



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



ELSEVIER



Research

Perceptions of radiography students toward problem-based learning almost two decades after its introduction at Makerere University, Uganda

Moses Mpalanyi, BSc^a, Irene Dorothy Nalweyiso, MPH^b and Aloysius Gonzaga Mubuuke, PhD^{a*}

^a Radiology Department, School of Medicine, Makerere University, Kampala, Uganda

^b Radiology Department, Mulago National Referral Hospital, Kampala, Uganda

ABSTRACT

Introduction: Problem-based learning (PBL) has been reported to be a valuable student-centred learning approach across the globe. In PBL students first encounter a problem, which triggers discussion, followed by student-centred inquiry. Makerere University College of Health Sciences has been using PBL for radiography students since 2002. Over the years, the learning landscape may have changed, including the significant disruption of learning by the coronavirus disease 2019 global pandemic. The study aimed at exploring the perceptions of undergraduate radiography students about the PBL curriculum at Makerere University almost two decades after its introduction.

Methods: This exploratory qualitative study involved 18 radiography students sampled purposively, from whom data were gathered using focus group discussions. Thematic analysis was subsequently used.

Results: Three key themes emerged from the data: (1) quality of teaching, (2) curriculum efficiency, and (3) curriculum expectations and rating. All students were generally positive about the curriculum. Most agreed that the curriculum was efficient to a greater extent and had met their expectations and desired objectives. Students, however, faced challenges; for example, with limited learning resources during the learning process.

Conclusion: This study highlights the significant role of PBL in enhancing student's problem-solving, critical thinking, literature search, and, most of all, their practical skills. Prioritization of teaching based on practical relevance and learning objectives is of great importance. The radiography students believed that their curriculum program was generally beneficial to them; however, it was affected by

limited resources and limited availability of teaching personnel, which needs to be addressed.

RÉSUMÉ

Introduction : Dans le monde entier, l'apprentissage basé sur les problèmes (ABP) est vu comme une approche d'apprentissage centré sur l'étudiant de grande valeur. En APB, les étudiants voient d'abord un problème suivi par une recherche centrée sur l'étudiant. Le Makerere University College of Health Sciences utilise l'ABP pour les étudiants en radiographie depuis 2002. Au fil des années, l'environnement d'apprentissage peut avoir évolué, incluant la perturbation importante de l'apprentissage résultant de la pandémie mondiale de COVID-19. L'étude visait à explorer les perceptions des étudiants de premier cycle en radiographie à propos du curriculum d'ABP de l'Université Makerere près de deux décennies après sa mise en place.

Méthodologie : Il s'agit d'une étude qualitative exploratoire. L'étude a porté sur 18 étudiants en radiographie sélectionnés par échantillonnage dirigé, qui ont fourni des données dans le cadre de groupes de discussion. Une analyse thématique a ensuite été effectuée.

Résultats : Trois thèmes clés ont émergé des données: (1) la qualité de l'enseignement; (2) l'efficacité du curriculum; et (3) les attentes face au curriculum et sa notation. La plupart des étudiants ont convenu que le curriculum était largement efficace et avant répondu à leurs attentes et à leurs objectifs souhaités. Les étudiants sont cependant confrontés à des défis, notamment en raison de ressources d'apprentissage limitées durant le processus d'apprentissage.

Conclusion : Cette étude a mis en lumière le rôle significatif joué par l'ABP pour améliorer les habiletés des étudiants en matière de

Authors' contributions: This piece of work is complete because of the efforts of all authors who contributed to the conception or design of the work, the acquisition, analysis, or interpretation of the data. All authors and references who were involved in drafting and commenting on the journal have approved the final version.

Conflicts of interest: The authors have had no financial relationships with any organizations that might have an interest in the submitted work in the previous years and no other relationships that could appear to have influence the submitted work.

* Corresponding author: Aloysius Gonzaga Mubuuke, College of Health Sciences, Makerere University, P.O. Box 7072, Kampala, Uganda.

E-mail address: gmbuuke@gmail.com (A.G. Mubuuke).

résolution de problème, de réflexion critique, de recherche documentaire et surtout leurs habiletés pratiques. L'établissement des priorités d'enseignement en fonction de la pertinence pour la pratique et les objectifs d'apprentissage est d'une grande importance. Les étudiants en

Keywords: Perceptions; radiography; problem-based learning; curriculum

Introduction

Makerere University College of Health Sciences (MaKCHS; formerly the Faculty of Medicine) is the oldest health professions training institution in East Africa, having been established in 1924 [1]. To date, MaKCHS runs a number of undergraduate programs, of which radiography is part. After a curriculum review in 2002, radiography, along with the then-existing undergraduate programs adopted problem-based learning (PBL), shifting away from the more traditional, teacher-centred learning approaches and adopting an integrated student-centred learning approach [1]. PBL has been adopted by many medical schools around the globe because of its superiority in imparting generic skills, such as problem-solving, teamwork, critical thinking, communication skills, and interpersonal skills [2].

PBL has been reported to be a valuable learning method in which students first encounter and discuss a problem, followed by a student-centred inquiry [1]. This arguably contributes to the development of interpersonal and communication skills; presentation skills; promotion of self-regulated, life-long learning and self-directed learning (SDL) skills, which enhance students' enthusiasm; and motivation to continue learning [3]. At Makerere University, the PBL instructional strategy was an early component of community-based training, where students would interact with the local population to address their priority health needs. This positioned PBL as an efficient strategy to promote work-integrated learning, as well as service learning, since students used real contextual incidents to solve problems and learn from them. It is believed that early and sustained exposure to community and primary health care problems is likely to promote student participation in community health work. Despite the reported advantages of PBL, it has been argued in some studies that PBL as an instructional method is time consuming, resource intensive, and does not impart deeper cognitive knowledge [4,5].

In a study on attitudes and perceptions of undergraduate medical students toward PBL conducted in Chitwan Medical College in Nepal, it was reported that 85.5% of the participants viewed PBL as an interesting method of learning. Although 78% of the participants preferred PBL to lectures, the majority (54.2%) pointed it out as a time-consuming approach. The participants also highly rated (80.5%) the tutor's role in enhancing the constructivist and active learning process during PBL sessions in addition to maintaining good intra- and inter-personal behaviors [6]. In yet another study on students' perceptions toward the PBL learning

radiographie croient que leur curriculum leur était généralement bénéfique, mais qu'il était affecté par le manque de ressources et la disponibilité limitée des enseignants, deux enjeux qui doivent être abordés.

approach in a system-based hybrid curriculum conducted at the College of Medicine, King Saud University, most of the students reported that PBL sessions were helpful in understanding basic science concepts ($P = .04$). In addition, most students reported that PBL sessions encouraged SDL, collaborative learning, and improved their decision-making skills. However, 54.5% of the students reported that the tutors seemed to lack proper training in facilitating PBL tutorial sessions, and only 25.1% of students agreed that the tutors were well prepared to facilitate the PBL sessions [7].

Another survey on attitudes and perceptions of pharmacy students toward PBL was conducted [8]. In this study, it was reported that the majority of the students rated PBL highly. The students also agreed that their critical thinking and self-regulated learning skills had improved after a series of PBL sessions. This study highlighted the significant role of PBL in enhancing student's problem-solving, critical thinking, literature search, and, most importantly, communication skills [8]. It has also been reported in other studies that PBL as a learning approach involves clear roles for each member of the group, known steps of discussion, and identification of learning objectives from the discussed problem [9–12] and that the tutor plays a crucial role in the success of the PBL tutorial discussions [13–18].

From the previously mentioned studies, it is evident that PBL has numerous advantages over teacher-centred learning approaches. However, there are still some drawbacks that need to be addressed, such as being resource-intensive. Before 1999, radiography training in Uganda was at diploma level. Radiography training in Uganda at degree level commenced in 1999 using the traditional teacher-centred approach of didactic lectures [19]. However, the curriculum was changed, and a PBL instructional strategy was adopted in 2002, including a component of community-based training where students would rotate in district hospitals for about 8 weeks in each academic year [1]. In 2010, a study on the attitudes and perceptions of radiography students and teachers toward PBL at Makerere University was conducted [19]. In this study, a cross-sectional descriptive approach was adopted in which self-administered questionnaires and focus group discussions (FGDs) were used to collect data from both students and faculty. The findings from the study reflected what is reported in the literature. For example, the study reported that all students and 80% of faculty rated PBL highly as an instructional method. Students and faculty reported that PBL was a gateway to the acquisition of key generic skills such as teamwork, problem-solving, and SDL. Inadequate

learning resources, poor facilitation of PBL tutorials, and student assessment in PBL were noted as the major challenges, as has been reported elsewhere [20–22]. Therefore, the challenges of PBL keep coming up across all contexts where it is implemented. It is not known if, almost two decades later, PBL in radiography training at Makerere University is still viewed as positively, as it was at its inception. The learning landscape may have changed, including disruptions caused by the COVID-19 global pandemic. The purpose of this study, therefore, was to explore perceptions of final-year undergraduate radiography students toward the PBL learning approach. Understanding student perceptions can further assist in informing future curriculum reviews and continuously improving this approach to learning.

Methods

Design

An exploratory qualitative study was conducted at MaKCHS using FGDs. Qualitative research focuses on exploring phenomena from the experiences of individuals [23]. In this study, a qualitative approach was the most suitable because the researchers were exploring perceptions of students regarding PBL who had experienced this approach to learning. Ethical approval to conduct this study was granted by the Mulago Hospital Research & Ethics Committee (Protocol No. MHREC 1552). All participants provided informed consent before taking part in this study. The participants were assured of the confidentiality of their responses. The participants were also informed of their right to withdraw from the study at any time without fear of negative repercussions.

Participants and Sampling

The study involved final-year undergraduate radiography students who were selected using purposive sampling. Purposive sampling is a type of sampling where participants are selected based on their experiences to provide information that can adequately address the study purpose [24]. In this study, final-year radiography students were selected purposively because they had been using PBL as a method of learning for a much longer time and thus had accumulated the experience needed to answer the study objective. The final year group had 19 students. Eighteen radiography students were included and one student was excluded because he was part of the research team.

Data Gathering

Data were gathered using FGDs. FGDs were used to collect data because they can elicit more ideas from participants about the subject under study, since ideas from different members can trigger more views from the rest of the members [25]. There were three focus groups, each focus group having six members. The questions in the FGDs were open-ended and explored aspects such as perceptions regarding quality

of teaching using PBL over the traditional teacher-centred lectures, access to learning materials, interaction with tutors, and feedback from tutors. The FGDs also explored the efficiency of the curriculum as far as attaining the learning goals was concerned, including various competencies. Finally, the FGDs explored student perceptions of what they liked and challenges with PBL as a learning method. The FGD questions were developed by the researchers informed by literature on PBL. These questions were first piloted with a few students before commencing the main study. One of the researchers conducted the FGDs asking the questions and guiding the discussion. The participant responses were audio-recorded verbatim and thereafter transcribed by one of the researchers who had experience in transcribing qualitative data. Some notes were also written by another member of the research team during the FGDs for reference.

Data Analysis

Thematic analysis was used. This involved open coding of the data manually by the researchers. The transcribed raw data were read several times to generate the initial codes through the process of open coding. The audio recordings were periodically referred to as well as the written notes for clarity. The generated codes were also related and compared with each other to generate categories. These categories were related to each other to form the final themes.

Findings

Of 18 participants, 83.3% ($n = 15$) were male, and 16.7% ($n = 3$) were female. In all, 88.9% ($n = 16$) of the students had joined the university directly from high school, whereas 11.1% ($n = 2$) of the students were upgrading from a diploma to a degree in radiography. In addition, 77.8% ($n = 14$) were from urban centres, whereas 22.2% ($n = 4$) lived in rural settings. All students reported using the traditional teacher-centred method of learning before joining the university. The analysis of data from the FGDs resulted in three major themes, namely, (1) quality of teaching, (2) curriculum efficiency, and (3) curriculum expectations and rating. These themes and their key-related codes are summarized in Table 1 and are thereafter described with key representative participant quotations.

Theme 1: Quality of Teaching

The teaching quality referred to the student's perceptions and understanding of what good teaching meant within the PBL realm. As far as the teaching was concerned, students preferred interactive teaching provided by PBL over traditional lectures that were majorly teacher-centred. However, the students wanted free and easy access to learning materials for their self-directed study. In addition, they valued teacher feedback concerning their practical skills as well.

I think good teaching involves lectures interacting with the students, their ability to give them the necessary skills and

Table 1
Themes and Related Key Codes

Theme	Key-Related Codes
Theme 1: Quality of teaching	<ul style="list-style-type: none"> • Lecturers interacting with students • Discussion by each • Sharing opinions in PBL • Quality understanding from tutors • More time to clinical practice is good • Enough time for practice
Theme 2: Curriculum efficiency	<ul style="list-style-type: none"> • Early exposure to clinical areas • Curriculum with real cases • Empowering students • Problem-solving skills • Opportunity to search information
Theme 3: Curriculum expectation and rating	<ul style="list-style-type: none"> • Practical expectations met • Good introduction to community • Learning objectives covered • Tutorials well attended • Limited learning resources • More guidance from tutors

information, so that they can use those skills and knowledge to actually do what is required of them.

I like the interaction PBL gives where we discuss and share opinions...this keeps my learning very active rather than a teacher talking alone in front of us the students.

The approach lecturers use in PBL to me is the best and it offers us quality understanding of concepts. This is because you discuss with the tutor guiding you and then you go and find out information from different sources.

The participants considered it only appropriate that more time directed to clinical practice would be perceived as part of good teaching.

In good teaching, we should get enough time for our practice.

Theme 2: Curriculum Efficiency

The curriculum efficiency was about students' perceptions on how efficient the curriculum had been in achieving the desired goals. Concerning the curriculum efficiency, the majority of the participants asserted that the curriculum was efficient, to a greater extent, and this was attributed to the students gaining an early exposure to clinical practice that facilitated their understanding of concepts better.

COBERS introduces us early to the clinical setting in the community, right from year 1, it helps us to really know what we are going to see.

It gives us a view of the places we are going to be working, like it introduces us to these places such that we know what we are going into.

The curriculum was also considered to be research oriented, which was achieved through the provision of

opportunity for students to engage in SDL. This gave students more time for their own independent reading.

I think PBL may be one of the reasons that we are a bit better than we could have been if we were on a lecture-based program. Empowering students to be able to work our problems on their own, sort of gives them the zeal to go on and look out more information and be able to move on even if the teachers (lectures) do not provide it all.

Theme 3: Curriculum Expectation and Rating

The curriculum expectations and ratings were related to student's perceptions toward the achievement of the expected learning objectives through PBL.

Overall, the curriculum using the PBL approach met students' expectations, and credit was given to the practical sessions and some theory sessions during tutorials that contextualized real practical situations.

For I have liked the curriculum implementation, especially the practical bit of it. So, I would give the PBL/ COBERS curriculum 80%. At least it met a number of my expectations. However, some aspects need to be fixed such as learning materials and tutors being present all the time to guide us.

A few participants were, however, not contented with the curriculum. According to these students, the limited availability of PBL tutors and the limited learning resources grossly affected the learning process, and therefore, their rating was negative.

I am giving it 40% because there is limited availability of the lecturers and the rest of the people supposed to guide us even in the clinical setting plus very few learning resources for research. I also expect tutors to ably guide us during PBL tutorials, but sometimes they do not.

The participants further suggested that the institution needs to increase learning resources in order for PBL to run efficiently.

So for me I think they should provide the resources as a university so that there is improved efficiency during student training especially in the library where we scramble for few books and few computers.

Discussion

The purpose of this study was to explore radiography students' perceptions toward the PBL approach to learning almost two decades after its introduction at Makerere University. The findings from the study generally revealed that students were positive about PBL because of its potential to provide opportunities for students to engage in self-directed and self-regulated learning when compared to the traditional teacher-centred learning approaches. The students seemed to agree that PBL provided them with an opportunity to acquire critical thinking, life-long learning, and problem-solving skills. These findings correlate with previous studies, which also reported that students rated PBL highly as a good

instructional method and a gateway to the acquisition of key generic skills [6,19]. The implication of this is that there is a need to continue promoting the PBL approach to learning, since it gives students opportunities to actively participate in knowledge acquisition when compared to the traditional teacher-centred approaches such as didactic lectures.

The advantages of PBL as a learning strategy have been extensively reported in the literature [17–22]. Most of what has been reported in these previous studies generally resonates with the findings from this study that PBL facilitates the acquisition of key outcomes such as active learning through self-directed and self-regulated learning, teamwork, communication skills, critical thinking, and problem-solving skills. These are aspects that are important to every health worker. Therefore, this study emphasizes the importance of using the PBL approach to learning. Although PBL has its own challenges such as the need for intense human resources and learning resources, there is a general agreement that it is an important approach to consolidate student-centred and life-long learning [13].

Despite the fact that PBL was generally perceived as a good approach when it came to enhancing student's problem-solving, critical thinking, information gathering, and most of all their practical skills, the students who participated in this study were at some point not satisfied with the implementation of PBL. For example, it was reported that PBL had limitations such as suboptimal tutor facilitation and limited learning resources for self-directed study. This finding is in agreement with previous studies, which also reported inadequate learning resources as well as student assessment as major challenges affecting PBL implementation [19]. In addition, other studies have also opined that PBL is resource intensive, and more needs to be invested for its successful implementation [12]. The challenges of PBL such as inadequate training of tutors and limited learning resources keep resonating through various studies from different contexts. This problem was highlighted in the previous study conducted at Makerere University almost two decades ago [19].

The fact that inadequate tutor training and limited learning resources are still major challenges needs urgent attention. There is a need for more faculty development to train tutors on how to facilitate PBL sessions. It is also important to avail students with optimum learning resources, such as reading rooms, library resources, and ultrasound machines (for practical sessions). The use of online tutorials, online reading resources accessible by students, could be another way of decongesting physical infrastructure such as tutorial rooms. In the wake of the COVID-19 global pandemic that has disrupted the learning landscape globally, the use of online platforms for PBL sessions such as Zoom and other Learning Management Systems (LMS) needs to be explored. Such platforms could also be beneficial in the wake of increasing student numbers.

The need to continue training tutors in PBL facilitation skills is paramount, as this is likely to equip them with more skills in facilitating learning within PBL tutorial

sessions. This study also provides a more focused perspective, which emphasizes the radiography students' perceptions on PBL as an approach to learning. Addressing the students' perceptions potentially creates a platform that allows students to freely elucidate their experiences, and this, in turn, enables better assessment of sections within the curriculum that need improvement. Literature reporting evaluation of PBL programs in radiography training especially from Africa is still scanty. This study, therefore, provides key insights on which future studies specifically on radiography training using PBL can build. It would be of great significance if more research is also conducted regarding the perceptions of faculty toward PBL in radiography training. In addition, exploring the beneficial effect of using online platforms to support PBL in terms of accessing resources and conducting PBL sessions needs to be explored in future studies. The fact that this study was conducted in a single radiography institution limits the generalizability of the findings as training contexts may differ significantly. However, the study still provides a foundation on which other studies from many other contexts can build.

Conclusion

This study has highlighted the significant role of PBL in enhancing student's problem-solving, critical thinking, and information gathering skills. Students who participated reported that the quality of learning during PBL was good, and this was gauged through the content taught, teacher characteristics, and, most importantly, achievement of learning outcomes. However, PBL still has challenges, such as inadequate learning resources and poor facilitation of PBL sessions. Continued faculty development related to facilitation of PBL tutorials and exploring the use of online platforms could be one way to manage PBL sessions especially in the wake of the COVID-19 global pandemic that has inevitably changed the learning landscape; not only for now, but also perhaps for the future.

Acknowledgment

The authors would like to thank the radiography students of Makerere College of Health Sciences for their invaluable comments during the data collection stage of the study.

Research reported in this publication was also partly supported by the Fogarty International Centre of the National Institutes of Health, United States, U.S. Department of State's Office of the U.S. Global AIDS Coordinator and Health Diplomacy (S/GAC), and President's Emergency Plan for AIDS Relief, United States under Award Number 1R25TW011213. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

References

- [1] Kiguli-Malwadde E, Kijjambu S, Kiguli S, et al. *Problem-based learning, curriculum development and change process at Faculty of Medicine*. Uganda: Makerere University; 2006.
- [2] Rehman R, Afzal K, Kamran A. Interactive lectures: a perspective of students and lecturers. *J Postgrad Med Inst*. 2013;27:152–156.
- [3] Chan EA. Reflecting on the essence of our problem-based learning discussions: the importance of faculty development and our continuous quest for applications of problem-based learning. *Kaohsiung J Med Sci*. 2009;25:276–281.
- [4] Hartling L, Spooner C, Tjosvold L, Oswald A. Problem-based learning in pre-clinical medical education: 22 years of outcome research. *Med Teach*. 2010;32:28–35.
- [5] Emerald NM, Aung PP, Han TZ, Yee KT, Myint MH, SoeT TI. Students' perception of problem-based learning conducted in phase1 medical program, UCSI University, Malaysia. *South East Asian J Med Edu*. 2013;7:45–48.
- [6] Yadav RL, Piryani RM, Gopendra PD, Kumar DS, laxmi KY, Nazrul I. Attitude and perception of undergraduate medical students toward the problem-based learning in Chitwan Medical College, Nepal. *Adv Med Educ Pract*. 2018;9:317–322.
- [7] Abdul-majeed AAD, Mahmoud SK, Mohammad I, Hamza M. A Students' perception towards the problem-based learning tutorial session in a system-based hybrid curriculum. *Saudi Med J*. 2015;36(3):341–348.
- [8] Sathvik BS, Smitha CF, Padma GMR, Nagavi BG. Attitudes and perceptions of pharmacy students of Ras Al Khaimah towards problem based learning. *J Adv Pharm Educ Res*. 2013;3:217–225.
- [9] AlHaqwi AI. Learning outcomes tutoring in problem based-learning: how do undergraduate medical students perceive them? *Int J Health Sci (Qassim)*. 2014;8:125–132.
- [10] Caswell CA. Recursive reflective reports: embedded assessment in pbl courses for second language teacher education. *Interdiscip J Problem Based Learn*. 2019;13(2).
- [11] Lee H, Blanchard MR. Why teach with PBL? Motivational factors underlying middle and high school teachers' use of problem-based learning. *Interdiscip J Problem Based Learn*. 2019;13(1).
- [12] Korpi H, Peltokallio L, Piirainen A. Problem-based learning in professional studies from the physiotherapy students' perspective. *Interdiscip J Problem Based Learn*. 2019;13(1). <https://doi.org/10.7771/1541-5015.1732>.
- [13] Husain A. Problem-based learning: a current model of education. *Oman Med J*. 2011;26:295.
- [14] Merritt J, Lee M, Rillero P, Kinach BM. Problem-based learning in K–8 mathematics and science education: a literature review. *Interdiscip J Problem Based Learn*. 2017;11(2). <https://doi.org/10.7771/1541-5015.1674>.
- [15] Yew EHJ, Chang E, Schmidt HG. Is learning in problem-based Learning cumulative? *Adv Health Sci Edu*. 2011;16(4):449–464.
- [16] Odell MR, Kennedy TJ, Stocks E. The Impact of PBL as a STEM School Reform Model. *Interdiscip J Problem Based Learn*. 2019;13(2). <https://doi.org/10.7771/1541-5015.1846>.
- [17] Kumar R, Refaei B. Problem-based learning pedagogy fosters students' critical thinking about writing. *Interdiscip J Problem Based Learn*. 2017;11(2). <https://doi.org/10.7771/1541-5015.1670>.
- [18] Hung W. All PBL starts here: the problem. *Interdiscip J Problem Based Learn*. 2016;10(2). <https://doi.org/10.7771/1541-5015.1604>.
- [19] Mubuuke AG, Kiguli ME, Francis B. Attitudes and perceptions of students and teachers about problem-based learning in the radiography curriculum at Makerere University, Uganda. *Eur J Radiograp*. 2010;10:1016.
- [20] Major T, Mulvihill TM Dr. Problem-based learning pedagogies in teacher education: the case of Botswana. *Interdiscip J Problem Based Learn*. 2018;12(1). <https://doi.org/10.7771/1541-5015.1543>.
- [21] Belland BR. Developing my perspectives on scaffolding and problem-based learning: a retrospective view. *Interdiscip J Problem Based Learn*. 2016;10(2). <https://doi.org/10.7771/1541-5015.1616>.
- [22] Svihla V, Reeve R. Facilitating problem framing in project-based learning. *Interdiscip J Problem Based Learn*. 2016;10(2). <https://doi.org/10.7771/1541-5015.1603>.
- [23] Morrison J, Clement T, Nestel D, Brown J. Under-discussed, under-used and under-reported: pilot work in team-based qualitative research. *Qual Res J*. 2016;16(4):314–330.
- [24] Valerio MA, Rodriguez N, Winkler P, et al. Comparing two sampling methods to engage hard-to-reach communities in research priority setting. *BMC Med Res Methodol*. 2016;16(1):146.
- [25] Morgan DL. Focus group interviewing. In: Gubrium JF, Holstein JA, eds. *Handbook of interviewing research: context & method*. Thousand Oaks, CA: Sage; 2002:141–159.