

# Merits of Student- Centered Learning in Anatomy

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## Abstract

**Introduction:** The clinical significance of Anatomy in undergraduate medical education cannot be adequately emphasized. For doctors, the human body is the focus of investigation and intervention on a daily basis; for this reason, the study of anatomy in some form, will continue to be essential to safe medical practice. It is necessary for core knowledge of anatomy to be assimilated by all doctors in order to practice medicine safely. It may be true that most doctors do not need to dissect a cadaver or study a prosection in order to practice, but if they do, it can improve their understanding and this surely has to be of benefit both for the safety of the patient and satisfaction of the doctor as a professional. Teacher-centered typically refers to learning situations in which the teacher asserts control over the material that students study. In contrast, to teacher centered learning, student-centered typically refers to forms of instruction that, for example, give students opportunities to lead learning activities, participate more actively in discussions, design their own learning projects, explore topics that interest them, and generally contribute to the design of their own course of study. **Conclusion:** We should develop and implement an instructional design that focuses on incorporating active-learning and student-centered pedagogy into what is previously a traditional lecture-based course. These changes will lead to sustainable improvements in student attitudes and performance. Although the changes to be implemented may require a significant time commitment in the first year, it will essentially be a “one time investment” because it will not require extra effort to teach the revised model in the future. Furthermore, it will not only provide a model for revision of an individual course but can also provide a catalyst for institutional reform.

**Key Words:** Anatomy, Medical Education, Doctor, Practice Medicine, Teacher-Centered, Student-Centered, Small Groups, Self-Guided, Revised Model.

## 1. Introduction

The importance of Anatomy in undergraduate medical education cannot be adequately emphasized. For doctors, the human body is the focus of investigation and intervention on a daily basis; for this reason, the study of anatomy in some form, will continue to be essential to safe medical practice. It is necessary for core knowledge of anatomy to be assimilated by all doctors in order to practice medicine safely. It may be true that most doctors do not need to dissect a cadaver or study a prosection in order to practice, but if they do, it can improve their understanding and this surely has to be of benefit both for the safety of the patient and satisfaction of the doctor as a professional [1]. Anatomy teaching has undergone major changes due to time constraints and the rapid advances in computer technology. Also there has been a shift a teaching methodologies from a passive didactic teacher- centered approach to an active student - centered approach [2].

## DISCUSSION

Teacher-centered typically refers to learning situations in which the teacher asserts control over the material that students study and the ways in which they study it, i.e., when, where, how, and at what pace they learn it. In classes that would be considered teacher-centered, the teacher tends to be the most active person in the room and do most of the talking (e.g., by lecturing, demonstrating concepts, reading aloud, or issuing instructions), while students spend most of their time sitting in desks, listening, taking notes, giving brief answers to questions that the teacher asks, or completing assignments and tests [3]. In addition, in teacher-centered classrooms, teachers also decide to teach students in ways that are easy, familiar, or personally preferred or use instructional techniques shown to be most effective for improving learning. This might not work well for some students [4]. In a teacher-centered classroom, teachers choose what the students will learn, how the students will learn, and how the students will be assessed on their learning [5]. In context of Maryellen Weimer's Learner- Centered Teaching, Weimer identifies five areas where the teacher-centeredness of the classroom is clearly seen: the balance of power, the function of content, the role of the teacher, the responsibility of learning, and the purpose and processes of evaluation

[6]. In the traditional approach to college teaching, most class time is spent with the professor lecturing and the students watching and listening. The students work individually on assignments, and cooperation is discouraged [7]. it is almost inevitable that medical students will experience Didactic lectures, as the number of students attending is too large in comparison to the teaching staff available. Traditionally, most of the lectures were taken with chalk and board in India but With the advancement of technology, the use of PowerPoint (PPT) presentations is the most popular electronic presentation used.

In contrast, to teacher centered learning, student-centered typically refers to forms of instruction that, for example, give students opportunities to lead learning activities, participate more actively in discussions, design their own learning projects, explore topics that interest them, and generally contribute to the design of their own course of study [8]. Student-centered instruction is often associated with classrooms that feature desks arranged in circles or small groups (rather than rows of desks that face the teacher), with "self-guided" or "self-paced" learning, or with learning experiences that occur outside of traditional classroom settings [9]. Student-centered learning puts students' interests first, acknowledging student voice as central to the learning experience. In a student-centered classroom, students choose what they will learn, how they will learn, and how they will assess their own learning [10]. Student-centered teaching methods shift the focus of activity from the teacher to the learners. These methods include

active learning, in which students solve problems, answer questions, formulate questions of their own, discuss, explain, debate, or brainstorm during class; for example - What would or would not happen if this nerve were cut? Would an infarct occur if this artery were occluded? What would be the result of tearing this ligament? Cooperative learning, in which students work in teams on problems and projects under conditions that assure both positive interdependence and individual accountability; for example seminars and self directed learning; [11] and inductive teaching and learning, in which students are first presented with challenges (questions or problems) and learn the course material in the context of addressing the challenges, for example inquiry-based learning, case-based scenarios, problem-based learning, project-based learning, and discovery learning [12]. Student centered learning is thought to facilitate learning by laying emphasis from what is taught to what is learnt. But can be difficult to coordinate and administer, as teachers are also not trained in facilitating student based learning. Unless students are familiar on how to direct their own learning, they can be left confused and struggling with the curriculum [13]. Student-centered methods have repeatedly been shown to be superior to the traditional teacher- centered approach to instruction, a conclusion that applies whether the assessed outcome is short-term mastery, long-term retention, or depth of understanding of course material, acquisition of critical thinking or creative problem-solving skills, formation of positive attitudes toward the subject being taught, or level of confidence in knowledge or skills [14]. Student-centered learning requires students to be active, responsible participants in their own learning and with their own pace of learning. Classrooms at the college/university level are extremely instructor-centered and this situation works against students becoming successful, mature learners. There is growing interest in student-centered learning in higher education, and many universities provide online resources for their professors at their websites. The traditional lecture format of most large introductory science courses presents many challenges to both teaching and learning. Although a traditional lecture course may be effective for efficiently disseminating a large body of content to a large number of students, these one-way exchanges often promote passive and superficial learning and fail to stimulate student motivation, confidence, and enthusiasm. As a consequence, the traditional lecture model can often lead to students completing their under-graduate education without skills that are important for professional success. The individual instructor–student interactions often indicate that students are more concerned with their test scores than with gaining a thorough understanding of the course material. Poor student attitudes also were reflected by poor attendance, limited participation in class, and suboptimal student performance [13]. It is true that for many years the pedagogical focus was on teaching. We assumed (and not without justification) that if teaching improved, so would learning. When teachers demonstrate characteristics like organization, enthusiasm, clarity and fairness, research has shown that students learn more (as measured by higher grades). Teachers positively impact students on many levels, including curriculum design, intellectual challenge, personal growth, career guidance and other less tangible ways. Our students not only know us as teachers who design their course, they also know us as people who listen to their aspirations and struggles. Indeed, students’ memories and experiences with teachers are often just as important to their success as the skills they develop and knowledge they acquire [14].

**Teacher - Centered Paradigm:**

1. Knowledge is transmitted from professor to students,
2. Students passively receive information,

3. Emphasis is on acquisition of knowledge outside the context in which it will be used,
4. Professor's role is to be primary information giver and primary evaluator,
5. Teaching and assessing are separate,
6. Assessment is used to monitor learning,
7. Emphasis is on right answers,
8. Desired learning is assessed indirectly through the use of objectively scored tests,
9. Focus is on a single discipline,
10. Culture is competitive and individualistic,
11. Only students are viewed as learners. [15].

**Students - Centered Paradigm:**

1. Students construct knowledge through gathering and synthesizing information and integrating it with the general, skills of inquiry, communication, critical thinking, problem, solving and so on,
2. Students are actively involved,
3. Emphasis is on using and communicating knowledge effectively to address enduring and emerging issues and problems in real-life contexts,
4. Professor's role is to coach and facilitate, Professor and students evaluate learning together,
5. Teaching and assessing are intertwined,
6. Assessment is used to promote and diagnose learning,
7. Emphasis is on generating better questions and learning from errors,
8. Desired learning is assessed directly through papers, projects, performances, portfolios, seminars, self directed learning, small group teachings, Group discussions.
9. Approach is compatible with interdisciplinary investigation,
10. Culture is cooperative, collaborative, and supportive,
11. Professor and students learn together [16].

Teacher - Centered Learning is for covering the discipline, competition, based on delivery of information, lecture, assignments and exams for Summative purposes, faculty act as gatekeepers, teach and present information well and those who can will learn [17]. Student - Centered Learning is for students to learn, how to use the discipline, how to integrate disciplines to solve complex problems, An array of core learning objectives, such as communication and information literacy skills, Cohesive program with systematically created opportunities to synthesize, practice, and develop increasingly complex ideas, skills, and values, Students master learning objectives, Students construct knowledge by integrating new learning into what they already know [18]. Learning is viewed as a cognitive and social act, Based on engagement of students, Active learning, Assignments for formative purposes, Collaborative learning, Community service learning, Cooperative learning, Online, asynchronous, self-directed learning, Problem-based learning, Grades indicate mastery of learning objectives, Designer of learning environments, Engage students in their learning, Help all students master learning objectives, Use classroom assessment to improve courses, Use program assessment to improve programs [19].

### **Types of Active Learning**

In small group discussion and peer instruction also called “Think- Pair- Share” or “Concept Tests”, students think about the answer to a question posed by the instructor, and then discuss the question among each other. The instructor selects students to explain the consensus to the class. In effective use of clickers, Hand-held electronic devices can allow students to anonymously vote on answers to multiple-choice questions in real time. Clickers are usually most effective when used with peer instruction [20]. In one-minute papers, an open-ended question is given, students spend one minute writing their answers on index cards, which are collected by the instructor. Often given at the end of class, the questions ask students what was the most important concept they learned or what remains unclear. In interactive lecture demonstrations, students make predictions about the outcome of a classroom demonstration. They then observe the experiment or demonstration, describe the results, and discuss and reflect on the observed outcome. In case studies; students draw inferences and make decisions given a detailed description of a scenario often based on a true story. In concept mapping, students create a visual representation similar to a flow chart that identifies and shows the interconnections among various ideas related to a specific topic or problem [21]. In tutorial worksheets, students work through guided-discovery worksheets that lead them through a chain of logic to solve a problem or overcome a conceptual difficulty. Students complete the exercises in small groups, while the instructor circulates among the groups to ask targeted questions or to facilitate discussion as needed or at specific “check points” in the worksheet. In problem-based learning, students work in groups to solve complex, multifaceted, and realistic problems, researching and learning necessary background material as needed [22]. In just-in-time teaching, students submit answers to questions about pre- class reading online, due a few hours before class. Answers are graded

based on completion and effort, not correctness, and inform the instructor’s lesson plans [23]. In analytical challenge before lecture also called “invention activities”, students make predictions or attempt to answer questions before learning about the answers in class. The effort is more important than the accuracy of the attempted answers. In computer simulations and games, students use interactive computer simulations or online games to visualize phenomena, test predictions, and receive prompt, targeted feedback to refine their intuitions, and conduct and analyze virtual experiments [24]. In Group tests, a test is given twice to the same students. The first time, students answer the questions individually as in a normal test and submit their answer sheets. Then students are allowed to work in groups and re-take the same test. The two scores individual and group are averaged. In problem sets in groups, students work on problem sets in teams, and submit one set of solutions per team [25]. In random calling, the instructor informs the class that students will be selected at random to respond to a question perhaps using a shuffled deck of index cards with students’ names. Then, the instructor poses the question to the class, and remains silent for tens of seconds to allow everyone to think through an answer. After a sufficient pause or perhaps after peer instruction, the instructor selects a student at random to share thoughts about the answer. Then, the instructor calls on another student at random to comment on the first student’s response. In writing with peer review, students evaluate each other’s writing using a rubric or criteria provided by the instructor. Different teaching strategies can be applied simultaneously to teach anatomy to large groups of students [26]. As a matter of fact it is important to use multiple techniques in order to reach as many different types of learners as possible. In our experience teaching anatomy to large cohorts (greater than 200) has been challenging using the traditional transmission technique (i.e., lecture). Therefore, developing an effective delivery method of course material was

necessary. Both students and professors agree that use of dissection and/or prosection is the most efficient teaching method [27]. The other teaching methods that were ranked by professors and students include: Living people/radiology, computer assisted learning, didactic, and lastly models. This ranking showed that lecture are not necessarily the most effective way to teach anatomy, and that both teachers and students prefer other methods. This ranking is related to our study by using the same methods of teaching anatomy during lecture and case discussion sessions. That is why we suggest that a multi modality approach should be used. As a student-centered philosophy of education, the implementation of the case discussion approach in teaching the anatomy subject can increase the students' understanding of the subject as well as motivate them to learn. Multiple modality approach and using multimedia may also be an effective teaching strategy. This allows the students to actively participate in the curriculum process of learning, removes the traditional student/ teacher barrier and encourages more student- to-student interaction[28]. The question for those who aspire to be learner-centered is not how to abandon lectures, but to understand when “teaching by telling” effectively advances the learning agenda. Learner-centered teachers should not leave students to muddle through on their own, but must know when to intervene and what kind of interventions enable students to discover their own way to understanding. Meanwhile, those who are teacher-centered should work to engage and involve students. They must recognize that students can learn from each other and that the deepest learning happens when students have the opportunity to practice and obtain feedback. The best teaching is not one or the other, but a combination of both. Clearly, these two kinds of teaching should co-exist and complement each other, one thing for sure; the younger generation is growing with technology in hand and with fundamentally changed pressures (for gaining employment) and expectations of us as ‘teachers’ Being learner-centered does not mean rejecting traditional teaching methods! It means selecting those which best support the learner, rather than which are easiest, most comfortable, or most familiar for the teacher. Why not one word for both? They are in fact inseparable, no teaching without learning, no learning without teaching [29].

## CONCLUSION

It is time to re-assert the role of teacher as a multifaceted individual who contributes to learning inside and outside the classroom. We suggest that a multi modality approach should be used. Being learner-centered does not mean rejecting traditional teaching methods. We should develop and implement an instructional design that focuses on incorporating active-learning and student-centered pedagogy into what is previously a traditional lecture-based course. These changes will lead to sustainable improvements in student attitudes and performance. Although the changes to be implemented may require a significant time commitment in the first year, it will essentially be a “one time investment” because it will not require extra effort to teach the revised model in the future. Furthermore, it will not only provide a model for revision of an individual course but can also provide a catalyst for institutional reform.

## Declaration by Authors

**Ethical Approval:** Approved

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