

Active learning methods: a way of tackling large classroom setting

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The Department of Education in the United States published a report highlighting that colleges and universities are faced with a huge number of undergraduate enrollments. The report also expressed worry for class sizes which are reaching unprecedented levels (1). This increase in the number of students is not without its significant drawbacks. McLeod accentuated some of these disadvantages including a tense impersonal relation between teacher and students, the state of discomfort for teaching, and that teachers who teach large classrooms are in a lower status in their institution (2). Research also shows significant results on class size and student performance. In a study by Arias and Walker it was found that students who received training in small classroom environment in comparison to large classroom setting performed better in problem solving skills, critical thinking, and long-term retention (3). For this burgeoning problem, higher education institutions have tried to find remedies by pushing faculty to become better teachers and to deliver higher levels of quality and value in the educational context in regard to the exponential increase of university students (1). Apart from the endeavors in dealing with this problem, faculty cling to one of the most common teaching methods of instruction in schools to remedy this dilemma. This traditional passive view of learning, lecturing, is often considered as an educational method when teaching in large group environments. Although it can be a panacea but it is important to pay heed to students'

attention when incorporating lecturing in a large classroom. As teacher moves on with the verbal presentation; the fall-off in the level of attention increases (4). There are good justifications for moving away from the traditional approach of lecturing to groups of students. The solution to this concern may, in part, involve putting students in the state of being passive recipients of knowledge if we adopt lecturing as an only instruction method. In a study by Caprariis et al. it was proposed that lecturing leads to the ability to recall facts as it has no students' input/feedback (5). Similarly, research shows that a noteworthy portion of students are not learning the critical thinking, written communication, and complex reasoning skills thought which are the cornerstone of education (6). Aiamy and Haghani also asserted that there is a need of transformation for educational systems to foster creative thinking among their learners (7). In contrast, a more modern view of learning is constructivism. Based on social constructivists like Vygotsky, the learning process of an individual commences from the individual in which he/she constructs new knowledge on the basis of what he/she already knows (8). Constructivists expect students to be active in the learning process by taking part in discussion and collaborative activities (9). Constructivists also declare that the learning community plays a pivotal role in the process of learning. The Zone of Proximal Development is a momentous premise in social constructivism. Based on this key idea,

if a learner connects new knowledge with existing knowledge then learning occurs. The zone of proximal development can extend if conversations are traded back and forth between learners and teachers on what is already known by putting new thoughts and concepts in the context of current understanding (8). Overall, the findings of recent researches regarding the effectiveness of teaching methods favor constructivist, active learning methods such as student-led discussions, team-based learning, and problem-based learning (10,11). Likewise, Hunt et al. also noted favorable student attitudes towards active learning methods (12). Therefore, faculty should be familiar with different active methods of instruction in large classrooms to better provide a learning environment in which students are engaged enthusiastically in active learning to construct new knowledge. The primary purpose of this study was to identify effective popular teaching methods to be used in large classroom setting in order to help faculty who are charged with teaching large classes facilitate learning in the educational context.

It should be noted that the literature on active learning methods is extensive and as there are a wide range of methods, we briefly describe some of the popular active learning methods that can be typically used in a large classroom setting and have resulted in enhanced learning across the schools globally. It is highly important to mention that active learning methods such as flipped classroom, team-based learning, case-based learning, and jigsaw are described here as active methods of learning and we describe social media and audio response systems as effective tools which foster active participation and students' involvement in the learning process. These two tools are discussed after flipped classroom method as they can be used within this method when teaching large groups of students. In brief, we try to expand our findings in three ways:

A short description of each method or tool is provided;

Relevant literature with the use of each method or tool is highlighted;

More exploration of each method will be discussed;

Flipped Classroom

Flipped classroom or inverted classroom is one of the solutions that can address the apparent deficiencies in teaching large groups of students in a lecture-based course. Lecturing does not help students retrieve abstract knowledge to solve real life problems (13). Flipped classroom engages students in a process of intellectual inquiry (higher order thinking skills) and creates a learning environment where real life problems are solved by previously gained knowledge. This innovative method of teaching revolves around this premise that offloaded basic content (video, audio, text, images, web pages, animations, etc.) is delivered to students prior to a lecture or class session to be learned by students at their own pace. In this regard the class time, where the depth of learning should come from, is then dedicated to more student-centered and rich interactive learning activities. New knowledge is constructed through problem-based learning, case-based scenarios, and inquiry-oriented strategies (14). Based on this approach, teachers play the role of a facilitator with more face-to-face interaction advocating students in deeper learning processes. In terms of evidence, Sharma et al. inverted the rheumatology classroom at the University of Hong Kong by recording short video clips and posting them to YouTube channel and emailing to students. During the class session, groups were formed and based on video materials; case based discussions were followed in terms of investigation, management, and diagnosis of the problem. This initiative was evaluated with a positive impact (15). By the same token, in a study by Pierce and Fox, findings showed that

flipped classroom significantly enhanced students' performance during the delivery of a renal pharmacotherapy module in comparison to the students' former performance with the same module in a traditional mode of instruction (16).

Social Media

Modern technologies are revolutionizing students' learning in terms of less lecture-based teaching. Medical schools try to adopt new methods of instruction in which students are required to be more involved outside of classroom in preparation for interactive learning activities (17). Prober and Health state that; if students have access to information outside of classroom, this will enhance active participation (18). As the majority of students utilize at least one social media application, have familiarity, and most tools are free with simple functionality, they can be incorporated in the teaching and learning activities to encourage active learning. Social media tools facilitate peer-to-peer and peer-to-lecturer engagement. They also enable space for sensitive and probing questions in the learning process. George et al. took use of two social technologies (Google Docs and SurveyMonkey) into a lecture-based mode of instruction entitled "Social Influences on Health" which was conducted on 154 first-year students at Penn State College of Medicine. The results revealed perceived strengths of this approach by facilitating interaction and providing students with control over content (19).

Audio Response Systems

It was in 1960 that Audience response system(s) (ARS) at Cornell and Stanford Universities were used for the first time. They are practical in diverse fields of education for pedagogical activities and educational institutions use them to facilitate increased attention, interaction, instruction, student preparation, and engagement. ARS has an

input device which is controlled by the learner. It also has a receiver and a display linked to the input that can be controlled by the instructor (20). They can also cover formative and summative knowledge assessments (21). Doucet et al. conducted a prospective observational study on undergraduate veterinary students enrolled in a mandatory veterinary clinical pharmacology to evaluate the use of ARS in the promotion of active learning during case-based discussions in large groups. They concluded that ARS provide engagement, observation, motivation, and critical reflection. The results also highlighted a couple of advantages for students as the identification of their strengths and weaknesses, overcoming the fear of participation, focused feedback to the whole class at once, and dynamic interaction (22). As students' engagement, active learning, and assessment are important topics in large classroom environment (23), ARS are highly practical in these areas. By using ARS, teachers can modify their pace of teaching. If majority of students respond correctly to questions, then there is less discussion in comparison to when there is a large proportion of wrong answers.

Team Based Learning

The advent of Team Based Learning (TBL) is related to Dr Larry Michaelsen who first designed and tested this novel instructional method in the business school at the University of Oklahoma. Its use in medical education is paramount, and researchers in medical and nursing schools have taken advantage of its application (24). In brief, TBL has three phases. Phase one is the preliminary stage in which preparation of the targeted content occurs before class attendance. In phase two, in order to assess the acquired knowledge obtained from phase one, the individual readiness assurance test as well as discussion with the instructor are conducted. In the last phase which involves a higher level

of learning, students form small groups to apply higher course concepts to deepen their understanding (25). Zgheib et al. adopted Team based learning (TBL) approach at the American University of Beirut faculty of medicine to examine the effect of teaching pharmacology course on second year medical students' satisfaction and performance. The results showed that group performance was significantly better than individual performance and students expressed positive feedback (24). In a similar vein, research highlights that not only team based learning method has positive learning outcomes in students' performance when participating in teams but also team learning fosters a greater involvement, self confidence, and leadership ability in students (10,11,12).

Case Based Learning

Cased Based Learning (CBL) was first introduced by James Lorrain Smith, a pathology professor, at the University of Edinburg in 1912. CBL which uses a guided inquiry method is a pedagogical active learning approach based on patient cases. The cases in CBL must be valuable, authentic, interesting, applicable, and aligned with learning outcomes. Regarding the cases employed and discipline, this well-established instructional method can be defined. Real-life situations are the target of students learning in this approach. In brief, students in the role of a decision maker are encountered with a case to identify a problem. Then comes the analysis of potential causes and alternative solutions. To enrich learning, reflection on cases is required. So, learning teams are formed before class attendance and students share and discuss their findings together. In the final step, underlying issues are probed under the questioning and guidance of the teacher for appropriate courses of action (26). Michel et al. express that this learning and teaching approach is promising in gripping learners to combine, apply, and integrate basic knowledge in terms of real-life

contexts (27). Krueger et al. contended that by using CBL, superior results in terms of deeper level of understanding, concept application, and knowledge scores were obtained when there was a shift from the lecture-based method towards CBL (28).

Jigsaw

Jigsaw was first designed by Aronson in 1978. It is a cooperative teaching method which is flexible and has unlimited variations. Its premise is upon group dynamics and social interactions (29). Doymus purported that Jigsaw is one of the most frequently used techniques which can be utilized in large classroom environment (30). In brief, after the completion of out of class homework assignment, in the first phase groups are formed with one student in each group as the leader. These groups which are called "home groups" are developed to peer-teach other members. The members of home groups leave their group in order to create the so called "groups of experts" or the "jigsaw group". This formation is bounded for the preparation of subjects. One of the pivotal roles of "groups of experts" is making other students aware of the subject by teaching and preparing a report. On the following phase, students come back to their first group in order to teach the subject with the help of the report they have prepared. Lastly, comes the phase of completing in which teacher adopts some activities in small groups to unify students' learning and assess their understanding (31).

Based on enrollment projections, large classes are going to be ubiquitous and a way of life for faculty. Faculty must be cautious when teaching to large groups of students to facilitate adequate and relevant feedback. There is an expectation of schools to promote an integrated curriculum and incorporate active learning in the classrooms (24) to move away from passive learning to active learning. Although lecturing still seems to be the most

widely used medical education method of teaching for large groups of students in order to transmit information, but it is not as effective as other methods to provoke higher levels of thinking, information retention, knowledge transfer, and attitude change. Evidence highlights that Lecture-based courses are under careful scrutiny towards a focus on more active learning approaches (25). Graffam also states that in medical education the use of active learning approaches have been proved to be efficacious in improving learning outcomes (32). These changes should make faculty vigilant, thus, they need innovative and interactive methods and tools of instruction to foster active participation. So, if lecturing is combined with discussion and more active, cooperative learning methods, the resultant is superior retention of knowledge among students, engagement, interactivity, solving real life problems, and motivation for future learning. Bearing in mind the huge enrollments at schools, this keeps us on our toes to think about active learning methods and incorporate them into our teaching to evade from making our students passive learners during the class time. Considering flipped classroom as an umbrella over teaching and learning activities in large classrooms, students can progress beyond acquiring factual knowledge but gain the abstract knowledge with the support of teachers and the collaborative activities in small groups. In this way, new knowledge is constructed on the actual level of understanding. It should also be noted that social media as an aiding tool with its increasing popularity among students can be considered as a resource for students engagement in the learning processes. As more students have a zest for the use of internet and social media, this shows the ropes to guide the learning activities towards where more satisfaction and participation are achieved. In addition, the use of ARS keeps students motivated and attentive throughout the class time. As engagement is paramount in active learning for reflecting ideas (33), ARS oblige

all students, not only outspoken students, to engage in the activities and the resultant is improved learning. Evidence shows that the use of ARS in a lecture-based course, makes lecturing more comfortable and charming. This makes teachers cautious of students' needs to guide their teaching approach towards a more immediate and caring style (34). By the same token, students are more motivated when they receive encouragement from their teachers to participate actively in the teaching and learning activities. Schools can apply TBL in their curriculum when there must be some modifications for already established courses or when they are looking for alternative cost-effective learning techniques (24). TBL is a learning style which is smooth, promotes deep understanding, and engages students in self-learning. Nieder et al. experimented with TBL and expressed that student performance was improved based on a shift from traditional teaching and learning methods (35). As TBL is premised upon key instructional principles with accountability and interactive discussions a necessity (25), this highlights that in a lecture-based course which its aim is to cover the content, TBL has an aim to apply the knowledge in an interactive context between students and the teacher. This fosters student-centered, deep learning, and retention of the material presented. By adopting a CBL environment, face to face interaction regarding clinical cases, faculty shortens the linkage of theory and practice as students are encountered with real life situations. In order to solve the problems, students need intense interaction to overcome the problem thus, new knowledge is constructed by cooperation. The analysis of the cases in the case-based approach put the students in the right track of the real world. CBL as an Inquiry-based learning has an emphasis on constructivism. It promotes a deep learning approach with active and meaningful learning (26). Therefore, knowledge is acquired in a series of steps, group processes, and active participation which fosters a deep approach to learning by

acquiring, reproducing, and applying it. Hansen and Krackoy express that CBL engages students in problem solving and promotes active discussion and participation among students (36). As there is a need for a move away from passive learning methods, jigsaw as a cooperative method can be of great value in terms of making students active in and outside the classroom by forming small groups. Siegel contends that this method engages students actively in the learning process and it is increasingly used in more and more areas every day (37). Thus, by having this method on hand, teachers can involve students in the class activities. Consequently, students would not be the passive recipients of knowledge and the class time is spent in a more efficient and practical way.

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The active methods and tools identified in our study can foster more interaction among learners, elevate lifelong learning skills, and erode the passivity of students in a large setting environment. Faculty teaching large classes should be familiar with and attempt to include constructive, active teaching methods in their tool box to provide an environment in which learners can flourish whenever possible.

Ethical issues

Not applicable.

Authors' contributions

Both authors equally contributed to the writing and revision of this paper.

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