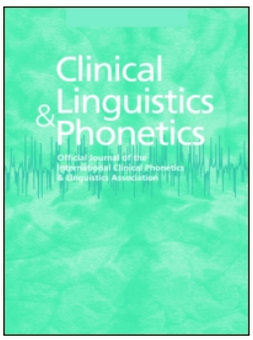
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An exploration of speech and language pathology student and facilitator perspectives on problem-based learning online

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ABSTRACT

This mixed-methods study explored the perspectives of second and third-year Speech Language Pathology (SLP) students and facilitators on Problem-Based Learning (PBL) online. As a result of the COVID-19 pandemic, PBL was delivered online for the academic year 2020–2021 via a virtual learning environment. Forty-seven students and five facilitators completed an online survey designed to evaluate the quality of individual and collaborative learning in the PBL online context. All participants had experience of pre-COVID-19 face-to-face PBL. Thematic analysis and descriptive statistics were used to analyse qualitative and quantitative data, respectively. Demonstrated a preference from both students and facilitators to maintain PBL in a face-to-face format. Aspects of functionality offered by the virtual platform assisted in the PBL process, however technical and environmental barriers impeded virtual delivery. Responses suggest that the development of rapport and interactivity levels online are not equivalent to face-to-face PBL, and these factors were perceived by participants to negatively influence the learning process. Perspectives on the role of the facilitator online convey divergent views between second and third years which reflected a change in facilitator style to support more independent learning in line with students' progression through the course. Our findings demonstrate that students and facilitators are open to future implementation of a blended model of PBL. Participants reported benefits such as reduction in indirect education costs and acquisition of a digital skillset. However, our study indicates a preference for enhanced social presence afforded by face-to-face PBL.

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Introduction

The PBL model

Problem-Based Learning (PBL) describes a constructivist pedagogical approach in which the focus is on deep student-centred learning (Moallem, Hung & Dabbagh, 2019). PBL was developed in 1969 at McMaster University, Canada, in response to medical students' poor application of knowledge and disengagement with traditional methods of learning (Barrows, 1996; Servant- Miklos, 2019a). It is an innovative pedagogy that has proliferated widely, particularly in the fields of education and health sciences (Hung et al., 2019). PBL follows a set of core principles as described by Barrows (1996) based on structuring learning

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around the cues presented through scenarios. The application of the pedagogy is guided by a sequential process ranging from five to eleven steps contingent on the curriculum design. The PBL approach involves small groups of students working collaboratively to set learning goals and undertake self-directed learning to solve a contextually based problem (Dolmans et al., 2016). PBL uses a facilitator to guide the learning process whose role is to question, support and encourage students in their acquisition of course content (Moust, 2010). In contrast to traditional methods of teaching in which students listen and take notes during lectures, PBL encourages active learning and student engagement with the process of learning (Moallem et al., 2019).

While PBL was developed for and traditionally used in face-to-face settings, the current COVID-19 pandemic has necessitated a move to delivery of online learning worldwide (Dost et al., 2020).

PBL in our programme

PBL has formed an integral part of the Bachelor of Science degree (BSc) in Speech and Hearing Sciences at University College Cork (UCC), Ireland since the programme began in 2003. Registration as a Speech and Language Therapist (SLP) in Republic of Ireland requires completion of a four-year undergraduate clinical degree or a two-year Masters degree and mandatory registration with CORU – Ireland's multi-profession health regulator.

Bi-weekly three-hour PBL tutorials are combined with aligned lectures and skills workshops to support learning objectives over six teaching semesters for a period of 3 years. In the Speech and Hearing Sciences degree at UCC an 11-step process is used adapted from a previously developed curriculum at the University of Hong Kong (Fourie, 2008). See Table 1 supplementary material. One example of a problem scenario in year three describes a patient in an acute hospital setting following a second stroke. Students are provided with sample case notes outlining medical information and family context and are required to determine appropriate initial assessment and intervention options for the patient.

The core communication disorder modules for years one to three, are taught using PBL and comprise 33% of Year one credits and 50% of Year two and Year three credits. The remaining modules are taught through lectures and workshops and cover topics in anatomy and physiology, language, speech, hearing and swallowing, clinical practice education and research. This integrated (or hybrid) approach assists students to synthesise and assimilate information effectively (O'Toole, 2012). Students are assigned to PBL tutorial groups of between 7 and 10 students. As students' progress through the programme, direct contact between the facilitator and student groups is progressively phased out to encourage students to become independent learners (Hmelo-Silver et al., 2019). The facilitators in our programme are experienced academic tutors usually comprising of SLPs who undertake facilitator training. Each first- and second-year group has a facilitator, whereas in third year a facilitator works with two groups and is present in tutorials approximately half of the time. The rationale for the use of PBL in our degree programme is to model and acquire the collaborative and teamwork skills required in current health care practice. Students set their own learning goals by collaborating with each other in order to solve a problem (or trigger) that is presented to them by their facilitator – thus learning is through real-life contexts in which there is social interaction.

In this manner, PBL encourages problem solving, critical thinking, creativity, and flexibility which are foundational skills for evidence-based practice (Burda & Hageman, 2015; Ho et al., 2014). These skills in turn are dependent on effective interpersonal communication, which requires sophisticated receptive and expressive capacity in both verbal and non-verbal domains. These skills are particularly important in the management and treatment of speech and communication difficulties that SLPs are responsible for. In other words, PBL in our programme is used for its communication training capacity as much as its pedagogical advantages (Fourie, 2008).

PBL in SLP

Fletcher et al. (2014) note that PBL is a relatively recent application to the education of SLPs used in a number of different countries, including Australia, Hong Kong, Sweden, and Ireland (Burda & Hageman, 2015). To put PBL online into context, it is necessary to first consider the literature on face-to-face PBL in speech pathology training programmes. Research suggests that SLP students view PBL as a productive way to develop critical thinking, self-directed learning, teamwork, and communication skills (Erickson & Serry, 2016; Fourie & Fletcher, 2006; Murphy, 2004; Pak-Hin Kong, 2014).

However, students also point out perceived deficits of the PBL process including insufficient preparation for clinical placement (Leahy et al., 2006) and inconsistent quality of peer contributions, which have been reported to be uneven and lacking in depth and breadth (Fourie & Fletcher, 2006; Pak-Hin Kong, 2014).

The role of the facilitator is also an important theme and research from Linkoping University, Sweden and La Trobe University, Australia highlights the difficulty in balancing the correct amount of input from the facilitator, while at the same time motivating students to assume responsibility for their own learning (Erickson & Serry, 2016; McAllister et al., 2014). Furthermore, students at La Trobe university have been critical of variations in facilitator style (Erickson & Serry, 2016).

Research undertaken by Slattery and Douglas (2014) on facilitator perspectives of PBL report that challenges of facilitating PBL include handling group dynamics, ensuring students contribute equitably and managing role conflict. McAllister et al., (2014) contend that facilitators view their role as changing with the student progression through their course.

Transition to PBL online

The rapid transition of PBL to digital spaces invariably adds additional complexity for collaboration and learning in an online learning environment. In the context of demanding academic and clinical placement schedules, previous PBL online research (before the COVID-19 pandemic) explored the feasibility of moving the curriculum online (Erickson, Neilson, O' Halloran, Bruce & McLaughlin, 2020). In contrast our study examines online delivery in response to COVID-19 restrictions. The literature is mixed with respect to student perceptions of online PBL. Research conducted in Australia suggests that the virtual medium compromises the PBL process (Erickson et al., 2020). Following completion of a single problem together via *Blackboard Collaborate*®, final year undergraduate SLP (n = 5) and Occupational Therapy (n = 3),

students were interviewed. Participating students perceived online communication to be challenging and adversely impacted the development of rapport. Students also reported problems with internet connectivity that compromised depth of discussion and formation of group bonds.

Contrastingly, research undertaken with students at the University of Hong Kong indicated a unanimous preference for PBL online (Ng et al., 2014). Researchers randomly chose eight third-year SLP students with previous face-to-face experience to complete 4 weeks of PBL online via *Adobe Connect®*.

Survey results demonstrated that participants perceived this medium of delivery to be a better use of available time and believed they had increased interest in PBL tutorials and enhanced acquisition of knowledge. Students in this study were at the advanced stages of the curriculum and therefore had optimum familiarity with their peers and the PBL process. The results of the two studies (Erickson et al., 2020; Ng et al., 2014) are not comparable in terms of PBL online exposure. Erickson et al. (2020) refers to a single instance of PBL online so it cannot be considered representative of the experience. It can be hypothesised that familiarity with the process in Ng et al. (2014) may elicit more positive responses to online delivery. Furthermore, neither study specified the percentages of students in the programme who participated in the research.

With respect to facilitator perspectives there is consensus in the limited literature that online PBL facilitators have to meet the same requirements as face-to-face facilitators (De Jong et al., 2018; Erickson et al., 2020 & Ng et al., 2014). Although facilitators in these studies acknowledged inherent limitations of the online platform, such as diminished non-verbal communication, they did not perceive an adverse impact on group collaboration. According to the facilitator surveyed in De Jong et al. (2018), the chat function and technical support tasks can be seen as an additional role which was perceived to add value to group interaction/learning.

However, given these studies elicited the perspective of just one facilitator, results should be interpreted with caution (De Jong et al., 2018; Erickson et al., 2020 & Ng et al., 2014).

We cannot assume that online PBL will foster the same learning experience and goals of traditional face-to-face sessions (Savin-Baden, 2009). We could hypothesise that the online format would exacerbate issues raised as problematic during face-to-face tutorials, or indeed present new challenges. In contrast, online learning may offer potential opportunities for student engagement in ways that are different from face-to-face interaction. This is in keeping with Dost et al. (2020), who evaluated perspectives of online learning during COVID-19 of medical students across the UK, pinpointing PBL as a potential solution to engagement difficulties experienced in traditional online education.

The current study

The available research conducted on SLP PBL online is limited to pilot and exploratory studies with small sample sizes. Previous findings show contrasting results regarding key tenets of the pedagogy of inquiry, such as group collaboration, depth of discussion and the role of the facilitator. Furthermore, a gap in the literature exists regarding student perspectives of the facilitator's role online. In the context of limited research, the current study explores SLP student and facilitator views of PBL online on a larger scale and over a more extended time period than previously reported.

SLP student and facilitator views of PBL online are explored in the context of a rapid transition to online learning, during the COVID-19 pandemic.

Therefore, the current study aims to address the following research questions:

(1) What are student and facilitator views on the accessibility and suitability of the online platform for curriculum delivery?
(2) What are student and facilitator perspectives on collaborative learning online compared to face-to-face PBL?
(3) What are student and facilitator perspectives on quality of individual learning online compared to face-to-face PBL?
(4) What are student and facilitator views on the role of facilitator during PBL online compared to face-to-face PBL?
(5) Are student and facilitators open to spending more time online beyond COVID-19?

Methodology

This study used surveys to primarily, collect quantitative data, with the addition of a number of open-ended questions which were analysed thematically. We have used the Consolidated Criteria for Reporting Qualitative studies (COREQ): 32-item checklist as a reporting guide (Tong et al., 2007). See Table 2 in supplemental materials. Ethical approval was obtained from the Clinical Therapies Social Research Ethics Committee.

Participants

Forty-seven students (second year n = 21, third year n = 26) and five facilitators (second year n = 3, third year n = 2) from the university formed the participant group. There were 7 to 8 students in each of the tutorial groups in each participating year. The facilitators were experienced academic tutors comprising of one senior academic, two senior SLPs, one staff grade SLP and one postgraduate SLP undertaking a Masters degree. Students completed at least 8 PBL problems in each semester. Students and facilitators were invited to participate in separate online surveys disseminated via email by the departmental administrator who has no role in the academic programme and acted as an independent third party. Criteria for inclusion in the study required participants to be second- or third-year students or facilitators.

First-year students did not meet inclusionary criteria as they did not have any experience of face-to-face PBL. Fourth year (final year) students had completed the PBL curriculum and did not experience PBL online.

Data collection

Data was gathered through an eight section online survey which was framed around the 11-stage PBL process (see Table 3 and 4 in supplemental materials). The 38-item student survey and 40-item facilitator survey were identical except for inclusion of two closed-ended questions for facilitators, which explored their perception of workload and preparation for PBL online. An initial qualifying question ascertained year group status to account for variance in year groups.

Quantitative questions included closed-ended yes/no questions, list questions and five-point Likert Scales. Open-ended questions recorded qualitative responses for sections three to eight. A qualitative question also addressed the influence of COVID-19 on delivery of PBL at UCC. The survey was piloted on eight final-year students and one facilitator. In line with survey feedback, adjustments were made to the order of questions to ensure a more logical sequence. In addition, as some Likert scale questions in the pilot survey elicited a neutral response (e.g. "I enjoy PBL online"), an additional qualitative question was added to provide justification for this response.

Procedure

The survey was distributed using *'Google Forms'*® and took approximately 15 minutes to complete. An information sheet was provided, and participants were required to tick a box in the embedded consent form before proceeding to the survey. The survey was open for completion for 3 months between December 2020 and February 2021. During semester one, both PBL online (2 weeks) and web enabled-PBL was implemented. During web-enabled PBL, the main tutorial group met face-to-face, but any student that was required to isolate under COVID-19 protocols could attend remotely. In this respect, some students attended remote and face-to-face PBL synchronously in a single tutorial. PBL was delivered online exclusively during semester two. The results of this study are specific to the collaboration platform used during the period of study (*Microsoft Teams.*®) in conjunction with the Canvas virtual learning environment. Canvas provides access to programme materials such as readings used in PBL sessions, use of discussion boards and facility to upload prepared work which are screenshared during tutorials.

Data analysis

The quantitative data was coded and input into SPSS Version 27 and descriptive statistics generated. See Table 5 supplementary material for the report of descriptive statistics.

According to the six-phase process outlined by Braun and Clarke (2006, 2020), a thematic analysis of qualitative responses was conducted. The first two authors familiarised themselves with the survey responses independently before systemically coding the data. The descriptive codes were then subsequently compared and agreed-upon to collaboratively develop subthemes and then main themes. Finally, they presented the preliminary subthemes and themes to the other authors for further refinement.

Rigour

Our study used a number of strategies to enhance rigour. Confirmability was demonstrated by obtaining data from more than 1 year and facilitator group. Transferability of the findings was considered by providing a comprehensive description of the context and participants. Credibility of the findings was enhanced by purposefully selecting students and facilitators with previous face-to-face PBL experience and providing detailed quotes to illustrate findings from the thematic analysis.

Dependability of the findings was sought through independent and joint coding of the data. In addition, a reflective journal was used to facilitate critical reflection into how our subconscious biases may influence interpretation of the codes (Finlay & Gough, 2003).

Results

Total response rate was 87% for Year 2 and Year 3 students combined (n = 47) and 100% for facilitators (n = 5). Ten students and all second-year facilitators completed the survey in semester one (December 2020). The remaining students (n = 37) and third-year facilitators (n = 2) completed the survey in semester 2 (January and February 2021). Student quotations were coded as S1, S2 etc., while facilitator quotes were coded as F1, F2 etc.

Qualitative results

Five themes and 12 sub-themes were generated from the data. (See Figure 1).

[Figure 1 here – visual representation of themes and sub-themes].

Moving learning online

The first theme addressed the change in delivery of PBL to the online medium and within this there were three sub-themes. Here, participants commented on the ability of the online platform support PBL online. Participants also discussed the practicalities of learning online.

Suitability of platform. The first subtheme addressed the suitability of virtual online platforms to deliver PBL. S8 outlined that *'It's layout in terms of being in a team is helpful for PBL as no new link has to be sent out. The same place, same time effect is good for the process'*[sic]. This suggests that this virtual platform can replicate the effect of having a designated time and place for tutorials, albeit in an online format. Facilitators were also supportive of the virtual platform it as *'very accessible and user-friendly' (F1)* and *'an appropriate platform for delivering PBL online' (F2).*

In addition, platform features including the chat function, screensharing for presentations and to a lesser extent the hands up function were identified as supporting participation. S31 stated the chat function '*allows the tutor to make comments without interrupting discussion'*.

A facilitator also described how messaging was *'[. . .] very useful when students experienced a delayed internet connection'(F2)*. In this context, the chat function was beneficial for balancing contributions and disseminating feedback.

Internet connectivity and technology issues. Internet connectivity was identified as the most challenging aspects of PBL online with nearly 100% of both student and facilitator participants identifying it as a barrier to PBL online.

Both students and facilitators noted that poor quality Wi-Fi caused lagging and communication breakdowns leading to a disjointed flow in conversation. Students raised concerns about the impact of poor Wi-Fi on missing content, the learning process, and their ability to contribute.

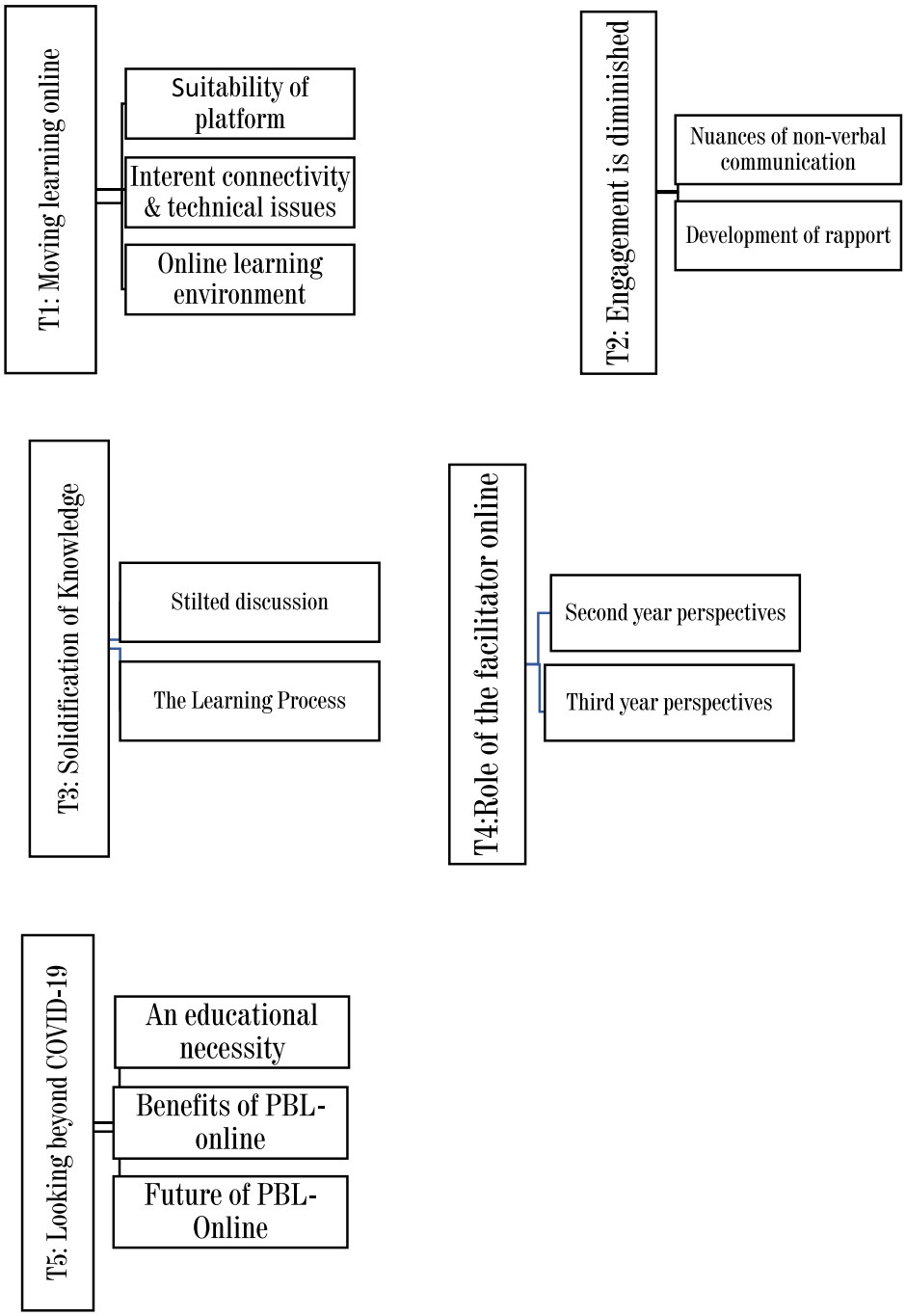


Figure 1. Visual representation of themes and sub-themes.

A facilitator stated that internet connection '*variability was a barrier in supporting group collaboration during online PBL' (F2)*. Some students described other technological limitations such as lack of experience with the platform and device incompatibility.

Online learning environment. Many participants identified problems with off-campus learning including issues with distractibility, concentration, and motivation. Some described the negative impact of being alone in an unstimulating environment for a prolonged period of time. S11 expressed '*it's easy to be distracted when you're not in that educational environment*'.

In other instances, students were distracted by '*background noise from housemates' (S5)* and *'family members coming into rooms' (S39)*. Excess screen time was noted to negatively affect concentration levels identified by 70% of students and 60% of facilitator participants. S40 noted *'Sitting down to learn from a screen all day is exhausting'*. This suggests that students experienced a lack of concentration and fatigue precipitated by prolonged screen time.

The impact of diminished engagement

Theme two relates to group interactivity online.

The nuances of non-verbal communication

Communication is a complex, socially situated process. Our results suggest that lack of access to the full range of non-verbal communication can lead to communicative breakdown in the online environment. Eighty-seven percent of student respondents found it was more difficult to interpret non-verbal communication and experienced difficultly establishing group dynamics in PBL online compared to face-to-face PBL. One participant said *'PBL online doesn't allow for nuances to be registered regarding non-verbal communication and things such as turn taking' (S45)*. Limited non-verbal communication contributed to difficulty anticipating the appropriate point at which to interject in a given conversation and repairing any mis-timings.

Students described a sense of hesitancy before contributing due to *'fear that you are speaking over someone else' (S22)*. Responses indicated that awkward or unsuccessful experiences, in particular speaking over others, were a barrier to communication in itself. A facilitator also commented on this experience stating, *'whereas when this occurs during face-to-face, it can be alleviated by a smile/ body language' (F2)*. This meant that *'[. . .] long, awkward, silences' (S20)* may be more common during PBL online interaction.

This occurrence presents a major challenge to flow of conversations and therefore the quality of discussions.

Development of rapport

Results suggest that the online medium presented challenges to building rapport, which subsequently impacted the nature of the social interaction which supports PBL.

S26 contends that the online format leads to '*lack of ability to develop relationships with those around you*'. Student-facilitator relations were impacted as illustrated by F3 who said, *'I feel like getting to know the students and build relationships requires face-to-face contact'*. Furthermore, students reported they are less likely to share personal experiences and prior knowledge related to the PBL case study. S24 states there is a *'lack of additional anecdotes and experiences that people in the group seem to add to the conversations more*

freely when PBL is done in-person'. This changed social dynamic implies a shift in the nature of collaboration in which conversations are less fluid and spontaneous than face-to -face PBL.

Solidification of knowledge

Solidification of knowledge refers to student and facilitators perceptions of quality of learning during online PBL.

Stilted discussion

Students and facilitators reflected how in-depth discussions can be restricted online as characterised by lack of topic expansion, less sharing of ideas and fewer questions. For example, 62% of student respondents and 80% of facilitator respondents disagreed with the statement 'I believe the depth of discussion online is as effective as face-to-face PBL'. A facilitator expressed there was *'[. . .] less expansion on topics. Often a student would present a point and it would not be followed up by other group members' (F3).*

Participants commented that spontaneous contributions were less likely to take place in the online format with one student stating, *'Spontaneous discussion occurs less online' (S36)*. In contrast, the virtual context of PBL online appears to elicit more rigid turn-taking and presentation of information, as opposed to open interactive discussion.

S22 noted it '*seems more natural to present findings and points of information online rather than in a discussion-based format when face-to-face'*. Some participants reported that overreliance on certain students to guide group processes was exacerbated online.

A facilitator commented that the online format can lead to reduction in participation *'I noticed that for the students who needed extra time to establish a rapport, they tended to gradually increase their participation* [during face-to-face PBL], *then became very limited again online'(F3)*. The facilitator contended this effect was most pronounced for students who were perceived to be introverted.

The learning process

Most participants felt the quality of learning was compromised. Overall, 45% of student respondents and 60% of facilitator respondents disagreed that the quality of learning outcomes during PBL online is equal to face-to-face PBL outcomes. S8 contended that online discussion compromised *'solidification of knowledge'* and they felt '*less confident'* on topics studied during PBL online. One facilitator commented that '*ease of interaction is stilted and more difficult online, and that will affect participation and quality (range and depth) of discussion, which can diminish the outcome' (F4)*. This comment indicates that while learning outcomes may be met, online interactions impact learning quality. In contrast, a minority of students did not perceive a change in the quality of the learning online, pointing out the same process is being followed. As S46 states *'I think that the way we learn has changed but I don't feel that the quality has differed'*.

S45 further points out, *'PBL is my favourite module as I learn through discussion, online or in-person, I feel I'm still learning a great deal'*. Some facilitators did not perceive student quality of learning to be adversely impacted online but instead pointed out interactional

deficits such as *'[. . .] building on each other's contributions, asking for clarification'* and *'challenging/ negotiating' (F3)* which invariably limits student opportunities to develop core PBL skills during PBL online.

Role of the facilitator during PBL online

The survey aimed to ascertain whether participants perceived a change in the role of facilitator online, from the position of students and facilitators, respectively. It is important to acknowledge that the facilitator becomes less directive as students' progress through the curriculum. While the facilitator is present at all times in second-year tutorials, facilitators are present about 50% of the time during third-year tutorials.

Second-year perspectives of the role of the facilitator online

Second-year students and facilitators generally shared the viewpoint that facilitators have more input during PBL online. Therefore, the online context necessitated a change in facilitation approach. There was a consensus among participants that facilitators are required to intervene more in terms of manging group dynamics and taking on more responsibilities typically associated with the student chairperson during face-to-face PBL.

S24 noted *'the tutor took on extra responsibility of carrying the conversation and guiding towards key learning issues in comparison to PBL in in-person'*. This view was echoed by a facilitator who stated students *'[. . .] require much more guidance when online'(F1).*

Third-year perspectives of the role of facilitator online

Students shared mixed perspectives about whether the role of facilitator had changed during PBL online. Some participants did not perceive a difference from face-to-face PBL.

On the other hand, other participants noted that facilitators were *'less likely to interject during sessions' (S22)* and have *'less of a role in managing group dynamics' (S35).*

In contrast, the facilitator responses suggest that the aforementioned points are not within the scope of the role stating the *'facilitator is not a member of the group, our work is behind the scenes, and designed to respect/support group autonomy' (F4)*. Instead, facilitators contend that technological support was their main extra undertaking during PBL online. Facilitators also reported having to increasingly encourage some students to turn on their cameras stating, *'It's very easy to disengage when online' (F4)*. Turning cameras off was noted to adversely impact flow of discussion.

Looking beyond COVID- 19

The fifth theme discusses facilitator and student perceptions of PBL online in the context of COVID-19 and beyond. The survey sought to establish whether participants are open to provision of PBL online post the COVID-19 pandemic.

An educational necessity

The move to PBL online was deemed a necessary reaction in response to the COVID-19 pandemic. However, we found overarching preference for a return to face-to-face PBL, with 60% of student participants and 100% of facilitator participants preferring face-to-face PBL. As S12 stated '*I think Covid has definitely put a strain on all sorts of tutorials and social gathering everywhere and everyone has had to sacrifice things in their life and unfortunately face-to-face PBL was one of those things we had to sacrifice as student SLTs'*.

Facilitators shared this viewpoint *'I don't feel as though the experience is as enjoyable as a face-to-face experience' (F3)*. It is clear that PBL online during the pandemic resulted in the process being described as *'more lonely' (S4)*. This is corroborated by 72% of students and 80% of facilitators identifying social isolation as a barrier to online learning. Facilitators contended that this phenomenon inevitably undermines the pedagogical process.

Furthermore, participants stated that 'web-enabled' PBL should not be a continued practice, as F3 states *'Have either all students online or none, it can be very difficult for the group to work effectively when split'*.

The benefits of PBL online

While results indicate a preference for face-to-face PBL, responses suggested benefits afforded by remote learning. This included *'not having to travel' (S29)* (95.7% of students), *'more time efficient' (S19*) (59.6% of students) and reduction in indirect education costs (70.2% of students).

Furthermore, some students commented that PBL online provided more study time '*to work on my assignments and to maintain a better college/work/ life balance' (S46)*. Some participants referred to the acquisition of new digital skills. *'It is great to get the experience of online interaction for teletherapy' (S1)*. Facilitators mentioned that an enjoyable aspect of facilitating PBL online *is 'preparing students for the clinical world, which is largely virtually based at present' (F5)*. These comments are relevant in an increasingly digitalised world.

Future of PBL online

Participants expressed the view that PBL online has the potential to be a feasible alternative to face-to-face learning but requires *'a lot more effort' (S32)* to compensate for the context of delivery. A facilitator supported this by saying *'All parties have to be onboard and work quite hard sometimes for online to succeed' (F4)*. Participants provided suggestions on how to enhance PBL online. It was clear that foundational preparation is needed with regard to setting clear expectations, technological familiarity and taking active steps to build rapport. These steps include organising a *'message group with group members to aid social interaction' (S16)* and *'inclusion of ice-breaker games to facilitate positive group dynamics' (F2)*. Two facilitators extended this advice by recommending the provision of social interaction outside the PBL to reduce isolation and promote social cohesion.

Quantitative results

The final research question addressed student and facilitator preferences for future implementation of PBL online. Overall facilitators unanimously preferred face-to-face PBL. Results from students are less definitive with 23% expressing a preference for PBL online. Furthermore, approximately two thirds (64%) of students are potentially open to future provision of PBL online in some capacity: 'no preference' (24%), 'more' (19%) and 'less' (21%) PBL online. Facilitators are also open to provision of PBL online with 80% expressing a preference for 'less' PBL online and 20% expressing a preference for 'none'.

Discussion

The primary aim of this study was to explore student and facilitator perspectives of PBL online in comparison to face-to-face PBL. Overall, the results of the study demonstrate a preference to maintain PBL in a face-to-face format. Responses suggest that interpersonal relationship development and interactivity levels online are not equivalent to face-to-face PBL. This implies the educational benefits of PBL may not be fully realised online given the pedagogy of inquiry is contingent on collaborative construction of knowledge (Donnelly, 2010). Nonetheless, this study provides evidence that participants are open to the future provision of PBL online in a blended capacity.

It was important to evaluate the effectiveness of the virtual platform used given that the success of any online course is to some extent contingent on the platform of delivery (El-Magboub et al., 2016). Our results indicate that the platforms used were functional and appropriate. Participants considered the platform easy to use, and found some functionality features (e.g. screenshare, chat function) instrumental to the learning process. The chat function was noted to be particularly useful in provision of evaluative feedback and to combat problems with internet connectivity. As expected, poor internet connectivity presents a major impediment in the delivery of PBL online. Delays and breakdowns lead to disjointed conversations, impingement of ability to contribute and fear of missing content.

These results replicate findings by Erickson et al. (2020) and Hashim et al. (2017) who identify internet connectivity as one of the chief limitations to collaborative learning during PBL online.

Student and facilitator perspectives of collaborative learning online in comparison to face-to-face PBL indicate that the challenging nature of online communication invariably leads to reduction in reciprocal and equitable exchanges, thus compromising the success of PBL online. Facilitators point out that poor non-verbal communication online can lead to diminished group-orientated interaction. These findings support De Jong et al. (2018) and Erickson et al. (2020) indicating a reduction of social presence (Cobb, 2009; Lowenthal & Dennen, 2017). The reported high levels of loneliness by both students and facilitators appear to be due to perceptions of feeling distant and detached from the rest of the group despite being, a finding also reported in Foo et al. (2021). Porges (2015) notes that the absence of cues associated with face-to-face interactions interferes with the communication of cues about personal and social safety. This is turn may result in students shifting into a bodily state that does not support effective social interaction.

This finding may also have implications as applied to reciprocal communication between clinicians and clients in teletherapy. Therefore, it is likely that lower levels of intimacy and immediacy in the online environment negatively impact formation of group bonds and subsequent development of rapport. The fact that some students are no longer comfortable sharing personal anecdotes may reflect a lack of trust and social cohesiveness within the group (Akcaoglu & Lee, 2016).

In contrast to our findings, facilitators in Erickson et al. (2020) and Ng et al. (2014) did not perceive an adverse impact on group dynamics nor the facilitator–student relationship. The small sample size of facilitators in both earlier studies (n = 1) may limit the generalisability of their results.

Most participants perceived the depth of discussion to be inferior to face-to-face PBL and linked diminished discussion with an inferior quality of learning. Given that social presence is positively linked with learning outcomes, it could be postulated that reported reduction in social presence has compromised the quality of learning online (Cobb, 2009; Short et al., 1976). As Savin-Baden and Bhakta (2019) remark, discussions in online environments are challenging. Furthermore, maintaining cognitive presence, where interactive communication needs to be sustained to construct meaning, was perceived to be demanding. Our findings support Erickson et al. (2020) who report this occurrence may compromise the pedagogy given cognitive presence is necessary to develop higher level skills engendered by PBL such as deep learning and critical thinking (Garrison et al., 2000). However, our results are not consistent with other research which has shown no impact on pedagogical quality (Lajoie et al., 2014; Ng et al., 2014). Finally, many students describe issues with distractibility and concentration which adversely impacts learning. Concentration difficulties were also reported by Dost et al. (2020) in their study which investigated student perceptions of learning online during COVID-19.

Our findings convey differences in views between year groups about the PBL online facilitator role and whether it is as effective as face-to-face facilitation. The divergence in views between students and facilitators may be driven by the difference in the facilitator role between years. Second-year students and facilitators were unanimous in their assertion that the online format necessitated increased facilitator intervention with regard to managing group dynamics and directing the PBL process. On the other hand, views from third-year students were less conclusive, as responses varied from the role remaining equivalent to face-to-face PBL to a perception of less facilitator input. Third-year facilitators contend the role is similar to face-to-face PBL, with the exception of the extra provision of technological support. Our second-year results stand in contrast to previous studies of facilitators' self-report of their role in which facilitators contend that their role during PBL online is comparable to face-to-face PBL (Erickson et al., 2020; De Jong et al., 2018; Ng et al., 2014). It is important to note prior studies are all pilot-based and it is possible that the facilitators (n = 1) may have had intrinsic motivation to derive successful outcomes, including willingness to adapt to the online environment and navigate technological breakdowns. Furthermore, to the best of our knowledge, this is the first study to explore student perspectives of facilitators during PBL online. It is noteworthy that third-year students in our study had no prior experience of face-to-face PBL without a full-time facilitator.

Previous studies of SLP student perceptions of face-to-face PBL suggests that students are not uniformly comfortable with less than full-time facilitator presence (Erickson & Serry, 2016).

Student and facilitator perspectives about the future of PBL online beyond the COVID-19 context indicate a preference for face-to-face PBL. While participants appreciated the necessity of PBL online during a global pandemic, many were looking forward to a return to face-to-face PBL. In fact, 80% of facilitators stated they wanted less PBL online. However, this does not necessarily mean they want no PBL online. In the context of COVID-19, when social interactions are minimal, it is not surprising that participants wanted less PBL online, particularly when other aspects of teaching are also online. It could be that in future a blend of PBL online and face-to-face would be beneficial to learning so that the strengths of each learning method could be realised. Our findings do not support Ng et al. (2014) where all students preferred online PBL to face-to-face PBL.

Many participants noted that PBL online has the potential to be as effective as face-to-face PBL but requires extra effort and advanced preparation to compensate for the change in context. These findings are corroborated by Savin-Baden and Bhakta (2019) who state that PBL tutorials in digital spaces, which have been successfully implemented and maintained over time, invariably have been those on which time and adequate resources have been spent equipping facilitators from the outset.

As in Erickson et al. (2020) and Ng et al. (2014), students reported benefits which included the convenience of no travel, time efficiency and reduction in indirect education costs. Interestingly, some students and one facilitator state that the experience of interacting online has enhanced digital fluency, which is beneficial for clinical practice with an online component (Irish Association of Speech and Language Therapists, 2020). Research suggests face-to-face PBL promotes critical thinking, deep learning, effective clinical reasoning, and strong interpersonal communication skills (Erickson et al., 2020; Erickson & Serry, 2016). However, our results suggest that the development of these pivotal skills, which are necessary for clinicians to develop therapeutic rapport and manage an evolving evidence base may be compromised in an online environment.

Participants described recommendations for future provision of PBL online including:

- Foundational training on video communication platform prior to engagement in PBL online as lack of familiarity with the software was a barrier to participation. Facilitators also emphasised the importance of external technical support, a finding also present in El-Magboub et al. (2016).
- More frequent tutorial breaks and the introduction of shorter and more frequent weekly tutorials to enhance concentration levels.
- Organisation of opportunities for social interaction outside the educational environment of PBL online to foster social cohesion.

Limitations

There are some limitations that should be taken into consideration when interpreting our findings. The study was conducted in the context of COVID-19 where all other teaching was delivered online and therefore limits the generalisation of our findings outside of this context. Although our survey instrument was designed to elicit views on

PBL only, we cannot guarantee that some participants did not consider hybrid learning in their response. Nonetheless, this survey did elicit rich insights into student and facilitator views of PBL online. Future studies could also focus on quantitative analysis of academic performance to investigate whether there are significant differences between online and face-to-face PBL.

The validity of the online PBL process could also be investigated using correlations with results from other assessments/learning activities. Most importantly, this research should be replicated and expanded to verify our findings and further our knowledge in determining effective models of PBL delivery.

Conclusion

The COVID-19 pandemic has changed the paradigm of learning and accelerated the influx of different learning technologies in higher education worldwide. This study addresses a key gap in the literature by offering a rich insight into SLP student and facilitator perceptions of PBL online. Given students and facilitators can be considered partners and co-consultants in the development and implementation of PBL curricula, the salience of these findings cannot be understated (O' Rourke et al., 2010).

Findings suggest that despite challenges of an online environment, both students and facilitators remain open to future implementation of a blended model of PBL that includes an online component.

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