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Review

Supporting Higher Education Students Through Polls in Inclusive Digital Formats

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Abstract: As digital learning increases globally, the use of evidence-based practices to create community and foster engagement is meaningful for higher education learners. Higher education students in digital formats have identified a lack of engagement and community in their courses. As more instruction moves to digital formats, research demonstrates the use of polls as a strategy based in increasing active learning, resulting in positive outcomes for students and to support student needs. As heterogeneous students are enrolling in online coursework, it is imperative that inclusive teaching strategies are employed. Utilizing this strategy in online coursework would benefit diverse higher education students in academic outcomes, experience and application.

***Keywords*:** higher education, formative feedback, active learning, surveys, polls, universal design for learning

1. Introduction

The use of formative assessment is widely employed to check for understanding and to gauge a student's learning progress. Formative assessment enables instructors to regularly collect and analyze data on student performance, thereby supporting higher education instructors in refining their teaching practices. Given the significant increase in the number of students engaging in online courses, it is imperative for higher education instructors to transition evidence-based practices into inclusive digital formats. This article highlights the potential use and benefits of polls as a specific formative assessment tool in higher education settings within digital formats with the inclusive framework of Universal Design for Learning (UDL) in mind. This technological tool acts as a catalyst to enhance engagement in various areas, including student-faculty interaction and active and collaborative learning, with the potential to improve retention rates (Sun, 2014). Within the digital learning classroom structures, polling can change the landscape of online learning through active learning and increase the learning experience and academic outcomes for all learners in higher education. The objective of this literature review is to investigate the literature related to and build the connection between the student engagement strategy, polling, within inclusive higher education digital learning environments.

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2. Methods

The methods for this literature review use of PubMed, Google Scholar, ERIC databases to gather the research. Keywords used included polls, digital learning, online learning, engagement, inclusion, higher education, and student outcomes as search terms. The major inclusion criteria initially included peer-reviewed journals published in the last 5 years only. I then broaden my search to include older research. Lastly, I broadened my research to the nonprofit education research and development organization, the Center for Applied Special Technology (CAST), CAST as well as federal and international agencies who report numbers related to health and educational outcomes for individuals with disabilities (National Center for Education Statistics and the World Economic Forum).

3. Literature review

Many higher education students are enrolling in distance education or digital learning formatted courses. In the fall of 2021, 9.4 million students, comprising 61 percent of all undergraduate students in the United States, were enrolled in at least one distance education course. Within this group, 4.4 million students, or 28 percent of all undergraduate students, exclusively took distance education courses (National Center for Education Statistics, 2023). Further, Rabourn et al. (2018) found that adult learners, aged 25 years and up, are a growing number within higher education and are more likely to take online classes to meet their needs and preferences.

The World Economic Forum, citing Coursea's (2021) findings, underscores the global prevalence of online course enrollment, with 189 million users in 2021. The United States leads in online learners with 17.3 million, followed by India (13.6 million), Mexico (4.8 million), Brazil (3.7 million), China (3.3 million), Canada (2.4 million), Russia (2.4 million), the United Kingdom (2.4 million), and Colombia (2.2 million). Moreover, emerging nations such as Paraguay, Lebanon, the Philippines, Guyana, Indonesia, Kenya, Ethiopia, Rwanda, Vietnam, and Kazakhstan are experiencing the fastest rate of growth in online learning (Coursea).

3.1 *Perceptions of higher education in digital formats*

Perceptions of higher education in a digital environment by students can vary based on several factors, including the specific course, the institution, the student's background, and individual preferences. Díaz-Noguera et al. (2022) found that more than 60% of students consider online education useful, but approximately 50% of students encounter limitations in terms of adaptation and enjoyment of this teaching modality. Shelton et al. (2017) discovered that students in online courses with low levels of engagement experience feelings of isolation and a lack of connection with their peers and instructors, increasing the risk of failure or withdrawal before the course concludes. Furthermore, Wladis et al. (2017) revealed that student attrition is significantly higher (7-20%) in online courses compared to traditional face-to-face classrooms, but institutions can mitigate online course outcomes by implementing targeted interventions for specific course types. Supplementary support, such as tutors, mentors, advisers, or additional technical assistance, may reduce attrition. Bernardo (2022) concluded that students' intention to drop out is directly and significantly related to their engagement. Therefore, it is crucial to incorporate evidence-based teaching strategies that specifically address student engagement.

3.2 *Use of evidence-based practices in digital higher education formats*

Evidence-based practices in education involve using specific strategies that have demonstrated positive outcomes through repeated, systematic, and valid research methods across educational populations. As Hattie (2008) emphasized, these practices include organizational clarity, transparent learning goals and assessment strategies, and building rapport with students by regularly checking in with them and encouraging peer interaction, with ongoing support and monitoring by the instructor. These evidence-based practices are applicable in both face-to-face and online environments, although their implementation may vary. With the increasing enrollment in online learning, it is essential for online educators to utilize evidence-based practices to ensure student success, retention, and upward mobility.

Evidence-based practices encompass a wide range of educational needs for students. As Michael (2006) questioned,

it is essential to evaluate the effectiveness of new teaching and learning approaches compared to traditional methods. Specifically in digital learning, strategies that promote collaboration, engagement, and community have been shown to yield better outcomes. Active learning, as discussed by Idsardi (2020), involves a range of instructional practices that engage students in learning through activities and discussions rather than passive listening to an expert.

Fraser (2014) pointed out that there is a significant amount of evidence supporting active-learning methods, but faculty and instructor adoption rates have not increased. Eddy et al. (2015) identified several barriers to adoption, including clarity, the overwhelming number of aspects that must be considered, and the time required for implementation. Preis et al. (2011) demonstrated that interactive participation among students enhances their learning, retention of concepts, and the ability to apply knowledge compared to students who do not participate. Online polling is also reported to promote enjoyable learning, enhancing intrinsic motivation. To support active learning strategies in digital formats, polling, which is a strategy to increase active learning, can be readily integrated into online learning management systems or accessed through external links, thereby improving implementation rates and, consequently, student outcomes in digital formats.

3.3 *Universal design for learning in higher education*

The National Center for Education Statistics (2023) report in 2019-20, some 21 percent of undergraduates and 11 percent of postsecondary education students reported having a disability. However, Lovett et al. (2015) discuss the discrepancies between qualifying for special education services and accommodations from kindergarten through twelfth grade to higher education, so these students who are identified as requiring special education services, who benefited from best practices to support their earlier educational experience, may not identify, or qualify for the accommodations that are provided in higher education. It is essential, then, that practices that support students with heterogenous abilities are delivered by faculty regardless of if students with disabilities are identified in their class, to ensure students are provided access to success in higher education.

The Center for Applied Special Technology (CAST) (2018) used scientific insights to develop a framework of teaching practices which focus on improving and optimizing the experience for all learners. Through the investigation of the learning process, UDL suggests strategies that support the access and participation in meaningful, challenging learning opportunities specific to what, why and how of learning in any discipline or domain. CAST highlights the importance of ensuring that all students have meaningful ways to engage and participate in learning activities (CAST).

UDL is a framework to improve and optimize teaching and learning for all people based on scientific insights into how humans learn (CAST, 2018). Thus, proactive inclusion of strategies that support diverse learners within the curriculum, is important for inclusion of all learners (Bunbury, 2020). The first pillar of the learning process includes the affective networks of how a student can learn, one's engagement in the content (CAST). Love et al. (2019) stated that ensuring students have multiple opportunities to actively participate and connect provides students multiple means for engaging in and communicating in an online course. Love et al. (2019) specifically discusses that student response systems, highlighting clickers, Plickers, and response boards, allows instructors to embed formative knowledge checks during lectures, actively engage students in lectures, and increase student opportunities to respond and engage in class, explicitly for students with intellectual disabilities.

3.4 *Use of polls*

Polls can enhance the interactivity of teaching sessions, encourage student engagement, and promote active learning. In a literature review, Rose (2019) found that online polling tools have a positive impact on student engagement and retention, and provide an effective means for educators to enhance their teaching. Bawazeer et al. (2023) found 86.9% of students within virtual classes agreed on enjoying participation in polls during the class, and 88.9% recommended the utilization of the polls again. Students stated they found the participation in polls increased understanding (88%) and class performance (63%). Additionally, students stated that polls improved their grades (53%). Through several class polling projects, Berry and Robinson (2012) also noted that a class exit poll can excite students about research methods and election dynamics, offering substantial pedagogical benefits. Instructors can employ polls to initiate discussions or to assess students' understanding of previous content before introducing new material. Students can participate in polls by anonymously answering questions, and there are opportunities for in-depth discussion during

class sessions.

Bernsten and Linares (2016) observed that the use of polls is facilitated by a wide variety of free or low-cost learner response systems that allow instructors to easily poll their classes using classroom computers or students' own portable devices, such as cell phones, tablets, and laptops. These tools enable not only multiple-choice questions but also open-ended questions, clickable image polls, and polls that allow the audience to submit ideas and vote on the best idea.

Sun et al. (2014) found that innovatively designed polls, incorporating pre- and post-class questions and the "plenty of time" strategy during class, were associated with higher levels of specific types of student engagement, including emotional and cognitive engagement. Through their findings, CourseArc (2017) explained the placement of polling in courses, highlighting its use before students learn a new lesson to spark curiosity, test pre-existing knowledge, presumptions, or biases; within the content as a reminder of concepts just taught and to assess students' ability to apply them to previous or future topics; and at the culmination of the content or module to assess short-term memory and reinforce knowledge in preparation for upcoming lessons.

Bernsten and Linares (2016) identified best practices for using polling, which include asking a limited number of less complex questions, providing students with response time, offering training with the technology in advance, avoiding overuse of polling to prevent a loss of engagement, and connecting polling questions to learning outcomes. To address equity concerns for neurodiverse students, Sun et al. (2018) found that instant polling strategies helped promote learning performance. Additionally, allowing students to discuss a topic after it was announced reduced anxiety and increased attention levels. In their findings, they state "The result shows that the application of the different teaching strategies did significantly influence students' test anxiety levels ($F = 3.89$, $p = 0.03$, partial [[eta].sup.2] = 12)" (Sun et al., 2018, p. 18). Lelieveldt and Rossen (2009) highlighted that exit polls provide students with a cooperative learning experience, support the connection of theory, methodology, and course content, and enable students to generalize their knowledge. Snyder and Hallam-Miller (2014) discussed that student anonymity is a notable advantage of polling tools, lowering the effective barrier to engagement. Furthermore, Bernsten and Linares (2016) noted that the use of polling technology can increase student learning by enabling instructors to adjust their teaching based on feedback from students regarding their prior knowledge or current understanding.

Increased engagement through collaboration in their digital formatted educational environment has been highlighted as improving the educational experience. As discussed by Blasco-Arcas et al. (2013), in online learning, students participating in active collaborative learning and active engagement is influential in enhancing students' learning performance. As discussed by Caldwell (2007), engagement in students results in several positive outcomes such as preparedness for the class, higher attention, good note-taking, and recall.

There are, however, barriers to implementation. Rose (2019) examined barriers to implementation include flexibility in curriculum design and delivery, instructors' subjective knowledge of the tools, and time constraints for instructors. Stowell (2015) also mentioned that incorporating online polling tools into the curriculum presents timing challenges.

4. Discussion

In this study, we found a gap in knowledge on use of polls in inclusive digital learning environments. Although the topic of engagement and online learning was investigated by researchers (Guo et al., 2023; Panigrahi et al., 2021; Boulton et al., 2019), online student success for students with disabilities in higher education (Betts et al., 2013) and Universal Design for Learning and online course development (Zhang, 2022; Hayward, 2022; Chen, 2018) the explicit connection of polling as a means of increasing engagement for learners in inclusive higher education environments was not investigated.

Within the evolving digital landscape of higher education, instructors, course developers, and stakeholders in the development of coursework require knowledge of evidence-based strategies to support the learning of heterogeneous students. Polling is a strategy that utilizes active learning; this strategy can be incorporated into the online course's learning management system, within the platform of remote classrooms, or even by sending free polls the smartphones of students. Many free online tools that have polling access are highlighted by Patil (2023) while other pay-for options are also available.

As the research above suggests, polling supports the instructor's ability to increase student participation and sense of classroom community, encourage a student's learning process, decrease anxiety, increase vulnerability, encourage critical thinking skills, and allow the instructor to use formative assessment to deliver, modify and support learning objectives. Within online classroom structures, knowledge and implementation of online tools, such as polling, change the landscape of online learning, and increase the learning experience for learners in higher education.

Based on the literature review, there is a gap in the recent literature related to polls, and the impact it has on the digital educational experience of an inclusive higher educational landscape for all thinkers and learners in inclusive environments. It is pivotal for higher education institutions to support inclusive practices for all learners to access education. This specific strategy of polling is related to increasing student engagement within digital learning environments and is a core component in Universal Design for Learning. Continued adaptations of traditional inclusive practices for online learning are crucial as online learning grows and students become more diverse.

Although barriers to implementation may hinder the incorporation of polls into digital coursework, some remedies may include ensuring that stakeholders in higher education receive messaging and professional development on free online polling tools, as well as time to discover, implement, and manage these useful and free tools. Further, Instructional Technologists in higher education can play a key role in supporting faculty to troubleshoot and implement these tools. To support student experience and outcomes within digital coursework, learning about and utilizing polls, is beneficial in higher education.

5. Conclusion

The evidence-based practice of polling offers numerous benefits and provides instructors with an accessible tool to increase active learning and foster a sense of community within online learning environments for heterogenous learners. This technology has the potential to enhance engagement and collaborative learning, improving retention levels and the student experience. However, addressing the barriers for instructors to implement polling is crucial to increase its usage. Further, research should bridge the gap in literature, and focus on the impact of polling in digital learning environments for heterogenous learners.

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Conflict of interest

The author declares no competing financial interest.

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