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Resolving asymmetry of access in peer interactions during digital tasks in EFL classrooms

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ABSTRACT

In face-to-face classrooms, when mutual visual and/or aural access to a digital device is needed but lacking during digital tasks, participants display an orientation to asymmetric access and resolve the issue through multimodal resources. This study examines the trajectory of negotiating access to digital devices held or handled by a coparticipant in peer classroom interactions. The data are audio-video recordings from English as a Foreign Language (EFL) classrooms, where individual and collaborative learning tasks are performed on or with digital devices. The findings show that pupils seek access to devices mainly through embodiment, such as body shifts, and rearranging material resources, and display a preference for not touching a device held by another pupil. Overall, the negotiation process reflects different types of situated roles and authority. The study contributes to an understanding of peer interaction around digital devices and offers important pedagogical implications for the implementation of technology in classrooms.

1. Introduction

As digital devices and applications have become everyday tools in today's face-to-face classrooms, a growing body of research has described classroom interaction around such digital technology (e.g., Jakonen & Niemi, 2020; Juvonen et al., 2019; Rusk, 2019; Råman, 2022; Råman & Oloff, 2022; Sahlström et al., 2019; Theobald et al., 2016; Vänttinen & Kääntä, 2024; see also Jakonen et al., 2022). It has been shown, for instance, that pupils may "engage with technology in unexpected, and at times, highly innovative ways that often diverge from the task-as-workplan" (Dooly, 2018, p. 184) and that they simultaneously need to manage both the task on the digital device and the interaction around it, while solving interactional or task-related trouble (Vänttinen, 2022). Similarly to any pedagogical methods and tools, tasks performed on digital devices can engender various types of trouble, which often derive from the fact that many digital tools have originally been designed for individual rather than for collaborative or, as Jakonen et al. (2022, p. 112) point out, any kind of educational use. During tasks, this design feature can lead to situations where participants have asymmetric visual or aural access to a digital device even when mutual access to it is needed for collaboration, which in turn can result in unequal opportunities to access important information and to participate in activities.

The present study investigates how pupils in English as a Foreign Language (EFL) lessons within Finnish basic education negotiate visual and/or aural access to a digital device when mutual access to it is needed to perform groupwork or to assist a peer, for example. Specifically, I analyse instances where a pupil lacks access to a device handled by a peer and seeks to resolve this asymmetry of access through varied combinations of multimodal resources. With multimodality, I refer to all the resources that participants employ in interaction, including talk, embodied resources, such as eye gaze, gestures, and movements of the head and the body, as well as material resources, such as different objects that are relevant for the ongoing interaction (see e.g., Lilja, 2022; Mondada, 2019). Through these resources, participants in interaction can achieve joint attention by (re)orienting each other, interactionally relevant objects, and the space surrounding them in embodied ways. In other words, they can build and renegotiate interactional spaces (Mondada, 2013). In the context of the current study, a pupil with access trouble can renegotiate the existing interactional space to achieve mutual access to a device and to secure a joint focus on a task.

The study draws on multimodal conversation analysis (CA), which examines how social interaction is temporally and sequentially structured, not only through talk but also other multimodal resources (e.g., Lilja, 2022; Mondada, 2019). Through its microanalytic lens and its focus on multimodality, CA can tease out the various methods that pupils in the data use to negotiate access to a device and which would not be visible through a narrower analytical focus only on talk or through an

investigation of macro-level phenomena. Since CA also emphasises the role of sequential context and the ongoing activity in how actions are formed and understood (Deppermann & Haugh, 2022), it is well suited for analysing the local, situated roles that are reflected in the trajectories of access negotiation during task activities. The aim of the study, then, is to find out (1) how mutual visual and/or aural access is negotiated to a digital device held or handled by a peer, (2) what preferences for multimodal resources are displayed in the negotiation, and (3) what kinds of local roles and authority are reflected in this process.

Previously, asymmetry of access to digital devices has received little attention within classroom and CA research (see, however, Jakonen & Niemi, 2020; Råman, 2022). The current study contributes to the field by showing how children and teenagers negotiate mutual access to a device within classroom peer interaction and thus by illustrating the kind of multimodal work that pupils engage in while building collaboration in educational settings. In addition, it furthers our understanding of the roles that pupils orient to and display in classroom peer interaction. Finally, the study has important pedagogical implications since (the lack of) access to devices used for pedagogical tasks may ultimately affect pupils' opportunities for collaboration and learning.

2. Background

In pedagogical contexts, technological objects can be seen as situated resources (Nevile et al., 2014) for learning activities performed on or with them, and access to them thus affects participation and learning opportunities (see e.g., Eilola & Lilja, 2021; Greer, 2016). In this sense, they are comparable to any other semiotic objects in the classroom, such as books, whiteboards, or maps, that are engaged with for pedagogical purposes (e.g., Jakonen, 2018), and pupils' (lack of) access to them may also become relevant for the organisation of interaction (see e.g., Heller, 2016). Asymmetric access to devices may also lead to situations similar to the "fractured ecologies" in video-mediated contexts (Luff et al., 2003), when access to the information mediated through devices or to actions performed on them is not shared by all participants.

During digital learning tasks, achieving joint attention (Kidwell & Zimmerman, 2007) becomes a practical problem of building mutual access to the device and generates a need for constant (re)negotiation of interactional space (Mondada, 2013; Haddington & Oittinen, 2022). Organising the interactional space around a digital device is a multimodal task, which involves arranging participants' bodies, embodied resources, and the material surroundings in a way that grants mutual attention to coparticipants and interactionally relevant objects (Mondada, 2013), including technology (Oittinen, 2020). Outside the classroom context, Due and Toft (2021), for instance, illustrate how joint attention is secured to computer screens by pointing and using the cursor to highlight text (see also Olbertz-Siitonen & Piirainen-Marsh, 2021). Within an educational setting, Thorne et al. (2015) show how a group of university-level students walk on campus and simultaneously maintain joint attention to a shared digital device by remaining in the proximity of the device holder, displaying orientation to the device through gaze and postural alignment, and at times requesting to manipulate the device. Intersubjectivity around digital devices is thus sustained through multimodality, combining verbal resources with embodiment (see also Thorne et al., 2021) and with the use of digital technology.

While questions of access and intersubjectivity have recently received particular interest within CA research on remote and hybrid educational contexts (e.g., Balaman, 2018; Balaman & Pekarek Doehler, 2022; Jakonen & Jauni, 2021; Oittinen, 2022; Rusk & Pörn, 2019; Sert & Balaman, 2018; Uskokovic & Talehgani-Nikazm, 2022), surprisingly little attention has been paid to negotiations of access to digital devices in face-to-face classrooms. Jakonen and Niemi (2020), however, show how a pupil can use touch to block a peer's attempt to gain haptic access to a digital device during collaborative tasks. Closely related to the present paper, Råman's (2022) study explores teachers' multimodal

work to negotiate visual and haptic access to their students' devices. In a context of problem-solving on digital skills courses for senior citizens, Råman illustrates how the type of problem may affect what kinds of resources teachers prefer when attempting to gain access to devices; when the objective is for the students themselves to learn how to solve a problem with the device, teachers tend to use resources, such as verbal directives and pointing gestures, that allow the student to maintain control over the device. By contrast, when problems are treated as 'solvables', teachers more directly take control over students' devices to locate and solve the trouble (Råman, 2022). Råman (2022) and Jakonen and Niemi (2020) thus highlight negotiation for access to digital devices as a multimodal phenomenon, a viewpoint which the current study also adopts.

By examining the role of embodiment and material resources in access negotiations, the current study contributes to the line of classroom interaction research that investigates multimodality in technology-rich pedagogical contexts. Earlier studies have shown, for instance, that talk needs to be carefully coordinated with and can be disrupted during actions performed on a computer (Gardner & Levy, 2010; Levy & Gardner, 2012). Various studies have also confirmed that action formation can rely on embodied and digital resources, sometimes even without talk. Theobald et al. (2016), for instance, describe how a teacher mobilises pre-schoolers' actions on a digital device in embodied ways. In studies on peer interaction around technology, embodied resources, such as eye gaze, facial expressions, and gestures, as well as actions on digital devices have been shown to be used for various social actions, such as pursuing a response and recruiting assistance from peers (Vänttinen, 2022), asking for and giving instructions (Tuncer et al., 2022), attributing blame to a peer after mistakes in digital tasks (Vänttinen & Käänta, 2024), and signalling 'being stuck' during collaborative writing (Juvonen et al., 2019). To my knowledge, however, body shifts and movements of the head have not received similar interest in research on digitally rich classrooms.

Negotiating access to objects, such as digital devices, also brings forth questions of participants' roles and authority (Heller, 2016, p. 270). Who gets access to a device and has the power to regulate others' access to it reflects the distribution of deontic rights and obligations (see e.g., Stevanovic & Peräkylä, 2012) in the local context. Råman (2022) suggests that teachers' institutional role and epistemic authority may grant them the right to access students' devices, even the ones owned by the students. Theobald et al. (2016) also illustrate the institutional role of the teacher in allocating turns on a mobile device to pupils but in a way that enables the pupils to maintain the ownership of the device. In the context of peer interaction, however, pupils have a more equal standing, at least from a purely institutional perspective, and their distinct methods of negotiating access to devices may therefore not be explained solely in terms of institutional authority. Indeed, Thorne et al. (2015) argue that the device holder "may sometimes have special privileges (and responsibilities) by the fact that [they are] holding the device" (p. 282), which suggests that the digital device itself brings with it deontic authority for its holder. In a similar vein, Cekaite (2009) and Musk (2016) found that students having access to the mouse and keyboard seemed to have the authority to make final decisions about spelling corrections during collaborative tasks on a computer. This study shows, however, that there may be combinations of different types of local and situated roles at play when access to digital devices is negotiated in classroom peer interaction.

The current study contributes to CA research investigating multimodality and classroom interaction research by illustrating how pupils negotiate not only visual but also aural access to digital devices during peer interaction. It shows how pupils design their conduct so that it both displays orientation to the asymmetry of access and works to gain access to the device. In particular, the study highlights the role of movements of the head, body shifts, and moving the body in the physical classroom space as well as adjusting the material resources, such as digital devices and chairs, in access negotiations. In addition, the peer context allows us

to look past the institutionally unequal status between teachers and pupils and, instead, to examine how a preference for certain, self-initiated actions reflects different types of roles and authority among institutional equals.

3. Data and methods

The videorecorded data for the study come from a larger data set consisting of 19 English as a Foreign Language (EFL) lessons in four Finnish comprehensive schools. Digital devices, such as pupils' smartphones or the school's tablet computers, were used in all these lessons, but the time spent on devices varied. While some lessons ($n = 10$) were mostly structured around digitally supported tasks, others only included short digital tasks or games. The task types in the whole data set varied from vocabulary games and grammar tasks to preparing short presentations in English and involved both individual and teamwork. The lessons (from 45 to 60 min each) were recorded with two to three fixed video cameras and three external microphones, and in four lessons, additional screen recordings were made of the school-owned mobile devices that were used for tasks. Altogether this resulted in circa 51.5 h of video data.

Seven groups of pupils aged 10 to 15 years (from grades 4 to 9), four teachers, and two assistant teachers participated in the study. All pupils spoke Finnish as one of their languages and studied English as a foreign language. Permission to collect data was obtained from the schools, and the adult participants and the underaged participants' guardians gave informed written consent to participate and to have the data used for research publications. Participants were informed at the beginning of the lessons that they could withdraw from the study without prior notification – a freedom that a few pupils exercised.

From the data set, I made an initial collection of all instances of peer interactions that occurred around digital devices. These data were analysed using multimodal conversation analysis (CA), which involves a micro-level inspection of the temporal and sequential structures of social interaction (e.g., Sidnell & Stivers, 2013) and how these structures are collaboratively built out of talk, embodiment, such as gaze, body shifts, and gestures, as well as material resources (e.g., C. Goodwin, 2000; Mondada, 2019). During preliminary analysis, my attention was drawn to instances where pupils visibly oriented to an asymmetry of visual and/or aural access to mobile devices handled by their peers, when joint attention to them was needed for teamwork, negotiating answers, or assisting a peer. A collection of 51 cases was thus built for the purposes of the present study and analysed in detail to identify trajectories of resolving asymmetric access to a device. The focus was on discerning potential preferences for certain multimodal resources and understanding how participants' conduct reflected aspects related to local, situated roles and authority. The preferences varied according to whether tasks were performed on individual or shared devices, and accordingly, the final collection used in the study can be divided into three subcollections: (1) 23 cases where pupils perform individual tasks on individual devices, (2) 4 cases of teamwork performed on individual devices, and (3) 24 cases of teamwork on shared devices. The first two subcollections ($n = 27$) involve individual devices and an orientation to each pupil's 'ownership' of their device, whereas negotiations in the third subcollection reflect an orientation to a shared device and joint responsibility for the task.

The data have been transcribed using CA conventions (Jefferson, 2004) and an adaptation of the multimodal transcribing system developed by Mondada (2018, 2022). The original talk is given in bold font, with translations from Finnish to English below it in italics and embodied as well as on-screen actions in grey font (for details, see the Appendix). The participant names are pseudonyms, and drawings have been used instead of video stills for pseudonymisation purposes.

4. Analysis

In the following sections, four representative extracts are analysed to illustrate how multimodal resources feature in the trajectories of negotiating mutual access to digital devices when joint attention to them is needed for collaboration, such as assisting peers or performing teamwork. The negotiations in the data collection involve a variety of multimodal resources used to display and resolve asymmetric access to devices. In all cases, participants perform some forms of body shifts, usually leaning towards the device or adjusting their (sitting) position. Most cases ($n = 29$) also involve head movements, and sometimes pupils move in the classroom space ($n = 11$), arrange the material environment ($n = 7$), such as furniture, and/or reach out their hands to gesture or point towards the device ($n = 12$). Verbal requests, sometimes indirect, are performed in only 6 cases. Touch is used to re-position a device handled by a peer in 7 cases, as a type of last resort, when a team member's access to a device is repeatedly denied or otherwise neglected.

The extracts exemplify the kinds of multimodal negotiations pupils engage in as they perform pedagogical tasks on devices. In addition, they show that the participants primarily display a preference for self-initiated multimodal work in gaining access to a device. Furthermore, the extracts illustrate different types of local roles and authority that are displayed in the negotiation process. The analysis is divided into two sections. Section 4.1 discusses the multimodal process of negotiating access to a device 'owned' by a coparticipant (subcollections 1 and 2), and Section 4.2 shows how problems of access to a shared device are resolved during teamwork (subcollection 3).

4.1. Negotiating access to coparticipant's device

Negotiations of access to a coparticipant's device occur after recruitments ($n = 24$) or occasionally ($n = 3$) amidst showings of devices. Recruitment refers to different ways that participants request or offer assistance in interaction (Kendrick & Drew, 2016), and, similarly to showings, require joint attention from coparticipants. In most cases in this subcollection (in 14 out of 24 recruitments), the recruiter starts arranging a shared interactional space with mutual access to the device during the recruitment, but the recruited participant displays that the access remains insufficient (see Extract 1). In 10 cases, however, the recruiter does not initially provide access to the device, and the recruited participant takes on the responsibility of negotiating shared access to the trouble source (Extract 2). Due to the high occurrence of recruitments in the data, Extracts 1 and 2 both illustrate multimodal trajectories of resolving asymmetric access to a device after recruitments. In both examples, the asymmetry is visibly oriented to by the recruited participant, and the trouble is resolved stepwise through a multimodal interactive process that is representative of the whole subcollection. Throughout the problem-solving sequence, the participants show a preference for maintaining the device-holder's situated ownership (see Day & Rasmussen, 2019) of the device. In Extract 1, the problem is related to asymmetric aural access, whereas Extract 2 showcases a trajectory of negotiating mutual visual access.

In Extract 1, fifth-grade pupils handle school-owned tablet computers to execute tasks on a digital platform offered by the publisher of the book series they use. The pupils are familiar with the platform and have completed similar tasks before. Sara and Anna, sitting next to each other (Fig. 1), perform individual tasks on their devices, sometimes helping each other and engaging in brief off-task conversations. Sara's current task, which Anna has already completed, involves listening to recorded words and spelling them correctly. Sara has trouble identifying the word *waterfall* and repeats an approximate pronunciation of it a few times, glancing at her book. She eventually requests help from Anna (line 1).

Extract 1.

```
1     SARA      #.hhh        +ann+a
      annaG     >>to tablet->
      annaF     >>smiles->
      saraF     >>smiles->
      saraG     >>to tablet+...+to anna's tablet->
      fig.      #Fig.1

2               (.)

3     SARA      kuun+tele±ppa +↑m±ikä tää* on;*÷+
                have a listen   what is this
      saraG       ->+to anna--+to tablet--------+ahead->
      sara                      ->±turns tablet toward anna->
      annaG                               ->*....*to sara->
      saraF                                         ->÷

4               (0.3)+♥#
      saraG         ->+to tablet->
      annaF         ->♥
      fig.             #Fig.2
```
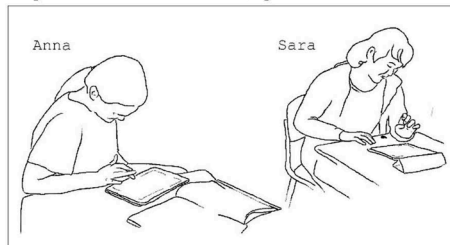

Figure 1. Gaze to devices.   Figure 2. Sara turns device.
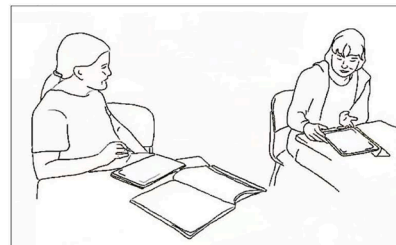
```
5     ANNA      krh* rhm• ((clears throat))
      annaG      ->*to sara's tablet->
      anna             •leans forward toward sara's tablet->

6               (0.2)±
      sara        ->±...->

7     SARA      kuuntele:.•
                listen
      anna              ->•immobile, leaning position->

8               (0.2)±
      sara        ->±adjusts tablet->

9               (0.6)±(0.6)•±
      sara        ->±......±presses 'play' button->
      anna               ->•stretched neck,
                            ear toward tablet->

10              (0.2)*±+(0.5)÷±+(0.2)#►  (0.2)►
      annaG       ->*away->
      sara         ->±,,,,,,,±
      saraG         ->+.......+to anna->
      saraF               ->÷mouth open->
      tablet                     ►bleeps►
      fig.                       #Fig.3
```
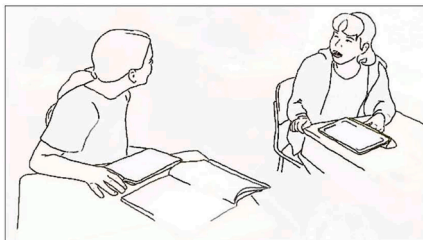
Figure 3. Participants listen.

```
11                  (0.2)

12    TABLET     waterf[all

13    ?              [(XX•*♥X)
      anna              ->•leans back->
      annaG              ->*to sara->
      annaF                ♥smiles->

14                 (0.4)•(0.2)*±(0.3)+
      anna            ->•stands up->
      annaG              ->*to sara's tablet->
      sara                 ±turns tablet toward herself->
      saraG                  ->+...->

15    ANNA       @>kuu(nte)le+ppa< #uuellee@?•
                 listen again
      saraG              ->+to tablet->
      anna                           ->•steps toward
                                        sara's desk->
      fig.                #Fig.4
```
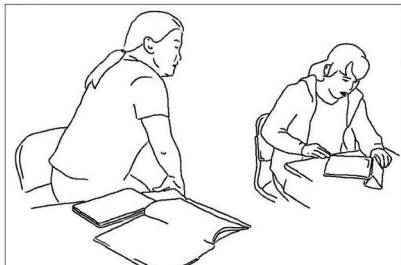

Figure 4. Anna stands up.

```
16                 (0.4)±(0.5)•*              ±
      sara            ->±leans toward tablet±presses 'play'->
      anna               ->•crouches over sara's tablet,
                            brings ear close it->
      annaG              ->*left->

17                 (0.3)+±(0.5)#
      saraG           ->+to desk->
      sara              ->±brings ear close to tablet->
      fig.                 #Fig.5
```
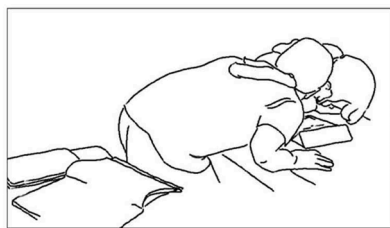
. (*continued*).
```
5
```

Figure 5. Participants lean towards tablet.

```
18    TABLET      =water•*fall*±÷
      anna              ->•
      annaG             *....*to sara->
      sara                  ->±sits up->
      saraF                    ÷smiles mouth open, frowns->

19                (0.3)•(0.6)±(0.2)+*(.)+(.)
      anna               •straightens up->
      sara                      ->±gestures with open hands,
                                    palms up->
      saraG                         ->+....+to anna->
      annaG                          ->*gaze direction
                                         not visible->>

20    ANNA        ↑/vɑ•terfo:l/.
      anna          ->•steps left->

21                (0.4)+(0.2)+(.)•±÷
      saraG              ->+.....+to tablet->>
      anna                   ->•turns, returns to her desk->>
      sara                   ->±
      saraF                    ->÷mouth closed, smiles->>

22    SARA        ahaa:,
                  oh okay
```

. (*continued*).

In Extract 1, Anna visibly orients to asymmetric aural access to the tablet. Here, mutual access is needed for Anna to assist Sara in recognising the target word *waterfall*. Sara's request for Anna to listen (line 3) is formed as an imperative *kuunteleppa* but mitigated by a somewhat dialectal pronunciation and the clitic *-pa*, which can be used to make directives more polite (Institute for the Languages of Finland, 2015; note however, that it may also assume authority over the listener, see (VISK, 2004)). Sara starts arranging a shared interactional space by shifting her gaze to Anna and turning the device on the desk toward Anna (Fig. 2). During Sara's turn, Anna puts her own task on hold and displays her availability for interaction (Kidwell & Zimmerman, 2006) through a gaze shift to Sara. After following Sara's gaze to the device (lines 4 and 5, respectively), Anna leans forward, either as a reaction to lacking access to the device or as a further display of orientation to Sara's line of action. Having secured Anna's attention, Sara further turns the device toward Anna (line 8). Coordinating her bodily actions with Sara's and displaying focus on the device, Anna stretches her neck and turns her right ear toward the tablet (Fig. 3), just as Sara presses 'play' (line 9). Sara then turns to look at Anna with her mouth open (line 10), and a bleep, followed by the word *waterfall*, can be heard from the device (lines 11 and 12). Overlapping the word, however, another pupil in the classroom exclaims loudly, which may hinder hearing the word.

Indeed, Anna orients to the lacking aural access by shifting and moving her body in the physical space of the classroom, despite Sara's earlier attempts at adjusting the interactional space. Anna leans back in the chair, glances at Sara (line 13), and then stands up, returning her gaze to the device (line 14; Fig. 4), which, interestingly, Sara brings to its original position facing herself – perhaps, in anticipation of a response. Anna requests Sara to 'listen' to the word again (line 15), mimicking Sara's request in line 3 but mitigating it through an animated voice. It is

noteworthy that this request is not strictly for access to the device but rather alludes to the aural nature of the problem.

Although the request positions Sara as responsible for listening, the careful bodily coordination that follows reveals that they both orient to solving the problem as a joint task. Anna seeks aural access by stepping toward Sara's desk, crouching over the device, and turning one ear toward it (Fig. 5), while simultaneously orienting to Sara's ownership of the device by letting her remain in control of it. Sara aligns with these actions and aids Anna in gaining access to the problem source: she leans toward the tablet, leaving enough space for Anna above it, and replays the word (line 16). Even while the application produces the word, Anna starts shifting her gaze to Sara. As Sara frowns and smiles (line 18), Anna resumes a standing position (line 19), dissolving the configuration. As an embodied next turn to the listening activity, Sara produces an open, palms-up gesture with her hands, indicating that she does not know or recognise the word (Müller, 2004, p. 238), and invites Anna's response through gazing at her. Accordingly, Anna utters the word *waterfall*, emphasising its written form by pronouncing the beginning of the word as it would be read in Finnish (line 20). The sequence ends as Anna returns to her desk (line 21) and Sara resumes home-position (Sacks & Schegloff, 2002), claiming understanding through the change-of-state token *ahaa* ('oh okay'; line 22) before starting to type (data not shown).

In sum, Anna multimodally displays her orientation to the asymmetric aural access to the device and shows a preference for solving this through her own embodied work. Sara aligns with Anna's attempts, however, and the careful coordination of their embodied actions displays a joint orientation to gaining mutual access. Yet, the resources adopted display a preference for the 'owner' to maintain haptic control over the device: Anna negotiates aural access to the device without touching it, while Sara manipulates and repositions the device as

needed. Thus, Sara maintains deontic rights regarding the tablet, while simultaneously positioning Anna as potentially having epistemic access (Stivers et al., 2011) to the information needed to solve the trouble.

Extract 2 is taken from a 9th grade lesson, where pupils perform individual assignments distributed by the teacher in Google Classroom, using hybrid laptops, that is hybrid computers that can be used either as laptops or tablets, borrowed from the school. More detailed information on the current task is not available due to the nature of the data, but the goal is to practise translating sentences from Finnish to English in the passive voice. Nora and Martta are seated in a diagonal formation, with the back of Martta's device towards Nora (Fig. 6). The two have been negotiating some previous translations together, and Nora has repeatedly shifted her body toward Martta's screen to access relevant information on the screen. As the extract begins, both focus on their devices, and Nora is typing (line 1).

Extract 2.

```
01   MARTTA     #e•i:::
                 no:::
     marttaG    >>to her device->
     noraG      >>to her device->
     nora       >>typing->
     martta      •straightens back, leans against chair->
     fig.       #Fig. 6

02              (1.1)•
     martta       ->•hands to lap one by one->

03              (0.5)•(1.2)±(0.3)*(0.8)
     martta       ->•
     nora              ->±
     marttaG                ->*ahead->

04   NORA       nyt +t•[ohon: (.)        tul+±•is tä#ä,]
                now this would come there

05   MARTTA          •[tää* ois       he̲lp+±•po mu̲u#t]en=
                      this would be easy otherwise
     noraG      ->+....................+to martta's device->
     martta           •gestures toward screen•leans toward screen->>
     marttaG          ->*to her device->
     nora                            ±leans toward
                                      martta's device->
     fig.                             #Fig.7
```
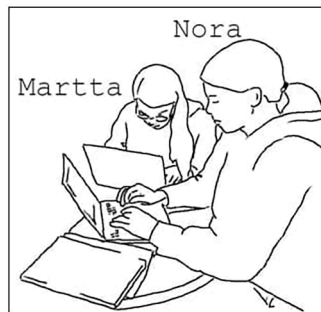
Figure 6. Martta and Nora.   Figure 7. Nora's gaze to Martta's device.

```
06   MARTTA     =mutku (.) >pi↑tää olla varmaa sit se<±=
                 but        it then probably has to have the
     nora                                    ->±

07              = >(riisi) o- pitää laittaa< eka.
                 (rice) is- has to be put first

08              (0.4)

09   MARTTA     (xx) että,
                (xx) that

10              (0.4)+±(0.2)+
     noraG        ->+....->+to own device->
     nora            ±returns to home position->
```

```
11   NORA       mäki oon siin± kasis*sa;+         ±
                I'm also doing that number eight
     nora                   ->±pushes chair back±turns right->
     marttaG                      ->*...->
     noraG                           >+shifts between
                                       objects and floor->

12              (0.2)*
     marttaG      ->*to nora's screen->

13   MARTTA     (jotai ±siinä)* jotaki siitä#=
                (something there) something about the fact
     nora            ->±picks up bag from floor from her right->
     marttaG              ->*to her screen->>
     fig.                             #Fig.8
```
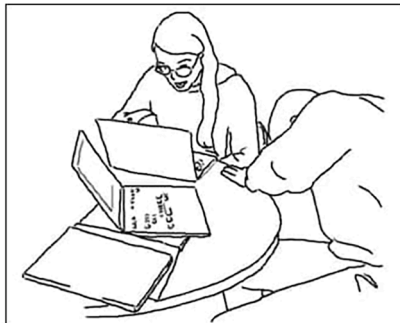

Figure 8. Nora picks up bag.

```
14              = et se::::::,±
                  that it
     nora                ->±puts bag on floor to her left->

15              (1.1)+(0.3)±
     noraG        ->+to her device->
     nora                ->±rolls chair toward martta ->

16   NORA       öö:±::[:::,          ]
                um::::::

17   MARTTA        [>koska (ei±hä]# se-)<
                    because it's not
     nora        ->±............±turns device->
     fig.                         #Fig. 9

18              (.)

19   MARTTA     ei-# ±(.) ↑voiksen laittaa↑=
                no-      can you put it
     nora          ->±adjusts device->
     fig.          #Fig.10
```

. (continued).

Figure 9. Nora turns device. Figure 10. Device faces both.

```
20                    =sil±↓lee et    niinkun:±;
                       so that           like
      nora              ->±moves device closer±adjusts device->

21                    (.)

22    MARTTA          (the)- niinku± hä!
                      (the)   like what
      nora                      ->±...->

23                    (0.3)±(0.3)+(0.1)
      nora              ->±rests elbow on desk,
                          supports chin on hand,
                          moves chair closer to martta->
      noraG               ->+...->

24    MARTTA          pi+tääk-
                      must (we/I)
      noraG           ->+to martta's screen->>

25                    (.)

26    MARTTA          >ku ei sitä±# voi>
                       cause you can't like
      nora               ->±stays still,
                          chin supported on hand,
                          elbow resting on desk->>
      fig.                #Fig.11
```

Figure 11. Nora gazes at Martta's device.

```
27                    (.)

28    MARTTA          sitä >ei varmaa voi< alottaa (sillai)<(.) now:;
                      it can't probably be started with (like) now
```

. (*continued*).

In Extract 2, Martta indirectly recruits Nora to assist with the translation of a sentence through a multimodal trouble alert. Specifically, Martta utters an elongated *ei* ('no'; line 1) and withdraws from the device by sitting up and leaning against the back of the chair, retracting her hands to her lap (line 2), and shifting her gaze away from the screen (line 3). In addition, Martta attempts to elaborate on the trouble verbally (lines 5–7, 9, 13–14), producing several false starts and restarts, and invites Nora's gaze by gesturing toward the screen (line 5). Finally, Martta formulates a direct question about whether they can start the sentence with the word 'now', again with false starts, self-repair, and pauses (lines 19–28).

Nora responds to the recruitment gradually. After Martta's initial trouble alert, Nora keeps typing (lines 1–3) before taking a turn (line 4), which is designed as a type of self-talk about what should be written next – although it could additionally be used to account for her pending response. During the turn, overlapped by Martta's turn regarding the trouble, Nora shifts her gaze and leans toward Martta's device (Fig. 7) to gain visual access to the trouble source. After Martta has explained what the first word in the sentence perhaps should be ('rice', lines 6–7), Nora shifts her gaze to her own device, returning to home position (line 10), and announces that she is working on the same translation. Nora then starts preparing for mutual access to both devices. While Martta attempts to explain the issue, Nora arranges the material environment by moving a bag out of the way (lines 13 and 14; Fig. 8) and bringing her chair closer to Martta (lines 11 and 15). In addition, Nora turns and adjusts her device, making the screen visible to Martta (lines 17–20; Figs. 9 and 10), and finally moves even closer to Martta, places one elbow on the desk, supports her chin on her hand, and shifts gaze to Martta's screen (lines 22–26; Fig. 11). As mutual access to the devices and the task has been secured, a negotiation of the translation follows (data not shown).

In Extract 2, the rights and responsibilities related to the participants' local, situated roles are reflected in the negotiation for access to Martta's device and the organisation of an interactional space with a shared focus on the task. On the one hand, both orient to their situated ownership of the devices borrowed from the school and their deontic authority over deciding what is done with them. Throughout the sequence, both maintain control over their devices, and Nora seeks access to Martta's screen through self-initiated embodied work, only readjusting her own device. Each participant is also responsible for typing their own translations. On the other hand, Martta's indirect recruitment work through the trouble alert and report of trouble (Kendrick & Drew, 2016) creates an opportunity for collaboration, while also positioning Nora as having access to the knowledge needed to resolve the trouble with the translation. To assist, however, Nora needs to know the trouble source, yet is not granted visual access to Martta's screen (cf. Extract 1, where Sara facilitates Anna's access to the device by repositioning it). In most recruitments in the data, the recruiter attempts to share access to the screen with the recruited participant, but here it is

incumbent on Nora to do most of the multimodal work for creating a shared interactional space, and she orients to the lack of access to the device through her embodied actions. While this may imply deontic authority on the part of Martta, it also gives Nora a chance to reposition herself and to reorganise the material surroundings to enable mutual access to the devices.

Besides illustrating how multimodal resources, such as body shifts, head movements, moving in the physical space, and arranging the material space can be used to negotiate aural or visual access to a digital device, Extracts 1 and 2 demonstrate how mutual access to a device can become crucial at certain moments of task-accomplishment: for example, lacking access to a digital device (and to the information it provides) may hinder achieving joint understanding of the trouble and resolving it. In addition, the trajectory towards shared access to a device reveals important aspects of authority and roles at play in peer interaction. Although recruitments position the recruited participants as potentially having access to knowledge that the recruiters lack in terms of the current task, the examples have shown that the exclusive right of the 'owner' to handle the device is still maintained during access negotiations. In the case of shared devices during teamwork, however, the question of ownership is less straightforward, as we will see in Section 4.2.

4.2. Negotiating access to a shared device

This section discusses how different local, situated roles may be reflected in and impact the ways in which mutual access to digital devices is negotiated during teamwork. The preference for using resources that do not interfere with the device-holder's rights is observable also in this subcollection, but participants also more clearly orient to access trouble through gestures or verbal requests, for example, which also make the exclusion of a team member visible to others (Extract 3). When a team member's rights to access the device are repeatedly violated, however, the device may be repositioned through touch (Extract 4). In these cases, different peer roles and rights cooperate, or clash, in access negotiations.

In Extract 3, one of the fifth-grade pupils in a team of three works to negotiate visual access to a shared tablet, as they are logging into a Kahoot! challenge that has varied recap questions from the whole course, involving grammar and vocabulary. The participants are familiar with the application and could be expected to know how the task proceeds. Joanna and Mila are seated side by side at Joanna's desk, while Markus is sitting farther away, opposite them (Fig. 12). As the start page is loading, Joanna adjusts the interactional space by turning the device slightly toward Mila on the desk (line 1). This grants the two visual access to the device while enabling Joanna to remain in control of it. Markus, however, has no visual access to the screen.

Extract 3.

```
1              (1.5)±   (0.7)   *   Δ
     milaG     >>scans classroom*to tablet->
     joannaG   >>to tablet->
     markusG   >>shifts between classroom and hands->
     markus    >>plays with blu-tackΔtakes eraser->
     tablet    >>page loading
     joanna        ±turns tablet toward mila->

2              (0.2)±#(0.2)+
     joanna        ->±
     joannaG          ->+eyes closed->
     fig.          #Fig. 12

3              (0.5)♦Δ(0.5)+(1.9)#
     markusG       ->♦toward tablet->
     markus        ->Δleans right, peeking toward tablet->
     joannaG           ->+to tablet->
     fig.                      #Fig. 13
```
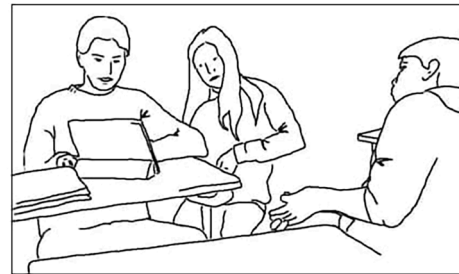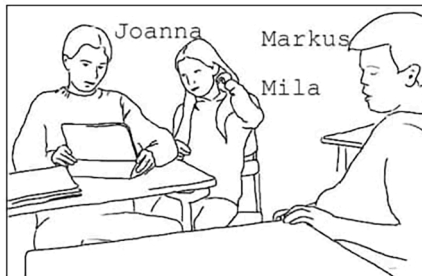

Figure 12. Joanna, Mila, and Markus. Figure 13. Markus leans right.

```
4    MILA      ollaaks meΔ taasΔ joku;+
               are we somebody again
     markus         ->Δ.....Δrests head on chair next to him->
     joannaG                  ->+...->

5              (0.2)+
     joannaG       ->+to mila->

6    MARKUS    >montako[ha<    kysymystä      siin]ä o;
               I wonder how many questions it has

7    JOANNA         [voiaan me+ olla joku+ muuki.]♥+
               we can also be something else
     joannaG            ->+.........+to tablet+down->
     milaF                              ♥smiles->

8              (0.3)

9    MILA      @ei:@* ↑ku me ollaa joku,*
               no we are somebody
     milaG       ->*to joanna----------*,,,->

10             #(0.2)*+
     milaG       ->*to tablet->
     joannaG      ->+to tablet->>
     fig.      #Fig. 14
```

```
11   JOANNA        oke;÷±Δ
                   okay
     joannaF         ÷smiles->
     joanna           ±turns tablet toward herself->
     markus        ->Δraises head, leans toward tablet->

12                 (0.6)♥
     milaF           ->♥

13   MARKUS        mon#taΔ kysymyst÷±▶ tos on.Δ
                   how many questions does that have
     markus        ->Δadjusts posture-----Δleans right, peeking->
     joannaF                      ->÷
     joanna                        ->±
     tablet                      ->▶Kahoot page appears,
                                     with "waiting symbol"
     fig.          #Fig. 15
```
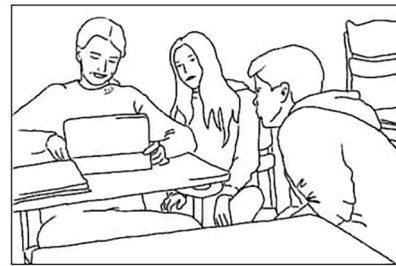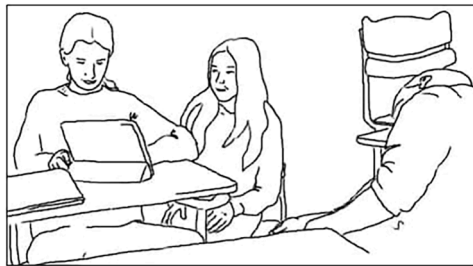
Figure 14. Markus rests head on chair. Figure 15. All gaze at device.

```
14                 (0.6)Δ(0.2)
     markus          ->Δ,,,->

15   JOANNA        kaksΔ↑toi♦sta kai. ♦
                   twelve I guess
     markus        ->Δleans toward tablet->
     markusG          ->♦to joanna♦to tablet->

16                 (0.7)

17   JOANNA        emmä tiiä.
                   I dunno

18                 (0.2)÷(0.8) ÷(0.2)*
     joannaF         ->÷smiles÷
     milaG                        ->*down->

19                 (0.5)*(0.6)♦Δ
     milaG           ->*to ipad->
     markusG             ->♦to hands->
     markus               ->Δplays with blu-tack,
                             leaning forward->

20                 (1.3)*(0.6)▶
     milaG           ->*to markus' hands->
     tablet               ▶waiting symbol disappears

21                 (0.2)♦*    (0.3)*•
     markusG         ->♦to tablet->>
     milaG           ->*to tablet*down->
     mila                         •leans toward tablet->
```

. (continued).

```
22              (0.3)*Δ(0.6)
    milaG          ->*to tablet->
    markus          ->Δleans closer to tablet, stretched neck->

23   JOANNA     (tule.)
                (come)

24              (0.2)▶Δ(0.9)
    tablet          ▶login page of Kahoot! challenge appears
    markus          ->Δstretches neck further->

25   MARKUS     monta.
                (how many)

26              (0.5)Δ(1.3)±
    markus         ->Δleans right->
    joanna              ±taps 'join the game' field->

27              (0.5)±(1.1)±
    joanna         ->±      ±types 'Joku' ((=Somebody))->

28              (1.0)Δ(0.5)±#(0.6)*
    markus         ->Δleans farther right->
    joanna              ->±
    milaG                    ->*to pupils behind them->
    fig.                #Fig. 16

29              (0.7)±              (0.4)±
    joanna         ±presses "Ok, go!"±

30              (0.9)±(0.3)Δ(0.3)*(0.5)               ±
    joanna         ±turns tablet toward mila & markus±#
    markus              ->Δrelaxes posture,
                        supports arms on thighs->>
    milaG                   ->*to tablet->>
    fig.                                       #Fig.17
```


Figure 16. Markus peeks at device.

Figure 17. Markus relaxes posture.

. (*continued*).

While the participants wait for the page to load, Markus seems disengaged from the interaction as his gaze scans the classroom and he plays with a piece of Blu-tack and an eraser (line 1). After Joanna repositions the device on the desk (lines 1–2), however, Markus shifts his gaze towards it and leans right, peeking at the screen (line 3; Fig. 13). It is uncertain, however, how much visual access this grants Markus as he soon readjusts his position, resting his head on the chair placed on the desk next to him (lines 4–11; Fig. 14). Markus' body shift coincides with Mila's inquiry (line 4) about whether their team's nickname will again be *Joku* ('Somebody') like in the previous task. Markus then self-selects, but instead of replying to Mila, he indirectly asks or wonders aloud about the number of questions in the upcoming quiz (line 6). This implies a lack of visual access to the device since Markus seems to be unaware of the fact that this information is not yet visible on screen. Moreover, the positioning of Joanna and Mila's bodies, their turns and gaze patterns, and the position of the device exclude Markus from the interaction and display an embodied social and epistemic alliance between the two (Niemi & Katila, 2022, p. 19; see also M. H. Goodwin, 2008). Ignoring Markus' question, Joanna and Mila glance at each other (although there is no mutual gaze; lines 5 and 9, respectively) and, in overlap with Markus' turn, Joanna suggests to Mila that they could choose another name. Mila then decides on the name (line 9), and Joanna accepts and turns the device to face herself, thus preparing for typing in their nickname (line 11).

Markus proceeds to upgrade his request through a combination of resources. He raises his head, leans toward the device (line 11; Fig. 15), and pursues response by repeating his question (line 13). Markus' gaze remains on the device instead of the addressee(s) (cf. Rossano et al., 2009), which together with the body shift (line 13) indicates that Markus is not only requesting information but also seeking access to the device. After a gap of 0.8 s, Joanna replies to Markus ('twelve I guess'; line 15), orienting to Markus' verbal question rather than the attempts at gaining access to the screen. Markus briefly glances at Joanna but quickly returns his gaze to the device and leans even closer to it. Joanna then expands her turn, saying that she does not know (line 17) – indeed, the information on the number of questions is still unavailable. Markus then glances at the objects in his hands (lines 19–21) but still orients to the device by maintaining the leaning posture. After 2.1 s, Markus again engages in actively seeking visual access to the screen as he fixes his gaze on the device (line 21), leans closer to it, and stretches his neck (lines 22 and 24). The login page finally appears (line 24), and Markus asks, this time in a shortened form, *monta* ('how many'; line 25), displaying the inadequacy of Joanna's response. Markus then leans right, first in line 26 and even more visibly in line 28 (Fig. 16) when Joanna is typing. Finally, when Joanna has finished typing and joined the game

(line 29), she turns the device so that all three participants have visual access to it (line 30). Markus immediately relaxes his posture, maintaining his gaze on the screen (Fig. 17).

Extract 3 illustrates how body shifts and head movements can be used together with verbal resources to work towards visual access to the device and to seek participant status in the task. Markus also displays a preference for gaining access to the tablet through his own embodied conduct, but when these attempts fail, he asks about the number of questions in the task. To the coparticipants, the request and the embodiments become "accessible as meaningful actions" (Smith, 2021) that display orientation to the team member's asymmetric access to the information and the device as well as to resolving the issue. Ironically, the verbal request is misaligned due to the very problem it is designed to resolve: the lack of access to on-screen actions leads Markus to attempt resolving the issue through a question that currently cannot be answered. Nonetheless, Markus refrains from touching the device, thus orienting to Joanna's rights as the current device-holder. A practical reason for Joanna not offering Markus access to the screen may be that this position of the device more readily allows her to type in the name. When the login process is finished, Joanna repositions the device to enable mutual access to it and, thus, modifies the existing interactional space into one with shared focus on answering the upcoming questions. By remaining in control of the device and deciding who gets access to it, however, Joanna still orients to her deontic authority as the device-holder.

In the current data, pupils seldomly touch devices held by peers, even during groupwork on shared devices. While shared responsibility for task-progression may entail shared rights to access the (visual) information needed to collaborate, pupils seem to orient to holding the device as a type of ownership with exclusive deontic rights, similar to cases where pupils work on individual devices. Extract 4, however, illustrates a case where a pupil tries to reposition a device held by a coparticipant when her rights to access it have been repeatedly denied. In a 4th grade lesson, Iris, Paula, Mea, and Amanda are performing a Kahoot! quiz on the English names of European countries on a shared tablet. On the desk, Iris' English book is opened to the page that shows these names. The participants are seated around Iris' desk (Fig. 18; Mea is hidden behind Iris in the figure), and thus far, Iris has been manipulating the device, holding it so that the screen faces her, while Amanda and Mea have partial visual access to it. Paula, seated opposite Iris, has displayed trouble accessing the device and has performed several body shifts and adjustments to her position to see the questions. A new question has just appeared on the screen, and they are to spell the English word for *Tanska* ('Denmark').

Extract 4.

```
01               #•                 (1.5)♥•
    amandaG      >>to tablet->
    irisG        >>to tablet->
    iris         >>holds tablet facing herself->
    meaG         >>to tablet->
    paulaG       >>to tablet->
    paulaF       >>smiles------------♥
    paula         •leans toward tablet•hand to tablet->
    fig.         #Fig.18
```
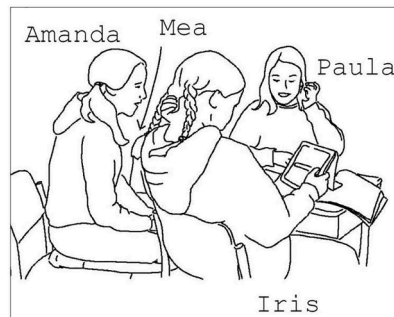


```
    Figure 18. Amanda, Mea, Paula, and Iris.
```

```
02  IRIS         [.h ↑tanska]• maa.
                  denmark country

03  PAULA        [i#-ris   ]•
    paula                ->•grabs tablet's cover,
                          pulls it->
    fig.          #Fig.19

04               (0.2)♠
    amandaG      ->♠to book->

05  IRIS         no ni.∅
                  alright
    meaG          ->∅to book->

06               (0.2)

07  IRIS         tän# mä± o[sa•*an,]
                  this I know
    iris          ->±lifts & tilts tablet toward herself->
    paula                 ->•retracts hand->
    paulaG                ->*to book->
    fig.          #Fig.20

08  MEA?                  [ (x)   ]
```
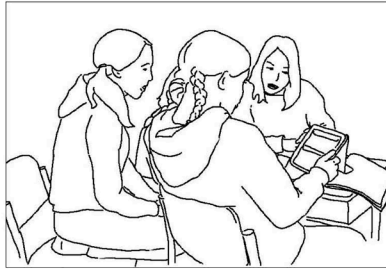
Figure 19. Paula reaches towards tablet. Figure 20. Paula tilts device.

```
09   IRIS       tän•±# mää o[saan (.) uh!]±
                this I know ugh

10   PAULA                 [      ↑I↓RIS ]±↑näytä:↓ä!
                                  iris show
     paula      ->•
     iris          ->±holds tablet high----±lowers tablet->
     fig.            #Fig.21

11              (0.4)#
     fig.            #Fig.22
```


Figure 21. Iris lifts device.   Figure 22. Iris lowers device.

```
12   MEA        de♠±nma:ark(h);∅
     amandaG    ->♠to tablet->
     iris        ->±lifts tablet, tucks in cover->
     meaG                   ->∅...->

13              (0.3)∅(0.3)*± (0.3)*(0.3)+          ±
     meaG          ->∅to tablet->
     paulaG           ->*to iris*to tablet->
     iris                 ->±places tablet on desk±
     irisG                      ->+to book->

14   IRIS       no ni ↑sa+nokaa⊗ ↓ki±rjaimet.
                okay say the letters
     irisG          ->+to tablet->
     mea                       ⊗leans toward tablet->
     iris                       ±leans toward screen,
                                hands to screen->
```

. (*continued*).

```
15                  (0.4)⊗ ♠
        mea              ->⊗
        amandaG            ->♠to book->

16   AMANDA    dee,♠=
        amandaG      ->♠to tablet->

17   MEA       =de♠±n::::-[  ma:±::r(k) ]♠+=

18   PAULA              [sähä ±sanosit]♠+=
                         but you said
        amandaG   ->♠to tablet-----------♠to book->
        iris        ->±types 'd'--±
        irisG                            ->+...->

19   PAULA     =et sä+∅ o*[saa#tki kir]*jo♠ttaa sen.+
                         that you know how to write it

20   AMANDA            *[ e:#::,    ]*-
        irisG        ->+to paula---------------------+to book->>
        meaG        ->∅to book->>
        paulaG       ->*to iris------*to tablet->>
        amandaG            ->♠to tablet->>
        fig.                #Fig.23
```


Figure 23. Mutual gaze.

. (*continued*).

At the beginning of Extract 4, all four pupils gaze toward the screen. Iris, Amanda, and Mea then orient to the next relevant action, producing the correct answer. Iris announces the country they are to name, *Tanska* ('Denmark'; line 2), and the other two shift their gazes to the book on the desk (lines 4 and 5, respectively), orienting to finding the English name there. Paula, however, makes her orientation to the lack of visual access to the device visible by leaning and moving her hand toward it (line 1). Before the extract, Paula has been shifting her body back and forth to secure at least some visual access to the tablet for circa 10 min. She is thus orienting to this continuous lack of access to the game when she finally addresses Iris by name in a reproaching tone and takes hold of the tablet cover. She pulls it, tilting the device slightly and thereby making the screen more visible to herself (line 3; Figs. 19 and 20).

However, Iris blocks Paula's attempts by lifting the device so that it slips away from Paula's hand (lines 7-10; Fig. 21). Simultaneously, she prioritises the task question and claims to know the answer (lines 7 and 9). Although Paula retracts her hand (line 7), she reproaches Iris by loudly addressing her by name and continues her attempts at gaining access by telling Iris to show the screen (line 10). In overlap, Iris lowers the device (Fig. 22), then lifts it again to tuck the cover under it (line 12), and finally places it on the desk (line 13), but still in a manner that restricts Paula's visual access to it.

Meanwhile, Mea offers a candidate answer (*Denmark*; line 12), followed by Iris' request to spell out the word letter by letter (line 14). Amanda complies by starting to announce the letters one by one (lines 16 and 20) while Mea slowly repeats the name (line 17). Paula, however, points out the contrast between Iris' request and her earlier claim of knowledge in an accusing tone (lines 18–19), thus challenging Iris' deontic authority as well as her claimed access to knowledge. The

conflict also relates to the problem that a potentially knowing participant, Paula, is not able to access the question, and the task progression can potentially be jeopardised. Iris types the first letter, *d,* in the answer box, before reacting to Paula's turn by shifting her gaze to Paula. A brief mutual gaze follows before Iris gazes at the book (line 20; Fig. 23) and then proceeds to type with help from the others (data not shown). Paula also reorients to the device, but after the task question has been answered, she suggests that they take turns typing in the responses, which leads to a negotiation of how turns should be ordered.

At least three aspects related to authority and roles seem to be reflected in this group's interactions. First, Iris as the device-holder has thus far been granted authority over the device, which gives her the exclusive right to manipulate it and prevents the others from touching it. In other words, Iris seems to hold the deontic authority, not only over the device but also over deciding how the task progresses – until, that is, this authority is questioned by Paula. Second, the participants seem to have distributed roles on the level of performing the task. So far, Iris has positioned the others as having epistemic access by asking them to tell her the answers – although Amanda and Mea here seem to reject this position by seeking the answers in the book. Selecting or typing in correct answers, on the other hand, is Iris' task. Third, issues of moral order become visible in how Paula rejects the distribution of tasks. Paula orients to their roles as team members who share the responsibility for task progression (Vänttinen & Kääntä, 2024) and the rights to access the information needed. By continuously blocking Paula's visual access to the device, Iris is thus violating Paula's rights as an equal member and potentially risking task performance, which eventually leads to Paula defying Iris' deontic authority (see lines 18–19).

Extracts 3 and 4 have illustrated how the resources to gain access to a

digital device during teamwork reflect peers' situated roles. The current data seem to support the argument by Thorne et al. (2015) that the device-holder has some exclusive rights over the device, which is indicated in the way that touching the device held by a peer is avoided and others' access to it is regulated by the device-holder. This also seems to be related more generally to the local distribution of responsibilities in performing the tasks. Whereas one participant may be responsible for handling the device, others may take on – often implicitly negotiated – responsibilities, such as providing the correct answer (Extracts 1 and 2), finding it in a book (Extract 4), or deciding on a team's name (Extract 3). Participants' rights and responsibilities as team members also seem to supersede the deontic authority of the device-holder. As Extract 4 illustrates, pupils can readjust the position of a device held by a peer when their rights to access the information needed to perform the task have been repeatedly neglected and/or when the lack of access potentially puts the group's task performance at risk. Through the repositioning, they can also reclaim their status as team members. In summary, then, the way that access is sought is not *only* dependent on predetermined institutional roles nor on the rights of a device-holder but reflect the situated, local combinations of rights and responsibilities.

5. Discussion and conclusions

This study has investigated the multimodal trajectories of resolving asymmetric access to digital devices in peer interaction during digital learning tasks. Drawing on multimodal conversation analysis (CA), it has illustrated how pupils negotiate mutual access to a device when it is needed, for instance, to proceed with a shared task or to assist a peer. The analysis has drawn attention to how pupils use embodied resources, such as head and body shifts or moving in the physical space of the classroom, or arrange the material surroundings in a way that not only grants them access to the device but also allows the device-holder to maintain haptic control of it. This preference is particularly evident in access negotiations after recruitments (Extracts 1 and 2), where the recruited participant orients to lacking access through multimodal work designed to avoid interfering with the device-holder's situated ownership of the device. In teamwork, on the other hand, there is an expectation of shared access to the device, which is oriented to in the more frequent use of verbal requests and persistent embodied work to gain access to the device. If a team member's access is repeatedly denied or otherwise neglected during groupwork, touch can be used as an attempt to resolve the issue (Extract 4).

The findings echo those of Råman (2022), who illustrated the ways in which teachers instructed students to resolve trouble with their devices without intervening with their haptic control of the device. In teacher-student interaction, however, the institutional authority of the teacher can in some cases give them the right to control students' devices (Råman, 2022). Such asymmetries of institutional status do not apply to the peer interactions in the current data, where pupils orient to different kinds of situated roles and rights. The device-holder seems to be given authority over the device (see also Thorne et al., 2015; Cekaite, 2009; Musk, 2016), even when it is owned by the school, and the rights to manipulate it may also be governed by the different roles adopted in performing the task. While some pupils are oriented to as having epistemic access to needed knowledge and thus as providers of answers, others display deontic authority over the actions on the digital device. As we saw in Extract 4, however, these roles may be questioned by a participant who attempts to reposition a device through touch to gain access to it. In such cases, it is the peers' roles as team members that are oriented to: team members should share access to the device and can take measures when this right is continuously violated. Moreover, the team shares the responsibility for successfully completing tasks, and hindering one member's access to relevant information can potentially impact task performance negatively. These findings give interesting insights into the local, situated roles that pupils orient to and dynamically negotiate in their peer interactions.

The detailed multimodal analysis has contributed to CA research on technology-rich classroom interactions and to our understanding of how meanings are multimodally created in interactions around digital devices. It has shown how asymmetric access to a device may be consequential for task-progression and group dynamics and is therefore addressed and resolved by the participants through locally tailored multimodal resources. Through its focus on peer interactions within Finnish basic education classrooms, the study has also shed light on the multimodal conduct of children and teenagers around digital devices.

In addition, the study has important pedagogical implications. First, since digital devices are often designed for individual rather than collaborative use, their implementation in the classroom requires careful planning. Teachers need to consider the kinds of devices that can be used, the types of tasks that can be performed on them, and how the physical and material space of the classroom can be arranged in a way that promotes working on the devices in relevant ways. Second, learning goals should impact decisions on whether to assign pupils individual devices or ask them to collaborate on shared devices. Sharing a device may result in one pupil getting more practice with handling the device and the digital platform while other participants mostly focus on the content. On the other hand, collaboration can lead to delicate negotiations of authority, rights, and obligations among peers, which leads us to our final pedagogical implication. Namely, these negotiations require the ability to appropriately participate in classroom interactions and activities, a topic which has not been sufficiently addressed in previous literature on interactions in technology-rich classrooms. The teacher's role is to support pupils in developing their competencies, including the ability to use digital devices in collaboration with peers and to share and negotiate rights and responsibilities fairly. Analysing how these abilities are (not) displayed in everyday classroom interactions can offer us important insights regarding how to best support their development.

As digital technology has become an indispensable tool both in institutional and everyday contexts, learning its use is an essential educational goal. Digital devices and platforms thus need to be developed to better support collaboration and pedagogical tasks in and outside of classrooms. Multimodal CA research can inform such development by presenting detailed analyses of how technology is used in and affects classroom interaction. By offering insights into the asymmetries and troubles related to their use as well as into the practices of resolving these issues, CA can help in creating efficient and inclusive digital and pedagogical practices that aid pupils to learn both digital and collaborative competences needed in the 21st century.

CRediT authorship contribution statement

Minttu Vänttinen: Writing – review & editing, Writing – original draft, Visualization, Validation, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The author declares that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix

Participants' talk has been transcribed using the Jeffersonian notations. Conventions from multimodal CA (see e.g., Mondada, 2022) have been adapted for other multimodal actions.

.	final falling intonation	
,	continuing intonation	
;	slightly falling intonation	
?	interrogative intonation	
!	animated speech tone	
↑	rising intonation	
↓	falling intonation	
hhh	outbreath	
.hhh	inbreath	
wha<u>t</u>	word emphasis	
>what<	speech that is quicker than the surrounding talk	
<what>	speech that is slower than the surrounding talk	
WHAT	speech that is louder than the surrounding talk	
wha::t	prolonged vowel or consonant	
wha-	cut-off word	
(what)	uncertain hearing or talk omitted for anonymisation	
[what]	overlapping talk	
=	no break between units of talk	
((incorrect))	transcriber's comments	
(1.5)	silence in seconds	
(.)	micro pause	
*•♥+±÷	Each participant's gaze, facial expressions, and other embodied actions are assigned a symbol, respectively. The occurrence of the symbol in a line of talk indicates the beginning/end of an embodied action. The action is explained below the lines for speech and translation in grey font.	
saraG	Gaze of the participant is explained in grey font in this line.	
saraF	Facial expressions of the participant are explained in grey font in this line.	
sara	Other embodied actions of the participant are explained in grey font in this line.	
-> ->	Action continues across following lines until the same symbol is reached.	
>>	Action begins before the beginning of the extract.	
->>	Action continues after the extract ends.	
…	Action's preparation.	
, , ,	Action's retraction.	
#	Shows the temporal placement of a figure in a line of talk.	

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