JOTE Journal of Occupational Therapy Education

Volume 7 | Issue 2 Article 8

2023

A Pilot Study to Compare Lecture and Active Learning

Jennifer Calabrese
Stockton University

Recommended Citation

Calabrese, J. (2023). A Pilot Study to Compare Lecture and Active Learning. *Journal of Occupational Therapy Education, 7* (2). https://doi.org/10.26681/jote.2023.070208

A Pilot Study to Compare Lecture and Active Learning

Abstract

Active learning strategies are being increasingly valued by instructors and implemented in higher education. However, mixed outcomes exist regarding learning, exam results, and student preferences for active learning compared to traditional lectures. A convenience sample of 26 first-year graduate students participated in a study that examined the impact of attending a traditional lecture versus an active learning session. Both sessions included a PowerPoint presentation and the active learning class also included embedded educational videos, instructor-led class discussions, a case study, and a think-pair-share activity. The instructor used a pre and post-test for each class and conducted a survey after each post-test. The study results showed statistical significance for both teaching methods, with the traditional lecture statistically higher by question. Most students' perceptions of learning and preferred teaching methods favored active learning. Students felt activities helped them maintain their attention and allowed them to self-reflect on their understanding of content. The students also perceived that their learning was supplemented through peer and instructor questions and engagement. Furthermore, students felt the active lecture helped improve their self-efficacy, made them feel more included in the classroom, helped to meet their unique learning styles, and gave them the perception that they learned more. Conversely, some students felt the traditional lecture was more concise than the active lecture, focused on the "important" content, and was better organized and easier to follow. Because students' learning, exam results, perceptions, and preferences vary, delivering a mixed method of instruction may benefit students while promoting self-efficacy and enjoyment of the instructor and classroom experience.

Keywords

Active learning, traditional lectures, student perceptions, preferences

JOTE
Journal of Occupational Therapy Education

Volume 7, Issue 2

A Pilot Study to Compare Lecture with Active Learning

Jennifer Calabrese, OTD, MOT, OTR/L

Stockton University

United States

ABSTRACT

Active learning strategies are being increasingly valued by instructors and implemented in higher education. However, mixed outcomes exist regarding learning, exam results, and student preferences for active learning compared to traditional lectures. A convenience sample of 26 first-year graduate students participated in a study that examined the impact of attending a traditional lecture versus an active learning session. Both sessions included a PowerPoint presentation and the active learning class also included embedded educational videos, instructor-led class discussions, a case study, and a think-pair-share activity. The instructor used a pre and post-test for each class and conducted a survey after each post-test. The study results showed statistical significance for both teaching methods, with the traditional lecture statistically higher by question. Most students' perceptions of learning and preferred teaching methods favored active learning. Students felt activities helped them maintain their attention and allowed them to self-reflect on their understanding of content. The students also perceived that their learning was supplemented through peer and instructor questions and engagement. Furthermore, students felt the active lecture helped improve their self-efficacy, made them feel more included in the classroom, helped to meet their unique learning styles, and gave them the perception that they learned more. Conversely, some students felt the traditional lecture was more concise than the active lecture, focused on the "important" content, and was better organized and easier to follow. Because students' learning, exam results, perceptions, and preferences vary, delivering a mixed method of instruction may benefit students while promoting self-efficacy and enjoyment of the instructor and classroom experience.

Introduction

In and outside of allied health programs, instructors may still predominantly use traditional lectures, where the instructor talks and the students listen, as a primary method of teaching and transmitting information to students (Deslauriers et al., 2019). Studies describe several limitations of this approach compared to the student benefits associated with active learning (McCullough & Munro, 2018; Pickering & Roberts, 2017; Wolff et al., 2015). Active learning strategies, where students are actively engaged and self-reflect on their learning, are increasingly valued by instructors and implemented in higher education. However, mixed outcomes exist regarding exam results and student preferences for active learning versus traditional lecture-based instruction (Alaagib et al., 2019; Bristol et al., 2019; Carstensen et al., 2020; Carvalho & West, 2011; Covill, 2011; Lake, 2001; Machemer & Crawford, 2007; Shahba & Sales, 2021; Struyven et al., 2008; Sumanasekera et al., 2020). This pilot study aimed to determine if active learning strategies are perceived as the best method of providing education to graduate occupational therapy students to improve their knowledge and meet their preferences for learning.

Literature Review

Active Learning Description

For this pilot study, active learning is defined as actively engaging students in the learning process through higher-order thinking (Freeman et al., 2014) instead of passively listening to a traditional lecture. Cattaneo (2017) grounded active learning in the Constructivist Theory, which emphasizes that students must be actively involved with the content and respond to course material to learn. This involvement can relate to classroom activities that allow students to reflect on ideas and consider how they can be applied in practical scenarios. Active learning involves the student in metacognitive planning, monitoring, and reflecting on learning. This process requires students to be self-directed, with an improvement in self-regulation noted (Mosalanejad, 2015).

Some of the active learning methods described in the literature requiring student cooperation include debating and questions leading to more discussion (Carvalho & West, 2011; Joshi et al., 2018) and the division of learning to solve a problem, or case-based learning (Henderson et al., 2018; Samuelson et al., 2017). Further mentioned in the literature are team-based learning (Remington et al., 2017), working with partners (Wolff et al., 2015), and group work (Marusic & Dragojevic, 2020). Also, in 2018, Adkins labeled think–pair–share activities, role-playing, peer teaching, gaming, and the 1-minute paper as methods to facilitate active learning.

Active Learning Benefits

Health-related and non-health-related literature show many benefits of undergraduate and graduate student active learning. McCullough and Munro (2018) concluded that with active learning, students showed increased content learning correlated with improved attention, interest, and motivation. Also related to active learning, students felt more motivated to work through challenging learning material when they felt included, valued, and supported in the classroom. They were more likely to take responsibility for

DOI: 10.26681/jote.2023.070208

their learning, consider new perspectives, and have increased self-efficacy (Lumpkin et al., 2015). Additionally, instructors providing this support can help students feel an increased sense of community and connectedness with other students and the instructor (Allsop et al., 2020). This student-faculty interaction enhancement, specifically after engagement in small group discussions, is shown to significantly improve students' educational performance and retention capacity (Joshi et al., 2018).

Another benefit to active student engagement is directing the focus of the learning toward areas the student found most challenging and complex to understand. Interactive methods help show students' understanding of concepts and allow them to receive real-time feedback from the instructor. While instructors consider the students' point of view, students may receive additional teaching to correct deficits in learning at any point in the learning process. This shift leans toward a higher level of thinking and increased mastery of course content while focusing on content proficiency (Marušić & Dragojević, 2020). Moreover, this content proficiency has been shown to include higher attitudinal learning in affective, behavioral, and social learning outcomes (Watson et al., 2021).

Traditional Lecture Description

Shi et al. (2018) defined a traditional lecture as an instructor verbally presenting educational content using technology or another visual display. A traditional lecture for this pilot study was an instructor providing course content while the students passively listened, took notes, or asked unsolicited questions (Freeman et al., 2014).

Traditional Lecture Benefits

Mixed benefits are noted for traditional lectures as a content delivery method. Covill (2011) revealed that students perceive traditional lectures as an effective teaching method. They are beneficial for allowing students to take notes, summarize key points, clarify complex topics, and broadly relate to a profession (Matheson, 2008). This perception is most accurate when the students perceive the instructor as enthusiastic (Kay et al., 2018). Information may be well received when presented by an engaging instructor using a systematic and organized approach. Avdeyeva and Omelicheva (2008) showed that traditional lectures benefitted student learning primarily in large class sizes while delivering substantial amounts of information in less time (Woodring & Hultquist, 2017). Feudel and Fehlinger (2021) also reported that traditional lectures provide information quickly, although students often need help to make sense of the information during the lecture as they are busy writing. They suggest that for many students to understand the content, intensive post-class processing based on their notes is necessary. Lastly, it is shown that students need help to apply information from traditional lecturing in a meaningful way, as required in many healthcare professions (Waldeck & Weimer, 2017).

Student Perceptions of Active Learning and Traditional Lectures

While student perceptions of active learning are mixed, they are improving, specifically for students favoring diverse teaching styles (McGreevy & Church, 2020). Students have reported an enhanced understanding of course content and improved teamwork

and lifelong learning skills after active learning, such as team-based learning (Remington et al., 2017). They also perceived positive learning outcomes while interacting with peers and an improved immediate ability to apply course concepts during active learning activities.

Conversely, students may dislike active learning perceiving it as requiring a higher time commitment. In addition to more time, Deslauriers et al. (2019) suggested that when students experience an increased cognitive effort associated with active learning, they initially take that effort to signify poorer learning. Therefore, it has been suggested that too much active learning can impede knowledge acquisition and negatively affect attention that would have otherwise been given to additional material (Wertman & Whiteside, 2010). Remington et al. (2017) stated that with active learning, students may raise concerns about missing the emphasis of learning or the instructor's perspective. The difficulty is noted in transitioning to their new active role in learning and navigating self-guided materials. Students also perceive inadequate active learning resources in the classroom requiring increased student preparation and motivation for learning (Abdelkarim et al., 2018). Last but importantly, students may avoid active learning activities due to the fear of being wrong or embarrassed in front of others (Barkley, 2010). Similarly, Deslauriers et al. (2019) found that students dislike being made to interact with one another.

Student Exam Outcomes

In a meta-analysis of 225 educational research studies, Freeman et al. (2014) reported "…that students in classes with traditional lecturing were 1.5 times more likely to fail than were students in classes with active learning" (p. 8410). In comparison, examining undergraduate and graduate healthcare students' exam scores, active learning methods such as problem-based learning improved student understanding of course content and exam scores (Alaagib et al., 2019). In additional studies, improved exam performance and course material comprehension were also found using active versus traditional lecturing (Carvalho & West, 2011; McGreevy & Church, 2020).

Similarly, Lake (2001) found that exam grades were higher after active learning, although students perceived they learned less and had a lower perception of the course and the quality of the instructor. In another study, exam scores measuring student learning were similar using active versus traditional lecture strategies in the classroom. However, in this case, student perceptions of active learning after the exam were more positive (Chilwant, 2012). Lastly, Bristol et al. (2019) studied the teaching methods of 340 nursing instructors while examining the National Council Licensure Examination (NCLEX) pass rates for nursing students. No difference in pass rates occurred when instructors used all active learning, traditional lectures, or mixed methods throughout the students' education. When focusing on students' exam scores as metrics, mixed outcomes are noted for both traditional lectures and active learning.

DOI: 10.26681/jote.2023.070208

Methodology

Study Participants

This pilot study used a convenience sample that included a cohort of 26 second-semester Master of Science in Occupational Therapy students from a northeastern state university. The sample included 23 females and three males, 25 students identifying as white and one as black, and all students between the ages of 22 and 27. All 26 students participated in some virtual learning method during their undergraduate education before graduate school due to the Covid pandemic. Then, all 26 students learned in person during the first semester of the occupational therapy program, which preceded this pilot study.

Description of the Course

All students demonstrated appropriate knowledge and skills in motor performance coursework which served as foundational knowledge for successfully completing the course included in the pilot study. The purpose of the pilot study neuroscience course included re-introducing neurologic systems and discussing neuroanatomy concerning health promotion and the impact of disease processes. The typical neuroscience class format was a four-hour in-person class in the designated occupational therapy program building on the university campus. The standard teaching methods in the first 1-3 hours of the class included lectures, problem-based questions, discussions, and collaborative learning groups. The last hour of the class included case studies for practice and exploration and students teaching essential concepts back to the instructor and classmates. This pilot study occurred during the first hour of the traditional lecture and active learning sessions.

The course content and student learning outcomes were based on the 2018 Accreditation Council for Occupational Therapy Education (ACOTE) Standards. These included B.1.1, “the demonstration of knowledge and understanding of the structure and function of the human body with a focus on neuroscience throughout the lifespan,” and B.3.5, “analyze the effects of heritable diseases, genetic conditions, disability, trauma, and injury to the physical and mental health and occupational performance of the individual.”

Description of Traditional Lecture and Active Learning Sessions

The course instructor developed class sessions (see Table 1) to prepare students for entry-level practice. The instructor created the lessons from information about neuroscience and best practice taken from the required course text and assigned readings listed on the shared course syllabus. Concepts were also gleaned from the National Board of Certification for Occupational Therapy (NBCOT) exam outline, empirical articles, and 24 years of clinical experience as a practicing occupational therapist and seven years as an instructor. The lecture content helped meet program, school, and university essential student learning outcomes (ELOs) and ACOTE standards.

The traditional lecture on clinical neurorehabilitation topics was developed, including diagnoses such as cerebral palsy, addiction, mental illness, autism, and neonatal brachial plexus injuries. The instructor emphasized the neurological basis of these conditions, neurotransmitter actions, and their impact on meaningful activities. The lecture also included the role of an occupational therapist working with individuals with these conditions. The instructor created the traditional lecture without interrupting supplemental learning activities. Students were permitted to ask questions, and the instructor expanded on the content in response, but the instructor posed no independent questions.

Afterward, an active lecture on the neurology of pain was developed, linking pain to self-management and participation in meaningful living. The instructor emphasized the neurological basis of pain and the role of an occupational therapist working with individuals experiencing pain. The lecture involved student-centered active learning activities, including a think-pair-share exercise on pain and roles, routines, and occupation; educational videos illustrating the pain pathway in the body and individuals' accounts of living with chronic pain; class discussion questions prompting students to reflect on and expand learning; and a case study involving an individual experiencing pain in their daily life followed by a group discussion on the application of learning as future occupational therapy professionals.

Table 1

Description of Traditional Lecture and Active Learning Sessions

Traditional lecture session: Clinical topics in neurorehabilitation
Student learning objectives: • List when different neurological conditions may occur in the lifespan • Describe the neurological basis for various clinical conditions • Explain how clinical neurological conditions may impact participation in meaningful activities • Understand occupational therapists' role in the management of neurological conditions
Format: 60-minute session presenting 28 Microsoft PowerPoint (PP) slides
Active learning session: The neuroscience of pain and its link to occupation
Student learning objectives: • Define pain and describe the neurological basis for distinct types of pain • Articulate diverse ways individuals self-manage pain • Explain the link between pain and occupational performance • Understand occupational therapists' role in the assessment and treatment of pain
Format: 60-minute session with the timely presentation of 28 Microsoft PP slides Additional Active Learning Activities: • Think-pair-share: Students collaborated with a partner to consider a time when they experienced pain. Students discussed the following: (a) what was the

DOI: 10.26681/jote.2023.070208

source of the pain, (b) how long did the pain last, (c) did the pain affect their daily routine, and if so, how, (d) how did they manage the pain, both physically and psychologically (e) did they receive help from professionals or family/friends to cope?
- 1-5 minute embedded educational videos for further clarification on PP content: The Gate Theory, counterirritants for pain cessation, and mirror box therapy.
- Instructor-guided questions: Encouraged student self-reflection on their understanding of lecture content and allowed additional learning from student and instructor responses and shared individual experiences. Based on student responses, brief discussions followed on the pharmaceutical management of pain, complementary health interventions, and working inter and intra-professionally.
- Case study: A brief case description of an individual experiencing chronic pain was read. Students were asked to consider how they would assess this individual for pain. Some student responses included (a) completing an Occupational Profile, (b) assessment of occupational performance (including physical, cognitive, psychosocial, sensory, and perceptual factors), and (c) interviewing the individual to identify the presence, intensity, location, type, and frequency of pain. The instructor used probing questions about coping skills and self-efficacy regarding chronic pain to encourage clinical reasoning.

Description of Tests and Survey Content

The course instructor developed a ten-question multiple choice test (4 choices per question) taken directly from the traditional lecture and the active learning sessions. Both tests required lower levels of Bloom's Taxonomy and the recognition of correct responses. The study pretest measured prior student knowledge of the learning topic before the lecture, and the post-test measured post-lecture student learning. Given these points, the pre and post-tests were created to take approximately 10 minutes. The pretest was a moderate to high challenge for students, so a score lower than 70% was anticipated. A physical therapy faculty member with research understanding and experience teaching neuroscience reviewed the lecture content and tests and agreed with the instructor that the test directly correlated with the class content. Additionally, this faculty member asserted that both lecture topics were similar in rigor after a collaborative meeting.

Concurrently, a teaching expert, the Director of the Center of Teaching and Learning Design, developed an anonymous survey consisting of seven open-ended questions (see Table 2). The survey helped measure the students' perceptions of the learning method used during the classroom session. Before use, the course instructor and eight faculty members from undergraduate and graduate programs across the university reviewed the survey and agreed on its content.

Table 2

Post-Session Student Survey Questions

Did today's lecture help you learn and understand the course content? YES/NO If YES, how did the lecture/ activities help? If NO, why not?
Did the lecture/activities maintain your attention during the class? YES/NO If YES, how did the lecture/activities help? If NO, why not?
I prefer __% of our classes to use today's lecture/ active learning method. Response provided: (0-100% listed in 10% increments)
Please suggest activities to increase your learning and participation in this class.
Please include any additional comments/suggestions regarding lectures/ activities.

Lecture Delivery

The traditional lecture and active learning session lecture were delivered using Microsoft's PowerPoint 365 Software (version 2211), designed for electronic presentations containing a series of separate slides, provided through the university learning management system in a classroom with 30 student seats. Instruction tools available at the school included a podium, wipe board, computer with internet access and monitor, and large viewing screen for PowerPoint projection.

The course instructor delivered the active lecture on the neuroscience of pain in the eleventh week and the traditional lecture class on clinical topics in neurorehabilitation in the thirteenth week of the Spring 2022 semester. Both lectures were presented at nine o'clock am, the first hour of a four-hour class.

Test and Survey Procedures

The course instructor gave the students ten minutes to complete the pretest before starting the traditional and active learning classes. The students completed the identical content post-test for ten minutes after the conclusion of each session, followed by ten additional minutes to complete a student survey. To ensure the tests were administered identically, they were administered through Blackboard Learn (version 9.1 v3900. 23.0), the university learning management system. The students used their computers while being monitored by the course instructor in the classroom. Afterward, students were given access to the survey link through the neuroscience course homepage to share their perceptions of learning methods and preferences for learning.

Participant Consent

Completing the course tests used for this pilot study was mandatory for all students for the active learning and traditional lecture sessions. The post-test scores were included as the low-stake course grade. Notably, the pilot study was approved by a university institutional review board before data collection. A study consent statement was provided as text at the top of the tests, and all students were given the option to consent to have the pre and post-test results used for this study. The instructor informed the students that there were no negative consequences for the withdrawal of their test or

DOI: 10.26681/jote.2023.070208

survey results from the study at any time, and no compensation was offered for their participation. Additional consent statements and the time required for survey completion were included as text at the beginning of the survey. The survey was anonymous, so it was preferred to use a consent statement instead of an identified informed consent form.

Data Analysis

First, descriptive statistics were used to evaluate the pretest and post-test score characteristics. The mean, standard deviation, and range in pretest and post-test scores for the active learning and traditional lecture session were determined. Then, quantitative data were analyzed using SPSS Statistics (version 27). Given that the variables were operationalized using a nominal level of measure, the instructor ran a Wilcox Signed Rank Test to assess for differences between pretest and post-test scores by question.

Narrative student survey responses were reviewed and grouped into categories according to active learning or traditional. After the course instructor completed the review and categorization, a second occupational therapy instructor independently reviewed the results. The two instructors compared results, and a consensus was reached. Consistent findings helped increase the dependability of the qualitative results and reduce potential bias.

Results

Twenty-six occupational therapy students attended the traditional lecture and active learning class with 100% consent to participate in this pilot study. This occupational therapy cohort consisted of 27 students. One student's data was excluded because they missed the active learning class session.

Quantitative Test Results

While examining active learning and traditional lecture test scores, all students showed a positive pre to post-test change. The pretest and post-test mean, standard deviation, and range of scores for the active learning and traditional lecture sessions for the combined study sample are shown in Table 3.

Table 3

Description of Active Learning and Traditional Lecture Session Scores in Percentages

	Mean Pretest Score	Pretest Standard Deviation	Pretest Range of Scores	Mean Post-test Score	Post-test Standard Deviation	Post-test Range of Scores
Active Learning	52.3	13.4	20.0-80.0	79.0	15.0	60.0- 100.0
Traditional Lecture	56.3	12.2	30.0- 80.0	90.7	10.5	70.0-100.0

The active learning session results indicated a statistically significant difference from the pretest to the post-test at a .05 level for active learning questions 1,2,4, and 9 (see Table 4).

Table 4

Active Learning Results Indicating a Statistically Significant Difference by Question

	z- value	p-value
Question 1	-2.673	.008
Question 2	-2.324	.020
Question 4	-2.840	.005
Question 9	-3.357	.001

Note. Z-value indicates data point distance from mean and statistical significance is $p<.05$

The traditional lecture session results indicated the following statistically significant differences at a .05 level for all questions except for question 6, which was slightly larger at .058 and still showed a difference between the pretest and post-test, as indicated in Table 5.

Table 5

Traditional Lecture Results Indicating a Statistically Significant Difference by Question

	z- value	p-value
Question 1	-2.496	.013
Question 2	-3.500	.000
Question 3	-2.333	.020
Question 4	-3.317	.001
Question 5	-2.673	.008
Question 7	-2.530	.011
Question 8	-2.530	.011
Question 9	-2.333	.020
Question 10	-3.051	.002

Note. Z-value indicates data point distance from mean and statistical significance is $p<.05$

DOI: 10.26681/jote.2023.070208

Qualitative Survey Results

Active Learning Results

The post-active learning survey showed that students felt the active learning class helped them learn and understand course content. The student responses representing this learning session's reported strengths included having an organized PowerPoint and class participation, including dialogue with the instructor and other students to expand student learning. The students valued the use of real clinical scenarios from occupational therapy practice to deepen their understanding of learning and the chance to show the application of their learning through clinical cases. They felt the embedded videos in the PowerPoint were beneficial, especially for students with different learning styles. Furthermore, instructor-prompted formative questions throughout the lecture were reported as appreciated to self-assess their understanding of learning and expand on concepts. Lastly, drawing illustrations on the wipe board to further clarify neurological concepts was indicated as helpful. The students did not report anything that prevented them from learning during the active learning class on the post-session surveys.

Also, all students reported that the active learning class assisted them in maintaining their attention throughout the session. When asked precisely how the class helped to do so, student responses included the instructor's ability to make the topic and learning content enjoyable to the students and break up the content with activities. Additional responses included to maintain attention were videos, class discussions, and linking learning content to current events and occupational therapy practice.

Parallel to the above student responses, most students commented that they preferred an active method of learning for future classes. Students were asked to suggest additional activities to increase learning and participation in class. Responses included drawing more illustrations to explain concepts, using games to increase active participation, and additional small group work and applying the material to real life through visuals and graphics. They also requested additional hands-on learning, partner work for introverted students, case applications, more real-life examples in class discussions, and pausing videos to ask students thought-provoking questions.

Direct student remarks on the active learning class included: "easy to follow along and insightful," "fun and engaging," "enjoyment," "comprehensive," "helped me focus and understand the content," and "this was a good lecture." Conversely, on the active class survey, one student wrote, "I do not mind being lectured at. I do not like the active stuff as much and do not even think that stuff helps me learn. Passive lectures are fine with me."

Traditional Lecture Results

Despite the quantitative results, the post-traditional lecture survey showed that only half the students felt the traditional lecture helped them learn or understand the lecture content. When asked what specifically prevented students from learning during the traditional lecture, student responses included the lack of professor and student engagement, real-life clinical examples, and discussion and conversation. Additional

responses included a lack of clinical application questions, boredom and loss of attention, and the pace needing to be slower. Direct student comments included, “it was boring,” “I felt like I could have just read the slides myself,” “it lacked engagement,” and "it was monotonous without conversation." They also stated, “I was too busy trying to keep up with notes,” and “I was paying attention, but there was a lack of knowledge checks to know if I understood.”

Consistent with previous responses, students’ comments on the future use of traditional lectures included, "no traditional lectures in the future as they make it hard to retain information,” “I would prefer only interactive lectures,” “no topics should be presented in straight lecture format, especially neuroscience." They also reported, "I learn best when my classmates answer and ask questions so that I can hear other ways people rationalize the material,” “I feel like I learned less in this class.”

In opposition, the student’s rationale on how the lecture did help to maintain their attention included, “I did not have to worry about participating, which helped me better focus on the material,” and, "it was straight to the point without much excess information, which can get confusing at times." They also concluded, "I did not get distracted by frequent pauses in the lecture,” “the content was interesting,” and “I knew that I had a test, so I paid attention more.”

As shown, students in this study preferred traditional lecture styles and active learning. Students liked the traditional lecture structure, with one student stating, “…the traditional lecture seemed better arranged and more organized.” Other students built on this response and suggested a mixed method of learning. Another student suggested “using portions of traditional lectures as a review of previously taught content.” Suggestions for future class improvement included providing more real-life patient examples, discussions, instructor-led questions, hands-on activities, visual aids, and teach-back activities.

Discussion

Occupational therapy instructors try to prepare entry-level practitioners with the skills and knowledge to meet the diverse needs of a changing healthcare environment. Instructors use various instructional methods in most allied health programs, including traditional lecture-based instruction and active learning (Dewald, 2010; Pickering & Roberts, 2017; Russell et al., 2007; Seruya, 2007; Wolff et al., 2015). While active learning strategies are increasingly being explored and implemented in higher education, mixed outcomes exist regarding exam results and student preferences for active learning compared to traditional lecture-based instruction (Alaagib et al., 2019; Covill, 2011; Lake, 2001; McGreevy & Church, 2020; Struyven et al., 2008). This pilot study examined the impact of traditional lectures versus active learning on first-year graduate occupational therapy students’ learning, preferred learning preferences, and perceptions about their experiences.

DOI: 10.26681/jote.2023.070208

In the quantitative section of this study which compared pre/post-test results, a statistical significance was shown for active learning and traditional lecture sessions. A more significant statistical difference was noted for the traditional lecture by question, with a significant difference indicated for all but one test question. Despite these findings, the qualitative student survey showed that students perceived they learned more using active learning strategies. Similarly, a study by Lumpkin et al. (2015) revealed that students' positive perceptions of learning with active learning methods and engaging in learning activities positively influence their learning of classroom content.

In contrast, in classrooms with all active learning, students' learning may be impacted by the perception of limited learning due to increased cognitive effort or lack of confidence to take on more self-responsibility for learning (Deslauriers et al., 2018). Students have been shown to be poor judges of their competence (Porter, 2013), while the cognitive fluency of traditional lectures can be deceptive (Carpenter et al., 2013). Consequentially, students may not accurately assess their learning relative to active methods.

Within the context of learning preferences, the students in this pilot study expressed varied likes and dislikes. More specifically, students expressed positive sentiments when reflecting on their experience during the active lecture, such as describing learning as "energizing" and "fun." Other students described active learning as "anxiety-provoking," "embarrassing," and "too much effort." This disconnect can significantly affect students' motivation, engagement, and ability to self-regulate their learning. Tharayil et al. (2018) suggested that instructors use explanation and facilitation strategies to reduce student resistance to active learning. Explanation strategies include explaining the purpose of the learning, course expectations, and activity expectations. The PowerPoints used in this study included student learning objectives for both the traditional and active sessions, while the instructor provided further instruction on activity expectations during the active session. The instructor also used facilitation methods, including approaching non-participants, assuming an encouraging demeanor, inviting questions, and designing activities for participation.

The student's preferences and approaches to learning may have impacted this pilot study's results. Alaagib et al. (2019) studied students' learning styles and approaches to learning. One learning approach involved students having greater attention and motivation to learn due to an interest in the subject material and a desire to understand the content. Students recognized the value of learning in their professional careers. One student commented, "the content was interesting." This understanding may be present in occupational therapy students taking neuroscience. Several survey results indicated that the active learning sessions helped maintain their attention. This process also relates learning to previous knowledge and individual experiences to be effective. The active learning session in this study included linking fieldwork and volunteer patient experiences to classroom learning using a case study.

Also, according to Alaagib et al. (2019), another approach to learning comes from the fear of failure. It involves memorizing information in isolation versus understanding the content and significance in a broader context. This approach is indicated in the student survey comment, “I knew that I had a test, so I paid attention more.” Similarly, this learning approach focuses on achieving high grades, as indicated in the comment, “after the first lecture, I knew that the pretest and post-test were the same, so I memorized the test and knew what to pay attention to in the lecture."

The varied preferences of learning methods in this study may also be attributed to prior exposure and experience with specific methods of academic instruction, as shown in a study by Frame et al. (2016). Traditional lecture styles are often used in undergraduate education (McCullough & Munro, 2018). Frame et al. (2016) report that students who were offered active learning activities early in their education, before traditional lecture-based formats, may better receive active learning. This early exposure may allow students time to realize the benefits of active learning and assist them in building teamwork-related skills. The students in this study were first-year graduate students from various undergraduate institutions, in addition to most having been taught using online, hybrid, and limited in-person classes the previous year during the Covid pandemic. Covid compelled most higher education institutions to shift to either distance learning or some form of hybrid teaching model (Stamm et al., 2021). This change led to more limited faculty and student engagement with learning content, thus possibly limiting their previous exposure and affecting individual preferences.

Teaching methods should be selected based on the learning outcomes and the ways that would work best considering those outcomes. They should remain student-centered, using available resources and supports within an encouraging learning environment. This pilot study aligns with current literature in and outside the allied health profession (Hyun et al., 2017; Joshi et al., 2018), which describes the benefits and barriers to active learning and traditional lectures to meet learning outcomes. The study shows that active learning and traditional lectures improve exam performance. However, a mixed learning method may increase students' perceptions of learning, better align with student learning preferences, and help to achieve learning goals (McCullough & Munro, 2018).

Limitations

This pilot study has several limitations. They include teaching different topics for active learning and traditional lecture class sessions and the order of the lectures. The active lecture was delivered two weeks before the traditional lecture. One student mentioned a test bias knowing they would have the same pretest and post-test after finishing the first active lecture session. This experience may have affected the traditional lecture learning outcomes. Another limitation includes the size of study participants (n=26) and the need for more diversity of students, thus restricting the generalization of this information to a larger population.

DOI: 10.26681/jote.2023.070208

Additionally, this pilot study used formative tests examining short-term knowledge acquisition through recognition only. Due to curricular time constraints, the instructor developed one test for each class session. Only one other faculty member reviewed the tests and the amount of rigor required to complete both while intending to make them an equal challenge to the students.

Additionally, the lectures were limited to the first hour of the four-hour class. Research shows that insufficient exposure to the content can encourage superficial learning. Also limiting the generalizability of the study is that the classes were held in the morning, which may have affected motivation vs. afternoon classes held in concession with other classes or classes that include an active lab section. Another potential factor impacting the study is the students' definition of active learning and students' ability to self-report learning.

Conclusion and Implications for Occupational Therapy Education

Instructors should consider using a mixed method of course instruction to improve exam scores and student perceptions of learning and align with student learning preferences. The results of this pilot study can inform instructors of best practices while making the best use of resources and teaching time with students to meet the established learning objectives. A blended method can support students in developing their understanding of concepts, comprehending relationships between concepts in didactic courses and the profession, and enhancing the application of learning using student-centered learning approaches.

As a growing body of research highlights the benefits of active learning strategies, researchers should expand on these results using data from this pilot study. Studies should include larger samples and environments, including different course content, class length, and scheduled instruction time, such as morning versus afternoon and evening. Efforts should be made to create more valid study measures, including more extensive questions randomly divided into two question sets to improve the validity of the tests. The alternate tests could then be correlated with student learning. Additionally, survey unique student identifiers would allow for analysis between test scores and survey responses. Moreover, studies should also be expanded to examine long-term learning retention.

References

Abdelkarim, A., Schween, D., & Ford, T. G. (2018). A comparative study of attitudes towards problem-based learning of faculty members at 12 U.S. medical and dental schools. *Journal of Dental Education, 82*(2), 144-151. https://doi.org/10.21815/jde.018.019

Accreditation Council for Occupational Therapy Education standards and interpretive guide (2018). *The American Journal of Occupational Therapy, 72*(Suppl. 2). 1-83. https://doi.org/10.5014/ajot.2018.72S217

Adkins, J.K. (2018). Active learning and formative assessment in a user-centered design course. *Information Systems Education Journal*, *16*(4), 34–40. https://files.eric.ed.gov/fulltext/EJ1187945.pdf

Alaagib N.A., Musa, O.A., & Saeed, A.M., (2019). Comparison of the effectiveness of lectures based on problems and traditional lectures in physiology teaching in Sudan. *BMC Medical Education, 19*(2). https://doi: 10.1186/s12909-019-1799-0

Allsop, J., Young, S. J., Nelson, E. J., Piatt, J., & Knapp, D. (2020). Examining the benefits associated with implementing an active learning classroom among undergraduate students. *International Journal of Teaching and Learning in Higher Education*, *32*(3), 418–426. https://files.eric.ed.gov/fulltext/EJ1299931.pdf

Barkley, E. F. (2010). *Student engagement techniques*. John Wiley & Sons.

Bristol, T., Hagler, D., McMillian-Bohler, J., Wermers, R., Hatch, D., & Oermann, M.H. (2019). Nurse educator's use of lecture and active learning. *Teaching and Learning in Nursing, p. 14.* https://doi.org/10.1016/j.teln.2018.12.003

Carpenter, S.K., Wilford, M.M., Kornell, N., & Mullaney, K.M. (2013). Appearances can be deceiving: Instructor fluency increases perceptions of learning without increasing actual learning. *Psychonomic Bulletin & Review, 20*(6), 1350-1356. https://doi:10.3758/s13423-013-0442-Z.

Carstensen, S. S., Kjaer, C., Möller, S., & Bloksgaard, M. (2020). Implementing collaborative, active learning using peer instructions in pharmacology teaching increases students' learning and, thereby, exam performance. *European Journal of Pharmacology*, *867,* 172792. https://doi.org/10.1016/j.ejphar.2019.172792

Cattaneo, K.H. (2017). Telling active learning pedagogies apart: From theory to practice. *Journal of New Approaches in Educational Research, 6*(2), 144-152. https://doi.org/10.7821/naer.2017.7.237

Carvalho, H., & West, C. A. (2011). Voluntary participation in an active learning exercise leads to a better understanding of physiology. *Advances in Physiology Education*, *35*(1), 53–58. https://doi.org/10.1152/advan.00011.2010

Chilwant, K.S., (2012). Comparison of two teaching methods, structured interactive lectures, and conventional lectures. *Biomedical Research, 23(*3), 363-366.

Covill, A. E. (2011). College students' perceptions of the traditional lecture method. *College Student Journal, 45*(1), 92- 101.

Deslauriers, L., McCartya, L.S., Miller, K., Callaghana, K., & Kestina, G. (2019). Measuring actual learning versus feeling of learning in response to being actively engaged in the classroom. *Proceedings of the National Academy of Sciences, 11*(39), 9257. www.pnas.org/cgi/doi/10.1073/pnas.1821936116

Dewald, L. (2010). Building pedagogical intelligence in allied health: A primer. *The Internet Journal of Allied Health Sciences and Practice, 8*(3). https://doi:10.46743/1540-580X/2010.1305

Frame, T. R., Cailor, S. M., Gryka, R. J., Chen, A. M.H., Kiersma, M. E., & Sheppard, L. (2016). Student perceptions of team-based learning vs. traditional lecture-based learning. *Pharmacy Practice Faculty Publications*,*80*(3). https://doi.org/10.5688/ajpe80346

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences*, *111*(23), 8410–8415. https://doi.org/10.1073/pnas.1319030111.

Feudel, F. & Fehlinger, L. (2021). Using a lecture-oriented flipped classroom in a proof-oriented advanced mathematics course. *International Journal of Mathematical Education in Science and Technology*. https://doi.org/10.1080/0020739X.2021.1949057

Henderson, S., Kinahan, M., & Rossiter, E. (2018). *Problem-based learning as an authentic assessment method*. PG Diploma in Practitioner Research Projects, DIT. https://arrow.tudublin.ie/ltcpgdprp/17/

Hyun, J., Ediger, R., & Lee, D. (2017). Students' satisfaction on their learning process in active learning and traditional classrooms. *International Journal of Teaching and Learning in Higher Education*, *29*(1), 108–118.

Joshi, K., Padugupati, S., & Robins, M. (2018). Assessment of educational outcomes of small group discussion versus traditional lecture format among undergraduate medical students. *International Journal of Community Medicine and Public Health, 5*(7), 2766–2769. http://dx.doi.org/10.18203/2394-6040.ijcmph20182419

Kay, R., MacDonald, T., & DiGiuseppe, M. (2019). A comparison of lecture-based, active, and flipped classroom teaching approaches in higher education. *Journal of Computing in Higher Education, 31*(3), 449–471. https://doi.org/10.1007/s12528-018-9197-x

Lake, D. A. (2001). Student performance and perceptions of a lecture-based course compared with the same course utilizing group discussion. *Physical Therapy, 81*(3), 896–902. https://doi.org/10.1093/ptj/81.3.896

Lumpkin, A., Achen, R., & Dodd, R. K. (2015). Student perceptions of active learning. *College Student Journal, 49*(1), 121–133.

Machemer, P.L., & Crawford, P. (2007). Student perceptions of active learning in a large cross-disciplinary classroom. *Active Learning in Higher Education, 8*(1), 9–30. https://doi.org/10.1177/1469787407074008

Marušić, M., & Dragojević, A. (2020). Assessing pharmacy students' scientific reasoning after completing a physics course taught using active-learning methods. *American Journal of Pharmaceutical Education*, *84*(8), 1112–1122. https://doi.org/10.5688/ajpe7610

Matheson, C. (2008). The educational value and effectiveness of lectures. *Clinical Teacher, 5*(4), 218–221. https://doi.org/10.1111/j.1743-498X.2008.00238.x

McCullough, K., & Munro, N. (2018). Finance students' experiences of lecture-based active learning tasks. *Innovations in Education and Teaching International, 55(*1), 65–73. https://doi.org/10.1080/14703297.2016.1189843

McGreevy, K. M., & Church, F. C. (2020). Active learning: Subtypes, intra-exam comparison, and student survey in an undergraduate biology course. *Education Sciences*, *10*(7), 1–15. https://doi.org/10.3390/educsci10070185

Mosalanejad, L.R. (2015). The effects of case-based team learning on students' learning, self-regulation and self-direction. *Global Journal of Health Science, 7*(4), 295-306. https://doi.org/10.5539/gjhs.v7n4p295

National Board of Certification for Occupational Therapy. (2022, October) retrieved from https://www.nbcot.org/

Omelicheva, M. Y., & Avdeyeva, O. (2008). Teaching with lecture or debate? Testing the effectiveness of traditional versus active learning methods of instruction. *Political Science & Politics*, *41*(3), 603–607. https://doi.org/10.1017/S1049096508080815.

Pickering, J., & Roberts, D.H. (2017). Flipped classroom or an active lecture? *Clinical Anatomy, 31*(1), 118-121. https://doi.org/10.1002/ca.22983

Porter, S.R. (2013). Self-reported learning gains: A theory and test of college student survey response. *Research in Higher Education, 54,* 210-226. https://doi.org/10.1007/s11162-012-9277-0

Remington, T. L., Bleske, B. E., Bartholomew, T., Dorsch, M. P., Guthrie, S. K., Klein, K. C., Tingen, J. M., & Wells, T. D. (2017). Qualitative analysis of student perceptions comparing team-based learning and traditional lecture in a pharmacotherapeutics course. *American Journal of Pharmaceutical Education*, *81*(3), 55. https://doi.org/10.5688/ajpe81355

Russell, A. T., Comello, R. J., & Wright, D. L. (2007). Teaching strategies promote active learning in healthcare education. *Journal of Education and Human Development, 1*(1), 1–8. https://doi.org/10.1016/j.rdc.2019.09.001

Samuelson, D. B., Divaris, K., & De Kok, I. J. (2017). Benefits of case-based versus traditional lecture-based instruction in a preclinical removable prosthodontics course. *Journal of Dental Education*, *81*(4), 387–394. https://doi.org/10.21815/JDE.016.005

Seruya, F. M. (2007). Preparing entry-level occupational therapy students: An examination of current teaching practices. *Education Special Interest Quarterly, 17*(4), 1-4. https://doi.org/10.26681/jote.2019.030109

Shahba, A. A., & Sales, I. (2021). Design Your Exam (DYE): A novel active learning technique to increase pharmacy student engagement in the learning process. *Saudi Pharmaceutical Journal, 29*(11), 1323–1328. https://doi.org/10.1016/j.jsps.2021.09.011

Shi, Y, Peng, C., & Yang, H.H. (2018). Examining interactive white-board instruction on the academic self-efficacy, academic press and achievement of college students. *Open Learning: The Journal of Open, Distance and e-Learning, 30*(2), 115-130. https://doi.org/10.10180/02680513.2018.1454829

Stamm, M., Francetic, K., Reilly, R., Tharp, A., & Thompson, N. (2021). Kinesthetic learners during the Covid-19 pandemic: Occupational therapy students' perspective. *Journal of Occupational Therapy Education, 5*(2). https://doi.org/10.26681/jote.2021.050203

Struyven, K., Dochy, F., & Janssens, S. (2008). Students' likes and dislikes regarding student-activating and lecture based educational settings: Consequences for students' perceptions of the learning environment, student learning, and performance. *European Journal of Psychology of Education, 23*(3), 295-317. https://doi.org/10.1007/BF03173001

Sumanasekera, W., Turner, C., Ly, K., Hoang, P., Jent, T., & Sumanasekera, T. (2020). Evaluation of multiple active learning strategies in a pharmacology course. *Currents in Pharmacy Teaching and Learning, 12*(1), 88–94. https://doi.org/10.1016/j.cptl.2019.10.016

Tharayil, S., Borrego, M., Prince, M., Nguyen, K. A., Shekhar, P., Finelli, C. J., & Waters, C. (2018). Strategies to mitigate student resistance to active learning. *International Journal of STEM Education, 5*(1), 1–16. https://doi.org/10.1186/s40594-018-0102-y

Waldeck, J.N., & Weimer, M., (2017). Sound decision making about the lecture's role in the college classroom. *Communication Education, 66*(2), 27-250. https://doi.org/10.1080/03634523.2016.1275721

Watson, W. R., Watson, S. L., Magar, S. T., & Tay, L. (2021). Comparing attitudinal learning of large enrolment active learning and lecture classes. *Innovations in Education & Teaching International*, *58*(2), 146–156. https://doi.org/10.1080/14703297.2019.1711440

Wertman, D., & Whiteside, M. (2010). Comparing the effectiveness of traditional and active learning methods in business statistics: Convergence to the mean. *Journal of Statistics Education, 18*(1). https://doi.org/10.1080/10691898.2010.11889480

Wolff, M., Wagner, M. J., Poznanski, S., Schiller, J., & Santen, S. (2015). Not another boring lecture: Engaging learners with active learning techniques. *The Journal of Emergency Medicine*, *48*(1), 85–93. https://doi.org/10.1016/j.jemermed.2014.09.010

Woodring, B.C., & Hultquist B.L. (2017). I am using lectures in active classrooms. In M. Bradshaw, B. Hultquist, & D. Hagler, *Innovative teaching strategies in nursing and related health professions* (7th ed.), Jones & Bartlett Learning.