The Development of an Inventory to Explore Study Group Function

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Published online: 14 September 2018
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Abstract

Aims Courses for undergraduate medical students, particularly those with a problem-based learning curriculum, use small study groups as a key learning modality. Our aim was to design and validate an inventory to measure students' perceptions of the functioning of their study group.

Methods The initial items were derived from focus group discussions with four domains subsequently generated by the authors from the data. Students in years one and two were invited to respond to each item without being aware of the domain names. Collated responses were scrutinised and allocation of items to each domain was considered by each author with duplicate or ambiguous items being discounted. The resulting inventory was used to evaluate the perceptions of students in the succeeding year. The items were triangulated alongside the student perceptions by eliciting the opinions of small group teachers and personal tutors.

Results Forty-seven items were derived from four focus group discussions and an initial pilot. Subsequently 49.2% ($n = 472$) of year one and two students completed the first version of the inventory. After analysis of their responses, 24 items were allocated to four domains. When used with 32 study groups in the succeeding cohort of 274 first-year students, the inventory ranked them in order. The lowest scoring groups were also identified by tutors and teachers as problematic.

Conclusion We have developed an inventory to evaluate students' learning experiences in small groups to meet a need for medical schools that wish to monitor this aspect of their courses. Furthermore, the results have the potential to enhance the function of small study groups.

Keywords Problem-based learning · Team-based learning · Quality control · Student satisfaction

Introduction

Medical schools, especially those with problem-based learning (PBL) and team-based learning (TBL) curricula, make extensive use of small groups as a learning modality in their courses. Students work together to address problems, questions or case studies, and in this context, group dynamics may play an important role in student perceptions of their

learning experience and their subsequent academic performance [1, 2]. Whilst there are both merits and shortcomings of the various methods used to deliver a medical curriculum, it is recognised that certain skills and procedures are required within the group for learning to occur beyond the accumulation of knowledge by individuals [3, 4].

It is widely reported in the literature that there is a significant relationship between group cohesiveness and performance, with a cohesive group outperforming a fractionated group [5]. This correlation does not relate just to education but is found through a wide demographic of society including sports teams, military units and groups working in a business environment. Indeed, there remains significant interest in the importance of team performance for overall function and productivity [6, 7]. One could hypothesise that the academic performance and learning experience of a student may be influenced by how their study group functions [8].

The General Medical Council in the UK requires that medical schools provide curricula and an environment that are integrated, supportive and provide the student with the ability

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to meet the learning outcomes for graduation [9]. It is not just the UK that have such stipulations; the delivery of medical education to promote the graduation of a safe and competent doctor who can deliver effective and safe healthcare can be found worldwide [10, 11]. Medical schools must also have systems for quality management in undergraduate education, and this must be inclusive and reflect the students' learning experience [9].

In addition, there is increasing interest towards the appropriate mentoring of talent, and there is growing recognition that the requirements of individuals deemed to 'have talent' or be 'gifted' are different to the general cohort [12]. With the stipulations to enter a medical course, one may expect that there will be a proportion of students who are deemed 'gifted'. As the pre-frontal cortex does not fully develop until the mid-twenties, the time most medical students are undertaking their training, then there could be an argument that creating a stable learning environment and utilising tools to identify potential problematic situations early may be of benefit to the promotion and development of talented individuals [13]. This has obvious implications for the medical school and society as a whole.

Due to the nature of the various methods in which one can deliver a medical curriculum, there are different approaches utilised to optimise the function of a study group. There appears to be a predominance of studies in the literature confirming the effectiveness of team-based and problem-based learning in the allied health professions, but, currently, there are few tools that are widely-accepted and psychometrically-validated to evaluate learning within the context of problem-based learning medical curricula [14–17]. Nevertheless, the importance of a cohesive team structure is widely demonstrated through the research base including the utilisation of problem-based learning to educate students, improve skills, such as those required for management and leadership, and create an effective medical doctor [18, 19].

The Dundee Ready Educational Environment Measure (DREEM) is an instrument for analysing the educational climate and has been used in a variety of healthcare settings around the globe. A positive atmosphere and cohesive group have been found to improve students' perceptions of the curriculum and learning environment [19, 20]. This supports pre-existing theories that a supportive environment promotes not only students' performance but also their satisfaction whilst also encouraging a humanistic orientation in the delivery of healthcare [20]. One of the recognised limitations of the DREEM is that it focuses predominantly upon course content and structure rather than the learner's perceptions of their study group [21].

The increasing consumer expectations placed upon the delivery of effective medical education in an increasingly fiscally-limited environment demonstrate the fundamental importance of a supportive and effective learning environment. This study was designed to create an inventory that identified

student perceptions of both positive and negative elements that may contribute to group functioning. The views of the students were elicited to create meaningful and reliable data that could be incorporated into design and implementation of medical school curricula to optimise group environment and function. The resulting inventory is to be used in a project that investigates the optimal method of allocating students to study groups to enhance performance and student satisfaction. In addition, it provides students with individualised feedback to promote reflection and self-awareness.

Methods

Development of Inventory

Focus Groups

First and second-year students at Leicester Medical School were invited to participate in focus groups in March 2010. These were conducted at the start of the second and fourth semesters, respectively, of the academic year. Each focus group lasted approximately one hour and was led by the two authors. The aim was to provide an opportunity for students to discuss, in a safe environment, the way in which their study group operated and reflect on reasons why it functioned in the manner that it did.

Students were asked to reflect on how their own study group functions and were allowed to explore themes as they arose. The study groups are used to deliver a team-based curricula and comprise approximately eight to ten students. Each group spends between two and four hours together each day depending upon the methods module staff use to deliver material and the split between formal lectures and group-based activities. Groups are largely static during the pre-clinical period but may change, for example, if students pursue an interest in an intercalated degree or repeat certain parts of the curricula. Clinical educators teach across the syllabus to four particular groups within each year cohort. Each group has a separate personal tutor for pastoral care.

During the focus groups, the clinical educators served to clarify ambiguous statements and to facilitate discussion where necessary. Students were prompted to consider the relationship between group function and academic success, make observations about group dynamics and define what they perceived to be the positive and negative influences on group function if these themes did not arise spontaneously. These areas were chosen to reflect the main aim of the project—to identify factors that may produce a poorly functioning group and provide material for both the tutor and the group members to address.

Transcription

Following the interviews, the content of the focus groups was transcribed verbatim and disseminated amongst the research team. Each member independently thematically analysed the transcripts to highlight recurring themes. A total of 47 items were created to produce an inventory.

Pilot of the Inventory

The inventory of 47 items was randomised without reference to the concept of domains and subsequently placed within the course website. In June 2010, all 501 first and second-year students were sent an email inviting them to complete the inventory. In this email, students were informed that collated, anonymised reports for their own study group would be made available to them. Furthermore, we highlighted that the reports may provide insight into the views of their peers about their group work environment and could be used for reflective study with their group tutor.

During completion of the pilot inventory, students were invited to make free-text comments on items that they felt were irrelevant or difficult to interpret. Responses to the 47 items were measured on a modified six-point Likert scale to avoid central tendency bias: strongly agree, agree, tend to agree, tend to disagree, disagree, strongly disagree. A histogram was generated for each item from the responses provided.

Refinement of Inventory

Allocation of Items to Domains

In a parallel process to that described above, the research team individually scrutinised the list of items to determine whether they formed clusters of concepts that could be identified as over-arching domains. Four over-arching domains were identified:

- 1 Members' attitude to members. This domain concerns how students feel about the *support* shown by individuals to study group peers.
- 2 Group's attitude to members. This domain describes the *collegiality* within the group and how individuals are affected by group behaviours.
- 3 Members' interaction with work. This domain describes the *motivation* of individual members towards completion of work tasks.
- 4 Group's interaction with work. This domain contains items that describe *engagement* with the work tasks and processes that the group as a unit has adopted.

Each of the 47 items was allocated to one of the four domains independently by the research team. Any that were

ambiguous were further discussed and an expert and professional judgement was employed to attribute the final domain.

Refinement of the items and the domains was undertaken using the collated responses from the first- and second-year students who undertook the pilot. In deciding to retain, reword or reject any item we considered the following factors:

- 1 Duplication of item with attention directed to the histograms and recurring patterns of response
- 2 Discrimination: items which produced a full range of responses were retained
- 3 Aspirational or inferential items were rejected
- 4 Items that students identified in free-text comments as ambiguous or of limited relevance were removed

The resulting inventory contained 24 items in four domains. Inventory items were phrased such that there were equal numbers of positively- and negatively-worded items, to reduce bias, and the inventory is shown in Fig. 1. It was used in June 2011 to elicit the views of first-year students about the study group they had joined on entry to the MB ChB course in September 2010. Students completed the inventory on the course website at the end of semester two.

Validation of the Inventory

Learning in small groups at Leicester Medical School is facilitated by clinical educators who rotate between group rooms to deliver the curriculum. Thus, collectively, each tutor will encounter each group for an average of 100 h. Furthermore, personal tutors are assigned to each student and provide support and guidance to both work groups and individuals at defined points within the curricula.

To validate the inventory, clinical educators were asked whether they felt the groups they had taught were cohesive. The response could be 'yes', 'no' or 'unable to state an opinion'. The personal tutors were also asked to voluntarily participate and answer the following question; 'Does your tutor group, as a unit, hinder or help the learning of its members?' The options available were as follows: help, hinder, neither and do not know.

Results

Focus Groups

The four focus groups ranged in size from three to nine students. They comprised a diverse range of pre-clinical students; including both male and female students, individuals on the graduate entry course and those on the standard course, and students schooled in the UK, EU and internationally.

Fig. 1 Twenty-four items listed by domain

Members' attitudes to members	Group's attitudes to members
My group:	My group:
Are only interested in learning for themselves	Uses competition with other groups positively
Is understanding of my needs	Manages the diversity of its members badly
Has developed a sense of trust between members	Gets on well together outside of Medical School
Expects everyone to study the same way	Is dominated by one or two forceful people
Leaves the slower members behind	Listens carefully to what each person has to say
Members' interaction with work	Group's interaction with work
My group:	My group:
Members are enthusiastic about the work we do	Discusses concepts to enhance understanding
Has members who are lazy	Is flexible about working in sub-groups
Is held back by members' active social life	Works too fast in order to finish up early
Has members with a poor attendance record	Refocuses well after going 'off task'
Members prepare tasks ahead of time	Goes into things in far too much detail
	Works together to complete any remaining tasks
	Is able to relate work to our future role as doctors
	Took a long time to establish how to work together
	Is slow to speak up when answers are called for

Transcription

In total, 46 themes were identified as being of importance during the focus groups. These themes were subsequently translated by the research team into an inventory of items. The preliminary inventory was piloted with 11 third-year students who were undertaking a clinical block that included working on problems in a small group. Feedback from these students on the inventory was used to refine the inventory. As a result, four items were rephrased and an additional item was included to produce 47 items in total.

Pilot of the Inventory

Following an email to all 501 first- and second-year students inviting them to complete the inventory, response rates for first-year undergraduate students, second-year undergraduate students and first-year graduate entry students were 46.9% ($n = 211$), 49.8% ($n = 203$) and 55.2% ($n = 58$) respectively.

As part of the free-text comments, participants commented that elements which contributed to a positive group dynamic included constructive competition, the ability to work flexibly as smaller sub-units and to subsequently re-congregate effectively, active inclusion of all members and emphasis on discussion of concepts rather than simply focussing on the correct answer.

Refinement of Inventory

Allocation of Items to Domains

Figure 1 shows the final inventory following allocation of items to the relevant domains.

Delivery of the Inventory

At the start of the year in October 2010, 209 entrants were enrolled on the standard course and allocated to 24 study groups of eight or nine students. Sixty-four entrants on the graduate entry course were placed in eight study groups of

eight students. In July 2011, 266 students completed the inventory.

Responses to each of the Likert items were scored as +3 for strongly agree, through to −3 for strongly disagree. Correction was made for negatively-worded items. The scores for the component items were then averaged to produce an overall score for each domain on the same scale. The standard deviations for the scores were calculated for each domain. An overall score was calculated from the means for each domain.

Table 1 shows the group scores ranked from low to high by overall mean score, calculated from the means of each domain. Although scores in one domain tended to predict those in another, there were different response patterns in most of the groups. The numerical scores produced a skewed normal distribution with the majority of groups scoring above zero (the boundary between tending to agree or disagree with the item) for each domain and overall. A footnote to the table explains the shading of the cells. The mean overall scores

Table 1 Domain and overall scores listed by group

Group	Overall	Members' attitude to members	Group's attitude to members	Members' interaction with work	Group's interaction with work
Anon 1	− 0.4	− 1.0	− 1.1	0.3	− 0.1
Anon 2	− 0.3	− 0.5	− 0.3	− 0.4	− 0.1
Anon 3	− 0.2	− 0.4	− 0.8	0.1	0.0
Anon 4	− 0.2	0.1	0.1	− 0.8	0.0
Anon 5	0.3	0.1	− 0.7	0.8	0.5
Anon 6	0.3	0.4	0.1	0.5	0.3
Anon 7	0.4	0.2	0.7	0.6	0.3
Anon 8	0.5	0.4	0.6	− 0.4	0.9
Anon 9	0.5	− 0.4	0.5	0.8	0.8
Anon 10	0.5	0.3	0.2	0.5	0.8
Anon 11	0.5	1.1	1.1	− 0.4	0.4
Anon 12	0.6	0.7	0.9	− 0.2	0.7
Anon 13	0.6	0.7	0.9	0.9	0.2
Anon 14	0.6	0.7	0.9	− 0.3	0.9
Anon 15	0.6	0.3	0.8	0.6	0.7
Anon 16	0.6	0.3	0.8	1.1	0.6
Anon 17	0.7	1.0	1.0	− 0.2	0.9
Anon 18	1.0	1.0	1.1	0.7	1.1
Anon 19	1.0	1.4	1.4	0.5	0.9
Anon 20	1.0	0.9	1.4	1.3	0.8
Anon 21	1.1	1.1	1.1	0.8	1.2
Anon 22	1.2	1.4	1.1	1.7	1.0
Anon 23	1.3	1.6	1.4	0.5	1.5
Anon 24	1.3	1.7	1.3	0.7	1.4
Anon 25	1.3	1.3	1.3	1.4	1.3
Anon 26	1.4	1.0	1.5	2.2	1.1
Anon 27	1.5	1.6	1.7	1.6	1.3
Anon 28	1.5	1.6	1.9	0.9	1.5
Anon 29	1.6	1.7	1.8	1.8	1.4
Anon 30	1.7	1.6	2.1	2.2	1.4
Anon 31	1.7	2.0	2.1	1.6	1.5
Anon 32	1.9	1.8	2.2	2.0	1.6
Mean	0.8	0.8	0.9	0.7	0.8
Standard deviation (SD)	0.6	0.8	0.8	0.8	0.5

If the score for one group is equal to or more than one SD above or below the mean, it is presented in italics or bold: italics for below and bold for above

for the eight graduate entry groups and for 24 undergraduate entry groups were 0.88 and 0.80 respectively. The difference was not statistically significant.

Table 2 itemises the opinion of the 25 (78%) personal tutors who responded to the question on how the group influenced the learning of its members and who felt able to voice an opinion. Two did not respond to the survey and five answered ‘did not know’. Three tutors thought that the group hindered the learning of its members; four thought the group neither hindered nor helped and 18 thought that the group helped the learning of its members. Notably, all three groups with personal tutors who felt that their group hindered their learning had inventory scores in the lower third of the range. However, so did three of the 18 groups with personal tutors who felt that their group helped their learning. There is a correlation between the inventory scores and the personal tutors’ opinions about their group although this is not statistically significant (Fisher’s Exact Probability Test using the Freeman-Halton extension: $p = 0.08$).

Table 3 reports the views of the clinical educators compared with the scores measured by the inventory. There is a similar degree of correlation (Fisher’s Exact Probability Test using the Freeman-Halton extension: $p = 0.11$).

Additionally, the inventory was used by the University of Aberdeen with 174 students who had worked in 20 study groups during a course in Community Medicine in February 2011. Two groups produced scores below the mean by more than one standard deviation. In a personal communication, the course leaders reported that these were the two groups identified by their tutors as having difficulties working together (personal communication, March 2011).

Discussion

The creation of an environment within problem-based learning that supports successful group discussion and learning has been discussed at great length within the literature [22, 23]. Aside from academic interest, delivering an effective learning medium holds significant importance within the profession, associated accrediting bodies and at a governmental level [9–11]. This project arose from discussion between study

Table 3 Clinical educators’ opinions and group scores

Inventory response	Like to join	Neutral	Not wish to join	Total
Upper third	10	1	0	11
Middle third	5	4	1	10
Lower third	7	1	3	11
Total	22	6	4	32

group tutors about experiences, both positive and negative, that students had reported after working in groups. The excellent response rate and the enthusiasm of individuals to participate in focus groups further support the strength of student interest.

Four central topics underpinned the domains that arose from the student discussions. These were groups that were supportive and promoted collegiality, motivation and engagement. These themes mirror theories already well documented in group and talent psychology. Trusting your fellow teammates is known to produce a functioning team. Working in a resilient team is also a positive predictor of success as is the use of discussion over conclusion and the creation of a motivational and supportive group ethos [22, 24, 25]. Furthermore, it is known that the satisfaction amongst group members is of a higher magnitude when the group is congenial, engaged and proficient [17].

A positive outcome from the inventory is that the data yielded complemented the experienced opinions of both clinical educators and personal tutors in terms of identifying groups that were ‘problems’. As such, the inventory could be used alongside expert opinion to quantify observational inferences from faculty staff.

This inventory has a number of potential applications. Firstly, students can use the results within their own study group to reflect on whether it is operating well and, if not, the potential reasons for dysfunction. This will help students to develop their team-working skills, a necessary aspect of their future roles as doctors. Secondly, the inventory captures useful information on the functioning of the group and provides an insight for group tutors to assist groups encountering problems. Finally, for faculty responsible for the course as a whole, the inventory can highlight whether additional support for group work is necessary for optimal engagement with the curriculum and to identify which groups should be specifically targeted. It can be used as a further tool to support experienced tutors and educators and potentially medical school administration in allocating students to groups that may function well, once further results are known.

We believe that the inventory has been developed using a robust technique and that it demonstrates face and content validity. However, it represents the views of students of a single medical school and may not be generalizable to other

Table 2 Personal tutors’ opinions and group scores

Inventory response	Helped learning	Neither helped nor hindered learning	Hindered learning	Total
Upper third	8	1	0	9
Middle third	7	1	0	8
Lower third	3	2	3	8
Total	18	4	3	25

schools operating different curricula and pedagogical styles. Furthermore, the allocation of the 24 component items to four domains has been made by expert judgement. The inventory would benefit from further validation by using it with student study groups in other medical schools to provide evidence for construct validity.

In conclusion, the required standard of an undergraduate medical curriculum is higher than ever despite an evolving environment with temporal and fiscal pressures as well as higher student expectations. The utilisation of this inventory may provide a tool for experienced faculty staff to identify study groups with potential problems at an early stage. This would allow the provision of appropriate remedial advice and support to individuals and the group as a whole, to minimise an adverse impact on academic performance.

Summary

- Problem-based learning curricula make extensive use of small group work.
- Medical schools are expected by regulatory bodies to have systems for quality management of students' learning experiences.
- A standard inventory of study group functioning will provide data for faculty, students and tutors to improve the students' experience of working in a group.

Research Questions

- What is the ideal way of assessing study group function?
- Does a well-functioning group lead to enhanced performance at medical school and beyond or is the acquisition of skills in managing conflict important?
- Is there a way of building the 'perfect' study group?

Acknowledgments The authors wish to thank the students who participated in the focus group and completed the pilot questionnaire. The authors are also grateful to the enthusiasm and work of the late Dr Adrian Hastings and for the advice and support of Associate Professor Ron Hsu, Professor Stewart Petersen and Professor Richard Holland.

Author's Contributions HM, AB and senior support staff discussed the design of the study, read the focus group transcripts, commented on the emerging themes and items and debated the domain names and final allocation of items. HM and AB organised, conducted and transcribed the focus groups. HM wrote the original items alongside the late AH. HM wrote the first draft of the paper. All authors have commented on subsequent drafts and approved the final manuscript.

Funding/Support Student Experience Enhancement Group, Academic Practice Unit, University of Leicester.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval The study was approved by the University Committee for Research Ethics Concerning Human Subjects (Non-NHS).

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References

1. Jones RW. Learning and teaching in small groups: characteristics, benefits, problems and approaches. *Anaesth Intensive Care*. 2007;35(4):587–92.
2. Dolmans D, Michaelsen L, Van Merriënboer J, van der Vleuten C. Should we choose between problem-based learning and team-based learning? No, combine the best of both worlds! *Med Teach*. 2015;37(4):354–9.
3. Bate E, Hommes J, Duvivier R, Taylor DC. Problem-based learning (PBL): getting the most out of your students – their roles and responsibilities: AMEE guide no. 84. *Med Teach*. 2014;36(1):1–2.
4. Holen A. The PBL group: self-reflections and feedback for improved learning and growth. *Med Teach*. 2000;22(5):485–9.
5. Mullen B, Copper C. The relation between group cohesiveness and performance: an integration. *Psychol Bull*. 1994;115(2):210–78.
6. Liu ML, Liu NT, Ding CG, Lin CP. Exploring team performance in high-tech industries: future trends of building up teamwork. *Technol Forecast Soc Chang*. 2015;91:295–310.
7. Bertolotti F, Mattarelli E, Vignoli M, Macri DM. Exploring the relationship between multiple team membership and team performance: the role of social networks and collaborative technology. *Res Policy*. 2015;44(4):911–24.
8. Sawyer RK, Berson S. Study group discourse: how external representations affect collaborative conversation. *Linguist Educ*. 2004;15(4):387–412.
9. General Medical Council. Theme 3: supporting learners [internet]. General Medical Council. 2018. [cited 15 March 2018]. Available from: <https://www.gmc-uk.org/education/27392.asp>
10. Australian Medical Council. Assessing primary medical education [internet]. Australian Medical Council. 2017. [cited 15 March 2018]. Available from: <https://www.amc.org.au/accreditation/primary-medical-education>
11. Medical Council of New Zealand. New Zealand curriculum framework for prevocational medical training [internet]. Medical Council of New Zealand. 2014. [cited 15 March 2018]. Available from: <https://www.mcnz.org.nz/assets/News-and-Publications/NZCF26Feb2014.pdf>
12. Dries N. The psychology of talent management: a review and research agenda. *Hum Resour Manag Rev*. 2013;23(4):272–85.
13. Sternberg RJ. Multiple intelligences in the new age of thinking. In: *Handbook of intelligence*. New York: Springer; 2015. p. 229–41.
14. Kim HR, Song Y, Lindquist R, Kang HY. Effects of team-based learning on problem-solving, knowledge and clinical performance of Korean nursing students. *Nurse Educ Today*. 2016;38:115–8.
15. Kang KA, Kim S, Kim SJ, Oh J, Lee M. Comparison of knowledge, confidence in skill performance (CSP) and satisfaction in problem-

- based learning (PBL) and simulation with PBL educational modalities in caring for children with bronchiolitis. *Nurse Educ Today*. 2015;35(2):315–21.
16. Frame TR, Cailor SM, Gryka RJ, Chen AM, Kiersma ME, Sheppard L. Student perceptions of team-based learning vs traditional lecture-based learning. *Am J Pharm Educ*. 2015;79(4):51.
 17. Thomas RE. Problem-based learning: measurable outcomes. *Med Educ*. 1997;31(5):320–9.
 18. Ungaretti T, Thompson KR, Miller A, Peterson TO. Problem-based learning: lessons from medical education and challenges for management education. *Acad Manag Learn Educ*. 2015;14(2):173–86.
 19. Ortega BJ, Perez VC, Ortiz ML, Fasce HE, McColl CP, Torres AG, et al. An assessment of the Dundee Ready Education Environment Measure (DREEM) in Chilean university students. *Rev Med Chil*. 2015;143(5):651–7.
 20. Kelly M, Bennet D, Muijtjens A, O'Flynn S, Dornan T. Can less be more? Comparison of an 8-item placement quality measure with the 50-item Dundee Ready Educational Environment Measure (DREEM). *Adv Health Sci Educ*. 2015;20(4):1027–32.
 21. Roff S, McAleer S, Harden RM, Al-Qahtani M, Ahmed AU, Deza H, et al. Development and validation of the Dundee Ready Education Environment Measure (DREEM). *Med Teach*. 1997;19(4):295–9.
 22. Azer SA. Twelve tips becoming a student in a PBL course: twelve tips for successful group discussion. *Med Teach*. 2004;26(1):12–5.
 23. McLaughlin JE, Roth MT, Glatt DM, Gharkholonarehe N, Davidson CA, Griffin LM, et al. The flipped classroom: a course redesign to foster learning and engagement in a health professions school. *Acad Med*. 2014;89(2):236–43.
 24. De Jong BA, Dirks KT, Gillespie N. Trust and team performance: a meta-analysis of main effects, moderators, and covariates. *J Appl Psychol*. 2016;101(8):1134–50.
 25. Meneghel I, Salanova M, Martinez IM. Feeling good makes us stronger: how team resilience mediates the effect of positive emotions on team performance. *J Happiness Stud*. 2016;17(1):239–55.