

The use of H5P to Enhance Student Learning and Experience for Diverse Cohorts in Animal Science

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Abstract

The challenges currently facing higher education institutions in a post COVID-19 world, make it increasingly difficult to deliver an authentic approach where curriculum planning, delivery and assessment are purposely tailored to the goals and needs of the learner community. In 2021 the University of Southern Queensland (UniSQ) delivered its first suite of animal science courses. UniSQ has a traditionally higher external cohort of students compared to their on-campus, therefore the curriculum design needed to cater for this. Several key active learning strategies were employed to deliver this experience including flipped classrooms, group discussions, case studies, and problem-solving exercises, and they were operationalised via the use of the digital learning tool; HTML 5 package (*H5P*). *H5P* is an open source, online learning tool that ensured the capability to deliver an authentic experience for a diverse student cohort. It has been extensively applied in other disciplines, but to date the research suggests that its potential as a learning tool has not been fully realised in agricultural disciplines such as animal science. Engagement and satisfaction appeared to be positively impacted by the implementation of *H5P* in the animal science courses at UniSQ. Positive feedback related to the ability to engage meaningfully with the content in an enjoyable way, clarity of instruction and relevance of content. Longer term tracking of student engagement is, however, required to fully realise its impact.

Introduction

Universities post-COVID-19 are grappling with a learning environment that has been forever changed. Increased pressure has now been exerted on universities to deliver courses online, and while this has increased educational opportunities for students that may previously have been unable to access it, a poor online learning experience can contribute to student attrition rates and negative outcomes (Jacob & Centofanti, 2023). A considerable challenge is how to maintain high standards of pedagogy without compromising on engagement.

In higher education, there is a rich body of literature that supports the use of digital learning resources such as HTML 5 package (*H5P*), which is an open source interactive learning tool that allows the user to create engaging digital learning resources and activities. The interactive nature of it has been shown to help keep students engaged throughout their studies (Rahadiani, Kekalih & Krisnamurti, 2023). It has been implemented particularly successfully for content-heavy subject material such as human anatomy and physiology (Rekarhi & Sinnayah, 2018) but isn't generally widely adopted within agriculture and animal sciences.

Kuzminska et al. (2021) emphasise the need to develop interactive teaching materials and educational content as key to ensuring a quality student-centred education, and the research supports this with personalised, engaging online content linked to improved student satisfaction and success (Jacob & Centofanti, 2023). Furthermore, it has been found that when students'

expectations of the online learning content are exceeded, they are in turn more likely to engage further with the course content (Cheng, 2020).

When compared to other digital learning tools available, *H5P* has many unique features that make it an attractive option for universities to engage with. It is an open-source software that allows integration with many familiar university learning management platforms including *Moodle*, *Canvas* and *Blackboard*. It also has a wide range of templates of differing degree of complexity and interactivity, whilst also allowing the user capacity to create their own (Kuzminska et al., 2021). It also allows the user to download and store the created materials in personal environments or portfolios, and reuse and share them with others (Kuzminska et al. 2021).

The use of *H5P* can also assist with scaffolding (Grady & Davis, 2020). It can be used to facilitate lessons being broken up into chunks that increase in complexity, to help decrease cognitive load, step students through the learning process, and connect ideas to ultimately aid in building student confidence. The experience of using *H5P* materials in the study of chemistry (Zelleret al., 2021) is an example of this approach, with the transformation of video into an interactive educational resource. Godlewska et al. (2023) used *H5P* in practical training. While this is no substitute for actual practical work, it can enrich learning by providing students with context and preliminary insight and instruction into practical activities and expectations. Likewise, the results of a study of the use of *H5P* in the training of future specialists in biological sciences by Manacek et al. (2020) indicated that this platform is an effective and universal tool for forming students' critical thinking, independence, and confidence in mastering education material in problem-oriented learning. Furthermore, the experience of using *H5P* tools for the implementation of blended learning (Sinnayah et al., 2021; Mutawa et al., 2023) and the development of a flipped classroom framework (Wehling et al., 2021), has also been implemented with success (Mortensen & Nicholson, 2015; Ragland et al., 2023). Sinnayah et al. (2021) deemed the implementation of *H5P* successful because it effectively reduced students' cognitive load through chunking, making information easier to remember and understand. Additionally, the use of feedback in *H5P* activities encouraged learning via trial and error, enhancing students' knowledge and engagement in self-directed study. Wehling et al. 2021, found that in the context of a flipped classroom, *H5P* interactive tools made it easier to adjust pre-existing video material, thus ensuring that the quality of the learning content remained high while making it more accessible and interactive for students. This encouraged students to engage with the digital learning content at their own pace before class, making in-person sessions more focused on active learning.

H5P allows the user to create a range of different content types such as sequence content activities including course presentations, integrative book, and quiz question sets, rich content such as charts, collages, dialog cards and image hot spots; activities that test knowledge retrieval such as multiple choice, single choice, arithmetic and true/false questions and quizzes; test comprehension through audio recordings and dictation; test analytical skills through activities such as drag and drop, drag the words, and fill in the blanks; and test knowledge utilisation through essays and interactive videos. Quizzes are great as tests of knowledge and self-assessment of students (Williams, 2006), and while the creation of some other interactive elements does require more prior training, digital competence, and implementation time from the educator, they have been shown to greatly aid students in developing their problem solving and scientific inquiry skills (Blieck et al., 2019).

Jacob and Centofanti (2023) found that interactions could be embedded into videos by using questions and prompts, allowing the students to test their understanding of the content rather

than the traditional means of passively listening to a lecture. As an example, if an embedded question was answered incorrectly in the interactive video, the student would be prompted to return to the relevant section of the video that explained the topic. This is an example of the way in which *H5P* can greatly assist educators with testing knowledge and comprehension of course content in a fun and interactive way.

Recognising the diversity of learners, inclusive teaching practices that accommodate different learning preferences and backgrounds needs to be employed (Bates, 2022). This ensures that every student feels valued and supported in their educational journey (Major & Francis, 2020). The evidence suggests that this can be achieved and supported using digital learning resources such as *H5P*. The adaptability afforded by it also creates a more personalised learning experience for students, and the sheer variety of elements allows for educators to create a variety of formative assessments as part of the curriculum design of courses (Jacob and Centofanti, 2023).

This paper presents a preliminary reflection on the use of *H5P* in the animal science courses (<https://handbook-guide.unisq.edu.au/program/2025/BSCI>) at the University of Southern Queensland (UniSQ), to support a diverse cohort of online and on-campus students. The goal of this paper is to reflect on its implementation in the animal science courses, and its impact on the student experience.

Approach

In 2021, The University of Southern Queensland (UniSQ) delivered its first suite of animal science courses. UniSQ has a traditionally higher external and part-time cohort compared to their on-campus and full-time cohort (Department of Education, 2024), therefore the curriculum design needed to cater for this. The challenge was how to develop the curriculum for a diverse cohort of predominately external students, within a short time frame, with limited physical resources and in a learning environment at the time still impacted significantly by COVID-19.

The curriculum was designed to embrace active learning principles, to promote student engagement and participation to enhance learning outcomes, for which there is a rich body of supporting evidence (Armbruster et al., 2017; Baker et al., 2012; Swenson et al., 2018). UniSQ has a traditionally had a larger external cohort compared to their on-campus cohort, therefore the design needed to cater for this. The curriculum was therefore designed using several key active learning strategies including flipped classrooms, group discussions, case studies, and problem-solving exercises (Mortensen et al. 2015; Ragland et al. 2023) and was operationalised via the use of *H5P* (Figure 1).

Research points to the need to include interactive low-stakes guided content that students can use to revise sometimes overwhelming content (Williams, 2006). Non-assessed *H5P* activities were therefore implemented to provide students with the opportunity to engage with the content that enabled interaction and informal self-testing. Content was therefore scaffolded across the curriculum using *H5P*. As stated by Bai and Jiang (2022) this has been shown to be beneficial by engaging a variety of learners actively. It also helps students follow a clear structure and allows them to pace their own learning, while catering to a diverse range of learning preferences and abilities (Bransford et al., 1999).

Multiple different *H5P* elements were utilised including dialog cards, images, image hot-spots, multiple choice, and true/false question sets, video media, drag and drop, drag the words, and

fill in the blanks (Some of these options can be seen in Figure 1; b, c). As displayed in Figure 1 which shows some of these content rich elements, these were intertwined with course text and embedded directly onto the course activities page, to produce an interactive weekly ‘workbook’ style learning resource for students to engage with (Figure 1; a). As an example, in AGR3202 Animal Reproduction (a notoriously content heavy course), and AGR3302 Sensors & Technology in Animal Production, *H5P* assisted by delivering the information to the students in a fun and interactive way, catering for different learning preferences. Likewise, in the first-year course, AGR1101 Animal Health, Welfare and Behaviour, *H5P* was used to create formative assessment tasks which the students were able to engage with to revise the weekly course content. This was delivered to them as an aesthetically pleasing interactive workbook (Figure 1; a).

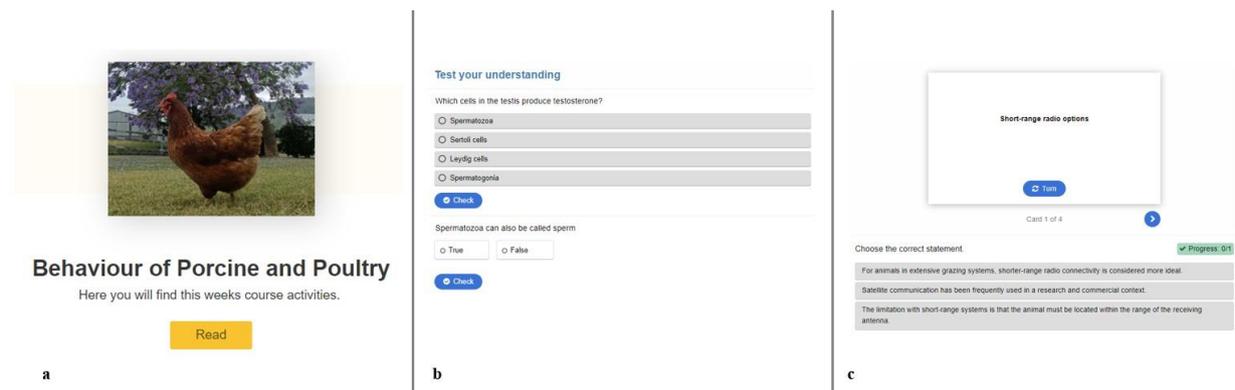


Figure 1: Example excerpts of educational interactive *H5P* elements in the Moodle environment (a; interactive workbook, b and c; interactive low-stakes formative assessment activities).

Impact on student learning, engagement, and experience

Regular feedback mechanisms, including mid-semester reviews and post-course reflections, have allowed for adjustments and improvements based on student input. These teaching practices have been consistently evaluated through course satisfaction surveys over the past three years.

Engagement and satisfaction have been positively impacted by the implementation of *H5P* with course surveys showing a high student satisfaction (out of a 5-point scale). Positive feedback related to the ability to engage meaningfully with the content in an enjoyable way, clarity of instruction and relevance of content. Furthermore, the high student progression rates in these courses are also considered a testament to student satisfaction and achievement. The average student course evaluations for external and on-campus cohorts since the inception of the animal science courses, and the implementation of *H5P* scaffolding across the curriculum has been 4.8 (evaluated from the courses and course data provided in Table 1), with the animal science courses consistently achieving these course survey results.

The first offer of the AGR3202 Animal Reproduction course achieved an end of semester course evaluation of 5. The results show that 80% of students attempted the non-assessable activities within the *H5P* modules, with some students re-attempting the non-assessed activities up to 5 times. In 2023, UniSQ analytics found that 93.8% (16 respondents) of students enrolled in AGR3202 Animal Reproduction accessed all the *H5P* weekly resources. Likewise, in AGR2201 Animal Production Systems, with the introduction of *H5P* activities the overall student course satisfaction survey went from 4.8 (2022, 2/6 respondents (internal), and 5/12

respondents (external)) to 5.0 (2023, 3/7 respondents (internal), and 5/14 respondents (external)). While the number of respondents is low for each of the courses and we cannot solely conclude that high student evaluation data is attributed to *H5P*, positive feedback regarding the use of *H5P* was received, with students expressing their appreciation for the way in which the online content was delivered. This feedback was also mirrored in the first-year cohort in AGR1101 Animal Health, Welfare and Behaviour in which they expressed their appreciation and enjoyment for the learning resources: *“The summaries are well-written; diagrams clarify the content well and quizzes help solidify what has been taught....”*, *“.....summarises key points exceptionally well, provides comprehension of a content heavy course in easy-to-understand language.....”*.

Table 1: Average student course evaluations (out of a 5-point scale) for external (EXT) and on-campus (INT) cohorts since the inception of the Animal Science courses (respondents/number of students).

Course	2021		2022		2023	
	EXT	INT	EXT	INT	EXT	INT
AGR2201 Animal Production Systems	4.3 (3/10)	-	4.8 (5/12)	5.0 (2/6)	5.0 (5/14)	5.0 (3/7)
AGR1101 Animal Health Welfare and Behaviour	4.4 (16/38)	-	4.3 (14/31)	5.0 (3/6)	4.6 (15/32)	5.0 (4/14)
AGR2203 Animal Nutrition	5.0	-	5.0 (3/5)	-	5.0 (3/11)	-
AGR3202 Animal Reproduction	-	-	5.0 (4/6)	-	4.8 (4/10)	5.0 (2/6)
AGR3302 Sensors and Technology in Animal Production	-	-	5.0 (4/6)	-	4.7 (3/7)	4.7 (3/11)

While studies have not necessarily found a significant improvement in student grades, as a result of the implementation of *H5P* (Jacob & Centofanti, 2023), feedback from students unequivocally supports the use of *H5P*, with studies finding students report positively on its use in course evaluation surveys (Jacob & Centofanti, 2023). This was also a finding in this study. Positive feedback was received across all the courses with students expressing their enjoyment of the quizzes, finding them particularly useful and enjoyable for their learning, and the fact that the diversity of e-learning content provided to them moved past simply being able to recall facts. They liked that the *H5P* content helped explain concepts in an easy-to-understand manner, and that visual aids were used so that even online students could apply some of the concepts and feel included. Students also expressed their appreciation for the organisation of the resources, and the way in which the courses were delivered. They liked the fact that diagrams were able to clarify the content, and that quizzes helped to solidify what was learned.

It is evident from the research and the student feedback garnered post its implementation across the animal science courses, that the use of *H5P* can assist educators in summarising key points exceptionally well and in providing comprehension of content heavy courses into easy-to-understand bite-size pieces of information. Along with other digital learning resources, it is evident that *H5P* can assist in maintaining suitable academic standards against the pressure to sustain student satisfaction, by incorporating ‘aesthetically appealing’ and presented content to

motivate their learning (Hoovier, 2017). In addition to *H5P*, other interactive digital learning resources have shown positive impacts on student learning, engagement, and experience. For instance, the use of Padlet (<https://padlet.com/>) has been found to facilitate interaction and collaboration in distance learning environments, significantly enhancing student engagement and satisfaction (Al Momani & Abu Musa, 2022). Studies have shown that Padlet can be effectively used for various educational purposes, such as brainstorming, resource gathering, and online discussions, which align well with the interactive and engaging nature of *H5P* (Jong & Tan, 2021). Similarly, active learning strategies, such as group discussions, role-playing, and gamified learning platforms, have been shown to enhance student engagement and knowledge retention (Hoovier, 2017). The integration of these tools complements the use of *H5P* by providing diverse and dynamic learning experiences that cater to different learning styles and preferences and aligns well with these findings on the use of *H5P*, as they emphasise the importance of interactive and engaging content in improving student experience.

Implications for practice

The implications of these findings for future teaching practices are significant, particularly in the context of the post-COVID-19 educational landscape. Universities are now under increased pressure to deliver high-quality online courses, and tools like *H5P* offer a solution to maintain high pedagogical standards without compromising student engagement. The interactive nature of *H5P* has been shown to keep students engaged throughout their studies, which is crucial for preventing attrition and negative outcomes (Jacob&Centofanti, 2023). The ability to create personalized, engaging online content is linked to improved student satisfaction and success (Kuzminska et al., 2021). Additionally, when students' expectations of online learning content are exceeded, they are more likely to engage further with the course material (Cheng, 2020). The use of *H5P* can also assist with scaffolding, breaking lessons into manageable chunks that increase in complexity, thereby reducing cognitive load and building student confidence (Grady, 2020). This research supports the need for interactive teaching materials and educational content to ensure a quality student-centered education, highlighting the potential of *H5P* to enhance learning outcomes across various disciplines.

Limitations and direction for future research

The massive transition to distance learning caused by the pandemic has highlighted the need for additional research to ensure the quality of education. In this context, many factors favour the usage of *H5P* to create and disseminate interactive content as a means of strengthening the motivation and involvement of students in active learning. While the research thus far shows the unequivocal support of students in the use of *H5P*, further studies in animal and agricultural science are needed on its use, as well as additional studies specifically looking at whether *H5P* can improve student academic outcomes with regards to course grades, as this would add further weight to the recommendation to use *H5P* for educators. It is clear from discussions with students and the feedback evidenced from the study desk activity reports so far, that the implementation of *H5P* has assisted with providing an engaging online teaching environment for both on-campus and external students in the animal science courses. Longer term tracking of student engagement is now needed, and further improvements are continuing to be developed, with refinements to the interactive elements and plans to develop and further embed it across the animal and agricultural science curriculum.

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