



Experiences of face-to-face and online collaborative learning tutorials: A qualitative community of inquiry approach

H. Q. Chim¹ · Diana H. J. M. Dolmans² · Mirjam G. A. oude Egbrink³ · Hans H. C. M. Savelberg⁴

Received: 28 June 2023 / Accepted: 5 February 2024
© The Author(s) 2024

Abstract

This study explores the experiences and the preferred schedule of face-to-face and online tutorials in a problem-based learning setting where students learn collaboratively, based on cognitive, social, and teaching presences. Seventeen experienced students and 13 tutors attended semi-structured interviews focusing on their experiences and preferences. The majority (15 students and seven tutors) preferred a 100% face-to-face schedule as the default option to stimulate deep learning and social interactions, while two students and five tutors preferred a schedule with a majority of face-to-face tutorials with some online sessions. Overall, face-to-face tutorial meetings were perceived to deepen content discussions, create a sense of connection through social interactions and non-verbal communication, and protect student well-being.

Keywords Problem-based learning · Cognitive presence · Social presence · Teaching presence · Blended learning

Abbreviations

PBL Problem-based learning
COI Community of inquiry

1 Introduction

In recent years, the increasing adoption of more digital solutions presents opportunities to collaborate from a distance. During the COVID-19 pandemic, education was moved online for safety purposes, which incidentally highlighted the practical benefits of remote meetings (e.g., flexibility, practical convenience, time-saving). There have been extensive debates and research on whether face-to-face or online conditions are better for education (Means et al., 2013). In actuality, we can enjoy the best

Extended author information available on the last page of the article

of both worlds, but there is a lack of research on how to schedule a mix of face-to-face and online classes.

Collaborative learning is where “*two or more people learn or attempt to learn something together*” (Dillenbourg, 1999). At universities, collaborative learning can occur in tutorial groups and in group projects and represents a valuable skill to prepare students for their careers. When learning collaboratively, students ask questions, build on each other’s reasoning, and discuss disagreements (Dolmans, 2019), to achieve individual and shared learning goals (Strijbos, 2016). One pedagogical model in which students learn collaboratively is problem-based learning (PBL), where students learn through exploring a problem or case in tutorial groups (Hmelo-Silver, 2004). In PBL tutorials at Maastricht University, 10–12 students learn collaboratively by interacting with each other and building a shared understanding of a case, while guided by a tutor. Students are given a problem, they identify known concepts and link it to prior knowledge, brainstorm about possible solutions to the problem, and identify learning goals. This phase is known as the *pre-discussion* phase. Based on the learning goals formulated in the pre-discussion phase, the students seek relevant sources of information outside the tutorial. When they reconvene, they present and discuss their findings, known as the *post-discussion* phase. Students are dependent on each other, and each student is responsible for achieving the group’s learning goals.

When students learn collaboratively, they engage in both cognitive and social activities. These socio-cognitive aspects fit well within the community of inquiry (COI) framework, which has been used extensively to research learning communities in online synchronous forum discussions (Garrison et al., 1999). For this study, we use the COI framework to explore how face-to-face and online tutorials are experienced by students and tutors, and to understand what their preferred schedule of a mix of both formats would be. The COI framework represents a process of creating a deep and meaningful collaborative learning experience through the development of three interdependent elements: cognitive, social, and teaching presence. *Cognitive presence* refers to the degree to which the students can construct meaning through their group discussions. Cognitive presence aligns with PBL, where cognitive presence plays a role when students explore problems, search for information, integrate new information into their cognitive schema, and apply their knowledge. *Social presence* refers to the ability to project oneself socially and emotionally, indicated by emotional expression, open communication, and group cohesion. *Teaching presence* is the facilitation of cognitive and social presences to achieve intended learning outcomes, including the teacher’s guidance of knowledge building and direct instruction (Garrison et al., 1999).

Deciding how to schedule face-to-face and online tutorials appears complex because of the differences in cognitive, social, and teaching presence between both settings. Previous studies have reported that online discussions tend to stay on-task (Jonassen & Kwon, 2001; Lantz, 2001), perhaps promoting a more focused environment for cognitive presence. However, students’

well-being may be negatively affected by the lack of social presence and interactions online (Rasheed et al., 2020). It may also be more effortful for tutors, because they may need to provide more guidance online where there may be more ambiguity (Donnelly, 2013). These arguments led us to consider several possibilities in scheduling tutorials or meetings where collaborative learning takes place. One option is a majority of online meetings to facilitate more on-task, focused discussions, with some face-to-face meetings interspersed to encourage social bonding and relieve the tutor's burden. Another option is to schedule more face-to-face meetings at the start of the course to develop social bonds. Generally, scheduling meetings could be done by having various ratios of face-to-face and online meetings, having back-to-back or interspersed settings, or meeting up face-to-face/online when there is a reason to do so. There are also the extreme ends of the continuum, with purely face-to-face and purely online meetings (Hrastinski, 2019), perhaps being a preference for some.

The aim of this study is to explore the experiences and the preferred schedule of face-to-face and online collaborative learning tutorials, based on the perspective of students and tutors. We use the COI framework to structure our exploration, asking the questions: *How did students and tutors experience deep learning, social interactions, and the role of the tutor in face-to-face and online tutorials? And how should we schedule future tutorials according to students and tutors?*

2 Material and methods

2.1 Design

This qualitative, cross-sectional study utilized semi-structured interviews. This study was approved by the ethics review committee of Maastricht University's Faculty of Health, Medicine and Life Sciences with approval number FHML-REC/2021/119/Addendum01_22.

2.2 Participants

The study was conducted at a Dutch research university in the south of the Netherlands. The university uses a student-centered approach that focuses on small group learning (approximately 12 students per tutorial group). The student population consists of local and international backgrounds. We used convenience sampling, using course announcements to recruit students and tutors from the Faculty of Health, Medicine and Life Sciences. During spring of 2022, we invited participants who were already enrolled at the university prior to the start of the COVID-19 pandemic, and had extensive experience with both online and face-to-face tutorial meetings. The students were made up of

third year Bachelor's students, while the tutors have a teaching qualification in guiding small group learning.

2.3 Procedure

Participants were invited via internal communications, specifically through departmental emails and course emails. Interested participants were given written information before the scheduled interview. One-on-one interviews were carried out with students and with tutors, conducted by H.Q.C. in a private meeting room to ensure confidentiality and comfort for the participants. Most interviews were executed on-site, because we expected the face-to-face setting to present more communication cues than the online setting. However, three interviews were scheduled online per participant's request. All interviews were audio-recorded with a dictaphone—the Philips DVT6010 (Speech Processing Solutions GmbH, Vienna).

The interview questions were inspired by the COI framework, emphasizing the importance of cognitive, social and teaching presence in online learning (Garrison et al., 1999). For the reason of using simpler language, cognitive presence was operationalized as deep learning, social presence as social interactions, and teaching presence as the role of the tutor. Because scheduling a combination of face-to-face and online educational meetings is a relatively new idea, we first asked about the different experiences in face-to-face and online tutorials regarding collaborative learning, before asking participants to form their ideal schedule. Overall, the interview questions were prepared collaboratively by the authors who have expertise in educational sciences, with consultation by an external educationalist, and co-created through pilot interviews with two tutor participants to check for the comprehensibility and appropriateness of the questions before the main data collection phase commenced. After briefing the interviewees and obtaining their consent, the following materials were used successively to conduct the interviews:

1. Visual aid with explanations (see Appendix 1) depicting different schedules of face-to-face and online tutorial meetings were shown to illustrate the variety of (non-exhaustive) possibilities to schedule the tutorial meetings.
2. Vignettes (see Appendix 2) were presented one by one that describe the COI concepts of cognitive, social, and teaching presence.
3. Semi-structured questions were used to stimulate discussion (see Appendix 3 for interview guide), including:
 - Main questions
 - How was/were deep learning/social interactions/the role of the tutor different in face-to-face and online tutorials?
 - Follow-up questions
 - Closing question

- What is your final suggestion of how a 2-month course would look like? And why?
 - Show the fill-in-the-blanks schedule (see Appendix 4).
4. At the end of the interview, a demographics questionnaire was presented, which included the following questions:
- Year of birth
 - Self-reported language proficiency, as more advanced speakers may find it easier to overcome barriers to communication
 - Nationality, because students and tutors from abroad may prefer one setting over the other
 - Years in higher education, describing how many years the students and tutors have been enrolled or teaching in higher education, respectively
 - Other online education experiences, where having more experience may lead to being more familiar and even comfortable with online settings

2.4 Data analysis

Audio-recordings were transcribed verbatim. When anonymizing the participants' data, the students and tutors were labelled alphabetically. The interview data was coded and categorized thematically, using a mix of deductive and inductive approaches. Deductively, the COI framework was used to guide the vignettes' questions. Then, each answer given by the participants – personal experience, opinion, description, and explanation – was given a code by the main researcher H.Q.C.. Each code was also labelled with the participant's overall preferred schedule and whether they were a student or tutor. Codes of similar content were grouped together to form themes. The themes were identified by all researchers (H.Q.C., D.H.J.M.D., M.G.A.O.E., and H.H.C.M.S.) and discussed iteratively to reach consensus. The themes were then expounded upon by summarizing the codes and consolidating them into a coherent explanation.

2.5 Reflexivity

We acknowledge that the background and expertise of the research team contributed to the design, interpretation, and reporting of this study. All members of the research team are involved in providing primarily face-to-face education, with online adaptations made during the COVID-19 pandemic. All research team members are also involved in educational research. The main researcher and interviewer (H.Q.C.) is a second-year post-doctoral researcher, with prior experience in leading two qualitative studies and after an additional 2-day training with an external educationalist to finetune interview competencies specific to this study. The remaining authors (D.H.J.M.D., M.G.A.O.E., and H.H.C.M.S.) are Professors in education, with extensive experience in guiding small groups and

using technology to facilitate small group learning. Our different perspectives combined with the theoretical concepts are expected to enhance the transferability of our findings.

3 Results

3.1 Sample characteristics

Data saturation, when novel themes no longer emerged, was achieved after interviews with 17 students and 13 tutors. Sample characteristics are described in Table 1 to provide readers with the context of the ensuing findings, although the authors did not find evidence that the contextual factors could have influenced the results. A typical bachelor student's schedule tends to vary, depending on the student year and elective courses chosen. The students tended to have a weekly schedule of two tutorials (two hours each), one lecture (one to two hours), and one practical workshop (one hour) per week. The tutors had 38–40 h per week employment, except for one tutor with a 16-h per week part-time employment.

3.2 Themes

Three main themes emerged from the interviews, as summarized and elaborated in Table 2. These themes describe *how* face-to-face and online tutorials were experienced, with explanations given on the experiences.

Theme 1: Online content discussions tended to lack depth.

Table 1 Sample characteristics

| | Students | Tutors |
|---|-----------------------|--------------------------------------|
| Sample size, n (woman/man) | 17 (11/6) | 13 (4/9) |
| Interview duration in minutes, M (SD ; range) | 58.6 (19.3; 31 – 120) | 70.9 (15.5; 41 – 98) |
| Age, M (SD) | 23.8 (3.5) | 41.2 (12.1) |
| Self-reported proficiency of language (English) used in tutorial, n | | |
| Advanced | 14 | 13 |
| Intermediate | 3 | 0 |
| Basic | 0 | 0 |
| International (i.e., non-Dutch) tutor/student, n | 7 | 4 |
| Years in higher education, M (SD) | 3.9 (1.1) | 12.7 (9.2) |
| Other online education experience | 0 | 1 tutor with 3 years online teaching |

Table 2 Themes (how), explanations (why), specific behaviors, and quotes from participants

| Explanation | Specific behaviors | Quotes |
|--|--|---|
| <p>Theme 1: Online content discussions tended to lack depth Magnified inequality in contributions online</p> | <ul style="list-style-type: none"> ● When online, more students remained silent while outspoken ones dominated more frequently ● Learning online was individual-based, rather than group-based. The students were there to report their findings and check their notes, rather than to discuss or check their understanding ● Students felt fewer consequences (e.g., social pressure) for unequal contribution online ● See Table 3 for list of contribution obstacles online | <p>Tutor-H: <i>“Usually they (students) are conservative in when they want to contribute. So, whether they are muted or whether they’re unmuted, they still are quite hesitant in sharing, asking questions. This is um a hurdle that they have to go over from their home situation. The um dynamic is limited during the online session.”</i></p> <p>Student-A: <i>“Because you don’t feel like anyone’s looking at you, you don’t feel like you have to say anything... You just think, ‘Oh somebody else is going to answer eventually, I don’t care’: The teacher also won’t be able to a single me out”</i></p> |
| <p>Passive monologues/presentations occur online instead of intellectual exchanges</p> | <ul style="list-style-type: none"> ● Students took turns presenting their findings to each learning goal online ● When online, students checked completeness of notes instead of checking their understanding ● As students tended to read their notes aloud online, the audience tended to zone out | <p>Student-K: <i>“(Online) it’s kind of presenting one by one, and then it’s the end of the process. So, everyone basically presents a learning goal. And you don’t really discuss... Most often when someone is presenting, I’m checking whether I have the same information in my notes... So, you’re really following whether you have the information that is said, but you are not really following what is said, like whether you understand what it’s saying, not interpreting and understanding.”</i></p> |

Table 2 (continued)

| Explanation | Specific behaviors | Quotes |
|---|---|---|
| Inability to interrupt monologues with questions or pieces of information when online | <ul style="list-style-type: none"> ● Interrupting the speaker online would lead to both speakers being inaudible, hence perceived as rude behavior ● After waiting for the online monologue to end, students tend to forget what they wanted to say ● Compiling a list of points to share after the other's online presentation felt like criticism, instead of the intended collaborative learning | <p>Student-O: <i>"There is a student that says, 'Okay, I'm going to talk about the first learning goal'. And that student gives a monologue of 15 min about the learning goal, because it's harder for the other people to intervene, you know?... While on campus, it's easy to do that because when someone is starting with the learning goal, other people probably feel more free to interrupt if something is wrong, or there is something to add, instead of waiting at the end of the person speaking, you know, because it's easy to interrupt, to just see that someone wants to say something or someone can easily raise a hand. Online, it's sort of harder to do that."</i></p> |
| Fewer questions asked online | <ul style="list-style-type: none"> ● Students tended to agree quicker online ● Students with questions preferred to search for answers on the internet or email the tutor ● When questions were asked to the group online, students found it easy to wait for others to answer ● When questions are directed to individuals online, they find it easy to blame technical issues for their inability to answer | <p>Student-O: <i>"It's impossible that everyone understands everything all the time (online). And if I think about the on-campus tutorials, there was always one thing that wasn't clear to someone. And that's good because that's when the person has questions and we check if we understand... So again, on campus, you get to know the people and then you feel more comfortable admitting that you don't understand or you don't know something. Online, where you don't know the people, because there is no social interaction besides telling them what you've learned. With just little to nothing that is personal, then it becomes harder."</i></p> |

Table 2 (continued)

| Explanation | Specific behaviors | Quotes |
|---------------------------------------|---|--|
| More distractions online | <ul style="list-style-type: none"> • Students and tutors have been suspected of, and have admitted, to being distracted by non-tutorial matters when online • Resistance to distractions were weaker online due to a lack of social pressure • Distractions came from: <ul style="list-style-type: none"> • Surroundings (e.g., phones, people, pets, house chores, eating) • Computer screen (e.g., texting, emailing, browsing other websites) • Technical issues (e.g., connection and diversity in visual backgrounds, audio quality, and volume) • Students and tutors felt fatigue, headaches, and stiff necks sooner and more frequently when online • The constant need to invite students to speak up online was tiring for students and tutors | <p>Student-O: <i>“Sometimes I see that, also from the tutor. Sometimes they get lost in this and (ask) ‘What’s going on?’ ... I know that people tend to listen a little less. Also, if I think about myself, I do tend to lose focus faster if it’s online, because I’m just looking at the little screen... Sometimes I tend to deviate from listening and maybe, okay, you know, I see a little message on my screen, I do look at it and then I lose 30 s of what has been going on in tutorial. It’s easy to be distracted.”</i></p> |
| Lower energy levels online | <ul style="list-style-type: none"> • Because online discussions tend to stagnate, some tutors asked more questions and provided more answers • Some tutors were more passive, because similar to the students, they experienced contribution obstacles online (see Table 3) and wanted to quickly end the tutorials | <p>Tutor-F: <i>“The online format is just more exhausting. We’ve got your stay on the screen all the time... People are more fatigue compared to if they would have it on campus.”</i></p> |
| Tutor guidance was needed more online | <ul style="list-style-type: none"> • Because online discussions tend to stagnate, some tutors asked more questions and provided more answers • Some tutors were more passive, because similar to the students, they experienced contribution obstacles online (see Table 3) and wanted to quickly end the tutorials | <p>Student-I: <i>“Well, I definitely see that they (tutors) are trying to stimulate the discussion. So, I wouldn’t say that they are doing a bad job, because I also see that it’s very hard online... It’s way easier when you’re face-to-face, when you can look at someone and ask a question. Because when you’re in a screen and you look to a person... You cannot look someone in the eye. I think they are trying harder online... It just went better face to face, so more effort online, with less effect, less results.”</i></p> |

Theme 2: Sense of disconnection online—limited non-verbal communication and social interactions

Table 2 (continued)

| Explanation | Specific behaviors | Quotes |
|--|---|---|
| Non-verbal communication provides feedback for natural turn-taking | <ul style="list-style-type: none"> • When face-to-face, non-verbal communication such as eye contact and nodding ensure that students and tutors speak at the appropriate moment • When online, there were multiple pauses as speakers did not want to interrupt each other • As a listener, nodding, making eye contact, and facial expressions can give the speaker positive feedback, signaling indicates engagement, which can act as encouragement for the speaker to keep elaborating. Different types of feedback would then elicit a different response, allowing the speakers to adjust accordingly | <p>Tutor-1: <i>"When a group is interacting, when they're talking to each other, it seems that there's like a sweet spot in timing, where if you respond, it's most natural. If you respond before that, it comes across as if you're going to see what you want to say, regardless of what's being said before. If you respond afterwards, so behind that sweet spot, it can be more that you overthought it too much or it's not very spontaneous anymore... But if you hit that sweet spot, it's just like a natural flow of conversation. And it's a lot easier to stay within that sweet spot if you're there with the group and everyone just looks at each other and see if they're willing to respond."</i></p> <p>Student-A: <i>"I think the physical interaction also means more social interaction. So, it's also like the little things, their social cues. For example, it's much easier to tell whether you have somebody's attention, whether people are listening, whether they understand what you're talking about. Because if you do it online you really just have like this pretty two-dimensional view, just have the face, but you don't get the rest of the body language, you don't see how they interact with other peers. And so (face-to-face) you have much more feedback where you can adapt to what you're talking about."</i></p> |

Table 2 (continued)

| Explanation | Specific behaviors | Quotes |
|---|---|---|
| Non-verbal communication can signal safety | <ul style="list-style-type: none"> When sharing content, disagreements or when giving constructive feedback, students and tutors try to signal friendliness, such as smiling, standing closer, and making eye contact, which is easier to do face-to-face. Feeling safe, students would be more ready to ask questions (whether academic or personal) and share disagreements When online, there is a feeling of distance, making feedback and jokes impersonal | <p>Tutor-G: <i>“If there is a lot more negative criticism towards someone... or points of improvement for some people... I think it’s much better to have it face-to-face so I am there to actually regulate it. On-site I can actually regulate this conversation if I see that the other person is feeling a bit more uncomfortable and then I can say ‘We can have a discussion later on’. By Zoom it can be a bit more difficult for me to see a person with their body language, if they’re actually feeling awkward or uncomfortable with it, with the feedback that we’re giving. So I think it’s better to have this face to face. And it’s even much more comfortable face-to-face because we can look at the person actually”</i></p> |
| Non-verbal communication can induce social pressure | <ul style="list-style-type: none"> When face-to-face, being in the same room while exchanging eye contact gave students a sense of social pressure and responsibility to the group Online, the stillness of a withdrawn student did not stand out, because non-verbal communication was lacking | <p>Tutor-I: <i>“If someone is sitting quietly in a corner while others are active, they stand out because everything is moving and there’s a lot of activity going on and there’s a quiet spot over there.”</i></p> |

Table 2 (continued)

| Explanation | Specific behaviors | Quotes |
|---|---|--|
| Non-verbal communication can help gather attention | <ul style="list-style-type: none"> • Before speaking up face-to-face, students and tutors use non-verbal communication (e.g., looking around the room, using hand gestures) to gather the attention of the others • Demonstrations of the human body (e.g., gait) that are part of the Biomedical Sciences program can enhance explanations and can be performed with more ease when face-to-face • As a speaker, enthusiasm can be conveyed through body language, voice intonation, and facial expressions. Students find that enthusiasm from students and tutors can be contagious, encouraging them to develop an interest for a previously mundane or neutral topic | <p>Tutor-H: “When you try to invite people, you look them in the eye. And that’s very difficult online because students don’t know whether you’re looking at them or not.”</p> <p>Student-L: “I might be less interested in a certain topic... But there is such a pre-discussion, where the motivated students can try to motivate other students, to get them enthusiastic about the topic as well.”</p> |
| Non-verbal communication can support tutors in providing guidance | <ul style="list-style-type: none"> • When online, rapid movement of the eye may signal searching for or reading information. However, students and tutors have reported feeling suspicious that the other person is distracted with non-tutorial related content on their screen • With limited information online, the tutor had to explicitly and frequently ask if the students have understood the topic • When face-to-face, avoiding eye contact during a question may signal that the student does not know the answer. A change in body postures (e.g., leaning forward or backward, searching through notes) may also signal that the student needs help or disagrees with the topic • When face-to-face, tutors may also provide feedback through changing body posture | <p>Tutor-H: “Eye contact, posture, like someone who is finding something very difficult will probably look at his notes, look up more, browsing through the case. When I look at people via Zoom, I can see they’re browsing, for example. But, yeah, you can tell by the face expression that they’re looking up and down, they’re searching for something but I’m not sure if that’s their own note or is that something not from the case?”</p> |

Table 2 (continued)

| Explanation | Specific behaviors | Quotes |
|--|--|---|
| <p>Non-verbal communication and social interactions can help build trust and create a safe environment</p> | <p>● Students and tutors made initial connections through first impressions of the other's appearance, behavior, even personal items, which are more visible face-to-face</p> <p>● Through observing another's non-verbal communication face-to-face, students adjusted their reactions (e.g., sharing more if the listener is enthusiastic, being respectful and sensitive if the listener appears vulnerable)</p> <p>● When online, students and tutors suspect that the other is distracted (by being on their phones, having external communication, consuming other forms of entertainment, being with others in the room, etc.) and not listening. This is especially prominent for those who have their cameras off, as they were suspected to be away</p> <p>● Students who are more reserved found it more difficult to approach a tutor (when attending 100% online tutorials), because they felt like they did not know the tutor</p> <p>● When face-to-face, social interactions occurring before a tutorial can activate students to speak up early on</p> <p>● When face-to-face, private conversations can occur without the whole group listening in (as it was online). Thus, students felt more comfortable sharing personal topics, which can build trust</p> | <p>Student-O: "Sometimes I would talk in an online tutorial, and like, no one will be listening to me. And then, of course I tend to share less of my notes because I feel okay. They don't care about what I'm saying. So why would I explain the 10 things that I found?"</p> <p>Tutor-E: "I don't have the same bond with students if I have a class fully online than face-to-face... I really appreciate students from the different characters that they have. I can really laugh and I can have an inside joke. Sometimes it just happens, non-verbally, or just in class. And online, it's so difficult to pick up these things,"</p> <p>Student-M: "When you don't feel connected to other people, you hold back your participation"</p> |

Table 2 (continued)

| Explanation | Specific behaviors | Quotes |
|--|---|---|
| Social interactions can help students connect | <ul style="list-style-type: none"> • Students found it easier to make friends face-to-face and felt more eager to attend tutorials when they had connected with their classmates • Chat functions online were only used between friends who met each other face-to-face before the course • Tutors were also more motivated to guide tutorials when there were social interactions | <p>Student-L: “Normally, I make three new friends in one tutorial group. And now I think I’ve made two in two years (online).”</p> <p>Tutor-F: “If I have the tutorial group where people who don’t have a social interaction beyond just the pure knowledge exchange, I don’t like this tutorial group. I’m not looking forward to it leading this tutorial and therefore my motivation to help these people is also just different, it’s lower.”</p> <p>Student-E: “To have that feeling of being in group to be part of a group with the same goal, having a good student life, while also, of course, preparing well for the exam. But also that you make friends to do social activities with, to enjoy life besides your study, I think that’s really important”</p> <p>Student-L: “When I’ve only met someone online and it will still be our first appointment, then it is easier to cancel or ‘ghost’”</p> |
| Social interactions can stimulate more social activities | <ul style="list-style-type: none"> • Social interactions shared when face-to-face lowered barriers for students to connect outside of the tutorial for social activities • When students have connected in face-to-face tutorials, they upheld promises of further meeting up outside the classroom • Social activities were seen by some students as a reward for studying hard | <p>Student-E: “It felt a little bit lonely and not like I was actually in a tutorial group, you know, because I didn’t feel at all that I belong to any group. I feel like I’m just coming to this meeting, no one cares about it, like literally I felt like even the tutor didn’t care about it at one point. And, everyone was waiting for it to be finished.”</p> |
| Theme 3: Student well-being suffered when tutorials were 100% online | <ul style="list-style-type: none"> • Social interactions and bonding were lacking in online tutorials | |
| Students felt lonely when attending 100% online tutorials | | |

Table 2 (continued)

| Explanation | Specific behaviors | Quotes |
|---------------------------------|--|---|
| Peer support was lacking online | <ul style="list-style-type: none"> When face-to-face, students can assess if their peers are not feeling well or doing their best, which enables them to support each other | <p>Student-L: <i>“It’s harder to determine (online) if someone is going through a harsh time or not. And yeah, it’s harder to motivate your colleagues via an online platform and WhatsApp, than helping someone up while sitting next to each other. Maybe asking them to go for a small walk? Have a chat? Like I’ve had that in the past, people in my group were not feeling well, but I had to hear that from the tutor, since we were worried about the unequal participation. We didn’t know where it came from and it turned out it was due to personal circumstances. I am not saying that it might have been overcome during face-to-face sessions. But I think there was a great chance that we might have noticed something was not going too well during those face-to-face sessions.”</i></p> |

Content discussions in online tutorials were perceived as different from face-to-face tutorials (detailed in Table 2). Students and tutors felt that online discussions had the sole purpose of checking off learning goals, while keeping discussions to a bare minimum. Online discussions were either shorter (fewer exchanges) or longer (more silences). There were various contribution obstacles (listed in Table 3) that obstructed the natural flow of discussions in online meetings. Students and tutors reported that online discussions contained fewer exchanges related to applying knowledge to practical examples, giving supporting explanations, sharing personal anecdotes, discussing disagreements, exploring personal interests, and adding jokes. With fewer exchanges online, students spent less time actively learning about the topic. Students and tutors also found online tutorials to be less enjoyable. Student-A explained: *“Online tutorials feel more like a chore to me. It’s something you have to do, to get it over with. Well, of course, the face-to-face (tutorials), you also have to do them. But it’s just much more enjoyable. You might find a nice piece of information the day before and then you’re like, ‘Oh, I can’t wait to talk about this with my tutor and peers.’ See what they think, see if the tutor has any more knowledge about this. And you’re just more open to sharing information and really, actually enjoy discussion”*.

In contrast, students experienced a natural flow of discussion in face-to-face tutorials, encouraging them to use their own words. Students reported being able to make more progress in the discussions by covering more details, while having a better understanding of the discussed concepts. Students and tutors also expected that face-to-face tutorials would improve students’ memory of

Table 3 Contribution obstacles during online tutorials that discouraged students and tutors from speaking up

- Having to unmute microphones. Leaving microphones unmuted would risk noise disturbances
- Students having cameras turned off
- Lacking non-verbal feedback/response from others (e.g., inviting another to speak through eye contact)
- Lacking verbal feedback/response from listeners (e.g., words or sounds of agreement)
- Speaking to a small screen felt less human/personal
- Not being able to have multiple speakers online
- Having multiple listeners listen in on the conversation discouraged elaborate exchanges
- Being unprepared/not knowing the topic of discussion. With the ease of searching up answers online, students feel safer to attend tutorials unprepared
- Feeling unsafe to share questions or information due to a lack of social connections
- Associating the home situation (where online tutorials tend to take place) with a place of rest and of low energy
- Feeling unmotivated when attending online tutorials
- Confusion about the reason for silence. It is difficult to understand silences. Possible reasons for silence, other than the abovementioned contribution obstacles, could be that the topic at hand is too complex, students are unprepared for the discussions, or maybe it is the students’ personalities to be more silent. When such a confusion exists, students and tutors find it difficult to react
- Fatigue from others not contributing

the discussed content, allow students to assess their learning, and build students' confidence. When tutorials were conducted face-to-face, there was a sense of togetherness, so students felt a sense of responsibility towards the group, to keep each other active, to stimulate each other in the discussions. Even when academic topics were not personally interesting to the students, having a good group dynamic could help them stay motivated and pay attention in class.

Theme 2: Sense of disconnection online—limited non-verbal communication and social interactions.

Students and tutors reported a sense of disconnection when online, as they experienced less non-verbal communication and social interactions. Non-verbal communication (different types described in Table 4) was limited online because computer screens had to display the tiny windows of all students (usually 12) and the tutor. These windows tended to show the attendees' faces only. Non-verbal communication was further reduced when students switched off their cameras or when a digital document was shared, which took up a larger portion of the screen. The weaker presence of non-verbal communication in online tutorials led students and tutors to feel less connected with each other (see non-verbal communication functions and related behaviors and quotes in Table 2).

Social interactions, in this study, include all student–student and student-tutor exchanges that were not related to the academic topic intended for the tutorial discussion. In this study, social interactions occurred *before*, *during*, and *after* the tutorial and during breaks in-between the tutorial. Conversational topics included jokes, discussing recent events, discussing other course work, technical problem-solving, sharing personal information and interests, and planning social or study activities outside the classroom. Students and tutors suggested that social interactions can lead to social connections. Students reported that it was more fun and easier to share their thoughts with friends than with strangers. Students also shared that they felt more “included” in face-to-face tutorials, because

Table 4 Types of non-verbal communication in tutorials, described by students and tutors

-
- Eye movement – eye contact is not possible when online. However, eye movement such as searching or reading from a screen may still be detectable
 - Body posture and body movement – including leaning forwards or backwards and using hand gestures. These are not usually visible when online due to the screen focusing on only the face and occasionally upper body
 - Facial expressions – including mouth movement, eyebrow movement, and so on, are visible both face-to-face and online
 - Spatial presence – the presence of other people in a spatially distributed area, which is not visible in an online setting
 - Digital functions—including the signal of unmuting, using emoticons, using the hands-up button, and using the chat function. These are not present in a non-digital setting
-

knowledge exchange was not the only purpose of their presence – they were also there for fun and making connections. Overall, students and tutors expect that students are better able to learn with and from each other when there is a sense of connection.

When online, there were barely any social interactions. Students and tutors attended just in time to start the online tutorial, turned off their cameras and microphones during the break, and left immediately after the tutorial. Tutor-L experienced the face-to-face tutorials as active, both in terms of the content discussions and social interactions. However, when the group had to move online, it became a quieter group – “*a lot of the liveliness was gone, the jokes were gone, easy bantering was gone*”, tutor-L described. Online tutorials were generally described as more business-like, focused, and formal. When face-to-face, tutors did not need to facilitate social interactions, because social interactions tended to occur naturally. When social interactions did not occur online, students appreciated the tutors’ efforts in initiating social interactions. However, these efforts did not work well because online social interactions felt forced. Responses to online social interactions tended to be short, involving only two or three students because students were aware that the others were listening in or waiting for them. Nonetheless, both students and tutors still suggested that tutors should continue initiating social interactions during online tutorials in an attempt to create a sense of connection, especially when there would be many online tutorials scheduled.

Theme 3: Student well-being suffered when tutorials were 100% online during COVID-19.

During the COVID-19 lockdowns, students experienced worsened well-being, which was noticeable during the online tutorials, also by the tutors. Students appreciated questions from tutors concerning their well-being during these online sessions. However, their answers tended to be short and “socially desirable”, because it felt uncomfortable to elaborate on personal issues while online.

Whenever face-to-face tutorials were possible, there was a higher chance for students to build their social network and organize social activities. “*We had walks in between (class) to clear our minds,*” student-L explained. Carrying out social activities, which was more possible face-to-face, was suggested by students to contribute to better well-being. For example, when students were facing hardships, such as having low motivation or emotional problems, having friends helped them to cope during the pandemic.

Still, there were students and tutors who hypothesized that well-being can be improved when students have the freedom to attend online tutorials from remote locations, because this may allow them to be with family or save on commuting time. However, some students reported that the time saved from not commuting to campus was spent studying instead. When students had to attend face-to-face classes again after the lockdown, Student-O shared that: “(Face-to-face) *you get to see to know people and that expands your possibilities in terms of both having friends and academic possibilities. (With less studying time,) my grades have decreased, about*

5%, but who cares? I'm happier... I'm happier to go to university. I'm happier to be around people. I've traded that 5% more for a nicer time at university. And I think it's better. Because in the end, grades aren't everything. You also need to have a richer life".

3.3 Preference on scheduling face-to-face and online tutorials

In this section, we report on the final preferred schedules of students and tutors – schedules made for the sake of deep learning, social interactions, and the role of the tutor. The preferences are detailed in Table 5.

Overall, 15 out of 17 students and seven out of 13 tutors preferred a 100% face-to-face schedule. These numbers include two students and two tutors, who requested the option to go online only when necessary, retaining face-to-face as the preferred choice. Students and tutors emphasized that the option to go online should be strictly monitored, for example, only going online when there are emergencies such as a national strike of public transportation, natural disasters, and so on. Two students and five tutors preferred a mix of majority face-to-face schedule with some online tutorials. One tutor did not have a preference and chose a 50–50 mix of face-to-face and online tutorials. Reasons for having some online tutorials include:

- the possibility to train online skills (i.e., online collaboration among students and for tutors to better their online guidance),
- the possibility to promote inclusivity in discussions (through turn-taking),
- the use of online facilities, such as having logistically convenient subgroup discussions in break-out rooms, co-creation (including quick sharing of information, digital whiteboards, and mind mapping programs), digital quizzes, and chat functions, and
- for practical reasons (e.g., ability to have back-to-back online meetings and attend from remote locations).

Nonetheless, because social interactions were deemed to deteriorate online, students' and tutors' preferred limiting the number of online tutorials.

One pattern that stood out from the schedules suggested in Table 5 was that the first and final few tutorials were suggested to be face-to-face by all students and almost all tutors (except from Tutor-M). Considering the importance of building connections and trust, the vast majority of students and tutors preferred meeting face-to-face frequently, especially for the first and final few meetings of the course. Some students even suggested a non-academic session purely for team building at the start of the course. Students and tutors who preferred some online meetings requested interspersing the online meetings with face-to-face meetings.

Table 5 Suggestions for a mix of face-to-face and online tutorials during a 2-month course with 14 tutorial meetings

| Session | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|-----------|---|-----|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Tutor-A | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Tutor-B | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Tutor-C | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Tutor-D | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Tutor-E | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Tutor-F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Tutor-G | F | F | F | F | F | F | F | F | F/O | F/O | F/O | F/O | F/O | F/O |
| Tutor-H | F | F | F | O | F | F | F | O | F | F | F | O | F | F |
| Tutor-I | F | F | O | F | F | F | O | F | F | F | O | F | F | F |
| Tutor-J | F | F | F | O | F/O | O | F | F | F/O | O | F | F | F | F |
| Tutor-K | F | F | O | F | F | O | F | F | O | F | F | O | F | F |
| Tutor-L | F | F | F | O | F | O | F | O | F | O | F | O | F | F |
| Tutor-M | F | O | F | O | F | O | F | O | F | O | F | O | F | O |
| Student-A | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Student-B | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Student-C | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Student-D | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Student-E | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Student-F | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Student-G | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Student-H | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Student-I | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Student-J | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Student-K | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Student-L | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Student-M | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| Student-N | F | F/O | F | F/O | F | F/O | F | F/O | F | F/O | F | F/O | F | F |
| Student-O | F | F | F | F/O | F/O | F/O | F/O | F | F/O | F/O | F/O | F/O | F/O | F |
| Student-P | F | F | F | O | F | F | F | O | F | F | F | O | F | F |
| Student-Q | F | F | O | O | F | F | O | O | F | F | O | O | F | F |

F=face-to-face; O=online; F/O=option, with face-to-face as default

4 Discussion

In this study, face-to-face tutorial meetings were perceived to deepen content discussions and create a sense of connection through social interactions and non-verbal communication. A 100% face-to-face schedule was the most preferred schedule by both students and tutors for reasons of cognitive, social, and teaching presence, which were operationalized as deep learning, social

interactions, and the role of the tutor, respectively. Students and tutors emphasized the importance of social interactions to build connections and trust, and to stimulate discussions and stay motivated. Some students and tutors indicated that they would like to have the option to switch to online when necessary for practical reasons.

In terms of cognitive presence, there was a general degradation of content discussions in online tutorials, according to both students and tutors. With discussions that lacked depth, students were less able to learn from each other and to self-assess their understanding of the topic. We suggest that the online setting may present new challenges for students to be cognitively present. The limited processing capacity (also known as cognitive load (Paas & Van Merriënboer, 1994) that students have may be used differently in face-to-face and online meetings. In another qualitative study, when learning collaboratively via web conferencing (e.g., Zoom or Microsoft Teams), various elements of the online interface were perceived by students and interpreted by the researchers as extraneous cognitive load, such as irrelevant stimuli, different formats of information, discontinuous flow of social exchanges, and so on, which may not be experienced face-to-face (Çakiroğlu & Aksoy, 2017). In this study, several distractors were reported as well during online meetings, such as disturbing noises of the surroundings from different microphones and technical connectivity issues, which might cause extraneous cognitive load. Paas and Van Merriënboer (1994) proposed that the adverse consequences of high extraneous cognitive load misdirect the attention of students from relevant learning elements. When deciding on how to schedule face-to-face and online meetings, we need to keep in mind that the students should not be overwhelmed with any added extraneous load, whether face-to-face or online, so that their processing capacity is retained for collaborative learning.

In terms of social presence, the limited non-verbal communication and social interactions in online tutorials reportedly led students and tutors to feel disconnected from each other. Online tutorials tended to stay on-task (i.e., focused on the academic topic) – a phenomenon that was described in previous studies as well (Jonassen & Kwon, 2001; Lantz, 2001). When online, there were fewer social interactions with other members of the group, such as personal conversations, jokes, and others. This may contribute to the fact that online education tends to leave students feeling disinterested, isolated, and alienated (Rasheed et al., 2020). Previous studies have also reported that social presence was experienced less in online courses (Zhan & Mei, 2013). Situations in which students meet face-to-face or online may evoke a different sense of belonging. This may affect the students' ability to participate, interact, and even disagree with others, while maintaining a feeling of comfort and trust. Importantly, feeling a sense of connection to other students has a strong and positive correlation with (Kozan & Richardson, 2014), and even predicts (Gutiérrez-Santiuste et al., 2015) students' sense of cognitive presence. Feeling connected with others was also shown to positively correlate with course retention and final grades in online higher education (Liu et al., 2009). The underlying reason may be that group cohesion positively predicts student

motivation, which positively predicts group productivity (Dolmans et al., 1998). Others hypothesized that the social aspects of collaborative learning stimulate the cognitive aspects of collaborative learning (Beuchot & Bullen, 2005; Clouder et al., 2006). Thus, social connectedness seems to be beneficial for collaborative learning.

In online tutorials, there was an apparent need for tutors to provide more guidance, as the online tutorials often stagnated and lacked depth. The founders of the COI framework assert that “*cognitive and social presence, and ultimately, the establishment of a critical community of inquiry, is dependent upon the presence of a teacher*” (Garrison et al., 1999). While teaching presence appears to be important in an online environment, many face-to-face collaborative learning settings such as PBL require the tutor to be less present to facilitate discussions, which are student-led and student-centered, and only stimulating the discussions when necessary (Hmelo-Silver, 2004). In the current study, tutor-interventions were considered to be necessary when online, while the flow of discussions between students appeared to be more seamless face-to-face. Online tutorials challenged tutors to guide students in a different manner (e.g., needing to be more directive), while the online setting also posed contribution obstacles for tutors (e.g., having less non-verbal communication). This finding aligns with a previous qualitative study, which reported that tutors needed to be more authoritative, positive, and didactic; in other words, to have more presence (Donnelly, 2013).

Students and tutors in the current study appear to have experienced less cognitive and social presence during the emergency remote learning during COVID-19, with teaching presence becoming more necessary online. The experiences reported in the current study align with a recent systematic review on student engagement in online learning during the pandemic (Salas-Pilco et al., 2022), where students experienced technological issues, challenges to develop soft skills, less exposure to effective teaching, and difficulties with self-regulated learning (Biwer et al., 2021). Yet, with time, students can also adapt to the new modality of online learning, through the usage of online platforms to support learning and development of digital skills. Moving forward, online learning can be better delivered with better accessibility to quality technology (having stable and strong internet connection, having noise-cancelling microphones, etc.) and further training in digital skills for students and teachers. Should online learning become a necessity once more, higher education institutions should provide more support for social engagement and emotional well-being.

In the end, the majority of students and tutors preferred face-to-face tutorials, which were experienced with deeper academic and social exchanges. The preference for having sufficient cognitive, social, and teaching presence may be generalized to other education activities, as a recent meta-analysis of education across all age groups found that cognitive, social, and teaching presence had a significant positive effect on actual learning, perceived learning, and student satisfaction of learning outcomes (Martin et al., 2022).

The strengths of this study include sampling from students and tutors who had ample experience in both the face-to-face and online settings, enabling them to make comparisons of both settings. Students and tutors were also from the same faculty, thus having similarities in terms of their experiences and educational goals. A limitation of this study is that the experiences of online tutorials were from the COVID-19 pandemic. These

pandemic-experiences may be different from non-pandemic times. Students have reported feeling more worried about pandemic-related problems, rather than focusing on their education. Students and tutors also suffered from the lack of social activities during the lockdown periods, leading to poorer well-being and less social connections. Furthermore, the move to online education during the pandemic for social distancing reasons was seen as a temporary situation by many. Consequently, less effort was put into optimizing online tutorials. In addition, the move to online education also caused a higher teaching workload, which affected the performance of many tutors. Therefore, the students' and tutors' experiences and opinions were probably influenced by these suboptimal conditions. Nonetheless, this study provides an initial exploration into the themes that may influence the experience of and preference for a certain mix of face-to-face and online tutorials.

5 Conclusion

In the end, the vast majority of students and tutors preferred a schedule of 100%, or at least a majority of, face-to-face tutorial meetings as the default option. Face-to-face tutorial meetings are perceived to deepen content discussions and create a sense of connection through social interactions and non-verbal communication.

Appendix 1 – Visual aid

Visual aid depicting examples of scheduling face-to-face and online tutorial meetings. Students and tutors were given explanation for each row. The first row depicted equal number of face-to-face and online sessions; second row with one out of three sessions being online; third row with one out of four sessions being face-to-face; final row meeting face-to-face for special reasons (without further elaboration of the special reasons by the researcher).

Example: 50-50



Example: 1/3



Example: 1/4



Example: for special reasons (e.g., start, middle, end)



Appendix 2 – Vignettes used

(For students) Vignette 1: You experience **deep learning** when...

You learn from brainstorming and discussing findings with your classmates. You connect what you learnt from the past to what you are learning now.

You and your classmates ask and answer questions, build upon each other's arguments, and discuss disagreements.

In the end, you have a deep understanding of the problem that was being discussed.

(For students) Vignette 2: You have **social interactions** when...

You meet, connect, and interact comfortably with your classmates and tutor in such a way that you feel free to interact in a social manner. You feel recognized and a sense of belonging to the group.

You and your classmates acknowledge each other's points of view. Disagreements can be easily brought up while still maintaining a sense of trust. There is a sense of collaboration.

(For students) Vignette 3: **Role of the tutor**

The role of your tutor is to enable and stimulate deep learning and social interactions (Vignette 1 and 2).

(For tutors) Vignette 1: Your students experience **deep learning** when...

They learn from brainstorming and discussing findings with their classmates.

They ask and answer questions, build upon each other's arguments, and discuss disagreements.

In the end, they have a deep understanding of the problem that was being discussed.

(For tutors) Vignette 2: Your students have **social interactions** when...

They meet, connect, and interact comfortably with each other and with you in such a way that everyone feels free to interact in a social manner. Everyone feels recognized and a sense of belonging to the group.

They acknowledge each other's points of view. Disagreements can be easily brought up while still maintaining a sense of trust. There is a sense of collaboration.

(For tutors) Vignette 3: **Role of the tutor**

Your role as a tutor is to enable and stimulate deep learning and social interactions (Vignette 1 and 2).

Appendix 3 – Interview guide

| | |
|-----------------------|-----------------|
| Date / Time | |
| Duration | |
| Participant ID | |
| Student / Tutor Group | Student / Tutor |

Agenda (approximately 75 minutes)

1. Introduction to research project, questions, informed consent (10 min)
 - Introduce researcher
 - We have had a lot of changes to the way we conduct tutorial meetings since 2020, moving from face-to-face to online. Looking towards the future, we want to find out how to schedule face-to-face and online tutorial meetings. How often should we meet face-to-face and online? How far apart should face-to-face and online meetings be? Different schedules of face-to-face and online meeting may affect the way we learn, the way we connect with each other, and how visible the Tutor H3ay be to the students.
 - In this interview, I will present you with some pictures and some text to read. Then I will ask some questions.
 - At the end of the interview, I will also provide you with a short questionnaire to understand your background.
 - I will sum up the important points from the information sheet in front of you.
 - i. Audio-record
 - ii. Participation is voluntary, right to withdraw, no reason, no consequences
 - iii. Confidential
 - A few important things to be aware of
 - i. When we talk about scheduling, we are actually talking about 100% face-to-face and 100% online meetings. We can have different schedules, maybe the first meeting is face-to-face, the second meeting is online, and so forth.
 - ii. **We are not talking about hybrid meetings, where in the same meeting, some people attend online while others attend face-to-face. We are NOT talking about this.**
 - iii. **We are also NOT talking about scheduling lecture nor practicals. For this research study, we are solely focusing on scheduling the tutorial meetings. So assume that there are facilities to support the convenient attendance to the tutorial meetings.**
 - iv. We want to focus on how to schedule online and offline meetings.
 - Before we start, do you have any questions?
 - Do I have your final consent to participate in this study?
 - Show schedules.
2. Vignette 1 (15 minutes)
 - a. Present vignette
 - i. Present
 - ii. Provide time to read

- b. Questions: How was deep learning different in online and face-to-face tutorials?
 - i. How did online and face-to-face meetings facilitate or limit deep learning?
 - ii. Tell me more about your personal experience.
 - iii. Did you do anything differently to change this/make this happen?
- 3. Vignette 2 (10 minutes)
 - a. Present vignette
 - i. Present
 - ii. Provide time to read
 - b. Questions: How were social interactions different in online and face-to-face tutorials?
 - i. How did online and face-to-face meetings facilitate or limit social interactions?
 - ii. Tell me more about your personal experience.
 - iii. Did you do anything differently to change this/make this happen?
- 4. 2-minute break (2 min)
- 5. Vignette 3 (10 minutes)
 - a. Present vignette
 - i. Present
 - ii. Provide time to read
 - b. Questions: How was the tutor's role different in online and face-to-face tutorials?
 - i. How did online and face-to-face meetings facilitate or limit the tutor's role?
 - ii. Tell me more about your personal experience.
 - iii. Did you do anything differently to change this/make this happen?
- 6. Closing question (10 min)
 - a. Summarize: Let us recap our discussions today (followed by summary of interview on cognitive, social, and teaching presence).
 - b. Present fill-in-the-blanks schedule
 - c. Question: What is your final suggestion of how a 2-month course would look like? And why?
- 7. Answer questionnaire (5 min)
 - a. Demographics
- 8. Thank you and goodbye.

Appendix 4 – Fill-in-the-blanks schedule

Reflecting on the entire discussion on

- deep learning
- social interactions, and
- the role of the tutor

What is your suggestion of how a 2-month course should look like?

Tutorial meetings across 2 months

▼

| | | | | | | | | | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | |

Face-to-face: **F**

Online: **O**

Please share your reason why.

Acknowledgements The authors thank the students and tutors who took part in this study.

Author contributions Study design, data analysis, reporting and discussing of results: H.Q.C., D.H.J.M.D., M.G.A.O.E., and H.H.C.M.S; Data collection, data management, data analysis, and writing of the report, H.Q.C.; All authors have read and agreed to the published version of the manuscript.

Funding This work was supported by the Kootstra Talent Fellowship [grant number 21.1259], provided by the Board of Maastricht University Medical Center+.

Data availability Data generated from this study will be available on Dataverse.nl or on reasonable request via the corresponding author.

Declarations

Conflict of interest None.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

Beuchot, A., & Bullen, M. (2005). Interaction and interpersonality in online discussion forums. *Distance Education*, 26(1), 67–87. <https://doi.org/10.1080/01587910500081285>

- Biwer, F., Wiradhany, W., Oude Egbrink, M., Hospers, H., Wasenitz, S., Jansen, W., & De Bruin, A. (2021). Changes and adaptations: How university students self-regulate their online learning during the COVID-19 pandemic. *Frontiers in Psychology, 12*, 642593. <https://doi.org/10.3389/fpsyg.2021.642593>
- Çakıroğlu, Ü., & Aksoy, D. A. (2017). Exploring extraneous cognitive load in an instructional process via the web conferencing system. *36(7)*, 713–725. <https://doi.org/10.1080/0144929X.2016.1276964>
- Clouder, L., Dalley, J., Hargreaves, J., Parkes, S., Sellars, J., & Toms, J. (2006). Electronic [re]constitution of groups: Group dynamics from face-to-face to an online setting. *Computer-Supported Collaborative Learning, 1*, 467–480. <https://doi.org/10.1007/s11412-006-9002-0>
- Dillenbourg, P. (1999). What do you mean by “collaborative learning”? In P. Dillenbourg (Ed.), *Collaborative-learning: Cognitive and Computational Approaches* (pp. 1–19). Elsevier.
- Dolmans, D. H. J. M. (2019). How theory and design-based research can mature PBL practice and research. *Advances in Health Sciences Education, 24(5)*, 879–891. <https://doi.org/10.1007/s10459-019-09940-2>
- Dolmans, D. H. J. M., Wolfhagen, I. H. A. P., & Van der Vleuten, C. P. M. (1998). Thinking about student thinking: Motivational and cognitive processes influencing tutorial groups. *Academic Medicine, 73(10)*, S22–24.
- Donnelly, R. (2013). The role of the PBL tutor within blended academic development. *Innovations in Education and Teaching International, 50(2)*, 133–143. <https://doi.org/10.1080/14703297.2012.760866>
- Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education. *The Internet and Higher Education, 2(2–3)*, 87–105. [https://doi.org/10.1016/S1096-7516\(00\)00016-6](https://doi.org/10.1016/S1096-7516(00)00016-6)
- Gutiérrez-Santuste, E., Rodríguez-Sabiote, C., & Gallego-Arrufat, M. J. (2015). Cognitive presence through social and teaching presence in communities of inquiry: A correlational–predictive study. *Australasian Journal of Educational Technology, 31(3)*, 349–362. <https://doi.org/10.14742/AJET.1666>
- Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn? *Educational Psychology Review, 16(3)*, 235–266. <https://doi.org/10.1023/B:EDPR.0000034022.16470.F3>
- Hrastinski, S. (2019). What do we mean by blended learning? *TechTrends, 63(5)*, 564–569. <https://doi.org/10.1007/S11528-019-00375-5>
- Jonassen, D. H., & Kwon, H. (2001). Communication patterns in computer mediated versus face-to-face group problem solving. *Educational Technology Research and Development, 49(1)*, 35–51. <https://doi.org/10.1007/BF02504505>
- Kozan, K., & Richardson, J. C. (2014). Interrelationships between and among social, teaching, and cognitive presence. *The Internet and Higher Education, 21*, 68–73. <https://doi.org/10.1016/J.IHEDUC.2013.10.007>
- Lantz, A. (2001). Meetings in a distributed group of experts: Comparing face-to-face, chat and collaborative virtual environments. *Behaviour & Information Technology, 20(2)*, 111–117. <https://doi.org/10.1080/01449290010020693>
- Liu, S.Y., Gomez, J. & Yen, C.J. (2009). Community college online course retention and final grade: Predictability of social presence. *Journal of Interactive Online Learning, 8(2)*, 165–182. Retrieved November 29, 2023 from <https://www.learntechlib.org/p/109390/>.
- Martin, F., Wu, T., Wan, L., & Xie, K. (2022). A Meta-Analysis on the Community of Inquiry Presences and Learning Outcomes in Online and Blended Learning Environments. *Online Learning, 26(1)*, 325–359. <https://doi.org/10.24059/olj.v26i1.2604>
- Means, B., Murphy, R., & Baki, M. (2013). The effectiveness of online and blended learning: A meta-analysis of the empirical literature. *Teachers College Record, 115(030303)*, 1–47.
- Paas, F. G. W. C., & Van Merriënboer, J. J. G. (1994). Instructional Control of Cognitive Load in the Training of Complex Cognitive Tasks. *Educational Psychology Review, 6(4)*, 351–371.
- Rasheed, R. A., Kamsin, A., & Abdullah, N. A. (2020). Challenges in the online component of blended learning: A systematic review. *Computers and Education, 144*. <https://doi.org/10.1016/j.compedu.2019.103701>
- Salas-Pilco, S. Z., Yang, Y., & Zhang, Z. (2022). Student engagement in online learning in Latin American higher education during the COVID-19 pandemic: A systematic review. *British Journal of Educational Technology, 53(3)*, 593–619. <https://doi.org/10.1111/bjet.13190>
- Strijbos, J.-W. (2016). Assessment of collaborative learning. In G. T. L. Brown & L. R. Harris (Eds.), *Handbook of Human and Social Conditions in Assessment* (pp. 302–318). Routledge.
- Zhan, Z., & Mei, H. (2013). Academic self-concept and social presence in face-to-face and online learning: Perceptions and effects on students’ learning achievement and satisfaction across environments. *Computers & Education, 69*, 131–138. <https://doi.org/10.1016/J.COMPEDU.2013.07.002>

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Authors and Affiliations

H. Q. Chim¹  · Diana H. J. M. Dolmans² · Mirjam G. A. oude Egbrink³ · Hans H. C. M. Savelberg⁴

✉ Hans H. C. M. Savelberg
hans.savelberg@maastrichtuniversity.nl

H. Q. Chim
hq.chim@gmail.com

Diana H. J. M. Dolmans
d.dolmans@maastrichtuniversity.nl

Mirjam G. A. oude Egbrink
m.oudeegbrink@maastrichtuniversity.nl

¹ Department of Nutrition and Movement Sciences, School of Health Professions Education (SHE), Faculty of Health, Medicine and Life Sciences (FHML), EDLAB, Maastricht University, 6200 MD Maastricht, the Netherlands

² Department of Educational Development and Research, SHE, FHML, Maastricht University, 6200 MD Maastricht, the Netherlands

³ Department of Physiology, SHE, FHML, Maastricht University, 6200 MD Maastricht, the Netherlands

⁴ Department of Nutrition and Movement Sciences, SHE, FHML, Maastricht University, 6200 MD Maastricht, the Netherlands