

2025: Vol 6, Nr 1
doi: 10.24834/jotl.6.1.1388

REFLECTIONS ON USING AUDIENCE RESPONSE SOFTWARE IN HIGHER EDUCATION ACCOUNTING COURSES

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Abstract

This reflective article explores the use of audience response software (ARS) in higher education accounting courses – namely Wooclap. Based on personal teaching experiences, the article explores the use of ARS to enhance student engagement and active learning. These experiences include teaching in an online environment during the COVID-19 pandemic at Dalarna University and in physical classrooms at Malmö University. Together, these contexts demonstrate the versatility and effectiveness of ARS in different educational settings. The author reflects on the pedagogical benefits of integrating ARS as an interactive application, noting that it facilitates real-time feedback, encourages student participation, and supports a constructivist approach to learning. The article also addresses the limitations of Wooclap, including its unclear impact on student attendance and performance. Although Wooclap and similar ARS have proven effective in enhancing engagement, their long-term benefits may diminish over time, indicating a need for further research and alternative strategies to maintain student involvement. The findings contribute to the broader discourse on technology-enhanced learning (TEL) in higher education, emphasizing the critical role of interactive applications in creating a more engaging and responsive learning environment.

Keywords: Educational technology, audience response software, Wooclap, accounting

Sammanfattning

Denna reflekterande artikel undersöker användningen av Audience Response Software (ARS) i högre utbildning inom redovisningskurser – specifikt Wooclap. Baserat på personliga undervisningserfarenheter utforskar artikeln hur ARS kan användas för att öka studenters engagemang och aktivt lärande. Dessa erfarenheter inkluderar undervisning i en online-miljö under COVID-19-pandemin vid Högskolan Dalarna samt i fysiska klassrum vid Malmö universitet. Tillsammans visar dessa kontexter på ARS:s mångsidighet och effektivitet i olika utbildningsmiljöer. Författaren reflekterar över de pedagogiska fördelarna med att integrera ARS som en interaktiv applikation och noterar att det möjliggör återkoppling i realtid, uppmuntrar studentdeltagande och stödjer ett konstruktivistiskt lärande. Artikeln behandlar även Wooclaps begränsningar, inklusive dess oklara påverkan på studentnärvaro och prestation. Även om Wooclap och liknande ARS har visat sig effektiva för att öka engagemanget, kan deras långsiktiga fördelar avta med tiden, vilket påvisar behovet av ytterligare forskning och alternativa strategier för att upprätthålla studenternas delaktighet. Resultaten bidrar till den bredare diskussionen om teknikförstärkt lärande (TEL) inom högre utbildning och betonar den viktiga rollen som interaktiva applikationer spelar för att skapa en mer engagerande och responsiv lärmiljö.

Nyckelord: pedagogisk teknologi, audience response software, Wooclap, redovisning

Introduction

On the 17th of March 2020, Dalarna University announced that all teaching must be conducted online as of the next day. The university leadership followed the recommendations of the Swedish health municipalities to prevent the spread of the coronavirus (SVT Nyheter, 2020). This decision came three weeks before I was expected to teach for the first time an entire (managerial) accounting course. Although the decision was predictable and Dalarna University was well-prepared with half of their courses already being taught online before the pandemic, this presented additional challenges for me. At that point, I was in the early stage of my PhD education. I had limited experience teaching in higher education – even less in teaching courses online and in the subject of accounting. On top of that, I was the course responsible which was also a novum to me. Although I felt confident and well-prepared for the course at that point, the shift to the online format changed quite a lot how I planned to conduct the lectures, the interaction with students, and the course examination moments.

As a first step in my preparations for conducting the course entirely in an online format, I started talking to colleagues who had experience with teaching courses online and what they saw as challenging in teaching courses in a virtual classroom. The colleagues I consulted for advice, mentioned that interaction with students is probably the biggest challenge of teaching courses online. In particular, they have experienced in other online courses that some students would turn off their cameras after some time during a lecture and presumably do something else, while only listening to the lectures in the background. Moreover, a common behavior that my colleagues experienced is the students leaving the virtual online classroom for the time they would get a group task or discussion question during the

lectures and (if at all) re-join as soon as the task is over. In that sense, I was well aware of the challenges briefly before I started my first online course and had at least a few weeks to reflect and take precautions on how I would manage the potential challenges with student interaction and involvement.

As part of this pedagogical self-reflection, I would like to draw upon this experience as a starting point and further reflect on how I regularly use now educational technology in my teaching to engage students during the lectures. In particular, I reflect on the use of Audience Response Software (ARS) as a tool to improve my lectures pedagogically. Additionally, I discuss the limitations of this tool based on my own experiences. I will begin this reflection by discussing the concept of student engagement and how it can be promoted in the classroom. Then, briefly summarize the most central existing research on ARS in (higher) education in the next section. Afterwards, I will briefly summarize and reflect on my pedagogical perspective which is of essence to self-reflect on how and why I implemented ARS in my teaching.

Student engagement

According to Barkley and Major (2020, p. 6), student engagement in college learning is characterized as “a mental state that merges cognitive and emotional processes, where students actively immerse themselves in the learning experience”. Rather than passively receiving information, engaged students strive to comprehend and internalize concepts by investing intellectual effort and tackling complex ideas. They demonstrate a genuine interest in the subject matter, feel motivated or enthusiastic about learning, and take responsibility for their educational journey. Student engagement is therefore more than student interaction in the form of the student asking and answering questions. Student engagement can be enhanced through various strategies: creating a safe and supportive classroom environment that encourages all students to actively participate, fostering a space where they feel comfortable taking risks and making mistakes without fear of judgment, and offering early and regular feedback to sustain motivation and confidence throughout the course (University of Colorado Boulder, 2023). One approach explored in this article for implementing these strategies in my accounting classes is the integration of ARS. There is a substantial body of existing research on this issue, which I will address in the next section.

Research on ARS in (higher) education

Educational technologies have been a feature of university education for a long time. Educational technologies are strongly embedded in how education is delivered and how teaching and assessment are conducted (Biggs & Tang, 2007). Educational technology is varied and can be applied in multiple ways in higher education and therefore educational technology takes on many forms - such as Learning Management Systems (LMS) (e.g. Moodle or Canvas), Online Learning Platforms (e.g. Coursera), collaborative tools (e.g. Microsoft Teams), communication tools (e.g. Zoom), to only name a few of the existing categories in educational technology (Alenezi, 2023). In line with the broad range of digital tools in (higher) education, also scholarly research on that topic takes on many different paths. Even before the outbreak of the coronavirus disease and the accelerated use of educational technology in the (virtual) classroom, research on educational technology was vast. Even so, research on students’ and teachers’ perceptions of using digital technology in the (virtual) classroom has provided many insights (Bond et al., 2018). A very recent trend is research on large language models (LLMs) such as ChatGPT.

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Its application and consequences on (higher) education have generated even more scholarly attention and research on educational technology (Rudolph et al., 2023).

Another distinct type of educational technology used in classroom settings is Audience Response Software (ARS). ARS can be categorized as interactive applications that enable teachers to engage with students through polls, text-based responses, or multiple-choice questions accessed on their mobile devices or laptops (Díez-Pascual & García Díaz, 2020). An educational technology study by Corral Abad et al., (2021) conducted a 4-year experiment based on specifically interactive applications in education. The findings revealed that these applications effectively help students identify gaps in their knowledge. Further studies, particularly those focused on ARS in higher education settings, have demonstrated its positive impact on learning outcomes—for instance, research by Rubio et al. (2008) revealed higher long-term retention scores among student groups utilizing ARS for their learning. In a similar study, the use of Kahoot, another ARS tool, has been shown to enhance the teaching-learning process, fostering more effective student engagement and comprehension (Díez-Pascual & García Díaz, 2020).

In this reflective article, I focus on my experiences with the Audience Response Software (ARS) Wooclap, while also incorporating reflections on the interactive features offered by the communication platform Zoom. Research specifically on Wooclap is rather scarce, but a few studies examine Wooclap as a tool for interaction in higher education. For example, Estada et al. (2024) analyze in their study the main added value of the use of Wooclap in different courses in the field of economics at the University of Valencia. The findings reveal that the students were very satisfied with the implementation of the tool as they felt it helped them to maintain their attention and identify the most important concepts of a lecture (Estada et al., 2024). A similar study by Moreno-Medina et al. (2023) has investigated the improvement of achievement and motivation of students in the Chemical Engineering program through the use of the Wooclap application. The results of the study suggest the use of Wooclap in the classroom has a significant, positive impact on the students' motivation and improves their academic achievement. Moreover, the authors show in their study that Wooclap has reinforced teacher-student feedback for a better teaching-learning process (Moreno-Medina et al., 2023). A third study examining the use of Wooclap in a higher education context is conducted by Marin et al. (2021). The authors of that study analyzed the feedback of students of a microbiology distance learning class where Wooclap was included as an ARS respectively an interactive application. The results highlight that the students were satisfied and in favor of implementing ARS such as Wooclap in their distance learning course (Marin et al., 2021).

Pedagogical perspective

In building my lectures and creating a learning environment for students I like to think of my pedagogical approach as a mixture of a constructivist and technology-enhanced form of pedagogy. Constructivism emphasizes that the learners construct knowledge with their activities and teaching engages students in active learning rather than simply transmitting knowledge from the educator to the learner (Biggs & Tang, 2007). Key principles of constructivist pedagogy include among others, active learning, contextual learning, and scaffolding (Richardson, 2003; Taber, 2011). Active learning lets students actively participate in the learning process by engaging with content through hands-on activities. In my accounting classes, I try to give students short exercises (from the course's exercise book) directly after I introduce a new concept. In that way, the students directly become active and engaged with a new

subject matter. Furthermore, I try to follow the contextual learning principle by tailoring or presenting students with accounting exercises in the context of their field of study (in my case, this is either the IT sector or the logistics sector). The contextual learning principle of constructivist pedagogy follows the idea that knowledge is better understood when it is learned in a context that is meaningful and relevant to the student (Biggs & Tang, 2007). Finally, I also attempt to build my teaching on the constructivist pedagogy principle scaffolding. This means, that I as a teacher provide support structures to the student but gradually remove this support as students become more proficient in the subject matter (van de Pol et al., 2010). I try to follow this principle by providing significant guidance in solving exercises together at the beginning of a course, gradually reducing this support over time, and instead offering recommendations for exercises they can practice independently. However, students always have the opportunity to approach me during the semester with questions in the course online forum.

The second stream of pedagogical approach that shapes my teaching is technology-enabled learning (TEL). TEL refers to the application of information and communication technologies to teaching and learning. The approach aims to constitute an enhancement of the student learning experience (Kirkwood & Price, 2014). The question of whether technology enhances or in other words improves learning is a common theme in recent literature and a central topic of this reflective article. Other digital tools than Wooclap that I apply in my accounting classes are for example computer-based accounting software, where students learn hands-on how accounting by accounting exercises that are very close to accounting in practice.

In the following two parts of this article, I will reflect on what I see as an “enhancement” or improvement by applying Wooclap in my accounting lectures and particularly focus on enhancing students’ engagement in my classes. Moreover, I will also address the limitations of applying interactive applications in my accounting classes based on my experience.

Wooclap as a tool to engage students in accounting courses

Coming back to my early teaching experience at Dalarna University, I was made aware of the challenge of engaging students during online classes. At that point, I implemented two different tools in my teaching intending to boost students’ engagement in class. This was on one hand Zoom’s survey function, which I prepared before lectures where I would solve accounting exercises from the course book. The students could then vote on which exercise they want to solve in class. Through this feature, the students could (anonymously) inform me with which exercise(s) they had issues and would like me to explain the exercise(s) further. Then I would explain and solve the two exercises that got the most votes (I always implemented the option, that none of the exercises needed further explanation). Students could of course also use the “raise hand” feature of Zoom and ask questions at any point just like in a regular classroom setting.

The second tool I used back then to boost engagement in class, was Quizziz. Quizziz is an application that helps educators to generate gamified quizzes and students can join via a link through their smartphone or computer. I used to build in such quizzes frequently during or at the end of my lectures. Many of the students named these quizzes in the course evaluation as something they strongly appreciated. Despite the positive feedback from students, I was not entirely satisfied with the tool itself, as its strong emphasis on gamification features tended to shift the focus of the quizzes from self-

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assessment to competition (although certain features like leaderboards or rewarding fast answers with extra points can be disabled).

Therefore, I was pleased to see that when I started my teaching position at Malmö University a year ago, the university had a Wooclap software license. Wooclap is a tool for response and interactivity with students but in contrast to Quizziz more adapted for education purposes and less designed for creating quizzes based on gamification design and features. Wooclap also has features that can be used to create polls and students can (anonymously) write comments or replies to questions asked to them. This also allowed me to use the features I was using from Zoom in a physical classroom setting. Wooclap is also easy to use in the classroom, as the presenter can just share with the audience a QR code or link, and they can join anonymously via their smartphone or laptop during a presentation.

Based on my teaching experience from teaching online courses at Dalarna University and my experience at Malmö University I will continue in the next paragraph with three reflections on the positive experience that I made by using Wooclap as an example of an ARS in teaching accounting courses. In the subsequent section, I will address the limitations of applying this educational technology.

(Self-)Assessment for the student and teacher

Applying Wooclap in my accounting lectures supports me first and foremost, in the active learning factor of constructivist pedagogy. Generally, to learn basic accounting skills, students must first familiarize themselves with accounting rules and procedures. This is a prerequisite to understanding the rules and principles of bookkeeping and ideally performing accounting tasks eventually. So basic accounting leaves little to no room for interpretation and my role as a teacher is strongly guided by transferring existing knowledge on basic accounting rules and best-practices to the students. Students have to recall specific information which according to Bloom's digital taxonomy can be supported by the digital activity of quizzes (Churches, 2010). I agree with this digital taxonomy as factual knowledge transfer is ideally supported by active learning where students can engage with the course content. Therefore, interactive applications respectively ARS like Wooclap support me as an educator to actively engage all of the students with the content. Rather than asking questions to the entire class and then a few students raise their hands and respond, I can ask via Wooclap questions to every single student in the classroom and the students can answer the questions anonymously. The tool allows me to ask a wide range of question types such as multiple-choice, true/false, fill-in-the-gap, open questions, and much more.

On that note, posing questions to the students via Wooclap not only helps the students as a short assessment of whether they understood the content of the lecture but also supports me as a teacher in getting direct feedback and input on the share of students who responded correctly. Through this instant feedback, I can gauge whether students have understood the material I have explained. If needed, I can revisit and clarify the correct or incorrect answers or even revisit certain aspects of the lecture to ensure students understanding. So in that sense, it is also an assessment for me as a teacher, to see whether the students could follow the content. Based on that feedback, I can even adapt then my lectures ad hoc. This follows the principles of scaffolding (van de Pol et al., 2010) where I can pose at the beginning of a subject rather easier questions and remove those easy questions – respectively turn to advanced questions when I see that a majority of the students understood the content that I was covering in the lecture.

Encouraging asking questions

From time to time I also pose open questions via Wooclap to the students and ask them if they need further explanation on a certain topic. This is what was described in the study of Moreno-Medina et al. (2023) as teacher-student feedback. With this approach, I get feedback from students in the form of questions on the content or they can name what they have not understood in the ongoing lecture.

The students write their answers anonymously and can also “like” the answers of other students. Based on that I see then if and what students would like to get further explanation on. My experience in using this has been positive as I rather seldom receive feedback from students when I ask them directly during the class whether they have questions regarding what we have covered so far today. But when I do pose this via Wooclap, students seem to feel more comfortable in pointing out what they did not fully understand or formulating specific questions on the covered content.

Posing such open questions via Wooclap to students can take quite some time in a lecture. Therefore, I have also tested doing a simplified version by asking the students Likert-scale questions via Wooclap on whether they could follow the content of the lecture (1 = “not at all”; 5 = “everything makes sense to me”) and whether I should slow down (=1) or speed up (=5) the pace of the lecture.

As my experience is based on accounting lectures with relatively large student groups of between 40 – 60 students, my impression is that students are reluctant to engage by asking questions in larger classes and especially hesitant to point out if they do not understand something. Therefore, my impression is that Wooclap as an ARS encourages students to ask questions and point out aspects they did not entirely understand. In addition, I observed that it especially encourages those students to ask questions who would not dare to do so in front of a large audience. In a similar vein, my impression is that it does not hinder students from asking questions in a “traditional way” which means raising their hand in the lecture. Rather it shows the students that it is strongly accepted and the purpose of active learning that they do pose questions – either through Wooclap or by raising their hand. In the contrary setting, in lectures where I would not use Wooclap as an opportunity to ask questions, I have observed that students ask significantly fewer questions. I would assume therefore that ARS also symbolize to the students that their questions are an active part of the lecture and therefore encouraged.

Taking away the focus on pure remembering

As indicated earlier, the aim of the accounting courses that I teach is that students can perform basic accounting and present and interpret financial reports once they have completed the course. Especially the first aspect requires a lot of learning the basic accounting rules and bookkeeping – or what according to Bloom's (digital) taxonomy can be described as remembering (Churches, 2010). At the start of the course, a significant focus is placed on remembering, as students need to familiarize themselves with foundational concepts such as accounting records and double-entry bookkeeping. This foundational knowledge is essential before they can progress to analyzing and interpreting financial results and reports. As an educator, it is therefore especially in the beginning challenging to not fall into a teaching style with pure frontal instruction – without any involvement of the students in the lecture per se. At the same time, teaching the basics of accounting principles is of high importance as each lecture or chapter that we cover in the course is strongly based on the previous ones.

Wooclap especially helps me in the first part of the course to enrich the lecture which would otherwise resemble predominantly knowledge transfer or frontal instruction. Furthermore, through the quizzes, I usually build in at the beginning or the end of a lecture, I can in particular highlight to the students what they should have learned by now to be able to understand the upcoming content. So the students become more aware of what they should know and understand at this point of the course.

The limitations of ARS or interactive applications in the classroom

Despite the benefits of using ARS in my teaching to follow a constructivist and technology-enabled learning pedagogical approach, I want to highlight in this section of my reflective article the limitations of interactive applications that I am aware of.

Impact on students' attendance and performance unclear

In all the accounting courses that I have taught so far – online or in-class and at Malmö and Dalarna University - I have experienced that students' attendance usually drops during the semester. This is currently a common issue in all the classes taught at the department and is frequently discussed during department meetings. In terms of my course, one of many potential factors might be that students prefer to learn the content entirely in a self-study format. However, I observe that students who participate in the lectures and seminars tend to perform better in the final assignment(s). As attendance in lectures is seldom mandatory in university courses in Sweden, my aim as a teacher is to follow a constructivist pedagogical approach and the concept of active learning – so to let students be an active part of the lectures and let them experience the benefit of attending lectures. Similarly, I would expect that technology-enabled learning might give students some additional motivation to attend a lecture as it breaks up classical frontal instruction and makes attending lectures a more interactive experience. However, as also my classes suffer from a significant drop in students' attendance, ARS or interactive applications cannot prevent a drop in students' attendance in lectures and seminars during the semester. Causes and potential solutions for these issues, have to be addressed with more or other arrangements and methods. The same applies to student performance. Based on my experience, I am, of course, unable to confirm or deny whether interactive applications in the classroom have a positive impact on student performance – although the previously mentioned study by Moreno-Medina et al. (2023) confirms a significant positive effect on students' achievements in a Chemical Engineering class where Wooclap was applied.

The positive impact on engagement decreases over time

The study mentioned above (Moreno-Medina et al., 2023) also confirms a significant positive effect on students' motivation in the examined classes where Wooclap was applied. Solely based on my experience I would support this finding, however only to a certain degree. I have received positive feedback from students in all of the course evaluations regarding Wooclap (and similar educational technology I applied, such as interactive features from Zoom). The students seem quite intrigued at the beginning of an accounting course and enthusiastic about doing short quizzes during a lecture. However, my impression is that students seem to become less engaged by Wooclap during the semester and they bring up fewer questions via the tool - respectively prefer to choose the option where we go ahead with the course content instead of repeating certain content. Similarly, I have the impression that after a few

weeks into a course, not all of the students choose to join quizzes or opportunities to give feedback during a lecture via Wooclap. As I see the number of participants in Wooclap and can compare it roughly with the number of students present in a lecture, the share of present students joining Wooclap usually shrinks after a few weeks during a course.

It remains therefore a challenge for me as an educator to not overstretch the use of Wooclap but at the same time use it regularly as students seem to feel involved and motivated by the tool. I take this to indicate that ARS positively impact student engagement in my lectures, but their beneficial effect tends to diminish over time.

Conclusion

To conclude, my experience using ARS – in particular Wooclap - in my lectures has been mostly positive and has been well-received by the students. In both the online and on-site classes I have taught, these tools have helped me engage students more effectively during lectures, provided them with opportunities for self-assessment, and offered me valuable feedback on their understanding of the content. I have enjoyed experimenting with educational technologies in my teaching and plan to continue doing so in the future.

I have observed that ARS can notably enhance student engagement. However, it represents only one part of the complex challenge of delivering engaging and insightful lectures. It is important to avoid overusing such tools and to remain mindful of their limitations. For instance, in my case, I question whether ARS has a significant, lasting impact on students' learning outcomes. Additionally, while students may initially enjoy the use of these tools, their positive effect on engagement may diminish over the course of the semester.

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