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RESEARCH ARTICLE
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A COMPARATIVE STUDY OF UHS NEW MODULAR VS. TRADITIONAL TEACHING METHOD IN MEDICAL SCIENCES

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Abstract

Objective

This study aimed to compare Modular with traditional method and gain students' and teachers' feedback

Study Type: Comparative Study

Study Duration March 2023 to July 2023

Place of Study: Rashid Latif Medical and Dental College Lahore

Introduction

Medical education is focusing on active learning methodologies to improve critical thinking and comprehension of subjects like anatomy, physiology, and biochemistry. Effective strategies include problem-based learning, case-based learning, small group discussions, and technology use. The Modular approach, developed in Punjab, integrates various medical disciplines and bridges the gap between fundamental sciences and clinical practice.

Methodology

This study was conducted in the Anatomy, Physiology & Biochemistry Department and involved first-year Bachelor of Medicine and Bachelor of Surgery (MBBS) students. It was a Comparative Study. The participants were allocated into two cohorts, each consisting of 50 students: group A was assigned cases of Diarrhoea, whereas group B was assigned cases of Malaria. Following the completion of theoretical lectures on the aforementioned subjects, the students were administered a pre-test consisting of multiple-choice questions (MCQs). The paired t -test was employed to compare the data, and the analysis was conducted using SPSS software version 23

Result
100 of 170 students took the pre- and post-Modular test and completed the evaluation form.
Students in groups Ashowed considerable improvement ($P < 0.001$) in mean scores, rising from 9.24 t o 14.03 as compared to group B students who approaches traditional method. In terms of student evaluation, 87% said Modular helped them grasp and remember the content. They said it improved their critical thinking and decision-making. All faculties supported Modular in the usual curriculum

Conclusion
Modular learning encourages student-centered discovery and improves logic, analysis, clinical, and collaboration. Strategically combining preclinical and clinical subjects helps bridge theory and practice. Modular research with big student groups can make medical education more student-centered. To evaluate MODULAR's success, compare it to didactic and conventional lectures.

Key words Modular system, Clinical Case learning, Medical Education, Under Graduate, UHS

Introduction

Medical education primarily focuses on lectures and practical sessions, leading to passive knowledge acquisition. However, there is a growing recognition of the need for active learning methodologies in teaching anatomy, physiology, and biochemistry. These strategies encourage critical thinking, active participation, and improved comprehension of the material. Effective active learning strategies include problem-based learning, case-based learning, small group discussions, and technology use like interactive simulations and virtual laboratories. These methods allow students to apply their knowledge to real-world situations and actively participate in the activities. Incorporating active learning into teaching these disciplines can boost engagement, motivation, and academic success. Medical education is constantly evolving, and subjects like anatomy, physiology, and biochemistry are taught separately without interaction between different fields of study. To create an integrated curriculum, clinical work should be incorporated at an early stage, and an environment conducive to active learning is needed. This environment can facilitate the teaching and learning of these subjects in a more integrated and practical manner. Educational institutions must consider the advantages of active learning methodologies when preparing future healthcare workers. The educational landscape in Punjab has undergone a paradigm shift due to the implementation of competency-based medical education for medical graduates. This new curriculum aims to integrate several medical disciplines, reducing the emphasis on compartmentalization of traditional medical fields. Novel approaches have been developed to achieve this goal, such as the Modular approach, which uses clinical scenarios to teach principles and connects learning across various fields. Active learning in medical education has numerous advantages, including improving critical thinking and problem-solving skills, bridging the gap between fundamental sciences and clinical practice, and enhancing students' analytical thinking and problem-solving abilities. By incorporating active learning methodologies and an integrated curriculum into the teaching of anatomy, physiology, and biochemistry, future students can better educate themselves and benefit from the experience. The Modular approach focuses on exploring real-life scenarios through an interactive, student-centered approach. Students are presented with clinical cases in the form of issues, including a comprehensive patient history and clinical scenarios. Additional information is provided to support clinical decision-making, such as relevant physical examinations, radiographic or laboratory studies.

The Modular method encourages students to apply their knowledge to real-world clinical situations through an interactive, student-centered approach. This not only improves their comprehension of the material but also develops their analytical thinking and problem-solving capacity. This approach allows for the integration of various disciplines, bridging the gap between fundamental sciences and contemporary clinical practice. The use of the modular method in the instruction of anatomy, physiology, and biochemistry can be of great benefit to future healthcare professionals, providing

practical and international learning experiences. It aligns with the movement towards competency-based medical education, which emphasizes the practical application of existing knowledge in actual clinical settings. It helps medical students integrate the clinical history of patients with their laboratory findings, enabling them to correlate their understanding of anatomy, physiology, and biochemistry with the clinical case and disease diagnosis. The Modular approach is learner-centered, prioritizing interaction among participants and promoting collaborative efforts and a multidisciplinary approach. Instructors participate in the activity as facilitators, while students are the primary analysts of the case presented to them. After conducting a comprehensive examination, it was determined that the Modular approach is enjoyable for both instructors and students. The modular method is a learner-centered approach that emphasizes teamwork, multidisciplinary interaction, and maximizing contact among participants in medical education. It enables students to evaluate clinical cases using previously acquired knowledge, improving their ability to correlate their knowledge with clinical cases and disease diagnosis. This is achieved by integrating the clinical history of patients with laboratory investigations, which can be used for diagnosis and patient management. The modular method also helps students develop critical thinking and problem-solving skills by putting them in clinical settings similar to real-life situations. This participatory, student-centered approach encourages students to apply their knowledge to difficult clinical situations, leading to a deeper understanding of the subject matter. Both instructors and students enjoy the modular process, demonstrating its usefulness in engaging participants and fostering active learning in pharmaceutical education. The modular approach is a comprehensive and successful system for teaching anatomy, physiology, and biochemistry in a more integrated and grounded manner. It places a strong emphasis on real-life clinical scenarios, critical thinking, and learning experiences across multiple disciplines, making it a beneficial complement to the curriculum of medical education. The incorporation of active learning strategies like the modular approach will prepare future healthcare professionals for clinical practice challenges as educational institutions continue to develop their programs. A literature review was conducted to locate original research in the field of implementing modular in anatomy, physiology, and biochemistry, and determine its usefulness as a teaching approach. However, there is a general lack of current original studies, particularly in the areas of anatomy, physiology, and biochemistry studied by students in their second year of medical school and bachelor of surgery (MBBS) programs.

Methodology

The study was conducted at a Private Medical College in the Department of Anatomy, Physiology, and Biochemistry to determine the impact of a novel instructional approach on first-year medical school students. The intervention consisted of interactive lectures, team-based learning, and practical demonstrations to enhance student engagement and comprehension of the material. A preliminary examination was conducted to determine the students' existing knowledge level before the introduction of the new instructional approach. After six weeks, the intervention was carried out, and a post-test was given to evaluate their knowledge and ability to remember it. The results showed a significant improvement in post-test scores compared to pre-test scores, suggesting that the new teaching style had a positive impact on the learning outcomes of first-year MBBS students. This improvement has the potential to affect future curriculum development and teaching practices. Following authorization from the Institutional Ethics Committee, faculty and students were given an orientation regarding the Modular process and the role of faculty as facilitators. Two modular exercises on diarrhoea and malaria were developed in collaboration with a physician, with the instructional objectives taken into consideration. Validated assessment sheets were used for pre- and post-modular evaluations, and a post-modular questionnaire was used to collect opinions from both students and faculty members concerning the efficiency of the modular instructional strategy.

The study divided students into two groups based on roll numbers:

Group A (50 cases of diarrhea) 1st year students with modular system

Group B (50 cases of malaria) 2nd year students with traditional approach

A pre-test consisting of clinical scenario-based multiple-choice questions (MCQs) was administered to both groups before the implementation of the modular method. Following the modular sessions, students were given the same set of MCQs to evaluate the effect of the modular exercises on their comprehension of the content. Group A focused on diarrhea, while Group B investigated malaria to put theoretical knowledge into practice. A facilitator was designated for each group, and each group was further subdivided into five subgroups. Each group was given one modular exercise with its learning objectives attached to it. The findings from this analysis will contribute to the ongoing effort to improve medical education by developing innovative teaching approaches and curricula. The study aimed to evaluate the effectiveness of modular exercises in medical education. Students were given case information one page at a time during three sessions, and learning objectives associated with each case were presented.

Results

The research involved 100 students who participated in pre- and post-Modular testing. The results showed that the Modular approach significantly improved students' learning achievement compared to traditional didactic lectures. The mean scores were higher in group A with cases of diarrhea and low in group B in case of malaria, indicating that the Modular strategy was beneficial in enhancing students' comprehension of medical information and their ability to remember it. The study also compared the application of Modular with specific case studies, such as those involving diarrhea and malaria, demonstrating its consistent good impact across various medical problems. The improvement in mean scores for groups A (n=50) provides additional evidence that the Modular strategy is beneficial in enhancing students' comprehension of medical information and their ability to remember it. Feedback from the students revealed that 88% of them agreed that the Modular method was helpful in learning the topic and applying theoretical knowledge. Additionally, the Modular course offered a context for learning, allowing students to retain information for a longer period of time. Furthermore, 84% of respondents stated that the Modular session inspired them to ask questions and think critically. Additionally, 85% of students felt that the Modular session helped them develop their communication and interpersonal skills, and 85% of students said that the small group discussion helped facilitate the exchange of ideas of great value. The students' recommendations for incorporating the Modular method into the curriculum on a more consistent basis underline the value of this approach in terms of improving the overall learning experience. They also found that the teaching that took place in small groups was seen as being more participatory, beneficial, and entertaining than standard didactic lectures.

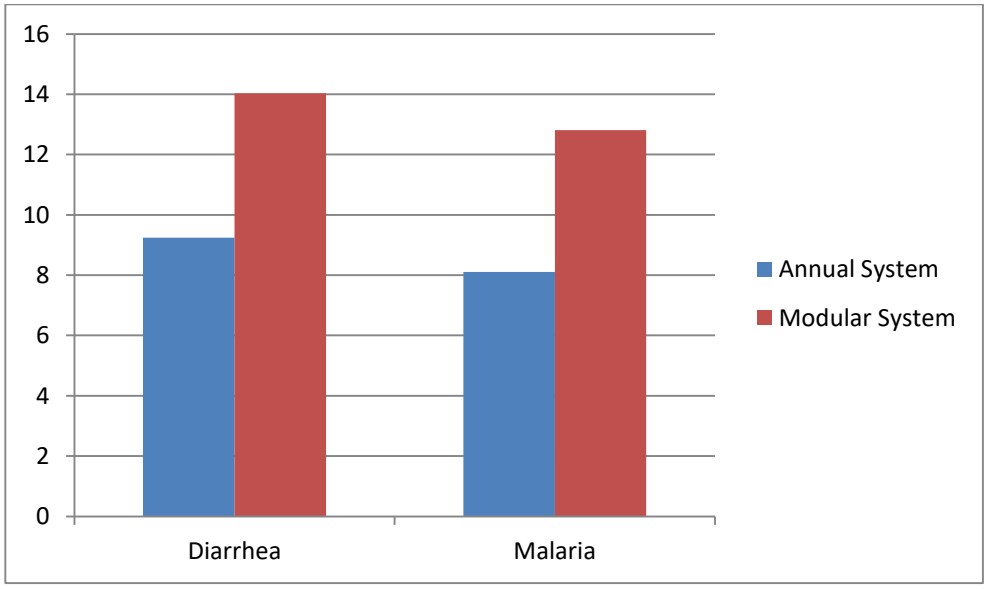

Figure 1. *Comparison of academic performance Annual system and Modular system*

Discussion

The success of the Modular sessions is further highlighted by the fact that students are able to remember the material due to their engagement in conversation and interaction with one another on the subject. The research not only reveals the benefits of the Modular strategy in improving students' learning outcomes but also highlights the overall good influence that the approach has on student engagement, comprehension, and retention of medical information. The findings of this study provide significant support for the incorporation of case-based learning, specifically the Modular technique, into the curriculum of medical education degrees. They all agreed that Modular increased students' interest in studying and that it should be promoted. Conversation and contact with friends helped students learn and increase their capacity to recall information. The use of small groups encouraged participation and interaction, which enhanced students' capacity for self-directed learning. The faculty members also believed that Modular improved students' ability to communicate. However, they acknowledged that applying Modular to the entire subject due to constraints in people, infrastructure, and time was difficult. Instead, they recommended focusing on essential themes within each system. This approach can be implemented with the participation of other departments, as the same subject is taught in multiple departments. The faculty members' observations on the enhancement of student confidence, activation of the thinking process, and promotion of self-directed learning further emphasize the multidimensional impact of the Modular method on academic development. They acknowledged the importance of interactions within small groups in cultivating involvement and communication skills, highlighting the efficacy of this instructional approach in generating an environment conducive to collaborative and engaging learning. Educating students should be a mentally stimulating and productive activity, and various instructional approaches can be employed to facilitate knowledge acquisition. Traditional didactic methods have been proven ineffective due to the passage of time, evidence-based research, and improved understanding of memory retention and replication. Modular learning was introduced for the first time in an educational institute, focusing on Anatomy, Physiology, and Biochemistry. The study involved two groups of MBBS students, one receiving sequential and organized material, and the other using modular learning, which allowed for more manageable and interrelated smaller chunks. The results showed that the Modular method resulted in a more profound comprehension of the topic, improved critical thinking and problem-solving abilities, and enhanced memory retention. Students in the Modular cohort demonstrated better engagement and motivation than those in other cohorts, as the Modular technique enabled more personalized learning experiences and accommodated various learning styles. Additionally, modular learning made it easier for students to study collaboratively, enhancing communication and teamwork skills, which are vital in medicine. The success of the Modular approach has led to a change in teaching methods at the institution, emphasizing active, student-centered learning methodologies. This has led to the possibility of future investigation and implementation of innovative teaching and learning methods across various medical specialties. Students and faculty members became more aware of the active-interactive small group teaching technique, and there was a significant improvement in content retention. Modular activities were enthusiastically accepted and enjoyed by the majority of students and faculty members. Previous research conducted by researchers in different geographical regions and examining various issues supported the findings. A study found that the use of Modular as a learning approach in ordinary classroom instruction was superior than teaching without any Modular sessions included in the subject matter. Modular activities were also found to increase logical thinking, clinical decision-making, and diagnostic interpretations among students. Modular has been found to be beneficial in integrating theoretical information into clinical pharmacology practitioners. However, the first question to answer is whether replacing existing instructional strategies with Modular is sufficient. In order to solve clinical problems using the case-based method, significant prior knowledge on the subject matter is necessary. In conclusion, while Modular is advantageous for students, it is essential to consider whether it is sufficient to replace existing instructional strategies. To effectively use case-based methods, prior knowledge on the subject matter is required. The study by Garvey et al. and Engel and Hendricson found that modular

learning has significantly enhanced the learning experience for MBBS students, leading to a fundamental shift in teaching techniques. Students have been able to remember more content, develop a deeper understanding of topics, foster critical thinking, problem-solving skills, and long-term memory, as well as encourage self-learning and collaborative learning. This has laid the groundwork for continuous investigation and implementation of innovative teaching and learning approaches across various medical curriculum disciplines. The collaborative aspect of modular learning has fostered a sense of community among the cohorts, which has also fostered the development of essential skills in the medical sector. However, the question of whether modular learning is sufficient to completely replace current instructional techniques remains unanswered. It is crucial to evaluate the wider impact and practicability of incorporating modular into the curriculum. As the institute continues to adopt active, student-centered learning techniques, it will be vital to conduct continuing evaluations and make adjustments to ensure that the incorporation of modular aligns with the overall educational goals and the needs of students. The successful implementation of modular learning in the study of anatomy, physiology, and biochemistry has not only demonstrated its efficacy in enhancing the learning experience but has also sparked a wider conversation about the future of teaching methodology within the medical curriculum. This achievement highlights the importance of adaptation and innovation as essential components in the pursuit of comprehensive and efficient medical education. A previous study by Kassebaum and colleagues found that students preferred lectures to the Modular strategy due to its ability to provide greater preparation and higher scores on written examinations. However, the study had limitations, such as the need for additional resources and time, and the need for students to have some prior understanding of the subjects. Additionally, the research did not investigate whether written subject exam results were affected differently by modular or didactic lectures. This rigorous approach allowed students to demonstrate comprehensive involvement and comprehension of the material. The implementation of modular exercises and subsequent analysis of their impact on learning outcomes provided valuable insights into the effectiveness of this teaching technique. These insights offer prospects for further improvement in medical education and the development of curriculum. Students worked together to analyze the case studies, applying their existing knowledge to the examples, determining their learning objectives, and developing study questions for each session. Facilitators played a significant role in directing the talks through the use of trigger phrases and a list of tools for organizing and driving their approach. Following the conclusion of each session, the learning objectives were reaffirmed, and the students were provided with necessary materials for continued education. The final session involved students reviewing the entire case study, and each group presented a seminar on various areas of the subject matter. A post-test was administered ten days after the last session to evaluate the effect of the modular exercises on students' ability to remember the material and their comprehension of the subject matter. An evaluation of the efficacy of modular was conducted by analyzing pre- and post-test results of students to determine whether they had improved their performance. A questionnaire with 18 questions and a Likert scale with five points was used to record students' perspectives on the utility of modular, followed by a focused group discussion. The results of the study provided a comprehensive understanding of the effectiveness and reception of the modular approach in the context of medical education. The results of these evaluations are likely to contribute significantly to the ongoing effort to improve teaching approaches and curriculum creation, which will drive future innovation and improvement in the field of medical education.

Conclusion

Modular learning promotes student-centered exploration and enhances logical, analytical, clinical, and collaborative skills. It combines preclinical and clinical subjects and can bridge theory and practice if used strategically. Modular can be used to provide a more student-centered approach to medical education through research with large student groups. To evaluate Modular success, it must be compared to didactic lectures and normal lectures.

References

1. Active Learning. (2023, January 12). https://www.bu.edu/ctl/guides/active-learning/
2. Akram, A., Rizwan, F., Sattar, K., Hadi, J I S., & Meo, S A. (2018, July 13). An approach for developing integrated undergraduate medical curriculum. https://doi.org/10.12669/pjms.344.14565
3. Atta, I S., El-Hag, M A., Shafek, S I., Al-Ghamdi, H S., & Alghamdi, T H. (2020, April 10). Drawbacks in the Implementation of an Integrated Medical Curriculum at Medical Schools and Their Potential Solutions. Education in Medicine Journal, 12(1), 29-42. https://doi.org/10.21315/eimj2020.12.1.4
4. Kryzhanovsky, G N. (2001, December 1). Pathophysiology on the threshold of a new century. https://doi.org/10.1016/s0928-4680(00)00066-3
5. Singh, K., Bharatha, A., Sa, B., Adams, O P., & Majumder, A A. (2019, May 16). Teaching anatomy using an active and engaging learning strategy. BMC Medical Education, 19(1). https://doi.org/10.1186/s12909-019-1590-2
6. Vedi, N., & Dulloo, P. (2021, January 1). Students' perception and learning on case based teaching in anatomy and physiology: An e-learning approach. https://pubmed.ncbi.nlm.nih.gov/33521136
7. Yousaf, A., Moin, H., Majeed, S., Shafi, R., & Mansoor, S. (2023, April 26). The positive impact of introducing modified directed self-learning using pre–small group discussion worksheets as an active learning strategy in undergraduate medical education. Medical Education Online, 28(1). https://doi.org/10.1080/10872981.2023.2204547
8. Bhardwaj, P., Bhardwaj, N., Mahdi, F., Srivastava, J., & Gupta, U. (2015, January 1). Integrated teaching program using case-based learning. https://doi.org/10.4103/2229-516x.162262
9. Lehl, S S., Gupta, M., & D'Cruz, S. (2021, January 1). Enhanced learning strategies of undergraduate medical students with a structured case presentation format.. https://doi.org/10.4103/jehp.jehp_221_21
10. Resources. (2023, January 1). https://medicine.llu.edu/academics/resources
11. Sangam, M R., Praveen, K., G, V., Bokan, R R., Deka, R., & Kaur, A. (2021, December 16). Efficacy of Case-Based Learning in Anatomy. https://www.cureus.com/articles/79340-efficacy-of-case-based-learning-in-anatomy.pdf
12. Juwita, R., Marfianti, E., Fauziyati, A., & Hisyam, B. (2021, January 1). The Effect of Blended Learning in Covid-19 Pandemic with the Achievement of Internal Medicine Stage Competencies at the Clerkship Program of the Faculty of Medicine UII. https://doi.org/10.2991/assehr.k.210930.009
13. Muraleedharan, A., Ragavan, S., Bage, N N., & Devi, R. (2022, January 1). Perceptions of Medical Undergraduate Students on Curricular Changes in Anatomy: An Embedded Design Mixed Method Study.. DOAJ (DOAJ: Directory of Open Access Journals), 10(1), 22-29. https://doi.org/10.30476/jamp.2021.92149.1472
14. Rahman, S. (2022, July 1). Transition from Traditional Curriculum to Modular Curriculum Possible Challenges. Journal of Gandhara medical and dental sciences, 9(3), 1-2. https://doi.org/10.37762/jgmds.9-3.328
15. Garvey MT, O'Sullivan M, Blake M. Multidisciplinary case-based learning for undergraduate students. *Eur J Dent Educ*. 2000;**4**(4):165-8. [PubMed ID: 11168482]. https://doi.org/10.1034/j.1600-0579.2000.040404.x
16. Engel FE, Hendricson WD. A case-based learning model in orthodontics. J Dent Educ. 1994; 58(10):762-7. [PubMed ID: 7962913].