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Navigating the Terrain:

Emerging Frontiers in Learning Spaces, Pedagogies, and Technologies

Sell not, TEL not: Minimising uptake failure of Technology-Enhanced Learning pedagogies - a pilot study

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An interdisciplinary group of researchers designed an innovative mobile application (app) to support bioscience language proficiency among pre-registration nursing students. The app's design, which incorporated features for audition and speaking prompts, was a key factor in its effectiveness. The same pedagogical approach was applied to alternative topics within the unit in Moodle, the university's learning management system (LMS). The intervention in both forms (IC) was trialled and evaluated in a pilot study with two consecutive student cohorts in 2023 (n_1=631, n_2=218). Student access to each form of the condition was measured via technology-provided user analytics. The intervention condition (IC) uptake was higher in its LMS form compared to the app form. However, there were more initial attempts of the standard condition (SC) than the IC overall, indicating a tendency towards novelty avoidance. This article highlights and discusses the challenges of implementing novel technology-enhanced learning (TEL) approaches, focusing on students as stakeholders. Recommendations are proposed to improve user uptake of TEL approaches by focusing on strategies to enhance students' perceptions of the TEL's utility. A consistent 'sales pitch' to students as stakeholders is suggested.

Keywords: Technology-Enhanced Learning, learner perceptions, performance expectancy, mobile applications, disciplinary literacy, innovation uptake, intervention study

Background

A range of theories have emerged to support the exploration of technology acceptance, described as an attitude towards technology and its adoption (Granić, 2023) and a decision to use or implement the technology or idea (Rogers, 1983). The Unified Theory of Acceptance and Use of Technology (UTAUT) model by Venkatesh et al. (2003) comprehensively integrates eight key determinants from other principal models, including the widely used Technology Acceptance Model (TAM; Davis, 1989) and has shown promise in educational contexts (Granić & Marangunić, 2019). Xue et al.'s (2024) review confirms that Venkatesh et al.'s (2003) antecedents to technology uptake remain critical to user access. User behavioural intentions are predominantly shaped by the effort needed to access or use the technology (effort expectancy) and the anticipated enhancement in performance or learning (performance expectancy) (Venkatesh et al., 2003). Chugh and colleagues' (2023) review also found these perceptions to be crucial in technology implementation planning. Chugh et al. (2023) stress the significance of evaluating technologies' effectiveness and impact before adoption, a critical step in higher education where technology integration plays a key role in delivering learning materials. One way to effectively integrate technology is for educators to empower and engage the learners in understanding its value to their learning and how to use the intervention (Štemberger & Čotar Konrad, 2021). As such, when implementing discipline-specific language interventions through educational technology, such as mobile apps, it is essential to highlight the efficacy of the intervention in promoting oral language development (Perry, 2021). Since Ryan et al. (2024) found that few mobile apps were used to support nursing students in learning nursing sciences, advocating the benefits of such technology to students is beneficial. This pilot study aimed to respond to the gap in the literature on mobile application uses for innovative nursing science education.

The pilot study

The intervention in this study was conducted in a second-year undergraduate Bachelor of Nursing bioscience unit over two terms, with two large cohorts evaluated (n_1=631, n_2=218). In support of students' disciplinary audition and oracy skills, where exposure to dialogic pedagogies was limited, audio recordings of discipline-specific bioscience terms were integrated into multiple choice and open field questions, ranging from recall to contextually placed language decisions. In this non-traditional approach to disciplinary literacy-building, students were prompted to read aloud during each question in the IC to promote oracy and language acquisition (Rahimi & Farjadnia, 2019). The IC was made available to students in two forms, including a bespoke mobile app and LMS-based audio quizzes. The app-IC provided mobile learning access for four weekly topics and was available to the first cohort by the third week of Term 1 and to the second cohort from the beginning of Term 2, and in both cases was available at least until the end of the unit. Although app information was available to students in both terms, there was no active promotion of the app in Term 1, other than several reminder emails from the Unit Coordinator, but it was promoted in Term 2 during the Week 2 tutorial. The LMS-IC was also provided for four alternative topics, as 'Audio Quizzes', which were embedded in the LMS from the start of both terms. Different topics were used for each of the two IC technology forms so that they were not in competition with one another. Standard quizzes (SC), without audio files, were available for the same eight topics as an alternative to all IC quiz versions, and all quizzes contained ten randomised questions. This allowed the exploration of acceptance of the pedagogy through the LMS comparison and provided insights into student technology type preferences by comparison of both IC modes. Learner analytics were recorded in the app and the LMS; however, only access patterns are explored here.

The analysis, design, development, implementation, and evaluation (ADDIE) instructional design approach (Branch, 2009) was used to guide the implementation of the intervention in this study. During the analysis stage, consultations with the Unit Coordinator determined that the proposed intervention may effectively support students' disciplinary vocabulary learning. Design, development and implementation phase decisions were based on the theoretical benefits of the pedagogy, with consideration given to data collection needs and constraints, user experience considerations and budget constraints. Evaluations were conducted using learner analytics from the app and LMS, as well as a Qualtrics student feedback survey, which was emailed to students. To evaluate issues with user uptake and to inform future decisions about scaling up the intervention, the following research questions were asked:

1. What facilitates/impedes student use of non-standard TEL approaches that benefit their disciplinary literacy skills?
2. How do technology-type and pedagogy influence students' uptake of novel TEL interventions?

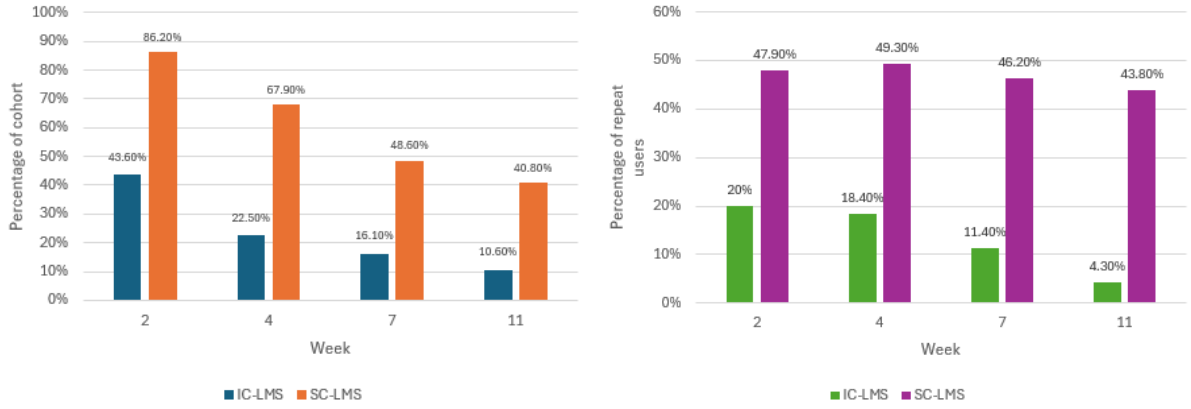
Results

Table 1
The highest number of students accessing the learning conditions in Terms 1 and 2 as a percentage (%) of the whole cohort, where n_1 is the total number of students in the Term 1 cohort, and n_2 is the total number of students in Term 2.

	Term 1 (n_1=631).	**Term 2** (n_2=218)
Highest number: App (IC)	0.6%	25.2%
Highest number: LMS Audio quiz (IC)	31.2%	43.6%
Highest number: LMS Standard quiz (SC)	72.6%	86.2%

User access increased in Term 2, after promotion efforts. App-hosted IC uptake by the Term 1 cohort was very low, with only 0.6% accessing the app (Table 1). App access was much higher for the second iteration of the intervention in Term 2, at 25.2% of the cohort. However, both LMS-hosted conditions showed higher student access than the app. The LMS-hosted IC access rates reached 31.2% in the first cohort and 43.6% in the second cohort, whereas the SC quizzes showed higher access rates than ICs for both terms at 72.6% and 86.2%,

respectively (see Table 1 and Figure 1). Additionally, students were more likely to repetitively access the SC quizzes than the IC quizzes in the LMS, as shown by students accessing a quiz two or more times (see Figure 1). Student access rates for all LMS quizzes, IC and SC dropped over each term, as exemplified in the Term 2 data (see Figure 1).



IC-LMS = Intervention Condition in LMS (Audio quizzes); SC-LMS = Standard Condition in LMS.

Figure 1. A comparison of student access numbers of the LMS SC and IC in Term 2 (the second iteration of the trial, after promotion of the intervention). Left: percentage of the whole cohort accessing each condition. Right: of students who accessed that condition, the percentage who did so more than once (≥2 times).

Learners tended to rate the language-learning benefits of the IC positively in the survey. One respondent claimed that the auditory and oracy demands 'improved [their] confidence' regarding bioscience language use, while others wanted a larger variety of questions to test their knowledge. However, several barriers to uptake were identified in student comments. One learner reported that the audio experience was too slow. Another expressed a preference for reading from a hard copy over logging into an app, while a third student agreed that 'logging on' was the least favourable aspect of the app. One student claimed that they did not 'learn much about the app?', the question mark indicating possible doubts about its existence or purpose. No students reported negative experiences relating to app instruction length, usability, or helpfulness. In addition, all survey respondents reported ownership of mobile phones, which were required for app use, and were comfortable using them for various purposes.

Discussion

The importance of promotion

The pedagogical approach trialled in this study was based on second language learning principles embedded in an app designed to teach nursing students biosciences language. The pedagogical IC was delivered through the app and in a pedagogically equivalent LMS quiz. Student access records showed a preference for the standard quiz. However, the app access rates increased substantially in Term 2, following educator-focused time demonstrating the benefits of the app-based approach to learning. This promotion appears to have engaged students, thus overcoming access barriers of perceived effort and performance expectations (Venkatesh et al., 2003; Xue et al., 2024). In both terms, the higher access rate for the standard quiz in the LMS evidences a disinclination of students to engage with less familiar learning approaches. Focused time spent introducing learners to new technology has previously been reported as key for successful uptake (Chugh et al., 2023). This may overcome aversions to novelty based on perceptions of time consumption, and the results shared here indicate that focused tutorials with product demonstrations are effective in selling new technology. Despite this focused effort to 'sell' or promote the product, students in this study preferred traditional reading and writing

question styles rather than auditory recognition or speaking prompts. This outcome demonstrates that students may not necessarily embrace novel learning strategies or trial alternative technologies even if learning advantages are demonstrated. The higher rate of repeated uses of the SC compared to the IC (see Figure 1) suggests that students are more likely to rely on habitual learning strategies they believe to be most effective within the available time, which may indicate unawareness of the potential efficacy of alternative strategies (Piza et al., 2019). While Granić (2023) argued that user perception of novelty or innovation was a key to adoption, this study's results indicate that students either did not find the intervention's approach novel or innovative, or that novelty was inadequate to support widespread uptake. Higher app use may have been hindered by individual factors, such as perceived lack of time and resistance to change (Latif, 2017), including the time required of students to download the free app before using it, followed by login using a student number. The reported audio lag may also have deterred some students from repeated use of the IC. This Perceived Ease of Use determinant is acknowledged in both TAM and UTAUT technology acceptance models (Venkatesh et al., 2003) and will be considered in future app user enhancements.

Stakeholder perceptions

Theoretically, the pedagogy promised to significantly benefit students' disciplinary literacy, particularly supporting their conversational readiness for clinical placements. One student indicated that the pedagogy, including either form of the IC, boosted their self-confidence, with other students agreeing and suggesting the question bank be increased. Venkatesh et al. (2003) asserted that stakeholder acceptance and usage behaviours are significantly influenced by factors including performance expectancy and effort expectancy. Effort expectancy may extend beyond perceptions of the technology's ease of use and the pedagogies encountered, although performance expectancy is more critical to usage behaviours. Deslauriers et al. (2019) demonstrated that students often incorrectly predict poor learning performance in response to activities requiring cognitive effort, compared to when they engage in lower cognitive-demand activities. We propose from our results that atypical learning approaches, such as the novel TEL intervention in this study, may feel unfamiliar and more challenging to learners than habitual learning strategies that may have lesser learning gains. To manage this, we demonstrated the app to the second cohort of students, increasing access rates. Without ongoing and consistent awareness-raising about the potential advantages for students in accessing and adopting new technology-enhanced learning strategies, students' perceptions of performance expectancy are unlikely to shift (Štemberger, & Čotar Konrad, 2021). Further investigation is required to explore the complexities of intertwined learner-perception aversions to non-standard TEL interventions.

Recommendations

It should not be assumed that students will engage with written information about an intervention's benefits to their learning, as the availability of such information and its novelty did not appear to impact uptake positively. When educators design tutorial time to demonstrate and promote or 'sell' new learning tools, a substantial increase in student uptake may result. It cannot be assumed that staff acting as gatekeepers will prioritise 'selling the TEL' amongst other teaching demands. An explicit user uptake and promotion strategy should be planned to minimise possible barriers to access and optimise ease of use. The benefits of the intervention should be regularly communicated and demonstrated in plain language to users to serve as continual reminders and to sell the benefits of new ways of learning, optimising the likelihood of access and adoption.

Conclusion

The implementation of new TEL approaches needs careful planning to promote user uptake and adoption, as this study demonstrated that students do not have a tendency to embrace non-standard TEL approaches. Students were more likely to use existing tools than novel ones, as without sufficient promotion, students were unlikely to expect performance benefits from novel tools. Effort expectancy from app log-in also appeared to hinder student uptake. Having staff prepared to sell, through demonstrating the learning interventions, coupled with an explicit, ongoing promotional plan, is recommended. Educating students about effort and

performance expectancy related to the learning benefits of novel pedagogies could enhance uptake. We recommend integrating 'selling' of the intervention's use into timetabled tutorials. Explaining the advantages of beneficial technology-enhanced pedagogies, using a 'sales' approach of frequent promotion, may gradually reshape stakeholder perceptions about learning benefits and usability.

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