in the findings of the two studies may be due to the fact that all of the participants in the present study can obtain shared visual access to the single IEED in the group, thus making embodied actions orienting to the IEED as effective as verbal cues in task-initiation. It further supports Goodwin's (2007) notion of 'embodied participation framework' and the systematics of interaction underpinning CA research, as the task-initiators design their verbal or embodied turns based on whether their embodied actions with the IEEDs are known to others (visually accessible). This also adds to the knowledge of ways in which technological objects can be used to initiate an activity shift in interaction, as this was previously only found in studies that focused on non-electronic objects, such as written

documents (Mikkola and Lehtinen, 2014; Weilenmann and Lymer, 2014; Dolata and Schwabe, 2017). Also, the current study suggests that while the IEED is a technological object, its technological affordances are not always used to achieving activity shifts, as participants can orient to the IEED in a similar way to a physical object.

In Section 4.3, the focus shifts to another sequential position where the IEED is used during participants' on-task discussion of the topic question. It finds that in these cases, IEEDs are invoked and used to search for information when no one in the group has sufficient knowledge about a task-related topic. There is a clear shift of upper body orientation (body torque) and gaze, indicating participants' transition between different the temporalities of face-to-face interaction and interaction with the IEED. Participants explicitly use the IEEDs as a tool to potentially provide information and use embodied resources to guide other participants' attention towards the IEED. This contributes to the knowledge of interactional uses of technology during face-to-face interactions. Studies in medical consultation interaction (e.g., Nielsen 2014 and 2019) have found that doctors use verbal and embodied actions towards the use of the computer to project and display engagement in different activities in doctor-patient interaction. The present study also finds that participants use explicit verbal turns with embodied actions to demonstrate their intention to use the IEED and they can also invoke the particular technological affordance of the IEED, such as information search when projecting a shift from face-to-face interactions to using the IEED.

This study also investigates participants' use of IEEDs after their first activation of these devices, the findings of Chapter 5 and 6 have demonstrated these uses. The following sections will discuss these findings.

7.2.2 *IEED screen contents triggering K- epistemic status claims and prompting other participants' help*

Chapter 5 in the present study examines the sequential organisation of the ESS, where content displayed on the IEED screen can be new to one or some participants in the group and prompt the help from participants with relative K+ epistemic status. Existing SOLE studies had little interactional evidence of how students display and claim knowledge through their discussion (i.e. Burgess, 2010). In the present study, the findings in Chapter 5 provide supporting evidence to the claim that computers in SOLE

can promote students' learning (e.g., Mitra 2012, 2014) by examining the moment-by-moment interaction and adding detail to the ways students display their epsitemic positions of the referent epistemic issue. These findings are discussed with reference to the CA studies of epistemics in conversation and participants' use of IEEDs in the following paragraphs.

As discussed in the literature review, Heritage (2012c) claims that epistemic imbalances between participants drive interactions forward in search of a state of shared understanding. Chapter 5 of the current study examines instances when the information presented on the IEED screen prompts K- epistemic status participants requesting help from potential K+ participants. In these cases, K- epistemic claims perform two types of social actions to drive the sequence forward; requesting information of the referent on-screen content, and seeking confirmation of participants' understanding of the on-screen content.

Section 5.2 shows how the interactional management of knowledge works in student-student interaction in an educational setting, a setting that requires further research (see Section 2.5.2). Building on the work of Jakonen and Morton (2015) and their notion of epistemic search sequences (ESSs) which focuses on students' collective interactional work in closing the knowledge gap in the group, Section 5.2 examines information request (IR) initiated ESS that prompt a 'knowing' response from another participant. It finds that some on-screen content triggers participants' unknowing epistemic status claims and requests for information. Participants employ verbal resources, such as reading aloud, and verbal instructions like 'have a look', as well as embodied resources like pointing and moving the cursor to guide other participants' attention to the referent on-screen content. Questions formulated with wh-interrogatives (in English or the Chinese equivalent) are used for IR, seeking information relating to cultural knowledge, and English language knowledge, such as contextual meaning, lexical meaning, and pronunciation. These findings add to the knowledge of ESS described in Jakonen and Morton (2015) as it shows various ways in which participants use different linguistic resources and embodied actions towards IEEDs in building epistemic searches to achieve epistemic equilibrium while working on the pedagogical task.

In response to the IRs, the relevant K+ participant would provide the information requested, followed by the K- initiator's acknowledgement. When acknowledging the

receipt of the information, the K- initiator uses repetition, laughter and/or nodding to demonstrate knowing. They can also further demonstrate their understanding of the peer-provided knowledge by laughing or translating the English content, as a way to demonstrate their understanding of the humour embedded in the provided clause meaning (line 5, Excerpt 7) or lexical meaning (line 23, Excerpt 9). The findings relating to how participants respond to IR add to the work of Jakonen and Morton (2015) regarding conversational resources used for sequence organisation in ESS. In particular, they reveal that K- initiators can use laughter and sequence expansion to display their upgraded epistemic stances in ESS. These manners of epistemic display found in the current study also contribute to the broader research scope of demonstrating understanding and displaying knowing in interactions, as previous studies do not focus on these elements (Macbeth, 2004; Koole, 2010; Hindmarsh *et al.*, 2011). Section 5.2 also describes the situation in which the K- initiator displays a more knowing epistemic stance and therefore the drive for the epistemic engine atrophies and the ESS closes. In these cases, participants move on to the next activity by using verbal instructions or manipulation of the cursor to scroll down the IEED and move away from the referent content.

Focusing on CS-initiated ESSs, the analysis in Section 5.3 adds to Jakonen and Morton's (2015) work on ESSs as their work has been mainly discussed in relation to the IR initiation. The findings of the present study suggest that CS and IR are two different social actions that participants use in ESS. Through the analysis of CS-initiated ESS in Section 5.3, it is found that the drive for the epistemic engine here is the 'less knowing' epistemic status claims to seek confirmation, suggesting that a K- initiator has some knowledge but requires it to be ratified by a relatively more knowledgeable participant. Both excerpts in Section 5.3 are in Chinese and the findings regarding the action formation of CS to contribute to the knowledge of CA research in Chinese interaction (see also Section 7.4). It was found that alternative questions, yes/no interrogatives and tag questions are used for CS in these sequences. In particular, the K- initiators use a declarative clause to demonstrate their understanding of the referent content but index a 'less knowing' epistemic status with tag questions, alternative questions, or yes/no interrogatives.

Through the analysis in Chapter 5, the findings consistently suggest that in the K- initiation (both IR and CS) of ESS, the on-screen content can serve as a trigger for

participants' K- epistemic status claims and requests for help from the K+ participants. However, there are occasions where the K- epistemic issue is unknown to all participants. The next section discusses the sequences which were analysed in Chapter 6 in which this occurs.

7.2.3 *Using contents on the IEED as a resource to achieve a collective understanding in the absence of a knowing participant*

Chapter 6 looks at the interactions in which the group's unknowing epistemic status is insufficient for participants to achieve higher epistemic positions when one participant requests help with understanding the on-screen content. The analysis in Chapter 6 finds that in these situations, participants can use relevant content from the IEED as a resource for knowledge and display an understanding of the referent content collectively. Conversely, they can also abandon the ESS and transition to the next activity without any claim or display of understanding the referent issue. These findings further SOLE research as they provide detailed interactional evidence of the ways in which students use the IEEDs as a resource for knowledge in the absence of a knowing participant, as well as the ways in which students choose not to use the IEEDs to achieve a collective understanding of the requested knowledge.

As Heritage (2012b) and Jakonen and Morton (2015) argue, the information imbalance (knowledge gap) between participants is the drive for further interaction and ESS. In fact, in Section 6.1 it was shown that participants would still advance the ESS even when all participants display or imply their K- epistemic status on the referent content, that is to say, in the absence of a knowing participant. The analysis of examples in this section found that participants can make use of the relevant content on-screen as a resource for knowledge to demonstrate their understanding on the epistemic issue collaboratively.

It was also suggested in this study that in response to a peer's K- initiation of IR or CS, other students do not always explicitly claim their K- epistemic status. For instance, in Excerpts 14 and 15, long silences after the K- initiation, claiming lack of access to the referent content, and suggesting to use the IEED as a resource for knowledge are treated as implicit displays of speakers' K- epistemic status of the referent issue. This finding contributes to the field of multimodal interactional studies of

epistemic displays in educational settings, where the majority of the studies are conducted in teacher-student interactions (Koole, 2010; Gosen, 2018), by adding to the knowledge of students' displays of epistemic access in small group peer-interaction using IEEDs. In the present study, it was shown that these K- respondents could display an understanding from the relevant content on-screen shortly after the K- initiation (Excerpts 13, 14, 15 and 16). In these cases, they refer to the relevant content as the origin of their epistemic access when demonstrating their newly obtained understanding to the group, as an inexplicit way of displaying their K- epistemic status at the beginning of the ESS and their in-the-moment achievement of the K+ epistemic stance. These references to the origin of their knowledge can be read-aloud, displayed through pointing at the relevant content, or by the incorporation of the content in their elaboration.

Adding to the understanding of multimodal epistemic displays in interaction, the findings in Chapter 6 also suggest that participants can use embodied actions to index their upgraded epistemics positions. For instance, change-of-state tokens, various displays of acknowledgement (e.g. nodding, acknowledgement tokens), or positive assessment of participants' understanding (i.e. verbal 'well done' and thumbs-up gestures) are found in the reaching of consensus about the referent content and the sequence closes.

However, there are also challenges in using the relevant on-screen content to achieve a higher epistemic status. In Excerpt 14, instead of showing agreement with the proposed understanding from peers, one participant contested the agreed-upon understanding by repeating the referent issue and explicitly indexing a K- epistemic status with a wh-interrogative. This challenge of understanding prevents the sequence closure for the ESS and provides the contesting participant more time to find the 'correct' relevant content on the screen. It turned out that the proposed understanding was based on the misinterpretation of the one piece of on-screen information, while the contesting understanding was based on the correct interpretation of different relevant content. This potential constraint of unmonitored IEED use in SOLE pedagogy will be discussed in more detail in Section 7.3.2, as it suggests that there is the risk of misunderstanding the referent knowledge and what is 'learnable' in SOLE, though other occasions like Excerpts 16 and 17 equally show that participants can repair these misunderstandings.

Another pedagogical challenge was examined in Section 6.3, where the K- participants do not advance the sequence in the exploration of the K- initiation and the ESS closes without participants displaying a higher epistemic stance of the K- knowledge. This finding aligns with Heritage's (2012a) argument that information imbalances are the drive for conversation, as no participant displays any higher epistemic status of the referent issue and there is the lack of information balance; thus the epistemic engine and ESS lacks driving force.

Comparing the findings in Section 6.2 and 6.3, this study argues that in the educational setting of a SOLE, interaction can be driven by both the pedagogical task and by information imbalance among the participants, depending on the degree of referent knowledge's relevance to the pedagogical task. As the analysis in Section 6.2 shows, participants display the relevance of the discussed epistemic issue to the completion of the pedagogical tasks in various ways. For instance, aligning with the findings of Nevile *et al.* (2014) and Tanner *et al.* (2017), the current study finds that during the group discussion, participants produce potential products of the pedagogical task that can be shown to the teacher after the discussion. These potential pedagogical products can be participants' English talk when demonstrating their understanding of the relevant Chinese information on the screen (Excerpt 13) or their notes produced in the note-taking activity (Excerpts 15 and 16) in response to peer's K+ demonstrations. The ESS was advanced when the referent knowledge is vital for assessing the aptness of the webpage in relation to the topic question (Excerpt 14). In comparison, the epistemic domains of the 'flag of Wales' (Excerpt 17) and 'the meaning of Postfeminism' (Excerpt 18) in Section 6.3 are less important to answering the topic questions of '*What does this mean?*' and '*Does lad culture exist?*' respectively, as participants did not treat these epistemic issues as being relevant to the completion of the task in interaction as in the excerpts in Section 6.2.

In summary, Chapter 6 examines instances of ESS in the absence of a participant of knowing epistemic status. The analysis suggests that in this scenario, the contents displayed on the screen can serve as a resource for knowledge to help the participants at unknowing epistemic status to achieve a higher level of epistemic stances. However, participants may also choose not to seek out a collective understanding, thus remaining in a K- epistemic position and shifting to another activity, when they deem the referent knowledge to be less relevant to the larger pedagogical goal.

7.3 Further Considerations

The aim of this study is to investigate the interactional unfolding of the student-student interaction and the use of IEEDs in SOLE settings, as this is where the author identified a gap in the literature. As such, this study contributes to an emerging body of research on student-student interaction and the use of technological objects in educational settings. In addition to this, through the review of the relevant literature, the study set out two further points of analytic focus; the affordances and constraints of using IEEDs in student-student interaction, and the management of participants' knowledge in student-student interaction relating to the use of IEEDs. In each of the following sub-sections, these aims will be considered in light of the analytic findings and how they relate to the previous research literature, such as those discussed in Chapter 2.

7.3.1 *Affordances and constraints of IEEDs in interaction*

Analyses in this study reveal some of the ways in which participants use the various affordances of IEEDs in their interaction. As been argued throughout the analysis chapters and in Section 7.2, three main affordances of the IEED are found throughout the analysis of this study. Firstly, the IEED is used in the management of the activity shift in interaction. Secondly, it can be a source of epistemic issues and be used in participants' initiation of the ESS, and thirdly, it can be used as a resource for knowledge.

The analysis in Chapter 4 shows that participants use verbal and embodied resources toward the IEED in initiating activity shift. In these cases, participants display and treat others' displays of verbal and embodied orientation to IEED as interactional cues to get on-task from off-task activities. Participants also promptly display their intention to use the IEEDs as an additional resource for knowledge in response to a question that no one in the group has sufficient knowledge to answer. These findings provide empirical evidence of how participants interactionally manage the two main pedagogical activities in SOLE; getting on-task, and using the IEEDs to search for information. The findings support the teacherless design of SOLE by providing further evidence of participants' 'self-regulated' behaviour in doing the pedagogical task, first described by Mitra (2004, p. 5).

Through the analysis of Chapters 6 and 7, it is found that the content displayed on the screen can be a source of participants' K- epistemic claims to initiate an ESS. As discussed in Chapter 2, several studies on the use of objects, especially text and paper, suggest that content on classroom materials can be topicalised in classroom interactions (e.g., Jakonen, 2015; Jakonen and Morton, 2015; Tainio and Slotte, 2017; Tanner *et al.*, 2017). In particular, the ESS which was first proposed from the study of Jakonen and Morton (2015), found in sequences of students resolving knowledge gap in peer-interactions in completing task sheets, has been observed and analysed in Chapters 6 and 7. The findings of ESSs in the present study suggest that in the K- initiations of the ESS, participants can claim unknowing or less knowing epistemic status of particular aspects of the content displayed on screen to request information or confirmation from peers. This is of particular interest as the findings of Jakonen and Morton (ibid) focus on the IR initiations of the ESSs, and the epistemic issues of the K- initiation were related to the content on a paper task sheet.

The findings of Chapter 6 suggest that the IEED can be used as an additional resource for knowledge in response to a K- initiation of an ESS. Sequences analysed in Chapter 6 focused on the occasions where there was no K+ participant when the ESSs were initiated. The analysis shows that participants can use content surrounding the referent content on-screen to collaboratively achieve a higher level epistemic stance, even when no participant in the group has displayed existing knowledge to answer the K- initiator's questions. This contributes to the understanding of how students use IEEDs as a resource for knowledge in peer-interactions in educational settings, just as studies by Jakonen (2015), Jakonen and Morton (2015), and Engeness and Edwards (2017) have shown that papers can be used for the same purpose. In addition, among these four studies that look at IEEDs in peer-interaction, only one instance in the study of Bierema *et al.* (2017) is found of participants using the content on IEED as a resource for knowledge, and this is video material from educational software, which is directly provided, unlike the information students found in SOLE.

Adding to the above to the discussion of the findings (Section 7.2), participants in student interactions use technologies in a similar way to physical classroom materials, in projecting activity shifts and as a resource for knowledge. It is interesting that when the IEED is used to project activity shift or as a resource for knowledge in ESS, its technological capacities, such as searching for information online, are not always

invoked in the interaction. This further support Hutchby's (2001) work on affordances, particularly on a person's agentic power to invoke technological artefacts' affordances in performing social actions in interaction. In addition, these findings contribute to education research on technological objects' uses including helping participants get on-task, as well as contributing to the CA research on interactional management of IEEDs in epistemic search sequences in student-student interactions.

Two constraints of these technological devices also emerged in the findings. Firstly, it is observed that a technological delay, such as the page loading in Excerpt 4, can halt the process of using the IEEDs. This interactional challenge was noted in previous studies by Greatbatch (1992) and Levy and Gardner (2012), as slow response times on the computer are found to be related to participants' disengagement with the screen. However, the present study finds that during the technological delay, the user of the IEED switches back and forth between the activities of talking to peers and checking the progression on the IEED, then uses verbal and embodied actions to guide other participants' attention back to the IEED when it is ready. The analysis also shows that participants can stay engaged with the IEED while performing other activities (i.e. conversing with peers), by remaining bodily orientated to the IEED screen while slightly tilting their head to select the next speaker (Excerpt 14) or quickly moving upper body back and forward to the IEED screen (Excerpts 12 and 18) to imply the designed recipient of their talk. This supports the evidence of students' multitasking ability when using computers found in the work of Levy and Gardner (2012), which suggests that students can conduct tasks on the computer and produce talk at the same time.

Secondly, it is observed that participants' level of access to the IEED varies depending on the types of IEEDs used, as a tablet is found to be used by more than one participants, but laptops tend to have only one primary user in the group. This may relate to the size of the IEEDs as laptops are larger and more difficult to move around compared to tablets. Although participants have arranged their seating at the beginning of their discussion (Chapter 4) to ensure their visual access to the IEEDs and embodied participation framework (Goodwin 2007), it is challenging for every participant to have the physical access to the IEED at all times. However, it is also observed that when participants sit far away from the tablet and don't have immediate access to the IEED, they make use of other resources as references in talk, such as teacher's writing and the

picture on the whiteboard (Excerpt 11), to ensure the recipient's understanding of the referent issue and to smooth the progression of the interaction.

7.3.2 *IEEDs and epistemics in student-student interaction*

Jakonen and Morton (2015) were the first to describe ESSs and focused on epistemics in peer interaction. However, previous research on peer-interaction only focused on the IR-initiated sequences where students serve as the resource for knowledge in resolving the knowledge gap (Jakonen, 2015; Jakonen and Morton, 2015). As discussed, this study finds that ESS sequences can be triggered by content on the IEED screen, and K- initiations of both IR and CS are found in this study. Also, the findings of this study suggest that in addition to using peers as a resource for knowledge, content displaying on IEED can serve the same purpose to advance and close the ESSs.

The findings of Chapters 6 and 7 show how content on the IEED screen can serve as a trigger for the epistemic claims in the K- initiation in ESS. Although Jakonen and Morton (2015) have noted the emergent feature of the knowledge gap in student-student interactions, this study closely examined the unfolding of participants' displays of the source of their K- epistemic status; the specific content on IEED screen. The analysis found that K- initiators use linguistic resources such as reading aloud, rising intonations and question formulations, to explicitly display the social action of IR or CS in their interaction while concurrently using embodied actions such as pointing or moving the cursor under the referent content to localise the referent content on the screen.

In the interactions where the K+ participants can use their existing knowledge to respond to the K- initiation in ESS, the pattern of the interaction usually unfolds as initiation-response-acknowledgement, sometimes with an expansion of demonstrating understanding.

However, previous research does not indicate that participants can still pursue the epistemic search in the absence of a K+ participant. The analysis of Chapter 6 found that participants can use the content on an IEED as a resource for knowledge and collectively achieve higher levels of epistemic stance. This includes finding the answer to the K- initiation question within the content (Excerpts 14 and 15), or localising the relevant content and working out the answer collaboratively (Excerpts 13 and 16). The examination of how participants display their epistemic access to the information on-

screen while demonstrating or contesting understanding to reach a consensus and achieve a better understanding on the referent epistemics, provides empirical evidence of the ways in which students use IEEDs as a resource for knowledge in interaction.

In the ESS, participants change their bodily orientation frequently to project or display engagement with different activities and the IEEDs. Previous research (e.g., Schegloff, 1998) suggests that body torque is related to displays of engagement in different actions and interactional involvements. In particular, body torque towards and away from a technological display screen can project the transition between two interactional temporalities, for example between video game and face-to-face interaction (Mondada, 2012). The findings of the present study support and add to the previous findings, as it found that participants use embodied actions such as body torque and gaze shift to display their engagement with activity on the IEED (e.g., reading, browsing) and with face-to-face interaction with peers. These were observed across different sequential positions and in various action formations. In the ESS, K- initiation was demonstrated by body torque and shifting gaze from the screen to peers. The response was demonstrated with pointing and reading aloud. Demonstrating understanding was shown by the participants' gaze, and the sequence closure of ESS was demonstrated by body torque and actions on the IEED such as scrolling down or clicking another tab in the browser.

The data and findings in Chapter 5 and 6 also provide evidence of students' upgraded epistemic positions in the domain of English language, as well as subject-related knowledge through their use of IEEDs and the interaction with peers. The former compliments the findings in previous SOLE research (Mitra, 2008; Mitra and Dangwal, 2010), where quantitative data of pre- and post-test results suggested L2 students' improved performance in English after learning about other subjects in SOLE. However, previous research does not demonstrate how learning happens in SOLE. Using the micro-analytic tool of CA and multimodal analysis, this study found that the K- initiators' epistemic positions relating to lexical meaning, pronunciation, and contextual meaning of sentence clauses is upgraded moment-by-moment in the student-student interaction, by using other (K+) participants or relevant content on the screen as a resource for knowledge. The latter finding concerning culture-related knowledge and concepts is examined through the interactional unfoldings when discussing topics such as haggis, the St. George's flag, lad culture and anti-intellectualism.

7.4 Methodological Considerations

In this section, the methodological considerations will be discussed from two main perspectives; the present study's methodological contribution to CA research, and the value of applying CA methodology in this study to SOLE research.

The primary focus of this study is to investigate participants' use of IEEDs in peer-interaction in the relatively new learning environment of SOLE. By using video data including the screen-recordings from the IEEDs and classroom recordings, this study was able to capture not only the multilingual talk among participants but also the ways participants in which manipulate the IEEDs and other objects. In particular, the data captured shows what, when and how on-screen content triggers and informs talk. This rich data also allows for multimodal conversation analysis in terms of participants' gesture use, posture, movements, and object manipulation (physical and technological) in the group interaction, and the larger physical space of the classroom. It is worth noting that new cameras that can record in 360 degrees, such as the *Insta360*, have emerged in the market since the data collection of the current research. Future studies can take advantage of this emerging technology, as 360-degree cameras can eliminate problems such as blind spots in recordings and the lengthy times for synchronising recordings from different angles.

Following Mondada's multimodal transcription conventions and providing accounts for different factors in interaction, the transcripts in this study present complex multimodal data in detail and achieved maximum readability. These transcriptions also went through several stages of quality checks, including presenting data and discussing it with colleagues and experienced CA researchers in data analysis seminars (e.g., MARG), with supervisors, and at conferences.

Apart from the detailed transcription of the multimodal data, participants' use of both Chinese and English languages in their conversation is captured and presented in the transcription. Bearing in mind the linguistic similarities and differences in these languages, the analysis of the ESS in Chapter 5 and 6 draws on previous knowledge of conversation research of Chinese interactions and contributes to this field of research in the following two ways.

First, participants were to not only able browse both Chinese and English information from the internet but also use both languages in talk conducting social

actions, such as referring to the on-screen content by reading aloud, IR, CS and demonstrating understanding. The analysis has shown that participants sometimes choose to use English when referring to Chinese content on-screen (Excerpt 13). This might be related to the pedagogical products discussed in Section 7.2.3. Occasions of participants choosing to use the same language in talk as that on-screen are also found in the analysis. Participants can choose to use Chinese as a shared language for requesting English language help as shown in Excerpt 8, or to talk in English when performing the same action as shown in Excerpt 14. These findings provide supporting evidence to the fact SOLE offers learners autonomy in their interaction, specifically in language use. The present methodology and research focus does not aim to explain every choice of language made in interaction. Other methodological tools such as interviews or research foci such as code-switching, or translanguaging, may contribute to the understanding of this behaviour in Second Language Acquisition (SLA) or multilingual studies.

Second, this study finds that participants are able to use the linguistic resources in both languages for action formation in ESS. Previous studies, such as Heritage (2012b), have found that verbal turns carrying epistemic status show strong associations between the social actions they perform and the morphosyntax they consist. In particular, previous studies of English interaction, such as Bolinger (1978) and Heritage (2012b), found that tag questions can be used for indexing a lower epistemic status, yes/no interrogatives can be used for advancing hypotheses, and CS and wh-interrogatives for IR. The findings of Chapter 5 and 6 show that participants use Chinese tag questions such as *duiba* (right?) and *shime* (was it?) to downgrade the speaker's epistemic status, Chinese question modal particles (*ma, me, a*) to formulate yes/no interrogatives for CS, and *zenme* (how), *shenme*/*sha* (what), and *na* (which) in wh-interrogatives for IR. Participants also use self-repair, transition markers (so, *ei*) and directives (these, *nage*) in both languages to indicate a shift in topic or activity in pre-enactment of the K- initiation, and the agreement tokens and chage-of-state tokens (oh, *ahh, ao ↓, ou, en ↓*) in response to K+ demonstration.

The findings concerning morphosyntax in both Chinese and English talk suggest the similarity in using linguistics features for action formation and displaying epistemic positions (e.g. Heritage 2012b; Stivers *et al.*, 2011) in the two languages. This also contributes to the study of question-response sequences (e.g., Enfield *et al.*, 2010) and

epistemics in interactional research in general across different languages, but particularly for Mandarin Chinese interactions (e.g., Endo, 2010; Yap and Chor, 2019).

Apart from providing empirical data as strong evidence of what participants do in a SOLE and how they do it, applying CA as a methodological tool contributes to the research of SOLE and the broader topics of student-centred pedagogies and CSCL.

One significant implication of this study brought out by CA methodology is that the sequential organisation in student-student interaction analysed here demonstrates the systematics in students' interaction in SOLE, where participants organise their interaction in an orderly way using verbal and embodied actions, IEEDs and physical objects in the surrounding environments. The analysis of students' learning-in-interaction suggests that the social displays of participants' upgrated positions in knowledge in SOLE are not as chaotic as Mitra described (Mitra, 2014). Instead, it is highly organised and follows the systematics of conversation and norms in interaction.

The CA-informed findings of this study also have practical implication for future use of the technology and teaching practice in similar settings. With the findings of this study providing emic insights of how students with the IEEDs organise their interaction, as well as the potential challenges (i.e., misunderstanding and unknowing), the teacher can obtain a better understanding of and in turn better facilitate students' learning in SOLE. For instance, when selecting the IEEDs for the sessions, the teacher can equip the classroom with laptops or desktops that have larger screens, as this study suggests that larger screens would provide easier access to students in the group during the interaction. Also, the teacher could give more structured support in the later stages of SOLE sessions, by, for example, providing information to add to the on-screen contents that students cannot understand. This study also informs teaching practice in the broader setting of student-centred pedagogies, as the analysis of student-student interaction provides the teacher with an emic perspective on students' interactional management of pedagogical activities, as well as on the social actions in group work. Furthermore, the micro- and multimodal analysis of IEEDs' use in interaction informs computer-supported collaborative learning (CSCL) research in terms of the affordances and constraints of the IEEDs, and can further inform the design of the curriculum and the use of IEEDs in the classroom.

7.5 Conclusion

This study investigates students' interactional practices with IEEDs in their group interactions in SOLE settings. It aims to contribute to the empirical interactional study of CSCL and student-centred pedagogies by examining naturally occurring interactional data among students learning in small groups with IEEDs. It addresses the imbalance between the widespread use of the technology in increasing practices of student-centred pedagogies and the limited number of interactional studies that investigate these interactional settings.

More specifically, as outlined in Chapter 1, this study investigates the IEEDs' affordances and constraints in student-student interaction in the learning environments. By applying multimodal CA, this study provides an emic perspective in investigating students' interactional practices with IEEDs among themselves in their group discussion. This study analyses the empirical data of students' interaction during the SOLE sessions, which is different from previous etic research that provides test results of students' improved learning outcome and observation on students' behaviour.

Findings suggest that students' first-time use of the IEED in their group can invoke its interactional affordance of preparing and projecting activity shift, the technological affordance of information searching, or both. The present study finds that, in these activity shift sequences, students treat embodied actions orienting towards the IEEDs as significant as verbal turns to prompt other participants to get on-task and pay attention to the IEEDs. It is also observed that the technological affordances of the IEEDs are not always invoked on these occasions, as students can display orientation towards the IEED without operating it to achieve an activity shift and get on-task. That said, when students have a question that they cannot resolve through talk alone, the technological affordances of searching online to obtain information is explicitly invoked both verbally and bodily by students. These analytic observations also contribute to the research on SOLE, as the interactional affordance of using IEEDs to get on-task was not recognised in previous studies. Furthermore, the empirical data showing students invoking the IEED's technological affordance to search for information in the absence of a peer having a K+ epistemic status provides supporting evidence of IEEDs' facilitating role for students' learning in the teacherless SOLE environment.

Considering the IEEDs in relation to epistemics in students' interaction, the findings of this study also demonstrate that students initiate claims of lack of knowledge regarding certain aspects of the on-screen content, and these K- claims perform two types of social actions; information request (IR), and confirmation seeking (CS) about the referent information. Building on Heritages' work on epistemics in interaction (2012a; 2012b; 2012c) and Jakonen and Morten's notion of Epistemic Search Sequence (ESS) (2015), this study examines the ESSs initiated by the K- claims on the referent information on-screen, which may consist of English-language-related or topic-related epistemic issues. Participants use various linguistic resources (i.e., wh-interrogatives, polar questions, tag question, and alternative questions) to form K- claims to request information or seek confirmation. These K- claims, in turn, can prompt the K+ participants' help, or advance the ESS by K- participants collaboratively using IEED as a resource for knowledge and to achieve a collective understanding. These findings are in line with Heritage's (2012a) claim that information imbalance is the drive for conversation, and they add to Jakonen and Morten's (2015) initial findings on ESS.

However, contrary to their studies, the present study also finds occasions where students do not advance the ESS and achieve understanding. This study argues that in the educational settings of SOLE, apart from the information imbalance, the pedagogical task can also be the driving force for the interaction, depending on the pedagogical relevance of the referent knowledge. These findings address the gap in research concerning interactional studies of epistemics-related issues in student-student interactions and the increasing practices of student-centred pedagogies.

The findings regarding epistemics also contribute to the research into how IEEDs are used in interaction. For instance, participants use bodily orientation (e.g., gaze, body torque) to project their engagement or disengagement with IEEDs and face-to-face interactions through their interaction, as well as various embodied resources (e.g., read-aloud, pointing, moving cursor) when referring to particular areas that they are looking at.

In summary, this study contributes to the understanding of the underdeveloped research area of IEEDs' interactional affordances and constraints in student-student interaction. More specifically, students' interactional practices using IEEDs are found to have affordances in three aspects of interaction; managing activity shift, triggering epistemic claims, and being used as an additional resource (to peers) for knowledge. In

addition to these affordances, two constraints of IEEDs are also observed in this study. First, when a technological delay occurs, it presents a challenge in the interaction as the activity on the IEEDs is halted until the problem is resolved. Second, participants' physical access may be limited depending on the seating and the type of the IEED, sometimes a participant cannot reach the only IEED in the group to perform their embodied actions when referring to certain aspects of the content on-screen.

More generally, the current study also informs future practice such as computer-assisted learning, computer-supported collaborative learning, and other student-centred pedagogies. For instance, the detailed interactional evidence suggests that there are physical and technological constraints of IEEDs presenting challenges to participants' activities when working on the pedagogical task in a group. In addition, in student-student interaction, participants may lack sufficient knowledge to understand aspects of content on screen and may fail to prioritise the pedagogical task over resolving the epistemic issue on screen. These findings suggest that there are certain limitations to the use of educational technologies.

7.6 Recommendations for Future Research

Taking the above into account, several directions for future research are apparent. Firstly, more empirical studies of SOLE settings with an emic perspective are strongly recommended. As argued throughout this study, there is an imbalance between the increasing practice of SOLE pedagogy and the low number of empirical studies of this new pedagogy. The current study presents interactions which took place in the specific, and less typical SOLE setting, where Chinese MA student in the UK study British culture outside of their MA programs. For instance, future studies could consider the ways the nautre of the task set could have an impact upon the ways the interactions unfold. For example, students' group discussion under topics with specific institutions such as NHS and BBC usually starts with searching on the internet, while topics with more abstract concepts such as death or the picutre of St,. George's flag usually start without searching on the Internet. It would also be useful to study typical SOLEs, such as those already implemented in school settings. This would also shed light on student-centred pedagogy and the understanding of small group student-student interactions.

Additionally, this study adds to the knowledge of SOLE-related and small group interactions that are strongly embedded into some HE curricula, such as seminars and group discussions where students frequently using objects such as laptops and tablets. It would be interesting to examine the interaction in these contexts and to compare the characteristics found with the current study, as the group interaction in these settings is usually more structured compared to the ones in SOLE.

Further research into multilingual interactions would also be welcomed. As discussed in Section 7.4, the current study found that participants use both L1 and L2 autonomously in various activities. The findings based on Chinese interaction informs the CA research in Chinese interaction, the ESS, and CA research in general. It would also be useful to examine other educational settings, or even non-educational ones, where participants have the autonomy to use various linguistic codes and resources in interaction.

Finally, Given the ubiquity of IEEDs in our lives, this study calls for further research into their use in more diverse educational settings. A broader scope of interactions involving IEEDs and their interactional practices in relation to epistemics should be undertaken. Due to the lack of research on interactions involving technology in educational settings, research on IEEDs that are used as a tool to assist teaching and learning is necessary. This would add to the understanding of the use of IEEDs in relation to the interactional management of knowledge in student-student interactions, teacher-student interactions, and whole-class interactions. In general, the findings in this study strongly suggest that the priory for future research may lie in the study of IEEDs in small-group student-student interaction, as they have presented interesting features which remain relatively unexplored.

Appendix A: Transcription Conventions

[ ]	Overlapping utterances (beginning [ ) and (end])
=	Contiguous utterances, or continuation of the same turn by the same speaker even though the turn is separated in the transcript
(0.2)	The tenths of a second between utterances
(.)	A micro-pause (1 tenth of a second or less)
:	Sound extension of a word (more colons demonstrate longer stretches)
-	An abrupt stop in articulation
__	Emphasised word or sound
↑ ↓	Rising or falling intonation
° °	Talk that is quieter than surrounding talk
hhh	Audible aspirations
.hh	Audible inhalations
> <	Talk that is spoken faster than surrounding talk
< >	Talk that is spoken slower than surrounding talk
£ £	Talk uttered in a ‘smile’ voice
* *	Gestures and descriptions of embodied actions are delimited between two identical symbols (one symbol per participant)
*--->>	The action described continues across subsequent lines until the same
---->>*	symbol (---->>*) is reached.
#	The exact moment at which a screen shot has been taken is indicated with # showing its position within turn at talk
fig.	number of the screenshot (from classroom recording or screen-recording)

Appendix B: Translation Glossary

APA	aspectual marker
ASSC	associative
BEI	a passive marker
CLS	classifier
CRS	current relevant state
CSC	complex stative construction
DUR	durative aspect
INT	interjections in speech
N	negator/negatives
PFV	perfective aspect
PROG	progressive aspect
PRT	particle
ONO	onomatopoeia
Q	question marker
3SG	third person singular pronoun

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