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Investigating the rationale for using online quizzes: The case of UniSA

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Research on online quizzes has surged in recent years, focussing on providing pedagogical insights and success stories. While these studies indicate educational benefits of online quizzes, most of the empirical ones are focused on a single course as opposed to institution-wide studies. This study sought to investigate the pedagogy underpinning the use of online quizzes by academics by examining their authentic assessment statements. The analysis of over 2,500 words of academic statements demonstrated that quizzes are primarily designed to assess comprehension and application of knowledge, reflecting their strong pedagogical role in facilitating acquisition and practice types of learning.

Keywords: Online quizzes, online tests, assessment, Bloom's Taxonomy, Types of Learning, pedagogy

Introduction

Research on online quizzes has surged in recent years, particularly following the emergence of COVID-19. Boitshwarelo et al. (2017) reviewed around 50 related articles, and subsequent studies by Gamage et al. (2019), Reedy et al. (2021), Lu & Cutumisu (2022), and Huber et al. (2024) have expanded the literature. The peak in research indicates a significant integration of online quizzes in higher education, facilitated by Learning Management Systems (LMS), which offer effective environments for quiz creation, deployment, and grading (Stone, 2014; Gipps, 2005). The literature reviewed by Boitshwarelo et al. (2017) and other studies provide insights into the pedagogy behind online tests, addressing key questions such as why, where, what, how, when, and who participates in online quizzes.

In terms of the *why*, online quizzes are used for both summative and formative purposes. While online quizzes often play a summative role, the formative intent is usually prevalent, whether they are formally graded or not (Cook & Babon, 2016; Boitshwarelo et al., 2017; Gipps, 2005). In their formative assessment function, online quizzes have a preparatory role for more summative assessment, through the provision of scaffolding and opportunities for self-regulated learning (Gipps, 2005; Nicol, 2007; Boitshwarelo, 2019) as well as providing diagnostic feedback to inform where teaching efforts may be focussed (Bull & Danson, 2004). Online quizzes can play a complementary role in course assessments, forming part of a holistic teaching and assessment approach (Boitshwarelo et al., 2017). They primarily test foundational knowledge and prerequisite skills necessary for later assessments (Brown et al., 2015; Cohen & Sasson, 2016). While many quizzes focus on recall, they can also evaluate outcomes related to comprehension, application, and some analysis as per Bloom's Taxonomy (Boitshwarelo et al., 2017; Douglas et al., 2012; Brady, 2005).

Despite varying findings on their influence on later assessments, many studies indicate they can be strong predictors of final grades (Brown et al., 2015; Cohen & Sasson, 2016). Additionally, online quizzes provide efficiency in assessment due to their automated nature in deployment, grading, and feedback, making them easier to administer, particularly for large groups (Boitshwarelo, 2017). They also facilitate the assessment of diverse topics, especially when course content consists of multiple discrete areas (Brady, 2005).

While these studies indicate educational benefits of online quizzes, most of the empirical studies are focused on a single course; empirical comprehensive institutional studies are sparse, with exceptions like Boitshwarelo (2020). Therefore, the study informing this paper conducted an institution-wide investigation into the pedagogy and practice of online quizzes at one Australian university where quizzes are widely used. This paper specifically focusses on the pedagogical rationale behind online quizzes, exploring how academics articulate their intentions for using them. Understanding the rationale is crucial for aligning intentions with actual practices and identifying areas for support to enhance educational outcomes. This knowledge can help identify effective practices and guides institutional support in leveraging online quizzes for improved learning.

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Methods

Context and data collection

This study was conducted at the University of South Australia (UniSA), which offers a variety of undergraduate and postgraduate programs through seven academic units, primarily utilising blended learning approaches. In addition, UniSA Online, provides fully online undergraduate degrees. The main learning platform employed is Moodle, enhanced by various technologies, to provide a rich learning and teaching ecosystem. The focus of this paper is on quizzes that are deployed through the Moodle quiz tool, which offers a range of assessment options and question types. The tool is widely used at UniSA, and in other institutions, and hence the practice and pedagogy around its use warrants investigation. A quiz, in the context of this study, refers to any assessment and/or activity using the Moodle quiz; this excludes any tool with a quiz functionality such as H5P. In 2021 an Authentic Assessment Initiative was rolled out by the University to support staff in thinking about and engaging in improving authenticity of assessment. As part of this initiative academics are required to include authentic assessment statements when they review their assessments. Authentic assessment statements are meant to provide a rationale for assessment choices and explain their authenticity or lack thereof. This is an ongoing process, and as of December 2023, about 300 courses (out of several hundreds) had authentic statements included within the curriculum management system (CMS). At the time of extracting the data, 66 of these courses with authentic assessment statements used the quiz tool to facilitate assessment. This roughly means one in five courses of these courses used the quiz as part of their assessment regime.

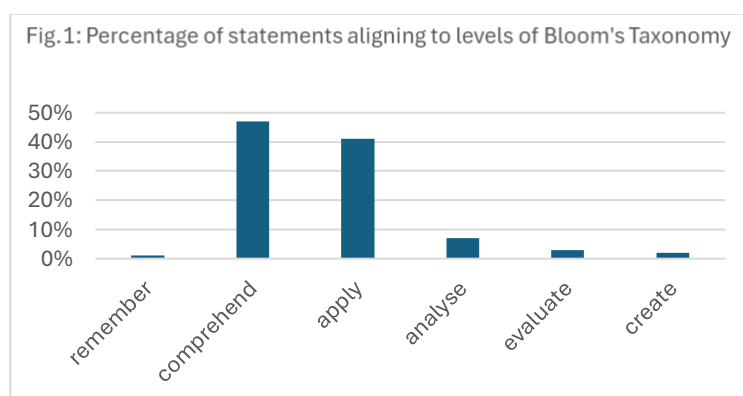
Analysis

To gain insights into the pedagogy underlying the quizzes, we identified authentic statements related to them for analysis. This analysis, conducted using NVIVO software, was framed through the lenses of Bloom's Taxonomy and the Types of Learning Framework.

Results

Learning outcomes

The collection of statements totalled over 2,500 words. These statements were categorised based on the types of learning outcomes they implied, as outlined in Bloom's Taxonomy. Some statements addressed multiple levels of the taxonomy, so word count was used to determine their frequency for ranking purposes. Figure 1 illustrates the percentage of the total word count corresponding to different cognitive levels of the taxonomy.



As observed from the figure above:

- **Remember:** This level constituted only 1% of the statements in the form of one statement:
 - 'This will help to build student's learning and knowledge and test your memories of concepts learned in the course.'
- **Comprehend:** Nearly half of the statements referred to 'Comprehend' putting emphasis on the assessment of conceptual understanding and skill development. Examples included:
 - 'The purpose of this assessment is to test students' understanding of the key concepts in brand management and marketing.'

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- 'In the quizzes, advanced-level law students demonstrate a comprehensive understanding of the law and rules related to lawyers' professional responsibility.'
- 'It encourages engagement with the course content to develop understanding of strategic communication contexts and strategic communication theory.'
- **Apply:** 41% of the statements focussed on 'Application' of knowledge and skills in real contexts:
 - 'Apply the relevant knowledge to solve different levels of business problems.'
 - '...Understand the content and develop concepts that are applied in the weekly (in-class) case study and other assessments.'
- **Analyse:** About 7% of the narrative referred to the 'Analyse' category using terms such as: critical thinking, analytical skills, and reflection. The few statements that referred to this category mostly did it in addition to, or as a result of, engagement with 'Comprehend' and/or 'Apply' categories, as illustrated by this example:
 - 'Students apply knowledge and demonstrate critical thinking as they consider real-life scenarios related to the methodology in psychology research.'
- **Evaluate:** A very small percentage (3%) of the narrative referred to 'Evaluation'. The evaluation was either in the form of evaluating material for its applicability to real life scenarios or in the sense of evaluating their own learning (metacognition):
 - '...providing actionable feedback to identify their own progress and develop evaluative judgment'
 - 'Critically evaluate the week's course materials, apply them to real-life situations...'
- **Create:** Two statements constituting 2% of the narrative volume referred to the 'Create' category by using the word synthesise expecting students to:

Purpose

While primarily graded and meant to evaluate performance (summative), the quizzes also facilitated ongoing learning (formative) that supports future assessments. This dual function highlights their importance in reinforcing foundational knowledge and preparing students for subsequent assessment. Some examples include:

- 'The quizzes provide a foundation for other assessment work through the focus on core concepts and principles.'
- '[the quizzes] help students develop the foundational knowledge necessary for a deeper exploration of these concepts in subsequent courses within the program and in future social work program.'

One of the dominant themes coming out of the analysis of the authentic statements, and illustrative of the formative role, was *engagement*: Regular quizzes, sometimes in association with other tasks, were intended to promote student understanding and involvement with the learning throughout the semester. Examples of extracts from the authentic statements include:

- 'Encourage students to engage with the material and become proficient in the analytical techniques'
- 'While not invigilated, it should be approached with preparation and engagement, akin to a closed-book, invigilated examination.'
- 'The five quizzes support and motivate students to engage with the core concepts and principles introduced in the course...'
- 'Students are expected to engage with weekly lectures and timely review relevant materials in preparation for these quizzes.'

Types of learning: In their formative assessment role the quizzes facilitate learning in a variety of ways. The statements were analysed to identify what type of learning the quizzes were intended to facilitate. This is presented in the following table:

Types of learning

Acquire: Learning through receiving information
This is the dominant form of learning facilitated by quizzes. By encouraging students to engage with the learning materials and develop a deep understanding of key concepts, learning by acquisition takes place. Testing their knowledge in a time-bound setting, quizzes motivate students to review course content regularly and demonstrate their understanding of it. Example of statements:

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<ul style="list-style-type: none"><i>In this continuous assessment 4th year students to draw on recently learned concepts about research methods</i><i>students are expected to engage with the learning materials to understand the content and develop concepts that are applied in the weekly (in-class) exercises</i>
Inquire: Learning by seeking relevant information
Inquiry in terms of seeking further information beyond course material was not evident. However, given the open book nature of some of some of quizzes it may well be that students are encouraged to look for additional information elsewhere.
Practice: Learning by trying out skills and knowledge to problems or situations
This was another common type of learning facilitated by the quizzes in congruences with the assessment of ‘application related learning outcomes’. The quizzes were intended to provide opportunity to apply(practice) learning knowledge and skills. For example: <ul style="list-style-type: none"><i>‘Answer questions based on both isolated and applied contexts, thus allowing students to apply their learning to semi-real-world situations.’</i><i>‘...applying their knowledge and analytical skills to global cybercrime contexts.’</i>
Discuss: Learning by sharing knowledge and/or debating ideas
No evidence
Collaborate: Learning by working together on specific tasks
No evidence
Produce: Learning by producing tangible outcomes
No indication that there is a production of artefacts or significant volumes of work.

Conclusions and implications

The expectation for academics to write an authentic assessment statement behoves academics to think through their rationale and makes their pedagogy explicit to themselves and to other stakeholders, leading to transparency of intended practice.

This study sought to investigate the pedagogy underpinning the use of online quizzes by academics by examining their authentic assessment statements. The analysis of over 2,500 words of academic statements demonstrated that quizzes are primarily designed to assess comprehension and application of knowledge, reflecting a strong alignment with the lower and intermediate levels of Bloom’s Taxonomy. This is consistent with the literature and suggests that educators prioritise assessing student understanding and application before delving into more complex critical thinking and evaluative skills (Boitshwarelo et al, 2017; Douglas et al., 2012; Simkin & Kuechler, 2005; Brady, 2005; Buckles & Siegfried, 2006). Correspondingly, the learning supported by this type of assessment was identified as predominantly acquisition and practice as opposed to discussion, collaboration and production of tangible outcomes (Laurillard, 2002, 2012).

In terms of purpose, the findings illustrate that while quizzes investigated functioned as summative assessments—earning students grades—they also served a formative role. For example, phrases such as “develop foundational knowledge” and “encourage engagement” highlighted the quizzes' dual role in not just grading students but also in motivating them to keep up with course content.

These findings affirm that while online quizzes are often seen as bad pedagogy, they do have a specific pedagogical role especially if used suitably. They can promote and assess the acquisition and application of knowledge and skills in an efficient way, while also motivating students to engage with their learning, fulfilling both a summative and formative role. While other higher levels of cognition may be somewhat possible to assess, it may have workload implications and/or efficiency trade-offs.

The implications of these findings include:

- Institutions should encourage and support academics to articulate assessment statements to make their quiz rationale explicit, so that they are not just an afterthought.
- Appropriate support should be provided to ensure that the articulated rationale aligns with the actual practice in the form of the design and delivery of quizzes. Further work, which is beyond the scope of this paper, is being conducted to establish the extent to which the designed quizzes align with their respective rationales
- Where feasible, advanced levels of Bloom’s taxonomy can be assessed through quizzes e.g., using more advanced question types that assess metacognitive skills. An example is the use of assertion-reason based multiple choice questions (Williams, 2006).

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- The versatility and authenticity of quizzes in the face of GenAI capabilities should be highly considered.

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