

Review Article

How to Devise Effective Teaching Strategies for Engaging Level Four Undergraduate Students and Enhancing Knowledge Retention

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Abstract

The life sciences cover subject areas such as biochemistry, anatomy, physiology, biology, and genetics. In their first year of study, undergraduate students undertake a comprehensive study of these areas of specialisation, imbibing the basic concepts of life processes. In broad terms, level 4 of the study curriculum in the life sciences is a mix of theoretical and practical laboratory skill development, which is a preparatory ground for higher academic exercise in research and future career pursuits in healthcare, biotechnology, or research in the life sciences. Most of the student participants in this class setting are populated by young adult international students who are in their first year of study in the life sciences. They are sociable and exuberant, as well as enthusiastic about learning. Because the class is mostly populated by students from diverse social-cultural backgrounds, it suggests that they will exhibit a broad worldwide view and traits for the multidisciplinary nature of the life sciences. They have prior knowledge of basic science subjects, and therefore, the students are expected to integrate and apply their prior knowledge of the basic science subjects in solving problems related to more complex and specific topics in life sciences at the undergraduate level of study. By their nature, the categories of students at this level of study are sociable and enthusiastic. Therefore, the students are expected to thrive in their academic activities through group discussions and collaborative learning where they are encouraged to share their diverse perspectives on working through the module topics and problem-solving skills. By incorporating interactive teaching methods, scaffolding instruction, and retrieval practices, educators can create a supportive learning environment and enhance student engagement and knowledge retention.

Keywords

Knowledge Retention, Innovative/Active Teaching and Learning Strategies, Undergraduate Students

1. Broad Questions for Inquiry

According to Fisher & Radvansky, retention of knowledge refers to the long-term storage of concepts and skills in memory [6]. Previous data showed that on the average, majority of university students only retain 20-40% of a lecture's key points in their notes at the end of the lecture session [11].

Additionally, without reviewing the material, these students recall less than 10% of the lecture after three weeks [3].

As stated in the Postdoc Academic Chat, which is a collection of essays by educators, the goal of every educator is to ensure that their lectures not only excel in delivery but also in

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Received: 1 October 2025; **Accepted:** 11 October 2025; **Published:** 3 December 2025



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facilitating students' retention of information beyond the traditional classroom setting [15]. However, these statistics are pointers that achieving the goals of knowledge transfer and retention by learners pose a considerable challenge to educators. Various interconnected factors within the realm of academic activities could influence the effectiveness of knowledge transfer and retention. It is worthwhile to note that these factors encompass the actions and behavioural tendencies of the educators, the characteristics and engagement of learners, as well as the dynamics and attributes of the learning environments. These components interconnect and exert their influence on the overall learning process, shaping the outcomes of knowledge acquisition and retention.

For instance, it is common knowledge and experience that students in their first year of university study are most often disruptive during class sessions, which could negatively impact the ability of the educators to maintain student engagement and class management. However, leveraging the socio-cultural attributes of the students can help educators effectively teach and transfer knowledge, ensuring student participation and retention in the classroom and beyond [9].

Therefore, it is pertinent to inquire:

- 1) How can faculties ensure that the students are engaged with the learning process for them to comprehend what they teach?
- 2) How can faculties/educators prepare and deliver lectures that leave a lasting impact on students within and beyond the classroom?

2. Rationale for Lines of Inquiry

Based on previous research findings [1, 2, 5, 10], the educator's teaching approaches and the students' learning experience could synergistically promote poor engagement and knowledge delivery, thereby promoting poor knowledge acquisition and retention by the students. These research findings have also posited that certain teaching practices and prior experiences of students that mould behavioural tendencies tend to contribute to level of interest in the subject being taught during the lecture session and the capacity to retain and apply the knowledge disseminated afterwards.

Effective lecture delivery and students' engagement and knowledge retention are crucial indices that impact academic success and effective learning in higher education. In contrast, the lectures' inadequate selection of teaching methods and the low retention of knowledge among students make their journey through the module burdensome to the students and their academic experience is negatively impacted. The toll on the student's academic experience is reflected in low class attendance, low motivation, high failure rate and ultimately a high incidence of school dropouts [4].

According to the Module Evaluation Questionnaire (MEQ) 2023-24-Coventry University-Summer survey outcome, 71% of the students in the 4 level find the lecture engaging, while 64% of the students considered the lecture sessions intellec-

tually stimulating (4009BIO MEQ, 2024). Therefore, interrogating the approach by which the teacher can instill students' active participation and interest in the process of lecture delivery and ensuring effective strategies to enhance their capacity to retain what was taught during the session are components of quality teaching. By promoting students' engagement and interest in the topics and course content during lecture sessions, as well as implementing strategies that enhance the student's capacity to acquire and retain knowledge, the process and outcome of lecture delivery become a memorable and rewarding experience for both the student and the educator. Accordingly, inquiries into strategies for effective teaching practices and student engagement and knowledge retention will provide insights into promoting teaching and learning environments that foster a sense of motivation, belonging, and commitment, ultimately enhancing retention rates and degree completion [21].

Therefore, this inquiry aims to ascertain what key strategies, designs and practices the teacher and learners could apply to foster improved and sustainable engagement, which will enhance the capacity of the students to effectively retain and use the knowledge disseminated during the lecture sessions. Moreover, institutions managers can enhance the overall quality of education and facilitate student success by analysing the teaching approaches that influence the effectiveness of lecture delivery, student engagement, and knowledge retention. By doing so, the institution can develop evidence-based practices, policies, and interventions in the context of the subject matter.

3. Strategies for Learning and Knowledge Retention

One of the fundamental pillars of the teaching philosophy is consistent with the assertion that "a good lecture always offers a point of view and an entry into a field of study." However, the lecture session is not the best arena to dive into a complicated intellectual argument or a large-scale informational/data transfer [16]. An educator's role should ideally extend beyond classroom activities, which will require a comprehensive approach that includes careful planning, engaging materials, and considering diverse student needs. When educators recognise the importance of pre-lecture preparations, they are able to deliver a more effective and engaging learning experience for the students [12, 15]. Providing students with course materials in advance allows them to prepare for upcoming lectures, promoting preparedness and improved engagement with the subject matter. According to a teaching resources report [14], teachers can greatly improve new information retention and transfer by purposefully activating, building on, and reinforcing links to students' relevant prior knowledge. To fully "own" new knowledge in long-term memory, students must rehearse and connect it to pre-existing knowledge frameworks, making it easier to retrieve new

knowledge beyond the classroom or learning session. Therefore, there should be a link between the fundamental concepts of the topics taught in the previous modules and, where applicable, basic science knowledge before students' university experience.

Previous research has highlighted that engaging students' curiosity and fostering their critical thinking skills can significantly enhance the learning process within the classroom [20]. There is the need for an interactive teaching approach that encourages curiosity and critical thinking among students. This method involves interactive quizzes and real-life case studies, fostering active participation and a deeper understanding of complex concepts, promoting innovative ideas and critical thinking.

The biomedical sciences, my area of expertise, require dynamic and continuously evolving knowledge to effectively address human diseases and disorders. As a result, the problem-based learning (PBL) method is an excellent strategy for engaging students and improving long-term knowledge retention in this field [13]. In this context, case study scenarios and analogies [8] could be used to challenge the students with real-world and open-ended problems that capture their attention and motivate them to assimilate the topic and find solutions.

The scaffolding instruction technique in laboratory practical supervision encourages collaborative group work among students, promoting knowledge retention and engagement. This approach starts with guided practice and allows independent work, allowing students to take ownership of the topic.

According to Subheesh & Sethy, low-stakes assessments reduce anxiety, promote students' risk-taking, and encourage collaborative and multidisciplinary teamwork, which ultimately serve as bedrock for boosting their confidence and fostering engagement and knowledge retention [19]. Formative assessments, especially during workshops, are a crucial part of my teaching approach, providing students with engaging quizzes, discussions, and verbal feedback for future improvement.

The retrieval practice is a powerful technique that strengthens memory consolidation, promotes flexible knowledge organisation, improves long-term assessment retention, enhances metacognition, and facilitates knowledge transfer, making it an invaluable strategy for durable learning [17]. To enhance students' knowledge retention, it is effective to use retrieval strategies, which involves administering quizzes on recently taught material during lectures, workshops, or laboratory sessions. Additionally, having students explain or summarize the concepts the next day can further reinforce their understanding.

4. Recommendations: Enhancement Strategies for Learning and Knowledge Retention

Educators can create dynamic, engaging learning envi-

ronments by utilizing active learning approaches and linking student profiles to teaching methods and experiences, promoting higher-order thinking, collaboration, and knowledge retention.

4.1. Gamification

In education, gamification refers to the integration of video game elements and mechanics into teaching environments to inspire students and make learning more enjoyable and interactive [7]. Since my undergraduate students are sociable and exuberant within the age bracket of about 18-25 years, the introduction of gamification to the lecture sessions might offer a new approach to engaging and enhancing learning. The goal is to capture the learners' interest and inspire them to keep learning and enhance knowledge retention.

4.2. Interactive Technology

Another recommended method to boost engagement is to make use of technology and online resources. This involves using digital tools and platforms that students are already comfortable with. Activities like online discussions, interactive quizzes, and multimedia content can help make teaching more engaging [18].

4.3. Peer Teaching

Encouraging peer learning can be achieved by organizing group activities, collaborative projects, and peer-to-peer teaching opportunities within the learning space populated by sociable and enthusiastic students. By harnessing the power of collaboration, students can engage in active discussions, share diverse perspectives, and reinforce their understanding of the subject matter. This approach not only fosters a strong sense of community within the group, but also enhances the overall learning experience for everyone involved.

4.4. Reciprocal Questioning

Another approach to keeping students engaged and retaining knowledge is the use of reciprocal questioning. In this method of teaching, students create questions about the content and discuss the responses. Specifically, students are asked to read a particular piece of content displayed on the slide design of an assignment from the subject matter, discuss it with classmates, and then share responses with the class. The educator gives feedback in the process, thereby further enhancing and supporting the students learning.

5. Future Evaluation

5.1. MEQ Report

The proposed enhancement strategies for learning and

knowledge retention aim to positively impact the teaching approach by introducing more engaging and intellectually stimulating methods while fostering a supportive learning environment. For instance, the incorporation of gamification into lecture sessions is expected to promote active participation and enhance the intellectual stimulation of the sessions, aligning with the key components outlined in the MEQ survey report.

5.2. Teaching Observation

Intellectually stimulating lecture sessions for level four students are anticipated by applying the above recommendations. The proposed new approaches are expected to bring a myriad of benefits for future practice, such as enhanced management of the learning experience, improved student integration, more effective session management, and ensuring greater learner engagement, participation, and interaction.

5.3. Students' Feedback

By applying the proposed enhancement strategies for learning and knowledge retention, there is a good expectation of an increase in positive feedback from students. This feedback will specifically focus on their improved ability to understand the topics being taught. Furthermore, the more intellectually stimulating learning environment will lead to greater retention of the knowledge gained and an increase in the success rates of the students.

It is important to highlight that improving professional practice is possible through collaboration with colleagues, participation in school best practice days, attending Continue Professional Development (CPD) events, and utilising student feedback.

6. Conclusion

In conclusion, effective teaching approaches for engaging level four undergraduate students and enhancing knowledge retention emphasise on the importance of a comprehensive teaching philosophy that extends beyond classroom activities and considers the diverse needs of students. By incorporating interactive teaching methods, scaffolding instruction, and retrieval practices, educators can create a supportive learning environment and enhance student engagement and knowledge retention.

Author Contributions

Paul Chidoka Chikezie is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The author declares no conflicts of interest.

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