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The relationship between medical student engagement in the provision of the school’s education programme and learning outcomes

Xiaoming Xu, N.A. Bos and Hongbin Wu

ABSTRACT

Introduction: Student engagement in the provision of the school’s education programme (educational student engagement) plays an important role in quality assurance in medical education. However, little is known whether this specific type of student engagement has effects on the learning outcomes for the involved medical students.

Methods: This study was based on a national-wide survey in China among medical students with 123,055 responses. The questionnaire was designed using international and Chinese national standards. T-test, analysis of variance, multivariate regression, and regression with interaction terms were used.

Results: Educational student engagement was positively associated with medical students’ learning outcomes in Clinical Practice, Science and Scholarship, Health and Society, and Professionalism. Besides, the influence was heterogeneous among participants at different learning phases. Learning outcomes in Clinical Practice were strongly associated with educational student engagement efficiently at the Clinical Medical Education and the Clerkship Rotation phases, and learning outcomes in Science and Scholarship were best correlated with the Clerkship Rotation phase.

Conclusion: Educational student engagement is positively associated with the learning outcomes, with the greatest effect on learning outcomes in Clinical Practice and the least effect in Professionalism. Besides, it has a greater impact on medical students at senior learning phases.

Introduction

The student engagement in provision of the school’s education programme (educational student engagement) refers to student engagement in teaching and assessment (Patricio 2016). There are all-together four spheres of student engagement recognized by ASPIRE (A Schools Programme for International Recognition of Excellence in Education): management of the school, provision of the school’s education programme, attending academic community, and attending local community and service delivery (Aspire-to-Excellence 2013). Educational student engagement has a more direct connection to the educational and teaching activities of students than other spheres. Furthermore, educational student engagement contains elements of the educational content, the interpersonal atmosphere, and the organizations of the program. It is consistent with the three domains of Moos’ theoretical framework of human environments and its application to quality assurance in medical education environments, which pertains to goal orientation, atmosphere, and organization (Moos 1973; Schönrock-Adema et al. 2015). Although studies have illustrated that student engagement in general relates to teaching effectiveness (Green et al. 2018; Stephenson et al. 2020), and may contribute to students’ academic achievements (Wouters et al. 2017), little research has explored how educational student engagement relates to medical students’ learning outcomes. As part of student engagement, educational student engagement plays an essential role in quality assurance in higher education (Coates 2005, 2010), also in the context of medical education (Hunt et al. 2018). With the increasing emphasis on student engagement in medical education (Aspire-to-Excellence 2013; Hunt et al. 2018; Milles et al. 2019; Peters et al. 2019), there is a need to

Practice points

- Educational student engagement can be effective in promoting the learning outcomes for medical students.
- Educational student engagement at the Clerkship Rotation phase is strongly associated with learning outcomes in Science and Scholarship.
- Educational student engagement at Clinical Medical Education and Clerkship Rotation phases is strongly associated with learning outcomes in Clinical Practice.
- Medical schools need to put more effort into enhancing educational student engagement at senior learning phases for medical students.
concretize the evaluation of this connotation-rich concept (Trowler 2010). The conflation of student engagement as a holistic concept could lead to a lack of clarity in concrete practice actions. Medical education institutions would further like to know how certain student engagement initiatives could benefit the learning outcomes of medical students, so that curricula or educational activities can be improved in a more targeted manner.

To address the associations between educational student engagement and learning outcomes in medical education, we conducted this study in the context of Basic Medical Education in China. Adapted by the World Federation for Medical Education (WFME)’s Global Standards for Basic Medical Education, the learning outcomes in Basic Medical Education in China are required in four competency domains: Science and Scholarship (S&S), Clinical Practice (CP), Health and Society (H&S), and Professionalism (PF) (Working Committee for the Accreditation of Medical Education 2016). Evidence showed that learning outcomes vary as students’ progress through the learning phases (Wouters et al. 2017). Basic Medical Education in China could be divided into four different learning phases: General Education, Biomedical Education, Clinical Medical Education, and Clerkship Rotation (Schwarz et al. 2004). Understanding the impact of educational student engagement on the learning outcomes of medical students at different learning phases could help the stakeholders, such as teachers and students, to adjust the teaching and learning strategies, and promote learning outcomes (Kusurkar et al. 2018).

In conclusion, the objective of this research is to analyze the relationship between educational student engagement and the learning outcomes for medical students in Basic Medical Education in China with addressing the following research questions: (1) How does educational student engagement relate to each domain of learning outcomes (S&S, CP, H&S, and PF)? (2) What is the relationship between educational student engagement and learning outcomes at different learning phases? This study will enable us to make practical recommendations to promote educational student engagement with concrete educational activities at different learning phases, thus contributing to the goal of excellence in medical education.

**Methods**

**Sample and data collection**

This study is based on the China Medical Student Survey (CMSS). CMSS is a national-wide survey dedicated to Basic Medical Education in China, initiated by the National Centre for Health Professions Education Development. In 2020, there were all-together 165 institutions that offer the clinical medicine education programme in China, 119 institutions registered to participate in this survey. Among them, 107 institutions successfully completed the survey. In terms of geographic distribution, of the 165 institutions nationwide, 74 (44.8%) are in the East part of China, 49 (29.7%) in the Centre part of China, and 42 (25.5%) in the West part of China. The 107 institutions participating in this study were correspondingly balanced geographically: 47 (43.9%) in the East, 33 (30.9%) in the Centre, and 27 (25.2%) in the West. The participants of CMSS were undergraduate medical students receiving Basic Medical Education at those institutions. Ethical approval (IRB000001052-20069) was obtained from the Institutional Review Board of Peking University. The front-page of the questionnaire provided an information letter and informed consent with the purpose and main content of the survey, together with a commitment to keep the data anonymous and confidential. Participants voluntarily participated, which had no effect on their study. The survey was conducted online from 17 June to 10 July 2020. There were 263,732 undergraduate medical students in 107 institutions and 180,348 questionnaires were returned with a response rate of 68.4%. There were 152,645 responses left after data cleaning, representing an effective response rate of 84.64%. In China, Basic Medical Education contains different educational tracks, including five-year undergraduate training programme and ‘5 (undergraduate medical study) +3 (standardised residency training)’ programme (Zhu et al. 2016). As the main educational track is the five-year training programme, we included responses from medical students undergoing the five-year training programme and 123,055 responses were used in the analysis.

**Measurement**

Learning phases and gender were asked. Besides, this study used two scales of measurement from CMSS data including educational student engagement and the learning outcomes. The six items (SE1-SE6) selected in the educational student engagement scale were in line with the ASPIRE (Aspire-to-Excellence 2013) (see Table 1). The participants were asked about items to respond with a five-point Likert scale (from 1 - strongly disagree to 5 - strongly agree). Cronbach’s $\alpha$ was used to assess the internal consistency, which turned out to be 0.88 in these six items. The mean scores of these six items were used for the measurement.

The learning outcome scales pertained to four subscales: S&S, CP, H&S, and PF and were designed based on the Accreditation Standards for Basic Medical Education in China (Working Committee for the Accreditation of Medical Education 2016). The self-assessment was used for evaluating students’ learning outcomes as described in other studies in medical education (Khoiriyah et al. 2015). We asked the participants to fill in their own perceived scores of their pre-entry level and their current level for each item (the scoring is an integer from 0 to 10, with 0 being none and 10 being the highest). We used the added value (current level score – pre-entry level score) for the analysis. The descriptions of the subscales in this scale are shown in Supplementary Appendix 1, and the detailed items can be found in Supplementary Appendix 2. Cronbach’s $\alpha$ of these four subscales were 0.88, 0.98, 0.95, 0.93 respectively.

**Table 1. Items in educational student engagement scale in CMSS.**

<table>
<thead>
<tr>
<th>Number</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE1</td>
<td>I have evaluated the curriculum, teaching, and learning processes</td>
</tr>
<tr>
<td>SE2</td>
<td>My feedback has been taken into account in curriculum development</td>
</tr>
<tr>
<td>SE3</td>
<td>I have participated as an active learner with responsibility for my own learning</td>
</tr>
<tr>
<td>SE4</td>
<td>I have been involved formally and/or informally in peer teaching (explaining the appropriate knowledge to my peers)</td>
</tr>
<tr>
<td>SE5</td>
<td>I have assessed my own competence</td>
</tr>
<tr>
<td>SE6</td>
<td>I have engaged in peer assessment</td>
</tr>
</tbody>
</table>
Data analysis

Initially, we calculated the correlations between learning outcomes and learning phases. We performed multivariate regression analyses to answer the first research question. We took learning phases and educational student engagement as a set of independent variables, took learning outcomes as the dependent variable, and added medical school as fixed effects. For the second research question, we checked whether learning phases have an influence on the relationship between educational student engagement and learning outcomes using the ANOVA test and Ordinary Least Squares regression with interaction terms. All analyses were conducted using Stata 15 and we regarded the differences to be significant when the p value was < .01.

Results

Participants

Among the 123,055 total responses used for analysis, 59.56% (73,291) were female students and 40.44% (49,764) were male students. Of these students, 26.60% (32,731) were at General Education phase, 21.68% (26,681) were at Biomedical Education phase, 30.40% (37,413) were at Clinical Medical Education phase, and 21.32% (26,230) were at Clerkship Rotation phase. The correlations between the learning outcomes and the learning phases are shown in Table 2. The scores for the different learning outcomes correlate significantly with each other and there is a positive correlation between those scores and the learning phases of the students. The learning outcomes in Clinical Practice are most strongly related to learning phases.

Educational student engagement and learning outcomes

The results of analyzing the relationship between educational student engagement and the learning outcomes can be seen in Table 3. It turns out that educational student engagement is positively associated with all four domains of learning outcomes. Furthermore, educational student engagement correlate with medical students’ learning outcomes in CP most (β = 0.508; p < .001), followed by S&S (β = 0.461; p < .001), then in H&S (β = 0.449; p < .001), and in PF least (β = 0.375; p < .001). The gender of the students was analysed as a control and only showed small effects on learning outcomes in S&S and CP.

More concretely, educational student engagement related to being an active learner (SE3) make a more prominent contribution in terms of learning outcomes in S&S. Activities related to evaluation (SE1) have greater effects on learning outcomes in CP and H&S. As for the learning outcomes in PF, feedback (SE2) have the largest effect. By contrast, activities related to peer-assessment (SE6) did not give obvious contributions to learning outcomes in CP, H&S, and S&S. The entailed correlations can be found in Table 4.

Educational student engagement and learning phases

The result of the ANOVA test illustrates that differences in educational student engagement can be identified among different learning phases (Table 5) (p < .001). In general, medical students are significantly more engaged in educational student engagement at the General Education phase (Mean = 3.77) and the Biomedical Education phase (Mean = 3.72), while less engaged at the Clinical Medical Education phase (Mean = 3.66) and the Clerkship Rotation phase (Mean = 3.65). In contrast, during the Clinical Medical Education phase the lowest engagement is seen in three out of six items, which includes peer teaching (SE4), self-assessment (SE5), and peer-assessment (SE6). Besides, the results show that medical students at the Clerkship Rotation phase have the lowest engagement in evaluation (SE1), feedback (SE2), active learner (SE3), and peer teaching (SE4).

Heterogeneity of the relationship among learning phases

To test if there are interactions on the correlation between educational student engagement and learning outcomes, we performed interaction term regression as shown in Table 6. It turns out that the different learning phases have an influence on the correlation. Concretely speaking, the interaction effect on S&S is more obvious at the Clerkship Rotation phase (β = 0.148; p < .001), and the interaction

<table>
<thead>
<tr>
<th>Table 2. The correlations between learning outcomes and learning phases.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variables</td>
</tr>
<tr>
<td>(1) Science and scholarship (S&amp;S)</td>
</tr>
<tr>
<td>(2) Clinical practice (CP)</td>
</tr>
<tr>
<td>(3) Health and society (H&amp;S)</td>
</tr>
<tr>
<td>(4) Professionalism (PF)</td>
</tr>
<tr>
<td>(5) Learning phases</td>
</tr>
</tbody>
</table>

***p < .001.

<table>
<thead>
<tr>
<th>Table 3. The relationship between educational student engagement and learning outcomes.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>SE</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Learning phases (base: general education)</td>
</tr>
<tr>
<td>Biomedical education</td>
</tr>
<tr>
<td>Clinical medical education</td>
</tr>
<tr>
<td>Clerkship rotation</td>
</tr>
<tr>
<td>Observations</td>
</tr>
<tr>
<td>R²</td>
</tr>
<tr>
<td>F test</td>
</tr>
</tbody>
</table>

Medical school fixed effects, and Robust standard errors are clustered at the medical school level. ***p < .001, F < 0.001. S&S = Science and Scholarship, CP = Clinical Practice, H&S = Health and Society, PF = Professionalism. The captions are the same for Table 4.
The results of this research show that educational student engagement is positively associated with medical students’ learning outcomes in all four domains of S&S, CP, H&S, and PF. The content of educational student engagement covers a wide range of aspects in the learning environment. Comprehensive quality assurance of the learning environment for medical education encompasses three broad domains: content, atmosphere, and organization (Schönrock-Adema et al. 2015). Educational student engagement encompasses not only a deep involvement in the content (content domain), but also promotes mutual communication among teachers and students (atmosphere domain), and ensures the change and maintenance of the system (organization domain). It incorporates the three key domains of quality assurance in medical education and provides medical students the opportunity to achieve learning outcomes in a conducive manner.

Moreover, the extent of influence of educational student engagement on learning outcomes varies in each domain of learning outcomes. The engagement has the most effective impact on CP, followed by S&S, less on H&S, and least on PF. The skills requested in CP such as patient care, clinic management are correlated effectively with the content (content domain), but also promotes mutual communication among teachers and students (atmosphere domain), and ensures the change and maintenance of the system (organization domain). It incorporates the three key domains of quality assurance in medical education and provides medical students the opportunity to achieve learning outcomes in a conducive manner.

### Discussion

The relationship between educational student engagement of each item and learning outcomes.

#### Table 4. The relationship between educational student engagement of each item and learning outcomes.

<table>
<thead>
<tr>
<th>S&amp;S</th>
<th>CP</th>
<th>H&amp;S</th>
<th>PF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beta</strong></td>
<td>Robust standard error</td>
<td><strong>Beta</strong></td>
<td>Robust standard error</td>
</tr>
<tr>
<td>SE1 (evaluation)</td>
<td>0.091***</td>
<td>0.007</td>
<td>0.159***</td>
</tr>
<tr>
<td>SE2 (feedback)</td>
<td>0.098***</td>
<td>0.006</td>
<td>0.025</td>
</tr>
<tr>
<td>SE3 (active learner)</td>
<td>0.116***</td>
<td>0.007</td>
<td>0.123***</td>
</tr>
<tr>
<td>SE4 (peer teaching)</td>
<td>0.071***</td>
<td>0.008</td>
<td>0.076***</td>
</tr>
<tr>
<td>SE5 (self-assessment)</td>
<td>0.082***</td>
<td>0.009</td>
<td>0.138***</td>
</tr>
<tr>
<td>SE6 (peer-assessment)</td>
<td>0.014</td>
<td>0.007</td>
<td>0.016</td>
</tr>
</tbody>
</table>

**Male**

- Learning phases (base: general education)
  - Biomedical education: 0.475
  - Clinical medical education: 0.855
  - Clerkship rotation: 1.191
  - General education phase: Biomedical education phase Clinical medical education phase Clerkship rotation phase

**Female**

- Observations: 123,055
  - R²: 0.137
  - F test: 0.000

Table 5. Descriptive statistics and ANOVA results.

<table>
<thead>
<tr>
<th>General education phase</th>
<th>Biomedical education phase</th>
<th>Clinical medical education phase</th>
<th>Clerkship rotation phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>SE1 (evaluation)</td>
<td>4.19</td>
<td>0.83</td>
<td>4.16</td>
</tr>
<tr>
<td>SE2 (feedback)</td>
<td>3.68</td>
<td>0.90</td>
<td>3.59</td>
</tr>
<tr>
<td>SE3 (active learner)</td>
<td>3.68</td>
<td>0.87</td>
<td>3.66</td>
</tr>
<tr>
<td>SE4 (peer teaching)</td>
<td>3.76</td>
<td>0.88</td>
<td>3.67</td>
</tr>
<tr>
<td>SE5 (self-assessment)</td>
<td>3.80</td>
<td>0.84</td>
<td>3.75</td>
</tr>
<tr>
<td>SE6 (peer-assessment)</td>
<td>3.51</td>
<td>0.99</td>
<td>3.49</td>
</tr>
<tr>
<td>SE</td>
<td>3.77</td>
<td>0.69</td>
<td>3.72</td>
</tr>
</tbody>
</table>

SE referred to educational student engagement situations in general with using the Mean of the six items. SD: standard deviation.

Table 6. The effects of gender and learning phases on the relationship.

<table>
<thead>
<tr>
<th>S&amp;S</th>
<th>CP</th>
<th>H&amp;S</th>
<th>PF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beta</strong></td>
<td>Robust standard error</td>
<td><strong>Beta</strong></td>
<td>Robust standard error</td>
</tr>
<tr>
<td>Male</td>
<td>−0.144</td>
<td>0.062</td>
<td>−0.002</td>
</tr>
<tr>
<td>SE</td>
<td>0.392***</td>
<td>0.015</td>
<td>0.377***</td>
</tr>
<tr>
<td>Male × SE</td>
<td>0.023</td>
<td>0.016</td>
<td>0.021</td>
</tr>
</tbody>
</table>

Learning phases (base: general education)

- Biomedical education: 0.375***
- Clinical medical education: 0.584***
- Clerkship rotation: 0.638***
- Biomedical Education × SE: 0.026
- Clinical medical education × SE: 0.073***
- Clerkship rotation × SE: 0.148***

Observations: 123,055
R²: 0.137
F test: 0.000

Robust standard errors in parentheses; Medical school fixed effects, and Robust standard errors are clustered at the medical school level. ***p < 0.001, **p < 0.01, F < 0.001.
educational student engagement (Pollard 2009; Chen et al. 2014). By contrast, the various and dynamic content covered by PF is intimately linked to personal experience (Whitcomb 2005), and the outcomes are difficult to estimate (Li et al. 2017). Although educational student engagement is not as effective a contributor to PF as in other domains, it did enable students to integrate their understanding of medical professionalism into the clinical learning environment (Armitage-Chan and May 2018; Whitcomb 2005).

In this study, we further explored the entailed educational student engagement activities. The findings confirm the important role of students’ evaluation of the program, giving feedback, and being active learners. Moving beyond the traditional definition of unidirectional feedback given by teachers, evaluation and feedback in educational student engagement nowadays refer to a bidirectional circular behavior, which could work as a cycle to bridge the information gap between teaching and learning (McGinness et al. 2020). Evaluation and feedback can help with promoting students’ evaluative judgement and self-efficacy (McGinness et al. 2020). Furthermore, being an active learner shows students’ autonomous motivation, which has been shown to have a positive impact on student learning performance (Kusurkar et al. 2013; Wouters et al. 2017). On the other hand, peer-assessment activities did not show obvious contributions to most of the learning outcomes. The success of peer assessment could depend on several factors, including the type of peer assessment, e.g. formative or summative; anonymity; and students’ accustomed towards doing peer assessments (Curran et al. 2020; Lerchenfeldt and Taylor 2020). Conducting a successful peer assessment requires the institution to provide clear introductions and help their students prepare well (Curran et al. 2020). To enhance learning outcomes, medical students could consciously increase their participation in certain types of educational student engagement.

Furthermore, the impacts of the educational student engagement on learning outcomes were heterogeneous across different learning phases. The results in this study indicate that the engagement at the Clerkship Rotation phase correlates most strongly with the S&S learning outcomes. The engagements at the Clinical Medical Education and the Clerkship Rotation phases are strongly associated with the CP learning outcome. Explanations may be related to reflections, which can better mobilize students to digest and assimilate what they have learned when their knowledge base increases (Ribeiro et al. 2019; Sandars 2009). Interestingly, Basic Medical Education students in China were most engaged at the General Education phase and least engaged at the Clerkship Rotation phase. Nowadays, medical students usually do not regard Basic Medical Education (referring to a Bachelor’s degree) as the end of their medical training (Wu et al. 2014). Most undergraduate medical students in China need to prepare and attend the Postgraduate Entrance Examination at the senior learning phases for the qualification of postgraduate study, which may distract them from joining educational student engagement. The lower participation in educational student engagement could also be explained by the curriculum design in the Clerkship Rotation phase. Gonzalez et al. (2019) indicated that there might be some structural barriers to student engagement especially when it comes to patient communication and health care delivery. The barriers pertained to lack of diversity, competing priorities, and the need for effective facilitation (Gonzalez et al. 2019). Although the participation in educational student engagement at the Clerkship Rotation phase was lower than the initial phases, the association between engagement and learning outcomes at this phase was stronger. Thus, we suggest that medical education institutions and medical students could put more attention in stimulating educational student engagement at senior learning phases. Moreover, what the findings of our study suggest is that if we want to effectively increase the educational student engagement of the senior students, we need to consider two aspects, both to increase students’ awareness of their engagement, and to avoid systemic flaws from a curriculum design perspective.

Our research demonstrates the effectiveness of educational student engagement on achieving learning outcomes convincingly with a large sample size based on a national-wide survey. We have included 107 out of 165 institutions (64.8%) that offer the clinical medicine education programme in China in our survey. Moreover, the geographic distribution was accordingly balanced with that of the whole country, which together gave our research a strong national representation. The content covered by the educational student engagement sphere provides a significant contribution to each learning outcome domain. The findings of this study suggest that medical schools could put more effort into enhancing the engagement at the senior learning phases for medical students in Basic Medical Education. Another practical application of this research could be to demonstrate to students that educational student engagement activities, such as evaluation, feedback, and being an active learner contribute to achieving learning outcomes, so that the students could have a stronger intrinsic motivation to participate in the educational student engagement activities consciously.

There were certain limitations of this research. Firstly, we used a self-assessed scale for evaluating learning outcomes and this may have caused some reporting bias. The subjective scoring of the students themselves could be biased to optimistic self-assessment. In addition, the lack of objective quantitative criteria for learning outcomes may affect the robustness of the results of this study. However, the self-assessment method has been widely used for evaluating students’ learning outcomes in medical education (Khoiriyah et al. 2015; Schiekirka et al. 2013), and there was a good correlation between their scoring and the learning phases they were in, especially for Clinical Practice, suggesting that the students had a fair judgement of their growth in achieving their learning outcomes. Secondly, instead of encompassing broader spheres of student engagement, we only analysed the relationship between educational student engagement and the learning outcomes. We were not able to compare the different student engagement spheres and draw relevant conclusions about which type of student engagement could contribute the most to learning outcomes. Thirdly, the participants of our study were all Chinese medical students, and we took the Basic Medical Education in China as our research context. We were unable to identify cultural influences or to
demonstrate the applicability of our findings to other medical education settings. Future research would be more objective if standardised learning outcome assessments could be used to investigate the effectiveness of student engagement. Besides, future research could also investigate other spheres of student engagement to select more targeted student engagement approaches for specific learning outcomes. Moreover, cross-country comparative surveys can be conducted to demonstrate the effectiveness of educating students to participate in more diverse settings.

Conclusion

In conclusion, our study analysed the relationship between educational student engagement and self-assessed scoring for learning outcomes for medical students based on a national-wide survey about Basic Medical Education in China. We find that educational student engagement positively correlates with medical students learning outcomes in Clinical Practice, Health and Society, Science and Scholarship, and Professionalism. Medical students have the highest level of engagement at the General Education phase, and the lowest level of engagement at the Clerkship Rotation phase. In addition, learning outcomes in Clinical Practice are associated with educational student engagement at the Clinical Medical Education and Clerkship Rotation phases, and learning outcomes in Science and Scholarship are most strongly associated with educational student engagement during the Clerkship Rotation phase. Therefore, we recommend that medical students as well as medical schools could stimulate more educational student engagement at the senior learning phases of the Basic Medical Education both for the benefit of the program as well as for the individual student.

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Disclosure statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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Hongbin Wu, Ph.D, is an assistant professor at National Centre for Health Professions Education Development/Institute of Medical Education, Peking University. He holds a PhD from Peking University focusing on health professions education. He has published articles in Medical Education, Computers & Education, BMC Medical Education and other top-tier journals. He has also translated books such as A practical guide for medical teachers and Researching medical education. He has worked as an investigator in many national-level research projects and launched the China Medical Student Survey.

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