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Partnering in a Pandemic: a Case Study on Designing Teaching and Learning Tools by Undergraduate and Graduate Medical Students with Academic Support

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**Partnering in a pandemic:
A case study on designing teaching and learning tools by undergraduate
and graduate medical students with academic support**

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Abstract

This case study reflects on the concept of student’s-as-partners in a project that took place during the Summer 2020, during the COVID-19 pandemic, involving nine students from two medical schools in Ireland (University College Dublin (UCD) and the Royal College of Surgeons of Ireland (RCSI)) and makes a pedagogical case for partnership in learning and teaching in medical education. This virtual partnership project lasted three weeks under the supervision of practitioners from the National Maternity Hospital (NMH). The focus of this paper is on one output from the project: designing and developing a Multiple Choice Questions (MCQ) bank. This bank of MCQ questions were written by the students, based on national and international guidelines, then peer reviewed by the students before final review by academic staff and then integrated into the online teaching for the next iteration of the Obstetrics and Gynaecology module in September 2020. The reflections on this MCQ development work provides valuable insights on challenges and opportunities for medical students at both undergraduate and graduate level who are planning for collaborative partnerships as a component of their medical education, as well as academic-practitioners in medical education who are initiating student-staff partnerships.

Keywords: Co-design, Learning Technologies, Medical Education, Online Partnership, Students-as-partners.

Introduction

This case study is a reflection on the challenges of undertaking a students-as-partners project wholly during a global pandemic. It explores how undergraduate and graduate students came together online to plan and develop a medical education project fully online due to the COVID-19 pandemic in Ireland. In this reflective paper, written by the students and facilitated by academic staff, the students describe why they undertook this project, what exactly they did, and the impact their creation had on them, as well as the potential for positively impacting on their peers' learning in the future.

This project in Irish medical education utilised a student-staff partnership incorporating peer learning. The students and the academics who supported the learning process are viewed as being engaged in a co-operative enterprise focused on the production, dissemination and application of medical knowledge, and to support the development of the students who would be using the tools.

A group of nine undergraduate and graduate students who did not have the same baseline of disciplinary knowledge in Obstetrics and Gynaecology worked together for this project as an alternative to clinical electives they were scheduled to undertake in the summer of 2020. These students worked together for three weeks and had a direct choice of what each of the three education tools they would work on were and how they would be developed. The elective was hosted by the University College Dublin (UCD) academic unit within the National Maternity Hospital (NMH).

Context and Rationale

The key stakeholders in this cross-university students-as-partners project were undergraduate and graduate students and academic practitioners who were planning clinical electives within the hospital during the summer. Due to the challenges in integrating students back into clinical practice during the pandemic, an alternative three week elective was proposed that would potentially allow students to gain exposure to medical education practice. This pilot also aimed to explore whether the medical education practice could be successfully accomplished if it was completed online. The group of nine students was co-ordinated by one academic practitioner from UCD who acted as the point of contact

and source of additional teaching throughout the duration of the project, with the administrative support of the UCD module coordinator.

MCQ Assessment

When it came to the decisions of what projects to develop, the issue of Multiple Choice Questions (MCQs) had been reported as problematic by students for a number of years in both universities involved, as students did not have easy access to any examples or past papers. Multiple choice questions are a common method of knowledge verification, and there are many reasons for their frequent use in medical education (Przymuszała, Piotrowska, Lipski, Marciniak & Cerbin-Koczorowska, 2020). Students look for ways of consolidating their knowledge of the core medical curriculum and prioritise study materials and strategies that relate directly to their upcoming exams. Summative assessments included MCQs, and students facing high-stakes exams want study resources that have a direct relationship with their assessments (Grainger, Dai & Osborne, 2018).

Both UCD and RCSI were unable to give access to their question banks, so students were reliant on finding MCQs online to use for practice purposes, and often were required to pay for access. This raised concerns of inequality if some students did not have the means to pay. When students are quizzed over class material at least once a week, they tend to perform better on mid-term and final exams compared to students who did not take quizzes, and were less likely to fail the class, especially if they were struggling with the course content. There may be links between student writing of MCQs, frequent quizzing, and student success (Guillory, 2020; Sotola & Crede, 2020). Students who develop these questions themselves are more likely to out-perform students who had reduced interaction with MCQ development (Sotola & Crede, 2020; Walsh, Harris, Denny & Smith, 2018), and despite concerns, student written MCQs are usually high quality (Walsh et al., 2018). Alongside this, in initial group discussions about the project, students agreed that they found the existing study approaches (books and journal articles) became monotonous and they wanted a different method to supplement their work and to allow for formative assessment.

In the last decades, medical training has become more student-centred, with an emphasis on active learning rather than on the passive acquisition of knowledge. It has been long argued that passive absorption of didactically delivered information should be replaced with active learning, based on curiosity and problem-solving (Bennion, Durning, LaRochelle, Yoon, Schreiber-Gregory, Reamy & Torre, 2018; Jones, Higgs, de Angelis & Prideaux, 2001; Zare, Yamani & Changiz, 2019). There is also a need for reciprocity between the undergraduate (students who enter medical school directly from secondary education) and graduate years (students entering medical school after completing a primary degree); after graduation both groups will work together clinically and therefore development of trusting relationships are important. The inclusion of both graduate and undergraduate students in this project aimed to encourage exchange of ideas and sharing of skillsets between these two groups. This student-centred, active learning model allowed the students to develop the projects themselves, learning through curiosity as they developed the “*know how*” rather than the “*know what*” (Jones et al., 2001).

Students as partners

Alongside these concerns, there continues to be increasing interest in the concept and practice of both students-as-partners and students-as-producers in medical education. Engaging students and staff effectively as partners in learning and teaching is arguably one of the most important issues facing higher education in the 21stst century. Student engagement in the curriculum means that students can develop by being deeply involved in their own learning (Zdravković, Serdinšek, Sobočan, Bevc, Hojs & Krajnc, 2018). Educational achievements which have fostered a high level of student engagement can lead to innovative curricular changes which have benefitted the whole faculty and enabling students to deliver highly impactful extracurricular projects. The concept of students-as-partners is interwoven through many other aspects of education, including assessment and feedback, employability, flexible pedagogies, internationalisation, linking teaching and research, and retention and success (Healey, Flint & Harrington, 2014).

Other studies also support the approach of students-as-partners in medical education. In one, student authors were given the opportunity to develop their own creative projects which would be used to

teach future students (Novak et al., 2011). They chose their own topics, planned and researched their projects, and then implemented them electronically. Students in subsequent years have utilised these files for learning, and the experience of creating the projects served as an opportunity for hands-on learning for the student authors, both of the material and of the practice of teaching. The projects demonstrated that student-created and student-led educational materials are both possible and beneficial. Furthermore, they encouraged other institutions to consider providing students with opportunities to develop their own creative projects that contribute to the curriculum.

How the Teaching and Learning Tools for Staff and Students in Obstetrics and Gynaecology were developed

In this section, we will describe how the students-as-partners project was implemented online over a three-week timeframe. The students-as-partners approach undertaken in the project is shown in Figure 1, highlighting the stakeholders involved in terms of students and staff, the educational theories explored together in the design of the project, and the learning technology tools used. Collaboration is essential in the scientific and medical environment and discussions are enriched when understanding is shared. Students should be able to interconnect diverse subjects and choose appropriate tools to solve problems (Mello et al., 2017).

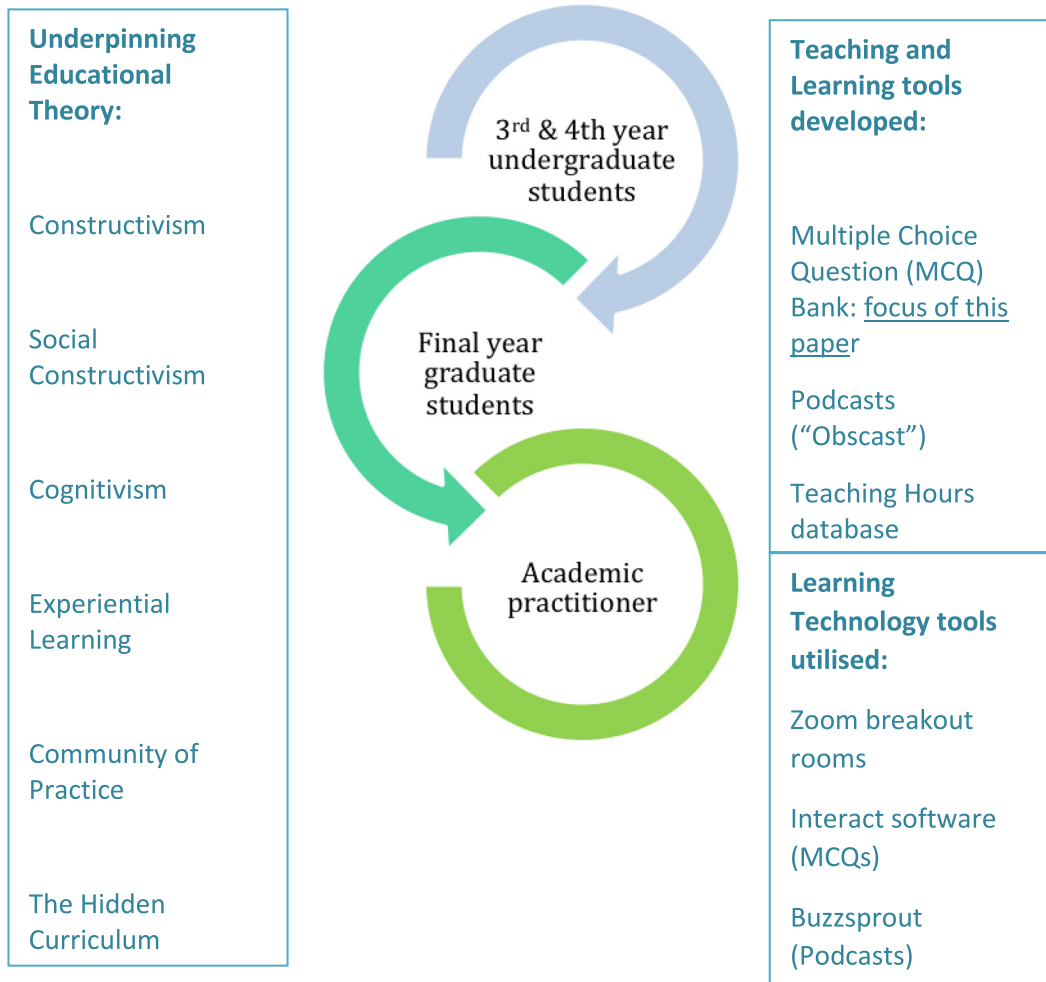


Figure 1: Dimensions of the Students-as-Partners Project in Medical Education

What we did

The strategy was to develop three educational teaching tools in a short period of time due to Covid-19 restrictions. Medical education teaching was scheduled three times a week with an academic practitioner. Tutorials covered the theories of medical education that underpin peer assisted learning (PAL) and supported the development of the teaching tools, for example, by reviewing Design Theory and the evidence base for practice. Normally, lectures with a small group would take place in a meeting or tutorial room. In this new COVID climate, the lectures all had to take place online; the timetable for these tutorials is shown in Table 1.

Week	Monday	Tuesday	Wednesday	Thursday	Friday
1	11:00 Orientation 12:00 Self-Assessment 14:00 Teaching	10:00 Student meeting 14:00 Design Theory	10:00 Student meeting 14:00 Teaching	10:00 Student meeting 14:00 Medical Education 15:00 Project review	10:00 Student meeting 14:00 Teaching 15:00 Self-Assessment
2	Bank Holiday	10:00 Student meeting 14:00 Review Projects	10:00 Student meeting 14:00 Teaching	10:00 Student meeting	10:00 Student meeting 12:00 Peer Assessed Learning 14:00 Teaching
3	10:00 Student meeting 11:00 Review Projects 14:00 Teaching	10:00 Student meeting 14:00 Postgraduate Medical Education	10:00 Student meeting 14:00 Teaching	10:00 Student meeting	10:00 Student meeting 12:00 Review Projects and Self-Assessment 14:00 Teaching

Table 1: Weekly timetable of the Medical Education Elective including academic facilitated tutorials and student project meetings

As the project got underway, the academic practitioner acted as a point of contact and supervisor for the students, and was the editor of the teaching tools. She provided signposting to guidelines and research that guided development of the educational tools and taught the education theory. The students were given the medical education lectures in order to give them the confidence and the ability to identify the possible shortcomings in the college teaching on the subject. This meant the

students were able to specifically choose to develop teaching tools that would address what the students identified as areas of their courses that could be improved. Students had an initial talk with the academic practitioner about choosing the topics and tools for themselves, and were provided with an orientation to Design Thinking to support them to think innovatively (Badwan, Bothara, Latijnhouwers, Smithies & Sandars 2018; Deitte & Omary, 2019). They were required to think through and identify what part of their respective courses had any obvious shortcomings from the point of view of the students and what they would like to do in order to address that. After the students had identified the issue of a lack of MCQs to practice for assessment, they embarked on writing questions. The factual information was based on the guidelines from the Royal College of Obstetricians and Gynaecologists (RCOG) and the Institute of Obstetricians and Gynaecologists (IOG), following guidance for writing single best answer (SBA) MCQs (Case & Swanson, 2001; Harris et al., 2015). Students developed questions individually then reviewed them with their peers before sending to the academic for proof-reading via a site called ‘Interact’¹; this allowed the students to design the MCQ question bank and send the link to the academic practitioner so that she could edit the MCQs directly. Feedback was provided to explain why answers were correct and incorrect to help the formative assessment nature of the MCQ bank.

Discussion

In the context of our project, partnership is framed as a process of student engagement, understood as academics and students learning and working together to foster student learning and teaching enhancement. In this sense, partnership is a relationship in which all the project stakeholders are actively engaged, and stand to gain from the process of learning and working together. This approach recognises that engaged student learning is positively linked with learning gain and achievement. We argue that our partnership represents an effective approach because it offers all of us the potential for a more authentic engagement with the nature of learning in medical education itself, and the

¹ Interact Quiz-maker: <https://www.tryinteract.com/>

possibility for genuinely transformative learning experiences for all involved. Creating MCQs requires both in-depth content knowledge and sophisticated analytical thinking (Grainger et al., 2018). The partnership was built on peer learning which has long been used in Science, Technology, Engineering and Mathematics (STEM) disciplines, where it has been shown to enrich students' learning experiences while developing collaborative work skills (Daud & Ali, 2014; Loda et al., 2019), and it is equally applicable to the medical education field (Friel, Kell & Higgins, 2018; Glynn, MacFarlane, Kelly, Cantillon & Murphy 2006).

From a pedagogical perspective, previous studies have discussed advantages and disadvantages of developing and using MCQs, and it was important for us to remain cognisant of these as we developed the question bank.

Reflecting on what happened

Although MCQs are viewed as time efficient and easy to grade, a challenge for the students in writing them was to ensure that each question was well written, and that the MCQ bank would be an objective, trustworthy, and adequate means of formative assessment for the students, with a potential to evaluate also higher levels of thinking. Table 2 outlines the main challenges met in the project and how the students worked together to overcome them; this table reflects feedback from the students only.

Anecdotally, the undergraduate and graduate students appreciated the opportunity to collaborate on this work as it gave clear insights into how a medical interdisciplinary team could function, with each team member contributing knowledge depending on their current skillset and interests. In addition, the teamwork between students from two different universities provided different perspectives making the elective projects more meaningful and valid. While the combination of students from UCD and RCSI was initially practical (students from both universities were scheduled for their clinical placement at the same time so they were asked to work together for the online alternative) because of the enhanced outcomes as a result of this collaboration future electives will aim to continue with (and expand on) this collaboration.

Challenges	Solutions	Where technology added value
Different levels of subject knowledge	Peer assisted learning Student-generated questions provided a formative assessment	Mentoring video call between students to highlight the main areas in the curriculum
Student led projects	Background theory provided	The online teaching classes allowed the students to perform gap analysis
Online teaching to facilitate social distancing	Zoom meetings, WhatsApp Discussions	Face to face and written virtual meetings allowed for regular communication
Collaboration between two universities, across two different year cohorts.	Teamwork and Communication	The academic practitioner acted as the liaison between the two universities and established contact via email with the students.
Timeframe to complete projects	Students were all focused so there was minimal conflict; we each understood how stressful the process was and supported each other throughout.	Regular “update” meetings; the students met for first 15 mins of the hour session; then academic would join and discuss updates and facilitate next steps
Working from home: creating boundaries	Clear working times agreed by all participants	Out of office messages on emails outside of core working hours; virtual meetings only within core working hours.

Table 2: Challenges encountered and partnership solutions

Findings: implications for medical education practice

We found that excellent communication between staff and students is essential. The key benefits for the readers of this case report of this project include: reading about the difficulties faced when trying to develop MCQs as a learning tool during a difficult time for society and education (i.e. pandemic); discovering the specific challenges of developing MCQ questions; and ultimately learning how both undergraduate and graduate students can work together towards a collective goal, using technology to support their learning and innovation.

The gaps this students-as-partners project is filling are:

- Future students will have access to an MCQ bank with over 200 questions on Obstetrics and Gynaecology covering over 40 topics related to the speciality; students are named as the authors of these questions and gave permission for them to be used. These questions will be provided to every student in each university. They will be free of charge to access ensuring every student has an equal opportunity to study and learn. Already, the MCQ bank has been accessed by nearly every student returning to clinical placement in Obstetrics and Gynaecology from September 2020.
- Increasing student knowledge about the process of writing MCQs: From the perspective of a learning exercise, in a multiple choice question-generating process, students were required to process, organize, integrate and reconstruct knowledge, which improves meta-cognitive development and encourages higher-order thinking.
- By evaluating and providing critical feedback on questions generated by their peers, students are engaging in collaborative learning, which encourages self-reflection, and soft skills development in communication and problem-solving skills.

Future research

A number of interesting areas for further investigation arose from this students-as-partners project:

- Compare students' knowledge of obstetrics and gynaecology topics pre- and post-exposure to the learning they gained by development of the MCQ bank.

- Qualitative exploration with the students developing and/or using the MCQ bank to investigate if it has had any impact on their grades; ask them did they use the tools, did they find them helpful, did they trust teaching tools developed by their fellow students.

Conclusion

The purpose of this case study was to reflect on the challenges faced by students when developing three online teaching and learning tools in a short timeframe, while also all working remotely. The paper has outlined a number of key dimensions of a students-as-partners project during a pandemic: how the development of partnership learning communities may guide and sustain teaching and learning practice in medical education; the sustainable practices of engaging students-as-partners in learning and teaching across medical education contexts; identification of tensions and challenges inherent to partnership in learning and teaching, and offering suggestions to individuals and institutions for addressing them.

A number of conclusions can be drawn from this students-as-partners project. Firstly, it is possible to undertake collaborative peer learning research projects in such a short period of time. Secondly, while working online can involve technical and pedagogical difficulties, these can be overcome by agreeing a clear process and communication for working together online. Thirdly, consideration of the working environment is paramount: it can be challenging to conduct medical education projects online and at home as the lack of boundaries means that the work can potentially overlap with personal time, which results in difficulties adjusting from a relaxed personal setting to a professional one at any time during the day.

The contribution of this paper is that future students and other academic-practitioners who are interested in conducting medical education work, or education work in any field, can learn from the challenges faced in this project, and the strategies used to overcome them, particularly in a post-COVID world. These strategies include theoretical review, discussion of the evidence base, clear communication, and facilitated support. By reporting on the successful aspects of the partnership

project, others can learn from our experiences. In the new and challenging environment that exists for education, this work provides insights in making best use of learning technologies and the collaboration of students-as-partners. This project can be an example of how technologies can be used by students and for students in other medical specialities where the students want access to summative assessments such as MCQs. The experience we have had during the first summer of this pandemic as students-as-partners has had a positive effect on our engagement, confidence, motivation, and ownership for learning in medical education. We experienced an increased understanding of the other's experience, and an enhanced relationship and trust between students and staff.

References

- Badwan, B., Bothara, R., Latijnhouwers, M., Smithies, A., & Sandars, J. (2018). The importance of design thinking in medical education. *Med Teach*, 40(4), 425-426. doi:10.1080/0142159x.2017.1399203
- Bennion, L.D., Durning, S.J., LaRochelle, J., Yoon, M., Schreiber-Gregory, D., Reamy, B.V. & Torre, D. (2018). Untying the Gordian knot: remediation problems in medical schools that need remediation. *BMC Med Educ*, 18(1), 120. doi:10.1186/s12909-018-1219-x
- Case, S. & Swanson, D.B. (2001). Writing one best answer questions for the basic and clinical sciences. *Conducting Written Test Questions for the Basic and Clinical Sciences* (Vol. 3, pp. 31-69). Philadelphia: NBME.
- Daud, S. & Ali, S. K. (2014). Perceptions of Learners about Peer Assisted Learning and Lectures. I. *International Journal of Science and Research (IJSR)*, 3(11), 1449-1455. doi:https://ecommons.aku.edu/pakistan_fhs_mc_cpe/9/
- Deitte, L. A. & Omary, R. A. (2019). The Power of Design Thinking in Medical Education. *Acad Radiol*, 26(10), 1417-1420. doi:10.1016/j.acra.2019.02.012
- Friel, O., Kell, D. & Higgins, M.F. (2018). The Evidence Base for Peer Assisted Learning in Undergraduate Medical Education: a Scoping Study. *MedEdPublish*, 7, <https://doi.org/10.15694/mep.12018.0000044.0000041>.
- Glynn, L., MacFarlane, A., Kelly, M., Cantillon, P. & Murphy, A. (2006). Helping each other to learn – a process evaluation of peer assisted learning. *BMC Medical Education*, 6(1), 6. Retrieved from <https://doi.org/10.1186/1472-6920-6-18>
- Grainger, R., Dai, W., & Osborne, E. (2018). Medical students create multiple-choice questions for learning in pathology education: a pilot study. *BMC Med. Education*, 18. doi:<https://bmcmmededuc.biomedcentral.com/articles/10.1186/s12909-018-1312-1>
- Guillory, A. (2020). Use of PeerWise in a Graduate Physician Assistant Pharmacology Course. *Pharmacology*, 34. doi: <https://doi.org/10.1096/fasebj.2020.34.s1.05828>
- Harris, B. H., Walsh, J. L., Tayyaba, S., Harris, D. A., Wilson, D. J., & Smith, P. E. (2015). A novel student-led approach to multiple-choice question generation and online database creation, with targeted clinician input. *Teach Learn Med*, 27(2), 182-188. doi:10.1080/10401334.2015.1011651
- Healey, M., Flint, A. & Harrington, K. (2014). *Engagement through partnership: students as partners in learning and teaching in higher education*. York: Higher Education Academy.
- Jones, R., Higgs, R., de Angelis, C. & Prideaux, D. (2001). Changing face of medical curricula. *The Lancet*, 357.
- Loda, T., Erschens, R., Loenneker, H., Keifenheim, K. E., Nikendei, C., Junne, F., . . . Herrmann-Werner, A. (2019). Cognitive and social congruence in peer-assisted learning - A scoping review. *PLoS One*, 14(9), e0222224. doi:10.1371/journal.pone.0222224
- Mello, L. V., Tregilgas, L., Cowley, G., Gupta, A., Makki, F., Jhutti, A. & Shanmugasundram, A. (2017). 'Students-as-partners' scheme enhances postgraduate students' employability skills while addressing gaps in bioinformatics education. *Higher Education Pedagogy*, 2, 43-57.
- Novak, S. H., Quinn, M., Canan, T., Metten, S., Wisco, J.J., Wimmers, P.F. & Uijtdehaage, S. (2011). A new approach to learning how to teach: medical students as instructional designers. *Med Educ Online*, 16. doi:10.3402/meo.v16i0.7252
- Przymuszała, P., Piotrowska, K., Lipski, D., Marciniak, R. & Cerbin-Koczorowska, M. (2020). Guidelines on Writing Multiple Choice Questions: A Well-Received and Effective Faculty Development Intervention. *Sage Open*, 10(3). doi:<https://journals.sagepub.com/doi/10.1177/2158244020947432>
- Sotola, L. K. & Crede, M. (2020). Regarding Class Quizzes: A Meta-analytic Synthesis of Studies on the Relationship Between Frequent Low-Stakes Testing and Class Performance. *Educ Psychol Review*. doi:10.1007/s10648-020-09563-9
- Walsh, J. L., Harris, B. H. L., Denny, P. & Smith, P. (2018). Formative student-authored question bank: perceptions, question quality and association with summative performance. *Postgrad Med J*, 94(1108), 97-103. doi:10.1136/postgradmedj-2017-135018

- Zare, S., Yamani, N. & Changiz, T. (2019). How to develop an undergraduate medical professionalism curriculum: Experts' perception and suggestion. *J Adv Med Educ Prof*, 7(4), 183-190. doi:10.30476/jamp.2019.45579
- Zdravković, M., Serdinšek, T., Sobočan, M., Bevc, S., Hojs, R., & Krajnc, I. (2018). Students as partners: Our experience of setting up and working in a student engagement friendly framework. . *Med Teach*, 40, 589-594. doi:<https://doi.org/10.1080/0142159X.2018.1444743>