

## A nurturing environment for teaching molecular biology to medical students

Sir,

Children learn complex tasks such as locomotor activities and linguistic skills in the 1<sup>st</sup> year of life without a strict educational program. This great natural self-learning ability begins to decline just as they enter the classic training programs of schools in most of which the trainees are the passive receivers of information. Such educational systems cannot raise the capabilities required for encountering the complex situations of the real world. This is especially true for those who are intended to have more sophisticated jobs such as medical doctors. Indeed, physicians are expected to make complex decisions based on a huge amount of rapidly evolving scientific literature. Therefore, improving intellectual characteristics such as curiosity, self-learning, and critical thinking have frequently been suggested to be considered as the core of medical education programs.<sup>[1]</sup> However, still a considerable fraction of most medical education curriculums is occupied by traditional lecture-based teacher-centered classes in which the students have no role other than memorizing the data to pass the examinations. These inefficient education systems should be changed to situations in which the students have the opportunity to shape their individualized structures of concepts. This constructivism approach not only leads to a deep understanding of basic concepts but also raises physicians that are responsible for training themselves all over their carrier.<sup>[2,3]</sup>

As a medical teacher, I (YG) was unhappy to see some students lose their interests as they go through their years of studying medicine. Indeed, most of the students were greatly motivated first they entered the medical schools, but this motivation gradually dropped as they found some courses unexciting. Hence, I was eagerly looking for ways to make my molecular biology class an opportunity for the students to have a pleasant learning experience. During this survey, I got familiar with the ideas of Sugata Mitra, a professor of educational technology. During his works, as a young engineer in the rural parts of India, he found that even children who do not know English can learn to work with a computer and browse the Internet without the assistance of teachers after some weeks that they had access to a computer. He repeated this experience in other situations for teaching other disciplines such as foreign language and biotechnology, and finally, he came to the idea that

children can teach themselves complex skills just if they have the chance to be in a supportive environment. To emphasize the role of this ecosystem, he named it as self-organized learning environment (SOLE). The role of teachers in this system is to facilitate the establishment of this supportive environment.<sup>[4]</sup> Although SOLE was described for children's education, I was interested to examine if it also works for medical students.

To evaluate the new method, my assistant and I dedicated three sequential sessions of the molecular biology course on signalling pathways to a novel education method based on team working and self-learning. Four scenarios were designed with relevant questions, each one covering a part of the whole topic: (1) Angiogenesis and vascular endothelial growth factor signalling pathway, (2) chronic kidney disease and transforming growth factor-beta signalling pathway, (3) cortisol signalling pathway, and (4) homing and SDF-1/CXCR4 signalling pathway. About ten students were allocated to each group and in the first two sessions, each group had to work in a separate room with free access to internet and textbooks. In these sessions, they had to search the resources and discuss together to explore the scenarios and answer the questions. The students participating in this course were mostly within their 1<sup>st</sup> month of entering the University from high school. Therefore, coming up with huge amounts of online literature and professional medical textbooks was not an easy task for them. However, they commonly found it a joyful experience as they got curious to find the answers to questions raised during their discussions. As the role of students was changing from passive listeners to active self-learners, my role had also to change to the facilitator of the discussions. I spent a part of the session with each group to guide their discussions by asking critical questions. In the third session, all students gathered in a hall and each group had a short slide presentation to share the findings with other groups. Besides, they were asked to have a poster presentation to visually depict their conclusions by drawing concept maps. The posters were peer-assessed and ranked by the students. Before the third session, the students were provided with online tutorials for concept mapping and presentation skills.

After the third session, the students were asked to give feedbacks through filling a questionnaire. Although

some students complained of the shortage of time (52.2%) and difficulty of the assignments (50.4%), most of them felt that their reasoning (74.4%), team working (76.4%), and problem-solving skills (73.2%) had improved. Furthermore, they indicated that they will use concept mapping for learning their future courses (65.4%).

Taken together, I believe this method could efficiently attract students and involve them in an active learning process. Although a wide range of contents cannot be covered by this approach, it allows a deep understanding of basic concepts. In addition, it can improve a variety of intellectual skills.

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There are no conflicts of interest.

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## References

1. Taylor DC, Hamdy H. Adult learning theories: Implications for learning and teaching in medical education: AMEE Guide No. 83. *Med Teach* 2013;35:e1561-72.
2. Bada SO, Olusegun S. Constructivism learning theory: A paradigm for teaching and learning. *J Res Method Educ* 2015;5:66-70.
3. Walankar PP, Panhale VP, Situt SA. Evaluation of learning approaches in physiotherapy students: A valuable insight. *J Educ Health Promot* 2019;8:25.
4. Mitra S, Dangwal R. Limits to self-organising systems of learning-the Kalikuppam experiment. *Br J Educ Technol* 2010;41:672-88.

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