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Christian Moro, Kathy Ann Mills & Charlotte Phelps

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The CRAFTS learning framework: equipping learners to create relevant, accessible, fun, tailored and scholarly activities in higher education

Christian Moro [a], Kathy Ann Mills [b] and Charlotte Phelps [a]

[a]Faculty of Health Sciences & Medicine, Bond University, Gold Coast, Australia; [b]Institute for Learning Sciences and Teacher Education, Australian Catholic University, Brisbane, Australia

ABSTRACT

Tertiary institutions are migrating away from didactic and teacher-centred approaches, and instead, pivoting to lesson designs that encourage hands-on learning and student engagement. However, this practice is often "try and see", with few frameworks providing evidence-based approaches for practical application that demonstrates how learning can be successfully achieved. The literature supports foundational concepts that can be applied to develop effective learning environments, where students become producers, rather than consumers of course content. The CRAFTS framework outlines the benefits of focussing on: Create, Relevant, Accessible, Fun, Tailored and Scholarly activities and interventions to guide and facilitate student learning. This article presents the framework, an example application of its employment within a tertiary health science and medicine subject, and an evaluation of its effectiveness. For educators wishing to engage students in learning methods that extend beyond traditional didactic teaching delivery modes, and instead, focus on learner-centred approaches, this framework embeds the concepts of creativity, relevance, accessibility, and fun into sessions that can be tailored to the individual learner and are scholarly in nature. In these ways, the CRAFTS framework presents a robust and evidence-based approach to encouraging hands-on learner-generated content that can be used for knowledge consolidation in a tertiary course.

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Education theory; students as producers; interactive learning; active learning; producers; peer learning

Introduction

The radical transformation of digital media environments has enabled new kinds of societal participation and opportunities for creative learning through user-generated textual production, beginning at the turn of the new millennium, and associated with the rise of Web 2.0 – the read-write or social web (Mills & Chandra, 2011). The burgeoning of platforms for collaborative, crowdsourced, and hybrid knowledge generation has made the way for new paradigms of learning in higher education that are founded on democratic epistemic understandings and collaborative knowledge architectures (Mills et al., 2013), which position students as producers rather than consumers of knowledge (Bruns, 2006; Bruns & Schmidt, 2011). This article shares a new evidence-based pedagogical model called the CRAFTS Framework based on research with higher education students in health science and medicine, that was underpinned by the research question: In what ways do

CONTACT Christian Moro cmoro@bond.edu.au
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students perceive that producing educational content supports their formal learning? Learning experiences were designed, enacted, and evaluated with medical students, while the analysis of weekly student survey data, students' learning artefacts, attendance at optional CRAFTS sessions, and engagement with the online resources about the learning experiences informed and refined the key principles of the CRAFTS Framework.

Presenting the CRAFTS framework

The CRAFTS Framework is founded on the key learning principles to provide opportunities for students to Create in ways that are Relevant, Accessible, Fun, and Tailored to the context, needs, and abilities of students, while content produced is characterised by Scholarly rigour through peer review. Each element of the framework is outlined below and its theoretical underpinnings from research are elaborated further in this section (Figure 1).

1. Provide opportunities for students to meet the digital demands of learning in a media age that extends beyond the industrial age of traditional learning – to **create** and generate content using a range of connected multimodal platforms for collaborative online learning and other new socio-material networks (Saykılı, 2019).
2. Ensure the content being produced is **relevant** for all students in the class and directly related to the curriculum.
3. Learning materials should be **accessible** to all students in the course and equitable in their use.
4. Make it a **fun**, entertaining, enjoyable, and engaging experience, where CRAFTers learn while they create.
5. **Tailor** the choice of resource creation to fit the skills of the group, creating resources that utilise expertise from each contributing member (artistic skills, computer ability, webpage development, content knowledge, etc.).
6. Build it to be **scholarly**, where it can be peer-reviewed, improved, and built on over time. Ensure every element of the created content is correct and proofread by an academic or expert.

Research foundations underlying the CRAFTS framework

The six essential requirements of the CRAFTS framework, and their basis in relevant research, are outlined below.

Create

The principle of Create is founded on theories of cognitivism, social constructivism, and connectivism, which emphasise student-driven and peer-learning approaches that involve reciprocal learning benefits to both expert and novice peers (Zhang & Bayley, 2019). There is robust research to demonstrate that active learning techniques applied in dynamic learning environments in higher education consistently lead to enhanced student motivation, supporting student understanding of theoretical concepts, and increasing student satisfaction with their learning gains (Sukkar et al., 2022). Likewise, since the rise of Web 2.0 tools that facilitate the expansion of user-generated content in online environments, new opportunities have arisen for produsage – that is, the collaborative production of knowledge that is shared creatively, iteratively, and often arising organically from user interactions on the web (Bruns, 2006; Bruns & Schmidt, 2011).

Educators are embracing a paradigm shift from industrial-style, traditional, and teacher-driven formats of instruction to more democratic forms of complex thinking, and collaborative knowledge and textual production. These changes have paved the way for the advancement of novel, hybrid, and cooperative learning processes that prepare students for responsible, democratic, and

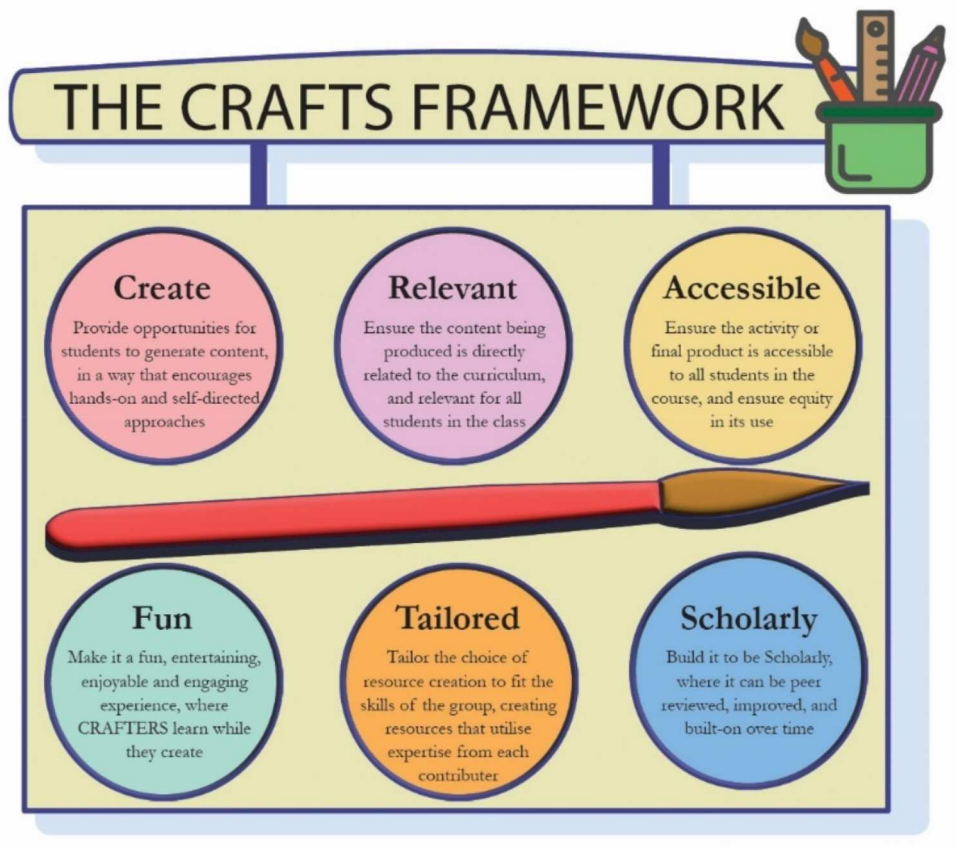

Figure 1. The CRAFTS Framework for multimodal content generation: Ensuring Created, Relevant, Accessible, Fun, Tailored, Scholarly activities for student learning.

user-producer engagement in the future world of work and productive digital citizenship. This is vital because digital communication environments have changed how students learn, gather information, and socialise in networked publics, supported by prosumer digital devices, social media platforms, and content-sharing web services (Adesope & Rud, 2019; Reyna et al., 2018).

Relevant

Even before the turn of this century, educators were urged to rethink teaching and learning paradigms that emphasise the provision of instruction, rather than enabling the production of relevant learning (Barr & Tagg, 1995). Universities and colleges had become locked into education structures that emphasised the delivery of 50-minute lectures that positioned students as passive recipients of knowledge, and that was decontextualised from the situated use or self-regulated application of real-world knowledge and skills. Importantly, self- and co-regulated learning are seen as key, which are the context-specific and often cyclical means to achieve personal goals. Constituting more than a singular internal state, self-regulation involves metacognitive knowledge, and the management of affective and behavioural processes applied in three phases: (i) forethought, (ii) performance, and (iii) self-reflection (Zimmerman, 2000).

Zimmerman's social cognitive model of self-regulation has been applied successfully in medical education (Rich, 2017), showing the benefits of extending this triadic model to emphasise social transactions as the core of regulated learning. In such developments, self-regulation is supported

by co-regulation in which there is shared control of learning among peers, with students reciprocally scaffolding the metacognitive engagement of peers in their specific areas of advanced competency (Rich, 2017). Such models of co-regulated adult learning are highly relevant in the age of online learning (Huang, 2019), where students possess digital literacies to create texts that can be collated into e-portfolios, as used in our current study, that differ from previous generations, and where co-regulated learning with peer-experts is no longer bounded by a shared physical space (Banson, 2022; Lam, 2022).

Accessible

A vital principle of CRAFTS is the need to overcome the ever-present challenges of "digital divides" in education – a term often associated with the work of van Dijk (2005), to ensure that learning is accessible to all students (Centeio, 2017; Owens, 2019). Research has identified key factors that emerged between 2017 and 2022, and which forecast technological and social changes that address the CRAFTS principle of accessibility. These factors are sociodemographic, socioeconomic, personal, specification of the technology type, social support, digital training, rights, large-scale events, and infrastructure, which were shown to be exacerbated during the pandemic (Lythreatis et al., 2022).

Most recently, new forms of digital access include algorithmic awareness and inequalities associated with data proficiency. The implication for higher educators is that pedagogical decision-making about the design of learning experiences within the CRAFTS framework needs to prioritise accessible digital platforms and skillsets. Tasks should give priority to ensuring accessibility and user-friendliness, while increasing flexibility to allow for student choice, maximising a variety of digital media formats available to learners for demonstrating or producing learning.

Fun

The idea that learning is memorable when the experiences are fun is supported by the research on games-based learning (Corti, 2006; Keogh et al., 2021), serious games (Sawyer & Smith, 2008), and leisure and entertainment activities, such as computer games, that have positive effects on learning. This recognition led to the use of educational games in formal learning environments (Connolly et al., 2012). Contemporary pedagogic theories demonstrate that learning is most effective when it is situated, active, experiential, problem-based, and provides immediate feedback, which are features inherent in users' interaction with digital games (Boyle et al., 2011). The CRAFTS framework applies the principle of fun by ensuring that learning experiences are not onerous, tedious, repetitive, or monotonous, but are well-designed and allow for a degree of student choice, to support cognitively, aesthetically, and socially stimulating tasks.

Tailored

The CRAFTS principle of designing learning activities that are tailored to contemporary learning cultures finds its origin in Jenkins (2009) well-known concept of participatory culture. Young people today are actively involved in online, peer- and friendship-driven networks of knowledge production, such as through modding, blogging, podcasting, contributing to wikis and fanfiction sites, digital sampling, video gaming affinity groups, and social media platforms that encourage sharing of creative digital artefacts (Jenkins, 2009). Many of these cultures involve literacies of listening, feeling, creating, curating, and collecting, rather than traditional learning models based on competition, specialisation, and hierarchical or tiered knowledge structures (Henderson, 2020). In such environments, learning emerges through collective intelligence from multiple perspectives and fields, applied to real-world problems (Moro et al., 2020). Similarly, creativity is central in the production of digital media, where students become engaged in critical co-creation to produce transmedia

texts that are tailored to utilise the artistic and technical expertise of the group, whether these pertain to animation, computer coding, video production, web design, music and audio design, or other multimodal resources (Mills & Chandra, 2011; Taddeo & Tirocchi, 2021).

Allowing students to choose how to approach an activity so that it can be tailored to their specific needs and skills, also removes the requirement for educators to provide a ''one size fits all'' approach to the content. In many modern cases, activities utilise purchased applications, or licenced software, which becomes less sustainable over time, and often has budgeting restraints when trying to scale for larger cohorts (Moro, Mills, et al., 2023). Enabling the students to come up with creative and imaginative ways to create revision resources can also generate enthusiasm in those who have skills to share. For example, instead of requiring a single method to create, provide students with building blocks, modelling clay, cardboard, pencils, butchers paper and other materials, and they are free to choose which ones to utilise in that session. This allows some to create 3D structures, some to simply pencil a drawing, and some learners may simply wish to write a list of learning objectives or examination questions. In some cases, members of the group will split up, and focus on their own creations to merge them all at the end with the others. This allows tailored and structured learning, where a student group can choose exactly how they would like to create the final product and apply their learned content for its creation.

Scholarly

Scholarly work is central because one of the goals of higher education is to develop students' capacities to apply evaluative judgements of knowledge and the work of others (Chen et al., 2022). Six standards of excellence in Scholarship Assessed were formulated by Boyer (1990) and Glassick and PhD Guest Editors The Council Of Academic Societies Task Force On Scholarship (2000). The six standards provide an erudite set of themes to guide and evaluate the quality of the work of scholarship, whether produced by teachers or students. Any scholarship worthy of merit should: (i) address clear goals, (ii) demonstrate adequate preparation, (iii) apply appropriate methods, (iv) deliver outstanding results, (v) be characterised by effective communication, and (vi) lead to reflective critique (Glassick & PhD Guest Editors The Council Of Academic Societies Task Force On Scholarship, 2000). Opportunities should be provided to develop students' evaluative judgement through making assessments and critiques of the scholarly work of others, including their peers. This principle supports the goal of higher education to develop students' capacities to apply criteria to evaluate the quality of knowledge in online, peer learning communities, which is now vital in technology-rich environments that are integrated into students' lives (Chen et al., 2022).

Methods: employing and evaluating the CRAFTS framework

Study setting and design

To evaluate the framework in a real-world setting, the process of engaging students in weekly CRAFTS activities was implemented across a first-year 12-week pre-medical Physiology subject at an Australian University. All students enrolled in the subject were timetabled to attend a non-compulsory 1-hour CRAFTS session each week over the 12-week semester. In this group activity, student groups of 3–5 members were assigned a hands-on activity and tasked with creating a resource that could be available digitally (via links, websites, uploaded resources, or photos) to the whole cohort to assist with revision (Table 1). At the conclusion of the lesson, all group submissions were merged and made available on the subject's learning management system website for students to use as revision resources. Although not all students chose to attend the CRAFTS sessions, as these were not compulsory, all students had access to the available resources through the subject website. Ethics for this study was approved by the Institutional Human Research Ethics Committee.

Table 1. Weekly CRAFTS activities offered to students in a semester one Physiology subject, tailored to the weekly lecture topic.

Weekly lecture topic	CRAFTS weekly activity (to be completed in groups of 3–5)
1: Body organs	Create an online quiz. Groups to write a series of questions, which will all be combined into a single revision quiz.
2: Skin	Create a crossword based on the words in this week's lecture
3: Cells	Create a meme based on the content this week. Find a relevant picture and annotate a comment below
4: Tissues	Create a "sustainable resource" based on the UN's Sustainable Development Goals to tackle one problem in human physiology
5: Epithelia	Use Lego, cardboard, modelling clay and/or crafting items to create one of the body features covered in this week's lesson. Photos will be taken of the object, and other students can "guess" what the model depicts.
6: Blood	Write a story about a patient who needed a blood transfusion. The reader must work out what blood type would be compatible.
7: Body fluids	Word associations. Find 4 pictures related to a word or concepts from this week's content, other students can guess what it is.
8: Bone physiology	Create a haiku (short poem, three phrases) in your group. Haikus will be merged into a larger document as multiple stanzas for all students.
9: Bone repair	Create a reverse crossword puzzle. The words are provided and the students need to write the questions.
10: Nerves	Create a word search. Pick key concepts from this week's lesson and merge it into a word search.
11: Brain	Create a social media-style video on this week's topic. Maximum of 20 sec. Group videos will be combined into a longer video resource.
12: Muscle	Create a role-play activity, with props, walking through the important steps of muscle contraction.

Created resources do not need to be digital in their design. Instead, a variety of digital or non-digital products can be crafted, with learners able to choose what would be the optimal multimodal format for the revision resource. However, for dissemination and later class revision, created resources were made available through the class learning management system website. This enabled freedom for students to have mixed approaches to the product's development, which then would be associated with a digitally delivered resource, a process that can facilitate some enhanced motivation and deep learning (Santos et al., 2019). It also meant that students were not tethered to their laptops, and could use their imaginations, artistic skills, or abilities to create. An example of this was groups that chose to use modelling clay to build cells or building blocks and cardboard to create 3D structures of the skin. After the session, these structures were photographed, labelled, and then made into "guess the cell" or "label the diagram" type questions, and uploaded to the learning management system for other students to learn from.

Data collection and analysis

A paper-based 5-item 5-point Likert scale questionnaire was employed weekly at the end of each CRAFTS session to evaluate participant perceptions of the activity. The Likert scale survey questions were guided by the framework itself, and the following questions were asked each week, tailored to the activity:

- The activity appeared to be relevant to this week's course content,
- The activity will be an accessible way to revise,
- This week's activity was fun to create,
- The activity was a good use of my skills (e.g. artistic, creative, scientific knowledge, and computer skills),
- I am confident that my submission was scientifically correct.

An open-ended question asking participants to provide any other feedback regarding the week's activity was also included at the end of each survey. Likert scale responses were collected weekly and analysed using GraphPad Prism v9 software. A two-tailed Spearman's correlation test was employed to analyse Likert scale responses and results where $p < 0.05$ were considered statistically significant. A deductive qualitative thematic analysis approach was employed, using the Braun and Clarke (2006)

six-phase qualitative analysis framework. Five themes were preconceived based on the theoretical framework underpinning this study: (i) quality of learning, (ii) supporting learner engagement, (iii) peer learning, (iv) retaining learning, and (v) creativity.

Results

Participant perceptions of the CRAFTS activities

Throughout the semester during CRAFTS sessions, on five occasions participants were asked to fill in a survey regarding their perceptions of that week's activity. Response rates on the survey ranged between 45% to 95% of attendees, with responses outlined in Table 2. The highest ratings were consistently given to the relevance of the activity to the course content, suggesting that students are mostly interested in the application of knowledge learned that week, rather than the specific endeavour. There were positive correlations between each of the CRAFTS criteria, with no significant differences between responses (two-tailed Spearman's correlation of amalgamated data across all weeks, $n = 217$ for each criterion). As such, each activity scored highly across each criterion with no CRAFTS criteria identified as less important or rated any lower by participants than others (Figures 2 and 3 and Table 2).

Scholarly assessment

To assess Scholarly submissions, the final created resources were peer-reviewed by two expert physiologists and based each one on the quality of submission as a learning resource (considering the accuracy, usefulness, clarity of content and understandability). The sessions were rated out of a 5-point Likert Scale (*1 = very poor quality, 5 = very high quality*) as: Create questions for an interactive polling quiz 4.5/5; Create flip cards with a term/concept on one side, and the definition on the other 4/5; Create a ''what am I'' poem for students to guess the concept 3.5/5; Create a real-world scenario with a question that applies student knowledge 4/5; Create a structure with Play-Doh, and require students to label, 5/5.

Qualitative analysis of feedback on CRAFTS activities

After 5 weeks of CRAFT activity workshops, participants were surveyed regarding their perceptions of the sessions. Eighteen responders (with an average attendance of 4.2 sessions, although 12 acknowledged that they had attended every session). As the CRAFTS framework was based on published literature, a deductive approach was applied for thematic analysis, where participants were asked questions related to five pre-specified themes: (i) quality of learning, (ii) supporting learner engagement, (iii) peer learning, (iv) retaining learning, and (v) creativity (Table 3).

Table 2. Average participant ratings on a 5-point Likert Scale (1 = Strongly Disagree to 5 = Strongly Agree) under each criterion of the CRAFTS framework.

The week's CRAFTS activity (Student responders / total participants)	Relevant	Accessible	Fun	Skills	Scholarly
Create questions for an interactive polling quiz (70/73)	4.7	4.4	4.4	4.4	4.5
Create flip cards with a term/concept on one side, and the definition on the other (43/62)	4.7	4.5	4.3	4.4	4.7
Create a "what am I" poem for students to guess the concept (36/80)	4.6	4.3	4.2	4.2	4.3
Create a real-world scenario with a question that applies student knowledge (45/50)	4.6	4.7	4.5	4.5	4.5
Create a structure with play-doh and require students to label (25/50)	4.4	4.1	4.3	3.9	4.2

Notes: Relevant: The activity appeared to be relevant to this week's course content. Accessible: The activity will be an accessible way to revise. Fun: This week's activity was fun to create. Skills: The activity was a good use of my skills (e.g. artistic, creative, scientific knowledge, computer skills). Scholarly: I am confident that my submission was scientifically correct.

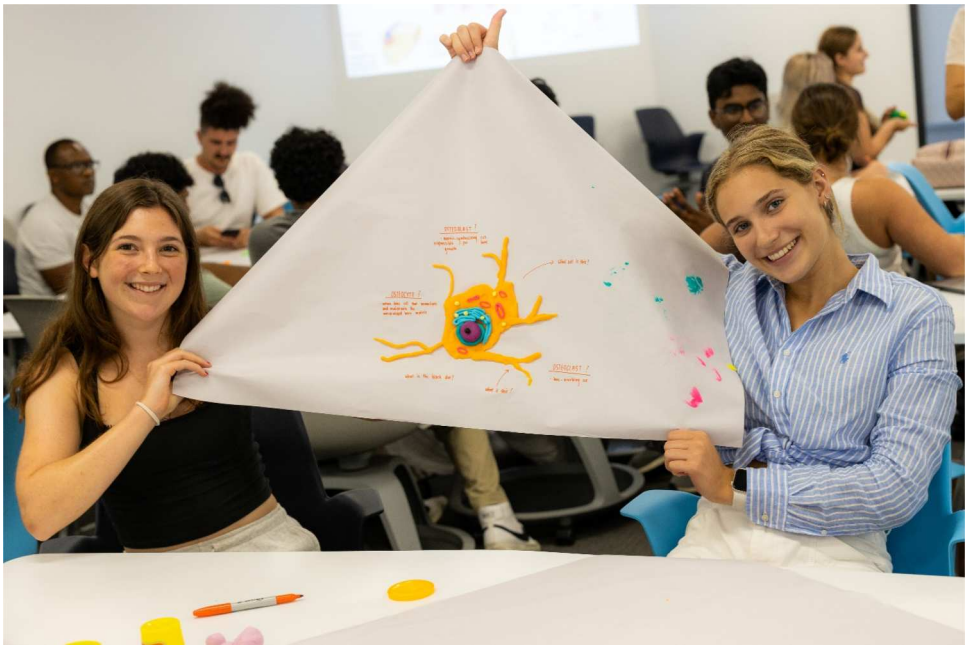

Figure 2. Students in a CRAFTS session using a modelling compound to create a cell found within the human body.

When surveyed, 47% (8/17) of students said that they preferred spending the class time doing hands-on crafting activities in small groups, rather than the option to engage in formal educator-directed teaching. Of the 53% (9/17) who reported they would prefer more time being taught, particular comments (5/9 responders) mentioned the request to spend specific time in revision sessions reviewing challenging concepts.

While most students positively received the framework (Table 1), some personality differences did get in the way of the class's intended activity. For example, one participant commented "I'm very shy and not an interactive person so it makes me uncomfortable … " (p. 9). Although there is evidence that challenging students beyond their comfort zone can be a positive, showing there can be intrinsic benefits in encouraging small group activities that allow students to get out of their comfort zone and work with their peers.

Seventy-three percent (73%) of participants (11/15) agreed that creating resources in small groups helped them to learn from other students, as it allows the opportunity to share knowledge

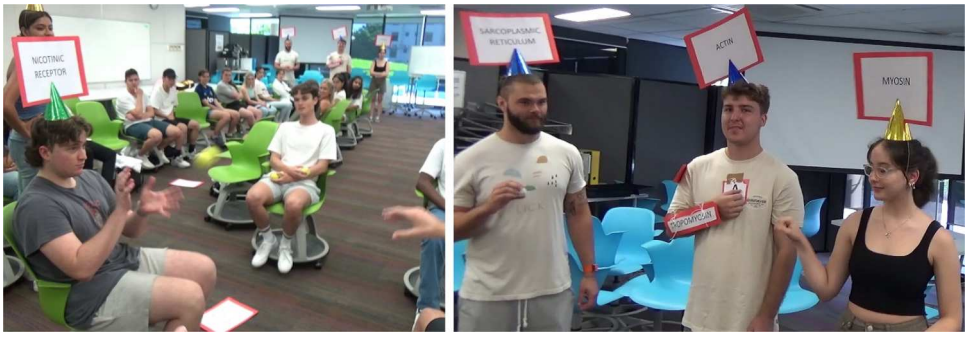

Figure 3. Students in a CRAFTS session taking part in a developed role-play, outlining the main processes in muscle contraction.

Table 3. The deductive analysis asked questions under each identified theme to draw insights from participants.

Theme	Question	Example responses
Quality of learning	Did creating resources enhance the overall quality of your learning? How?	"Yes, it's good for learning as you are trying to apply the knowledge from the class." (p. 6) "Yes, because the resources help me stay on top and not fall behind." (p. 15)
Supporting learner engagement*	Would you have preferred for us to spend more time "teaching the content", rather than asking you to create resources? Why/why not?	"Creating resources has been a really good way to see if I actually know the content." (p. 5) "More time teaching as sometimes the forum content is hard to understand." (p. 7)
Peer-learning	In what ways did creating resources in a small group help you learn from other students?	"This allowed me to see if we interpreted the content differently and allowed me to identify gaps in my knowledge that my friends knew." (p. 5) "I personally prefer quizzes helps to refresh the memory rather than talking amongst students. Ends up being just chatting." (p. 14)
Retaining learning	To what extent did creating revision resources help you retain information?	"Active recall!" (p. 2) "It helped with the surface layer of information, but the deeper layer I have to go and revise on my own as well as at uni." (p. 15)
Creativity	Do you think that producing revision resources each week enhanced your creativity?	"I think yes, it's a new way of learning." (p. 2)

(5/11), look at concepts from different perspectives (4/11), and identify new learning strategies (1/11). For example, a student noted: "This allowed me to see if we interpreted the content differently and allowed me to identify gaps in my knowledge that my friends knew." However, 27% (4/15) disagreed that creating resources helped them learn from other students, as they would prefer to learn individually such as completing quizzes (2/4), and one participant reported that the small group learning may be distracting and could lead to students ending up just talking off-topic with their peers.

Under the theme of creativity, 71% (10/14) reported that producing revision resources each week enhanced their creative skills, as it is a new way of learning (1/10), however, 29% (4/14) disagreed with this statement. Quality of learning was reported to be enhanced by 69% of participants (9/13), as the creation of revision resources is beneficial for reviewing the lecture content (2/9), applying knowledge (1/9), and identifying areas for improvement in learning (1/9).

Engagement with the created resources for revision

A folder with each week's created revision activity was hosted on the subject's learning management system page (using BlackBoard Learn: Anthology Inc., Boca Raton, Florida, USA). Of the 110 enrolled students, 60 accessed the resources on a regular basis (55%). The highest level of activity in the folder was during the week of the mid-semester examination, suggesting that users did access the created materials for revision, prior to a formal assessment. Of the users who engaged with the created resources, the average overall subject mark at the end of the semester was 69 ± 15% (± SD) with a range of 57% (36%–93%). This result shows that the created resources were used by students from a range of knowledge levels, not solely the top performers.

Discussion

Tertiary institutions are moving away from teacher-centred approaches, increasingly introducing modes of delivery that require students to interact, take part, and engage with the content. Educators can no longer expect students to be passive receivers of knowledge, and instead, need to provide educational approaches that allow them to take part in learning that construct their own understanding. This, in turn, can facilitate deeper learning, as well as build skills in critical thinking and the application of learned knowledge (Santos et al., 2019). However, these are quite new

ways of teaching in a tertiary environment. The traditional approaches to teaching still prevail, and in some cases, educators are unclear as to how to pivot teaching styles, and learning approaches, to more modern methods.

The CRAFTS framework presents an evidence-based and evaluated approach that educators and institutions can adopt when wishing to develop curricula that take advantage of modern tertiary teaching methodologies. In particular, using the framework can encourage hands-on learning and student-generated content in classes. The embedding of relevant, accessible, fun, tailored and scholarly activities in higher education allows the provision of a robust and effective learning environment that encourages learner engagement, peer learning, and creativity in a way that assists in retaining learning of even challenging concepts.

Although the literature is clear on the benefits of hands-on learning and having the students as active participants in a class, some learners do perceive that there is still a need for didactic approaches. As such, there was some resistance by learners to the structure of the CRAFTS sessions. In particular, some students were concerned that the activities were replacing otherwise formal instructions or lessons by the educator. This is not the case, as hands-on approaches are best used to supplement learned material, with a focus on application and revision. It is therefore helpful to explain to students that these sessions are focussed on knowledge consolidation (Moro et al., 2022), and aim to expand upon learned concepts. Other resistances observed were regarding personal characteristics. For example, one respondent's comment of: "I'm very shy and not an interactive person so it makes me uncomfortable … " may sound negative, but also points to the potential social benefits of collaborative learning activities, encouraging personal growth and development. In addition, providing even timid students with opportunities to work in small groups can assist in developing interpersonal skills and team-building abilities (McLean et al., 2022), which are commonly requested graduate attributes. This shows that even some of the reported hesitation and resistance to these activities may support their overall use in a programme and benefit students in the long term.

One potential limitation for application revolves around the challenges for educators to obtain quality preparation time required to develop and embed hands-on learning CRAFTS activities. In recent years, it has become increasingly apparent that there is a sentiment of curriculum becoming "very busy" and crowded (Moro, McLean, et al., 2023), leaving little time to engage in endeavours outside the core teaching modes of lectures and tutorials. This is coupled with declining attendance levels at peripatetic sessions, and the availability of course material in an online form (Cleary-Holdforth, 2007), which may contribute to reluctance among some educators to use hands-on, interactive learning experiences. However, it is becoming clear that institutions and students are both increasingly valuing the embedding of hands-on approaches, and there is certainly a benefit for learning and engagement. As such, we highly recommend that university administrators and curriculum designers aim to provide curricula space for interactive activities, as well as time in their workload schedules for educators to develop high-quality learning experiences. An additional limitation was that the results were not informed by the engagement of a control group that did not receive the interactive activities. Lastly, some sessions had variable attendance with relatively low response rates, so that the sentiments of some students may not have been captured.

Conclusion

The CRAFTS framework presents a robust and evidence-based approach to encouraging hands-on, learner-generated content that can be used for knowledge consolidation in a tertiary course. Application of the framework supported students' academic performance, with high student engagement, strong interactivity, and opportunities for creativity and social collaboration. Tangible materials and media are transforming workplaces and society, with new opportunities to equip learners with relevant professional competencies for the future.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Data availability statement

Data is available upon reasonable request by emailing the corresponding author.

Notes on contributors

Christian Moro, B.Sc., B.Ed., M.Bus., PhD., is an Associate Professor of Biomedical Sciences and Medicine, Bond University. His medical education research focusses on the implementation of novel technological tools to enhance student learning, participation, and interaction.

Kathy Mills, PhD, GradCertAP, M.Ed, GradDipChrStuds, B. Ed, is a Professor of Literacies and Digital Cultures at the Institute for Learning Science and Teacher Education, Australian Catholic University. Her leading research examines gaps in current knowledge and educational uses of digital media and literacy practices.

Charlotte Phelps, B.Biom.Sci (Hon.), is a Doctoral student in Physiology and Pharmacology and also an education researcher in the Medical and Biomedical Sciences Programs, Bond University.

ORCID

Christian Moro http://orcid.org/0000-0003-2190-8301
Kathy Ann Mills http://orcid.org/0000-0003-1140-3545
Charlotte Phelps http://orcid.org/0000-0002-4217-0214

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