"Generalization" in health professions education (HPE): learning agent or learning itself?

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Dear Editor-in-Chief

The complex process of learning, with all its principles, theories, actions, and reactions, is a continuous, necessary, and unavoidable phenomenon, not only for an educational system but also for human life. Learning is a process that, although many factors are involved in it (1), and some of these factors are known to us, the way information processing leads to learning, and, as a result, the way of learning itself is still not completely known. One of the debatable components related to learning is the generalization process.

Generalization is a process that causes learning, and according to the opinion of behavioral psychologists, the learner desires to respond to related and similar stimuli; therefore, it is a factor that can cause learning in humans (2). The process of generalization occurs abundantly throughout human life, and although this generalization is not always positive and can be misplaced, it also has a significant role in learning. The fact is that generalization will happen (3), and the

teacher must organize and design the teaching process in such a way that positive generalization leading to optimal learning occurs in the learner's mind and behavior. It seems that generalization also plays a significant role in creating mental schemas. Schemata are cognitive frameworks for organizing information (4) that help us save information for learning.

The importance of its generalization becomes more apparent when we know that the majority of learning processes contribute, albeit a small one, to generalization. In other words, ultimately, it is the generalization that causes learning. With a broader view and expansion of the subject, we realize that what Ausubel stated in his meaningful learning theory (5) results from generalization. In other words, meaningful learning occurs when the learner can combine the new learning with the old learning and create a result or concept or new principles from it (5), which is possible without generalizing these events and learning. Therefore, it seems that learning about any subject in any way has streaks of generalization in it. The

problem can arise when the educational system and subsequently the teacher ignore the generalization process in students' learning. It is suggested that teachers in their specialized fields, during or before the instructional design, compile some of the content of the courses that include various generalizations in that field and use it in their teaching so that a sequence and pattern of generalizations are formed in the student's mind. The student can form the rest of the sequences in his mind according to what he/she has learned. As an example, the learner, by knowing how the splint works, in situations where a standard splint is not available, uses cardboard as a splint, and his generalization can include other cases as well. By being in a managerial structure, a person enters any other administrative structure, and he can learn about the administrative procedures and processes by making generalizations. By raising and educating one child, parents generalize from its sequence and educate their other children more easily and correctly. Also, parents' anxiety and fear caused by care are eliminated or reduced. It becomes easy for a student to understand the subjects of medical physics when he has completed the physics course. Knowing a drug's mechanism enables the pharmacy student to make generalizations and learn the mechanisms of all drugs belonging to that drug family more easily. Even the competency and skill acquired by a medical student from practicing on a simulator or mockup in clinical training and transferring it to the real environment and on the patient's bed, in the first place, requires the occurrence of a generalization process. For policymakers and managers of the health system, generalization can help them apply the changes or events that they have experienced in a past situation in new situations that are created for them, in other words, to learn from it.

One of the cases worth mentioning is the use of generalization at the beginning of programs or training courses or the beginning of academic courses so that if the educational course is not held in a standard, attractive, and effective way, or if unpleasant events occur, the audience and learners of this course make incorrect generalizations and generalize these events to the entire course, teachers, and participants of the course. Of course, the reverse is also true.

These are just some examples of generalization in medical sciences. Medical teachers must explain this fact to their students and learners and explain its logic and scientific reason. From this point of view, it is clear why students should study gradually and continuously throughout the course and not postpone it to the days, nights, or final weeks of the semester. This important matter should be taken into consideration in educational courses and faculty development programs for the empowerment of faculty members in universities of medical sciences (6).

It can be stated that making and constructing more generalizations in lessons by the learner, in addition to facilitating his learning, can also reduce his anxiety and stress. From this point of view, the anxiety of studying on the night of the exam can be justified, and one of its causes is the student's reduced generalization during the course.

With these words, six basic and effective roles for generalization in medical education processes can be listed, including the role of generalization in:

1. Creating positive cognitive schemata

2. Creating new and meaningful learning (in basic sciences and clinical education)

3. Facilitating and strengthening hidden learning and making it explicit

4. Reducing the exam anxiety and stress of learners

5. Normal processes of human life (students and faculty members of medical sciences)

6. Beginning of programs, educational courses, or training courses in medical sciences

Finally, it can be concluded that although generalization is not all learning and various components are involved, we can see the shadow of generalization over the majority of learning processes, especially in medical education during learners' learning. This serious issue should be considered by decision-makers in the educational system, faculty members, and students. Although these generalizations may occur unconsciously, the knowledge and understanding of teachers and students about the

generalization process and its examples can increase the level of awareness and, subsequently, apply and consider it to facilitate learning.

Conflict of interest

The authors have no conflict of interest in this study.

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