



# Innovating Pedagogy 2023

**Exploring new forms of teaching, learning and assessment,  
to guide educators and policy makers**

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# Contents

<b>Executive summary</b>	<b>1</b>
<b>Introduction</b>	<b>6</b>
<b>Pedagogies using AI tools</b>	<b>8</b>
Using AI tools such as ChatGPT to support teaching and learning	
<b>Metaverse for education</b>	<b>13</b>
Educational opportunities through fully immersive 3D environments	
<b>Multimodal pedagogy</b>	<b>18</b>
Enhancing learning by diversifying communication and representation	
<b>Seeing yourself in the curriculum</b>	<b>22</b>
Pedagogies enabling students to see themselves in the curriculum	
<b>Pedagogy of care in digitally mediated settings</b>	<b>28</b>
Prioritising the well-being and development of students	
<b>Podcasts as pedagogy</b>	<b>32</b>
Embedding podcasts in teaching and learning practices	
<b>Challenge-based learning</b>	<b>37</b>
Rising to challenges to benefit individuals and societies	
<b>Entrepreneurial education</b>	<b>41</b>
Students as change agents in society	
<b>Relational pedagogies</b>	<b>45</b>
Working relationally in and across disciplinary and professional boundaries	
<b>Entangled pedagogies of learning spaces</b>	<b>50</b>
Connecting technology, pedagogy and all elements of a learning context	

# Executive summary

This series of reports explores new forms of teaching, learning, and assessment for an interactive world, to guide teachers and policy makers in productive innovation. This eleventh report proposes another ten innovations. They are already in currency but have the potential to exert a more profound influence on education. To produce the report, a group of academics at the Institute of Educational Technology at The Open University, UK, collaborated with researchers from the Centre for Innovation in Learning and Teaching at the University of Cape Town, South Africa. A long list of pedagogical innovations was proposed by the authors and then, through a process involving critique, research, and voting, pared down to ten that have the potential to provoke major shifts in educational practice. Finally, ten sketches of these innovative pedagogies were compiled, based on a review of published studies and other sources, and these are summarised below.

## 1 Pedagogies using AI tools

The emergence of generative AI tools, such as ChatGPT-4, has the potential to transform education practices. These tools can create content, including text and images, and are increasingly being integrated into various educational tools and platforms. However, they also present challenges and raise important issues that need to be addressed. Generative AI tools have been trained using vast datasets from the internet, enabling them to produce text that resembles human-generated content. Despite their impressive capabilities, they still have limitations, such as social bias and occasional factual inaccuracies. The range of generative AI tools is expanding rapidly, with applications in areas like presentations, article summarisation and image generation. These tools can serve as personal tutors, collaboration coaches, study buddies, or exploratoriums, providing learners with individualised support, facilitating group work, assisting in comprehension, and enabling data exploration. Furthermore, AI tools in education extend beyond generative AI, encompassing chatbots and artificial assistants that can enhance language learning, provide personalised guidance, and support cognitive processes. As these AI tools become more prevalent, there is a need to train students in their effective use, consider ethical implications, and reconsider assessment practices to accommodate their capabilities.

## 2 Metaverse for education

The Metaverse is a 3D virtual reality version of the internet that allows users to interact with each other through avatars. While the concept has been around for some time, recent investments in the Metaverse have brought it to the forefront of technological advancements. The Metaverse consists of online connected 3D worlds accessed through virtual reality (VR) headsets. Users can come together in a virtual world to collaborate and conduct any kind of permitted activity. Educational uses of the Metaverse have been proposed, including a new social communication space, with a high degree of freedom and immersion in a virtual world. While the implementation of the Metaverse is still in its early days, ten US universities have created 'metaversities' that developed digital campuses for learning through virtual reality. The use of the Metaverse in education has been primarily focused on STEM subjects, where it has been used for modelling systems and conducting experiments. The Covid-19 pandemic and the subsequent shift to online learning have increased interest in virtual worlds. While the Metaverse offers educational potential, there are challenges and concerns, including technical and accessibility issues and concerns over privacy and security.

### **3 Multimodal pedagogy**

Multimodal pedagogy is an approach to teaching that focuses on using different modes of communication such as words, images, sounds, and gestures to facilitate learning. It is gaining popularity due to social and technological changes that have destabilised the dominance of text-based practices. Multimodal literacy is an important part of this approach as it involves an awareness of the possibilities and constraints of different modes of communication, how they can work together to produce meaning, and how the medium shapes how modes are distributed and how meaning is communicated. Adopting a multimodal approach to pedagogy can help prepare students for workplace communication and enable different ways of knowing. It can also improve accessibility, inclusivity, engagement, comprehension, and the retention of knowledge. Examples of multimodal pedagogy include classroom activities designed to help students visualise three-dimensional structures, acting out pathways of sound, and producing multimodal academic arguments. Challenges of adopting this pedagogy include the need for digital skills, the possibility of distraction, and the need for different assessment methods.

### **4 Seeing yourself in the curriculum**

More and more students want to see people like themselves, with their history and backgrounds represented in their curriculum, learning materials and educational approaches. The decolonial movement seeks to address the historical legacy and ongoing effects of colonialism on societies and individuals around the world. One of its main aims is to ensure that education systems reflect the diverse cultures, experiences, and histories of their students. To achieve this, educators are adopting a 'decolonial' approach, which involves unlearning the biases and ideas that come from colonial history, and instead incorporating knowledge generated from authentic local contexts, including previously ignored Indigenous knowledge and philosophies of learning. Inclusive and decolonised curriculum and teaching resources are designed to reflect the diversity of the learning community. Flexible curriculum approaches should be considered to enable consistency in the curriculum while allowing it to speak to local or diverse audiences. Indigenous pedagogies are also being promoted to embed local stories, perspectives, and knowledge into core teaching and learning. These developments represent a demand for fundamental changes to how schools and universities operate to address power imbalances in education systems.

## 5 Pedagogy of care in digitally mediated settings

Pedagogy of care is an approach that prioritises empathy and the development of learners in a nurturing, supportive, and equitable learning environment. Care has not always been central to teaching, and education systems worldwide often over-emphasise academic achievement at the expense of nurturing caring individuals. Yet a pedagogy of care is increasingly recognised as a vital element of the educational process, contributing to students' self-esteem, well-being, and engagement. There are four key elements of the pedagogy of care: modelling, dialogue, practice, and confirmation. A pedagogy of care can be practised in digitally mediated settings through practical steps that educators can take to create a hospitable environment, empathise with students, and respond to their needs. The Covid-19 pandemic and the ongoing climate crisis have raised new challenges for educators related to fostering care among learners. However, practitioners adopting a pedagogy of care could face several challenges, such as personal exhaustion and burnout. It is important to consider self-care as a form of care among educators and others who support learning.

## 6 Podcasts as pedagogy

Podcasts are audio episodes that focus on a specific theme or topic and can be accessed for free online. The use of podcasts in educational settings has been growing over the past few years, and they can be used in two main ways – podcast curation and podcast creation. The use of podcasts in education can have many advantages, including flexibility, control over how the podcast is listened to by students, the informality which may appeal to learners, inclusivity, and delivery of up-to-date content. Using narrative podcasts as a shared learning experience can enhance levels of engagement and foster better efficacy in critical thinking. The creation of content for podcasts is becoming more widespread due to the increase in affordable recording equipment and free software. Educators have welcomed the process of producing podcasts as an opportunity to discuss core subject ideas in a more informal way and develop their own communication skills. Podcasts can be used for a variety of purposes in education, such as recording interviews and field trips, as well as assessment tasks involving reflection.

## 7 Challenge-based learning

Challenge-based learning (CBL) is a structured approach to using challenges in education or training. It consists of three stages: Engage, Investigate, and Act, and it is based on the idea that challenges 'provoke' learners into active participation and produce an outcome. CBL builds on experiential and constructivist learning, allowing participants to become both teachers and learners. Authentic use of technology, documenting and storytelling, and involving community members in a process to expand resources and enable authentic learning are the key ideas of CBL. It shares similarities with Project-Based Learning and Problem-Based Learning, but it also has its unique features. CBL can be exciting for students and teachers and has the potential to impact society. However, it can be difficult to manage, and associated with risk and unpredictable outcomes. Initial adoption of CBL can be time-consuming for educators and students. Assessment methods require careful consideration, and limitations include shortages of teaching staff, technical support, and appropriate and safe spaces for students to collaborate.

## 8 Entrepreneurial education

Entrepreneurial education teaches the knowledge, skills, attitudes, and mindset required to start, manage, and grow a business. It can lead to growth, job creation, economic success, and innovation in society. An entrepreneurial mindset includes creativity, curiosity, critical thinking, problem solving, communication skills, teamwork, flexibility, taking risks, and a strong work ethic. The goals of entrepreneurial education can vary from developing capabilities for entrepreneurship, understanding entrepreneurship, developing competencies for pursuing societal goals through entrepreneurship, to behaving in an entrepreneurial manner. Various pedagogical approaches are used, such as simulations, mentoring, design thinking, and others. Entrepreneurial education can engage learners who do not identify themselves as entrepreneurial and help them develop skills as future leaders. Challenges and limitations of the approach include its teacher-driven nature, the lack of standardisation, and the lack of funding for programmes. However, entrepreneurial education has recently gained traction in primary and secondary education as a means to develop skills needed to cope with a changing society. Emerging digital technologies such as 3D modelling apps, artificial intelligence (AI), and 3D printers can be used to support entrepreneurial education.

## 9 Relational pedagogies

Relational work is the process of communication that creates relationships and connections with others, including humans, materials, artefacts, technologies and the natural habitat. Relational pedagogies consider the role of relationships in educational settings and meaningful relationships as fundamental to effective learning and teaching, as well as professional work and collaborations. The concept of relational expertise refers to the ability to recognise and respond to what others might offer in local systems of distributed expertise, while at the same time being confident to engage with the knowledge that underpins one's own specialised practice. Relational expertise is particularly relevant to work that evolves rapidly in response to global challenges. Relational pedagogies are about creating and sustaining the expertise needed for collaboration across practice boundaries and disciplines. Examples of relational work in practice include developing relationships among health professionals working on antimicrobial resistance, and teaching and learning in higher education with co-design of content and curation of reading lists. Ultimately, relational pedagogies are about developing the capacities for relational work that could be relevant in a wide range of situations.

## 10 Entangled pedagogies of learning spaces

Entangled pedagogies recognise the intricate relationship between technology, pedagogy, and the learning environment. Instead of framing the debate in terms of whether technology drives pedagogy or vice versa, entangled pedagogies focus on understanding how these elements are interconnected and influence one another. Orchestration is a useful concept, where teachers strategically select tools, design activities, and manage the learning process to guide students effectively. In hyflex teaching, entangled pedagogies encourage collaboration among students in different learning spaces and require careful planning to accommodate multiple contexts and constraints. The use of generative AI tools such as ChatGPT exemplifies the entanglement of technology and pedagogy, necessitating ethical considerations and critical evaluation. Entangled pedagogies present challenges such as workload and institutional constraints, but they can lead to inclusive and innovative learning environments. Embracing entangled pedagogies encourages educators to consider the purposes and contexts of learning and how they are shaped by the entanglement of learning spaces, pedagogy and technology.



# Introduction

## Multiplicity of pedagogies, technologies, spaces, people and ideas

As we continue to write and reflect on our *Innovating Pedagogy* reports, it is interesting to see that contributing authors are increasingly putting forward clusters of pedagogies and representing innovations as part of larger themes that are becoming prominent in the education landscape globally. Last year we had 'pedagogies of microcredentials' and 'pedagogies of the home', 'hybrid models' and 'dual learning scenarios', as well as the broader themes of well-being and influencer-led education. This year we have 'pedagogies using AI tools', 'relational pedagogies' and 'entangled pedagogies of learning spaces', along with approaches highlighting entrepreneurship and education in the Metaverse.

In several of these cases, we debated whether we were writing about one pedagogy or more, and although we made certain decisions, it would be possible to take a different view. In addition, we now find ourselves open to creation of new names for pedagogies or clusters that have common concerns but that do not yet have established names in published literature. A degree of flexibility in naming things can enable educators to discuss areas of practice that are changing or evolving, as well as all the tools and techniques that may help.

There could be many reasons for the phenomenon of authors combining pedagogies and noting wider changes of focus or practice in aspects of education, or education as a whole. It could be partly due to our collective reflection as teams of authors, coupled with a growing focus on emerging trends in a world where it is increasingly necessary to stand back and make sense of innovations that appear to be mushrooming and moving quickly from one domain into another. It could also reflect the fact that we hear and read about teachers having the opportunity to make choices from an array of pedagogical approaches and techniques that will enable them to work on specific goals and student needs, while at the same time the teachers are addressing their more holistic intention to enhance

teaching practices in respect of certain student groups or topics. Similarly, teacher trainers and professional learning developers have an ever-growing repertoire of available methods and technologies as well as multiple learning spaces (online and offline) that can be deployed to fulfil their aims.

All this seems to represent what can be described as a trend towards "a multiplicity of technologies, methods and modalities" available for a learning experience', meaning that several media and modes of communication and delivery can support teaching, learning and assessment across a range of contexts and spaces. It makes for a potentially complex teaching and learning environment where student activity needs to be 'orchestrated', as explained in our section on 'Entangled pedagogies of learning spaces' in this report. It has, however, the advantage of offering more options to suit different circumstances and student needs and it can support combining formal teaching and independent or informal learning.

The Metaverse, which is an intriguing extension of previous forms of virtual reality that have been trialled in education (see 'Metaverse in education' in this report), joins up physical and virtual worlds, and it can connect formal and informal learning. However, it is also yet another space that educators may need to get to know and include in their curricula and learning designs. Teaching and learning can be increasingly multimodal across multiple media, provided there is affordable and reliable access to relevant technologies and appropriate support – but such possibilities take time to implement with care and consideration for all involved. Content created by teachers and students, including podcasts (see 'Podcasts as pedagogy' in this report), enable more people to participate in co-constructing education, making sure that everyone's history and knowledge are respected and valued. Flexible curriculum approaches, which make space for adaptation or addition of localised content, help realise this goal (see 'Seeing yourself in the curriculum' in this report).

## Facing challenges and tackling them collaboratively and compassionately

With so much on offer and so many possibilities, education can seem like an even more difficult challenge than it was before. Yet the possibilities should be treated as ways to enable productive discussion and positive change. The key to embracing them is to adopt a collaborative, caring and compassionate stance, recognising that people may need support and that working together is nearly always likely to produce better outcomes than working in isolation (see 'Pedagogy of care in digitally mediated settings' in this report).

Global societal challenges<sup>2</sup>, in education and well as in many other domains, call for concerted action and collaboration<sup>3</sup>. In this report we cover 'Challenge-based learning', designed to provoke students to engage with complex topics that can provide powerful educational experiences. Challenges may require multiskilled or multidisciplinary teams to come up with solutions. Educators may therefore need to consider that students increasingly have skills and knowledge that they have picked up in their informal online learning and collaborations, which teachers often know little about. Challenges can help students display their hidden skills and talents, as well as enabling learning about, and contributing to solving, real-world issues. Development of entrepreneurial attitudes and relational skill sets (see 'Entrepreneurial education' and 'Relational pedagogies' in this report) can be ways to equip students to work together on challenges.

As education experiences become entangled with technologies underpinned by AI (artificial intelligence), it is certain that cooperation and exchange of knowledge and understanding will become even more important. In our 2020 Innovating Pedagogy report we wrote about 'Artificial intelligence in education' and the year after we covered 'Using chatbots in learning', as the potential of 'natural' conversations between humans and computers started to become an everyday reality. In the past year the world has witnessed an eruption of technologies powered by AI, and in the past few months a key moment has been the release of general-purpose 'conversational AI' tools such as ChatGPT, which have allowed the general public to experience the power of conversational AI as applied to all kinds of writing tasks as well as a means of informal learning. This momentous step in the use of AI in education is the reason we have included 'Pedagogies using AI tools' in this report.

We were briefly tempted to get ChatGPT to write the whole report, but (happily?) it is not capable of doing so. Nevertheless, it was useful in terms of generating a first draft of the Executive summary, which was then adjusted and improved (by humans!) to produce the final version.

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# Pedagogies using AI tools

## Using AI tools such as ChatGPT to support teaching and learning

### Introduction

A new wave of artificial intelligence (AI) tools has emerged during the past year. These are known as 'generative AI' and they can be used to create new content, including text, images, and computer programs. Together they have the potential to change education practices, however they raise many issues that will need to be addressed. They can be valuable tools to support learning, but they are also prompting changes in the ways in which learning is assessed.

### Generative AI tools

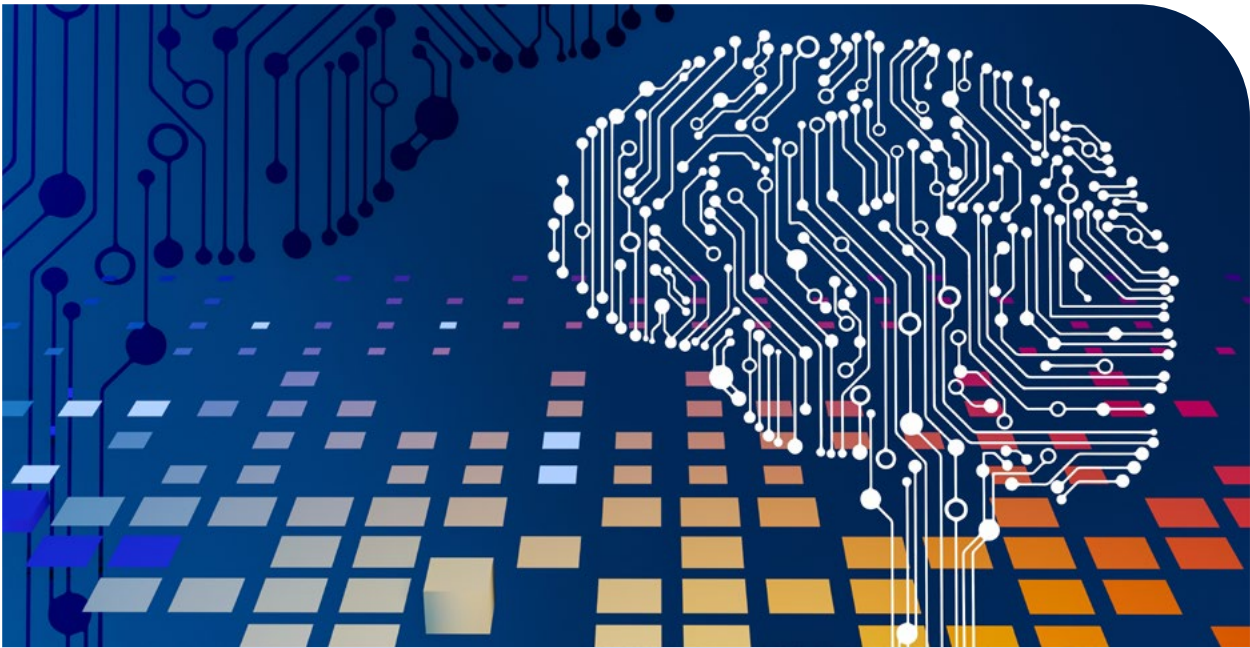
Currently, the best known generative AI tools are ChatGPT-4 and its predecessor, ChatGPT. Both are designed to engage in conversations with their users, responding to commands and producing text that appears to have been produced by a human, rather than a machine. These tools are developed using large sets of texts from the internet – ChatGPT was trained using 300 billion words<sup>1</sup>. Because these datasets are so large, the tools can learn to predict the next word in a sentence, reproduce different genres and styles, and shift easily between languages.

Although the output of these tools is impressive, they still have many limitations. OpenAI, the company that produces ChatGPT, acknowledges the limitations. One of these is social bias – the tool reproduces and sometimes amplifies the biases that are present in its training dataset. Because that dataset is made up of text that is available online, it is not neutral but reflects the opinions of those who create online texts. Another limitation is the tendency of these tools to “hallucinate” – producing outputs that are factually incorrect or irrelevant.

The range of generative AI tools is growing all the time. It also changes rapidly as some tools change name and form, and others move behind increasingly expensive paywalls. Those currently available, and useful for teaching and learning, include:

- <https://www.decktopus.com/> helps produce professional presentations
- <https://monica.im/> summarises articles (in Chrome)
- <https://stockimg.ai/> generates images for your project
- <https://openai.com/product/dall-e-2> creates realistic images from a text description
- <https://www.chatpdf.com/> upload a pdf and ask it questions
- <https://sheetplus.ai/> translates text into spreadsheet formulae
- <https://agentgpt.reworkd.ai/> breaks task into steps and works through them
- <https://books.google.com/talktobooks/> ask questions of Google Books
- <https://bearly.ai/> summarises long papers
- <https://www.perplexity.ai/> short answers to questions, with references
- <https://www.questgen.ai/> generates quizzes from text
- <https://tldrthis.com/> summarises any article
- <https://www.aomni.com/> finds, extracts and processes Internet data

In addition, familiar tools are beginning to include generative AI. For example, the language learning app, Duolingo, now has a version that includes AI features that can explain answers and carry out roleplay. Microsoft plans to incorporate generative AI in all its tools, including Word, Excel, and its Bing search engine.



AI tools can support and augment individuals in their learning journey

## Pedagogical approaches that make use of AI

Mike Sharples, a former *Innovating Pedagogy* author, has been researching the relationships between AI and education since the 1980s. His latest book, *Story Machines<sup>2</sup>*, traces the development of computers as creative writers since a machine was developed in the 19th century to write Latin verse. He has also worked to identify ways in which generative AI can be incorporated within pedagogies to support both teaching and learning. These include their use as “possibility engines”, expressing the same idea in a variety of ways to open up ways of thinking about a subject. They can be used as motivators, providing challenges and games that encourage students and extend their learning. They can also be used by educators as co-designers, providing ideas, structures, activities, and quizzes that can be used to build a course. They can be used as a personal tutor, a collaboration coach, a study buddy, or an Exploratorium (a space for exploring science, technology and the arts).

**Personal tutor:** Learners can benefit from individual support, but few have the resources to employ a personal tutor. ChatGPT can take on this role if prompted to do so, providing immediate feedback on input and then building on what the learner already knows.



expressing the same idea in a variety of ways to open up ways of thinking about a subject



**Collaboration coach:** Working together to research and solve problems is an important skill that not only helps learners to build their knowledge but can also be transferred to family life or the workplace. However, one reason that group work is often unpopular is because students do not know how to go about it. A tool such as agentgpt can take a prompt for a large task, break it into smaller tasks, identify the order in which they can be carried out, and help to complete them. For example, a prompt such as ‘Four of us want to develop a business plan for a consultancy that will develop prompts for AI tools’ will be broken into tasks including researching successful business models, developing a list of potential clients, and developing a pricing strategy.

**Study buddy:** Sometimes learners do not want to draw on a teacher’s expertise but want to chat with a peer in order to check their understanding and compare interpretations of material. If prompted to do so, ChatGPT can take on that role. It can summarise passages of text, ask questions about that text, and give responses. Another tool that can help in this context is [TLDRthis.com](https://tldrthis.com) (TLDR stands for ‘too long: didn’t read’), which can produce summaries of long pieces of text.

**Exploratorium:** The Exploratorium in San Francisco describes itself as a public learning laboratory, a place to explore the world and ignite curiosity. Generative AI can perform a similar function by providing tools that enable learners to find, play with, and explore data. Many types of generative AI can do this – [aomni.com](https://aomni.com), for example, is an information retrieval agent that can search the internet to find, extract, and process data. Given a prompt phrased in everyday terms, it can break it down into tasks, deciding what to search for, which information to browse and process, and then provide a detailed response.

## Other roles for AI in teaching and learning

Although generative AI appears new to people who do not work in the field, artificial intelligence (AI) has become increasingly

common in everyday life. One example is chatbots, computer programs designed to simulate human speech and conversation. *Innovating Pedagogy 2021* examined how these can be used in education to pose questions, answer questions, analyse students’ needs, or guide them through the process of problem solving. They do not replace teachers, but take on some routine tasks, freeing teachers to give more complex, personalised support.

In the context of language learning, these artificial assistants offer a range of benefits. They can offer direct help, including instruction, guidance, and recommendations. They can also provide sustained help, enabling students to rehearse what they have learned and develop good language-learning habits, such as frequent practice. From a cognitive perspective they can direct the student’s attention to certain aspects of a language, provide scaffolds that support students to learn material they would not be able to take on unaided, or provide opportunities for spaced repetition to help students remember new vocabulary and grammar. Artificial assistants can also motivate students, monitor progress, help with scheduling, and take on roles such as interpreter or translation aid.<sup>3</sup>



AI tools supporting individuals in their work contexts

## Curriculum shifts

As AI tools become more widespread, students will need training on how best to use them, and what their limitations are. In the past, very few people needed to be “prompt engineers”, with the skills to prompt a machine to generate useful text. In the future, though, this skill will be useful in multiple situations. The first responses of a tool like ChatGPT tend to be fairly bland and formulaic, with paragraphs all the same length, and the same sentence starters used frequently. The output changes as the prompt changes. It can be told to respond in a certain way, for instance: ‘You are a tutor who always responds in the Socratic style’, ‘I’d like you to act as a study buddy’, ‘Act as a subject matter expert on English grammar’. It can be told who to aim its comments at: ‘Respond to someone with a reading age of eight’, ‘Address your remarks to an expert in a related field’, ‘Assume I know nothing about this topic’. It can also be told to alter its output: ‘Use a variety of different words’, ‘Use an academic register,’ ‘Translate this into Greek’.

Another shift in the curriculum will be to explore the issues of ethics and bias associated with these tools. Their responses can look so convincing that students forget to carry out basic fact checks. Do the works the tool is referencing actually exist? Are the biographical facts accurate or are some of them simply ‘hallucinations’? Does the tool always assume that experts are white men? Students need guidelines to help them understand what sorts of problems they may encounter and how to interpret the responses that are generated (‘Navigating post-truth societies’ in *Innovating Pedagogy 2017* provides helpful support for this task).

More broadly, generative AI tools require a shift in assessment practices. Just as the introduction of electronic calculators 50 years ago prompted maths teachers to rethink what they should assess and how they should do it, generative AI is prompting a reconsideration of assessment in every subject area. These tools can provide accurate answers to multiple-choice questions, and with the right prompts, they can produce convincing essays on most subjects. In tests, it has been shown that they can provide sufficient correct answers to be able to pass many professional exams. Educational institutions will need policies in place to guide how and when generative AI tools can be used to support responses to assessment. At the same time, there will need to be a shift to different forms of assessment, including complex tasks, real-world tasks, reflections on the process of responding to a task, and critiques of responses produced by AI.

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## Resources

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# Metaverse for education

Educational opportunities through fully immersive 3D environments

## Introduction

The Metaverse can be viewed as a three-dimensional (3D), immersive version of the internet, where people interact through avatars. This form of virtual reality in education is not new, however, the current developments and investment in the Metaverse make it worth revisiting, as it potentially opens up new opportunities in education.



key to the Metaverse is a connection between the physical world and the digital one



The Metaverse arose as a fictional concept in the 1992 novel *Snowcrash* by Neal Stephenson. Typically, the term is now used to refer to online, connected 3D worlds, accessed through virtual reality (VR) headsets; these worlds persist and continue when the individual user is offline, so other users will be interacting in them rather than all action being paused. Metaverse users can come together in a virtual world to collaborate and conduct any kind of permitted activity. Key to the Metaverse is a connection between the physical world and the digital one, with users acting out physical gestures, and objects such as buildings existing in both the digital and the real world. The use of the term Metaverse can be somewhat loose, however, and it has been used to refer to games such as *Fortnite* which can be accessed through game consoles without virtual world headsets.



Experiencing learning in the Metaverse



Many major technology companies are investing in the Metaverse. In particular, Facebook founder Mark Zuckerberg has invested heavily in it and he sees the immersive world as the future of the internet. Education is often proposed as an example of the power of the Metaverse because there are opportunities to create and interact in both real and imagined environments. Three main educational uses have been proposed<sup>1</sup>:

- **New social communication space** – providing a new dimension and possibility for social connections
- **High degree of freedom** – users can choose from a wider range of options in actions and scenarios, that are difficult or impossible in the real world; for example, altering gravity
- **High immersion in a virtual world** – through realistic immersive environments, such as ancient Rome simulations.

It is still early days in the implementation of the Metaverse, and while there are many proposals for its potential use, there are relatively few evaluated use cases. A related concept that has gained interest is that of 'digital twins', which is defined as "a comprehensive digital representation of an individual product. It includes the properties, condition and behavior of the real-life object through models and data."<sup>2</sup> Examples might be a digital laboratory, or an industrial process or campus, which uses real-time data from physical systems in the real world to maintain the digital twin.

## Educational applications

The use of the Metaverse in education is predominant in STEM subjects (science, technology, engineering and mathematics), representing 53% of educational uses<sup>3</sup>. In STEM it is used largely for modelling systems and conducting experiments. The next main subject area is general education, where the Metaverse is used in conjunction with physical classrooms. In the Arts and Humanities, it is most frequently used for language learning.

In 2022, ten US universities created 'metaversities' (a term derived from Metaverse + universities) which developed digital campuses to provide students with learning through virtual reality in a range of applications, from enhancing remote learning to reducing costs by providing medical students with virtual cadavers.<sup>4</sup> An example of digital twins is seen in construction education, where visiting construction sites can be problematic for students. By using a digital, immersive version of a real site, students could create group projects with different roles<sup>5</sup>. Similar approaches have been used for engineering students and product design.

The use of the Metaverse in education has thus far been limited to very specific domains. However, the Covid-19 pandemic and subsequent shift to online learning saw an increased interest in virtual worlds and models. For example, students have used a Metaverse-based simulation of aircraft maintenance, interacting within the simulation with other students from different physical locations. Performance of these students on tests was higher than those receiving video tutorials.<sup>6</sup>

While these examples are not very different from virtual and extended reality models that have been in operation for several years now, the Metaverse approach does allow for a group-based approach, interacting with the avatars of other learners and the physical representations of objects. This additional social layer to virtual reality offers educational potential for the Metaverse.

## Challenges and concerns

The claims and potential of the Metaverse are reminiscent of previous interest in virtual worlds such as Second Life. While there is still an active user base of Second Life, it did not have the transformative effect on education that many predicted, so it is worth considering why mainstream adoption of Second Life failed to materialise and evaluating whether those reasons hold true for the Metaverse.

First, we can see a very similar over-hyping of the Metaverse, which was also seen with Second Life, for example in a paper in 2009: "Gartner ... estimates that by 2012, 80% of active Internet users, including Fortune 500 enterprises, will have a "Second Life" in some form of 3-D virtual world environment [...] these virtual worlds are expected to have a large impact on teaching and learning in the very near future with pedagogical as well as brick-and-mortar implications".<sup>7</sup>

And while some communities still exist on Second Life, the widespread adoption did not occur, and most 'islands' are now largely deserted, as a 2015 tour of deserted campuses found.<sup>8</sup> There were perhaps three main barriers to the widespread adoption of Second Life:

- **A lack of purpose** – much of the online activity simply replicated the face-to-face setting, such as lecture halls, and it was difficult to know what this offered over simply live streaming a real lecture.
- **Technical and accessibility issues** – the rendering of the 3D world could be slow, and glitches in navigation could arise. Accessibility was a significant issue with no screen reader support and the need to control movements (of avatars or vehicles) continually, so many learners with disabilities found it difficult to use.
- **High user investment** – to get effective use out of Second Life a user had to invest a lot of time in it. There was a significant threshold to getting set up, navigating and feeling comfortable in the online space. Many users, and particularly students who just wanted to study their subject, were averse to doing so.

Looking at the Metaverse now, it is worth considering if these barriers still exist. If we examine accessibility first, using the Metaverse does not rely as much on small mouse-based movements, and there is a wide range of work being undertaken to improve accessibility. The use of haptic technologies, such as gloves that rely on touch, may increase accessibility for some, since their use does not rely on small movements, but it may decrease accessibility for others if physical movement becomes an essential part of interaction. It is likely to still raise issues for many users, but there has been distinct improvement compared to Second Life. Similarly, technical capability has improved since the earlier implementations of Second Life, with reliable broadband and rendering capabilities, although accessing the Metaverse will still require a good internet connection and a headset, which are not available everywhere.

A related concern is about who drives the design of the Metaverse environments and for what purpose. New educational technologies are seen as commercial opportunities and they may favour profits over educational value. To build inclusive environments requires a diversity of developers and users to widen the representation of educational contexts, and strong controls over use of student data. What is more, there are instances still where use of the Metaverse seems to be recreating the face-to-face experience, which happens when, for example, people are having video meetings in the Metaverse. Using the Metaverse is much more persuasive in more specialised applications in education, as set out above.

In terms of the high user investment required to use the Metaverse, it is worth noting that there has been an increase in 3D world usage in several parts of the world, where video games involving construction, exploration and social interaction (such as *Minecraft* and *Animal Crossing*) have proved extremely popular. In those countries, there is a high level of familiarity with gaming – including creating and navigating an avatar through a virtual world – in a significantly larger proportion of the population. The threshold is thus not as high for participation. Indeed, there may be more of a desire from learners to use the type of tools they already play around with in their daily lives. However, this varies across the world.

## Conclusions

Currently much of the literature relating to the Metaverse in education is concerned with its potential, with few real cases to draw upon. The Metaverse should be seen in the context of several other increasing trends such as use of augmented reality, the Internet of Things, artificial intelligence (AI) and gaming in education, which are all focused on virtual worlds, as well as connecting digital data to objects. Given that each of these related fields is likely to improve and develop over coming years, this will provide impetus to expand uses of the Metaverse. The threshold to participation and development of virtual worlds is still quite high, but likely to decrease with investment and a more distributed development community.

For some fields in education there are obvious benefits to using the Metaverse, where students can interact with virtual environments and manipulate objects that would be difficult or impossible to realise otherwise. Similar reservations that existed in relation to previous virtual worlds such as Second Life remain, however, particularly the question of whether there will be widespread, generalised use of the Metaverse. There is also a definition issue, since much of the literature is currently using the term Metaverse to refer to any virtual reality tool. While the educational potential of the Metaverse is interesting, this work has been present in education for at least a decade, and so far it does not demonstrate clearly what is fundamentally different about the Metaverse.

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# Multimodal pedagogy

Enhancing learning by diversifying communication and representation

## Introduction

Multimodal pedagogy focuses on 'mode' as the defining feature of communication in learning environments<sup>1</sup>. The term 'mode' describes culturally and socially shaped resources for communication, such as images, words, sounds and gestures<sup>2</sup>. It differs from the terms 'medium' and 'media' which describe the material resources (e.g., paper) or technologies which are used to create and disseminate the messages realised through modes. Although multimodal approaches to pedagogy have been recognised and practised for close to two decades, as a result of the dominance of text-based practices in education they have tended to be sidelined as alternative pedagogical approaches.



it can allow for diverse ways of knowing which can promote accessibility and inclusivity



Multimodal pedagogy is gaining traction now primarily because of current social and technological changes that are destabilising the dominance of text-based practices. Socially, more than ever, there is an urgency to address issues of accessibility and inclusivity in education. This is seen in movements such as Universal Design for Learning (UDL) and 'decolonising the curriculum', which advocate for multiple means of representation in order to allow for diverse ways of knowing and learning. Academic integrity is also a growing concern, as advances in digital technology are making it easier to cheat and plagiarise. In particular, the release of 'generative AI' tools, such as ChatGPT and Bard, which can generate various types of text in response to the user's questions or instructions, is raising concerns with regard to the future of written assessments. Among some solutions being put forward to address this issue is adopting multiple approaches to assessing knowledge.

## What is multimodal pedagogy?

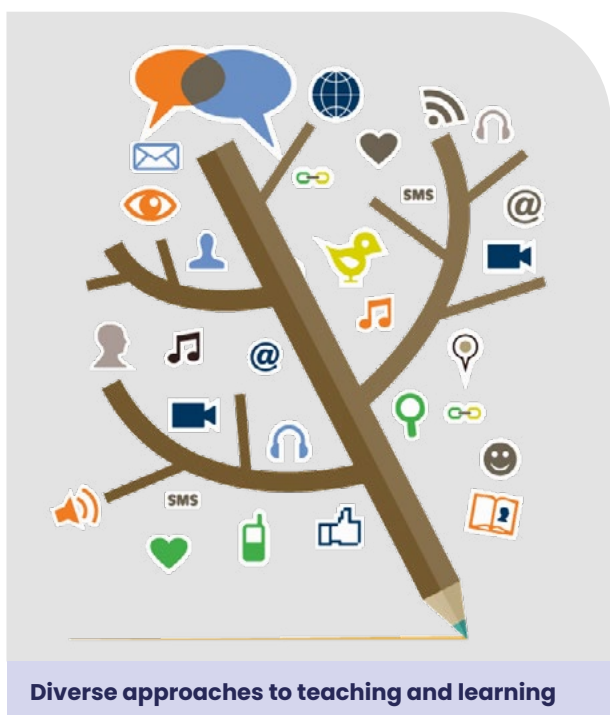
Multimodal pedagogy aims to provide students with opportunities to learn and demonstrate their learning through multiple modes, and to develop their knowledge and skills in multimodal literacy. Multimodal literacy involves awareness of:

1. The **possibilities and constraints** of particular modes of communication<sup>2</sup>. For example, the written mode is well-suited to expressing thoughts in a logical sequence, but it has constraints in expressing spatial relations; the visual mode (e.g., images, models) is well-suited to expressing spatial relations, but less suited to expressing ideas in a logical sequence (unless employed in a sequence, such as in the case of sequential images like comics).
2. How **modes can work together** to produce meaning. For example, how images and words can be combined to produce satire in comics or how sound can be used with images to evoke emotions.
3. The ways in which the **medium** shapes how modes are distributed and how meaning is communicated. For example, creating comics as a book will differ from creating comics for the online space. The tangible nature of the book allows for page turning, while the screen often requires reading through scrolling<sup>3</sup>.
4. How **genre** (the type of communication or writing style) affects how a message is structured for a particular audience in a particular context. For example, comics, essays, blogs and tweets are genres of text that construct messages differently for different audiences in different contexts.

A multimodal approach to pedagogy can help prepare students for workplace communication<sup>4</sup> as well as enabling different ways of knowing. Opening up to different approaches to knowing has been noted to improve accessibility and inclusivity, as well as to enhance engagement, comprehension and the retention of knowledge<sup>5,6</sup>.

## Examples of multimodal pedagogy

An example of a multimodal approach to learning is demonstrated in the case of a second year university course, *Pathology of the Ear*, that is situated in the discipline of audiology<sup>5</sup>. Classroom activities were purposefully designed to assist students in translating taught facts into clinical knowledge by providing student opportunities to engage with the course content multimodally. For instance, to help students visualise the three-dimensional structure of the ear, students were asked to construct the anatomical structures of the ear using a box and materials that they brought to class. To help students understand how sound moves through the inner ear, students were taken to a hall and asked to work in groups to act out the pathway of sound. By providing opportunities for students to engage with knowledge in different modes, anatomical facts and concepts became less abstract and more accessible to the students.



An example of a multimodal approach to assessment is demonstrated in a study which required students in a second year media course to produce multimodal academic arguments<sup>7</sup>. The assessment was presented as a semester-long group project which required students to create a multimodal text that offered an analysis and a stance on a current event issue. Students could choose to present their argument in the form of videos, comics, or PowerPoint. They were supported not only on the digital skills that would be required to create these outputs, but also provided with knowledge of how modes, genre and chosen medium work to produce meaning. To provide an incentive for students to work consistently throughout the semester, the assessment was broken up into components. Besides the final product, the other components included a synopsis, a rationale for choice of media, a draft plan, and an individual reflective journal.

In another example of a multimodal approach to assessment, this time in the context of secondary school, a study<sup>6</sup> showed how allowing students to produce persuasive arguments in the form of video enabled academically marginalised students to demonstrate their knowledge in ways that are not visible through traditional assessment practices, such as answering true/false questions and fill-in-the blank questions or writing briefs in response to prompts.

Communication in the workplace is increasingly demanding multimodal awareness and competence. A study involving a course on teaching English for Professional Purposes<sup>4</sup> highlights the multimodal literacy skills needed in professional communication. These include, for example, understanding the appropriate use of font, layout, colour and images in professional report writing; and the appropriate use of spatial and gestural modes, such as culturally loaded gestures and emblems in intercultural communication.

## Challenges and considerations

Some key challenges with enacting multimodal pedagogy include:

- **Training:** Educators who seek to employ multimodal pedagogy will need to be multimodally literate in order to make appropriate decisions, such as, what modes to use to communicate the curriculum content, how to recognise the 'signs of learning'<sup>2</sup> in multimodal assessments, and how to foster multimodal literacy in the classroom. Lack of understanding of the appropriate use of modes can lead to cognitive overload for students rather than enhance the learning experience.
- **Access to resources:** The creation of multimodal texts does not necessarily require the use of digital technologies. If the use of digital technologies is required, it is important that students are supported with the necessary resources. These include not only the computer literacy skills that are needed to create and edit, but also the provision of software and support in utilising the software.
- **Assessment:** Assessing students' multimodal products can be challenging, as rubrics will need to be developed that recognise the 'signs of learning' in the multimodal products. Marking multimodal assignments can also be time-consuming.

Overall, practising multimodal pedagogy requires careful consideration of design: how to design the learning experience so that modes are meaningfully and purposefully employed to support learning. Some of the challenges mentioned above can be addressed if educators develop networks to share ideas and resources in enacting multimodal pedagogy<sup>3</sup>.

## Conclusions

Multimodal pedagogy can help prepare students for workplace communication, it can allow for diverse ways of knowing which, in turn, can promote accessibility and inclusivity of learning, and it can promote students' comprehension of materials and engagement. A central challenge to enacting this pedagogy is that educators would, first and foremost, need to have knowledge of multimodal literacy practices in order to design and assess learning experiences. While multimodal pedagogy has tended to be practised as an alternative pedagogy, it is likely to gain momentum in curriculum design as the importance of developing students' multimodal literacy skills becomes more evident and as social and cultural changes require us to be more diverse in our communication practices.

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# Seeing yourself in the curriculum

## Pedagogies enabling students to see themselves in the curriculum

### Introduction

More and more students are demanding that their education reflects their own contexts, experiences and cultures. They want to see people like themselves, with their history and backgrounds, represented in their curriculum, learning materials and educational approaches. This idea has been gaining popularity in places like South Africa, after students protested against the continued domination of colonial and white culture in university education. The decolonial movement (a global political and intellectual movement that seeks to address the historical legacy and ongoing effects of colonialism on societies and individuals around the world) was famously represented by the #RhodesMustFall and #FeesMustFall student struggles that erupted in 2015 in South Africa. In countries across the globe, for example Canada and Australia, First Nations are promoting the inclusion of indigenous knowledge in the curriculum after decades of deliberate suppression<sup>1</sup>.



the goal is to address power imbalances that exist in current education systems



This is not just about adding some books or stories to the curriculum. It means changing the whole system to make sure everyone's history and knowledge are respected and valued. These calls represent a demand for fundamental changes to how schools and universities operate. The goal is to address power imbalances that exist in current education systems, such as who is teaching, how students are taught and assessed, as well as the content of what is being taught<sup>2</sup>.

To do this, some educators are adopting a 'decolonial' approach. This means trying to unlearn the biases and ideas that come from colonial history, and instead incorporating knowledge generated from authentic local contexts, including previously ignored indigenous knowledge and philosophies of learning. This also involves choosing or creating relatable course resources, using inclusive teaching methods, or changing how students are assessed<sup>3</sup>.

### Examples in practice

#### Inclusive, relatable teaching resource choices

A common focus in inclusive curriculum and decolonisation efforts has been considering the choices that have been made in the design of teaching and teaching resources, and critically evaluating the content to which students are exposed. A range of frameworks, audits and processes have been created to support such analysis, including themes such as:

- Ensuring that examples, case studies and reading lists reflect the diversity in the learning community (e.g., Kingston University's Inclusive Curriculum Framework)
- Establishing whether stereotypes or misconceptions are being perpetuated through representation and role models, and how stereotype threats can be combatted
- Recognising how language choices, such as cultural-specific references or metaphors, can present barriers (e.g., Monash's Inclusive Teaching principles)
- Soliciting indigenous materials which bring in greater diversity and locally relevant contexts (e.g., Open Education Resources of Indigenous Games of Africa)
- Promoting the use of local languages as a vehicle for comprehending threshold concepts (e.g., Open Educational Resources' Term Bank).



Students' diverse experiences brought into the curriculum

While educators and institutions should take responsibility, they should also recognise the narrowness of their own perspectives. Students can be valuable partners in widening the perspectives involved in reviewing the curriculum.

To enable consistency in the curriculum while allowing it to speak to local or diverse audiences, flexible curriculum approaches should be considered, which combine standards with space for the adaptation or addition of localised content. The Organisation for Economic Co-operation and Development (OECD) highlights this as one of the key trends in curriculum innovation which can address equity gaps.

### **Inclusive and indigenous pedagogies**

University students who are not first language speakers of the dominant language of instruction are often treated as having a deficit and disadvantage, with little recognition of the rich linguistic resources they bring to their learning experience. Even aside from countries with a colonial heritage, given the linguistic diversity of many contemporary classrooms, **multilingualism and translanguaging** (enabling students to use their home language along with other languages in education) are being recognised as pedagogical strategies for inclusion. Depending on the context, bringing a variety of contextually relevant languages into teaching, learning or assessment can enhance students' comprehension and confidence.

In a South African undergraduate Humanities course, which had a high level of linguistic diversity, translanguaging was encouraged to disrupt the traditional strict 'academic' classroom language<sup>4</sup>. Not only did this make it easier for students to ask questions during a session, but translanguaging broke the assumption of English as the only medium for knowledge and authority in the classroom. The translanguaging pedagogical practices included developing concept glossaries in mixed languages, allowing students to submit essays in their language of choice, and encouraging the use of any mix of languages in lectures, tutorials and online forums. Assessment tasks included writing a first assignment in a student's first language or switching between languages. The assignment required students to write definitions of key disciplinary concepts in their own language and included reflecting on their personal linguistic heritage. Using translanguaging and multilingualism in teaching and for student feedback and marking requires linguistic diversity in the teaching team. The challenges of marking in a variety of languages can also be ameliorated by using improved capacity for accurate automatic translation in artificial intelligence (AI) applications.

An Australian '**curriculum reconciliation**' journey, called Jindaola, at the University of Wollongong invites participants into a process of negotiating new understandings of indigenous knowledge in relation to existing discipline-based knowledge<sup>5</sup>. The Jindaola pedagogy is deeply contextual – and requires a protracted engagement with the physical land in a collective process of reciprocal knowledge creation, learning development and sharing. Participating in the Jindaola requires interdisciplinary groups to attend five gatherings (on campus and off campus on the Aboriginal community land) over 18-months. The participants receive coaching and mentoring for professional and personal development to decolonise their perspectives of knowledge systems. The programme is facilitated by academic curriculum development staff and elders of the local Aboriginal communities. Participants work together to co-create new curricula that embed Aboriginal stories, perspectives and knowledge into teaching and learning. This programme has been created out of the local cultural and geographical context of a part of Australia, but they share three relevant principles for other educational institutions to consider: shifting mindsets about different knowledge systems from a deficit to a strengths-based approach; facilitating genuine reciprocal exchanges with recognised knowledge holders; and making space to privilege non-dominant knowledge systems.

Many Canadian educational institutions are also grappling with the history of exclusion of people's indigenous knowledge and worldviews. *Etuaptmumk*, or '**two-eyed seeing**'<sup>6</sup> is an approach which seeks to incorporate indigenous knowledge perspectives into the curriculum to enhance the comprehension of what may seem to be abstract knowledge in an academic discipline. In a study looking particularly at engineering education in Canadian higher education, 'two-eyed seeing' was offered as a decolonial lens. By teaching students how to apply two perspectives, an Indigenous Knowledge perspective along with Western ways of knowing, it is hoped that the graduate engineer gains a more holistic integrated professional practice. In contrast to scientific and engineering knowledge approaches to classify, quantify and separate, Canadian Indigenous Knowledge emphasises participation, experiential

learning, process, and connectedness. These Indigenous Knowledge approaches share values with the growing movement in engineering to adopt more sustainable design and development. This includes bringing 'Elders and Knowledge Keepers' in as advisors, teachers and experts, creating safe spaces for indigenous people in educational environments and inserting Indigenous Knowledge into the core curriculum.

Similarly, the 'two-eyed seeing' approach was successfully implemented at a Zimbabwean high school<sup>7</sup>, to help students get to grips with complex scientific concepts around forces in structures. The teachers used a local example of indigenous technology to illustrate the concept (in this case, a local farmer has built a wooden structure to hold his harvest). Research on this approach, which integrated Western scientific concepts with indigenous knowledge in context, found that students' achievement improved.

In Uganda, **indigenous dance training** has been used in schools since 1962 to allow learners to explore different cultures. Subsequently, the Department of Performing Arts and Film at Makerere University incorporated indigenous dances from ethnic communities into their academic programmes. To facilitate students' acquisition of dance skills, culture and knowledge, they use Ubuntu-driven pedagogic frameworks ('Ubuntu' is a set of values based on concepts such as reciprocity, mutual respect and working towards the common good and strongly emphasises the place of human dignity). For example<sup>8</sup>:

- **storytelling** – the learners get access to the information on the history, purpose, and meanings of the dances through storytelling
- **inquisitorial observation** – where observation of dances ignites discoveries that can expand a learner's understanding
- **embodied experimentalism** – learners immerse themselves into dance movements, songs, movement gestures, and drum rhythms
- **embodied intercorporealities** – an individual dancer interfaces with the bodies of other dancers and drummers

- **peer modelling** – teachers and learners learn dance skills with and from each other
- **mechanisms of qualitative assessment and feedback** – the community, dance teachers and dance masters scaffold learning through feedback and support.

## Challenges and Limitations

Inclusion, as seen in some of these initiatives, has been critiqued as ‘additive’ (added on to existing practices), implying that the aim is assimilating the approaches into the dominant culture from which they are being excluded. Tools have been created that make it seem like an easy process where we merely need to adapt teaching materials to remove exclusion, when exclusion is in fact more complex and problematic<sup>9</sup>. Endeavours to include indigenous knowledge and representatives of local communities can reinforce existing ideas that these communities are not like us, or ‘not us’. Given the existing dominant power relations, communities whose knowledge and interests have been previously marginalised may resist changes to traditional educational approaches because of their achievement aspirations within those traditions.

From a student perspective, there are risks around curricula attempting to be inclusive as it can result in overemphasising differences and individualisation at the expense of creating a cohesive learning community which recognises difference as well as a common interest. For teachers, even when they want to make changes, existing teacher training and resources may offer little support and guidance on how to transform educational practices. Transforming education through curriculum change places a high demand on teaching staff for personal change. The most effective strategy may be to build diverse teaching teams to provide a variety of perspectives, multiple languages, and a physical representation of difference. Team teaching also offers its own ‘community of practice’ to support, stretch and challenge individuals in a journey of transforming education. Transformative work around the curriculum requires resources (time, money and skills) to facilitate genuine engagement.

## Conclusions

The above examples of curriculum change showcase how higher education institutions and schools are grappling with aspects of inclusivity and representation. At the same time, these initiatives require reconsideration of knowledge power relations and how one tackles questions such as: ‘Who is the knower?’, ‘What and whose knowledge is legitimate?’, ‘What power relations are at play in the processes of knowledge production?’, to mention a few. Nevertheless, a feeling of a sense of recognition and humanising curricula are more likely to enhance student performance and success.

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# Pedagogy of care in digitally mediated settings

Prioritising the well-being and development of students

## Introduction

A sizable body of research on teacher-student relationships points to the fact that caring is a key contributor to students' self-esteem, well-being, and engagement. Caring "can be conceptualised as a feeling, a motivation, and/or a behaviour, reflecting a concern about another person's feelings and needs". Those who advocate that caring should take on a central position in teaching and learning emphasise that empathy is basic to human relationships, that all people desire to be cared for, and that care is an educational goal and a vital element of the educational process.

An educational approach that prioritises empathy and the development of learners in a nurturing, supportive, and equitable learning environment is referred to as 'the pedagogy of care'. Another term often used in the context of caring in teaching and learning is 'pastoral care'. Pastoral care is often seen as separate and parallel to teaching and refers to tasks assigned to specialists and some teaching staff in an educational institution to promote learners' personal and social development and foster positive attitudes.

Pedagogy of care has not always been central to teaching. Although it has been argued that education should aim to develop competent and caring people, education systems worldwide often over-emphasise academic achievement at the expense of nurturing caring individuals. However, recent global challenges brought by the Covid-19 pandemic and the ongoing climate crisis raised new challenges for educators related to finding a way to foster a deep connection and care among learners.

education systems worldwide often over-emphasise academic achievement at the expense of nurturing caring individuals



Digitally mediated learning

This has brought pedagogy of care to the fore. Situations like Covid-19 made us “rethink what is important to society and hence education. The response from even the most market-driven sectors has been about protecting human life and looking after each other”<sup>2</sup>. So, what are the key elements of pedagogy of care?

## What might pedagogy of care involve?

Pedagogy of care can involve the following actions<sup>3</sup>:

**Modelling** recognises that the educator can demonstrate through their own behaviour what caring in action means. We do not tell our students to care; instead, we show them how to care by creating caring relations with them. This can mean being responsive to students’ needs and concerns, and by demonstrating empathy and understanding.

**Dialogue** recognises that the educator can intentionally provide students with opportunities for an open-ended dialogue, in which they understand that their diverse perspectives are valued. Teachers can encourage the use of open discussions in the classroom and the practice of drawing conclusions from multiple sources through these discussions. Open dialogue happens when the teacher does not hold the ‘answer’. Instead, the teachers and learners together search for a fuller understanding of a learning problem at hand.

**Practice** recognises that the educator can aim to establish a learning culture where learners are inspired to develop genuine care for their own learning, and awareness of how this relates to, and positively impacts, their wider lives and the lives of their communities. For example, teachers can provide assignments that allow learners to apply concepts in real-world situations, or group projects that require collaboration and communication, which can help learners practise care and apply what they have learned in a course.

**Confirmation** recognises that the educator can provide personalised feedback that highlights transformative dimensions of a student’s learning journey. This can be fostered by the teacher finding an opportunity to provide specific feedback about an individual’s caring responses,

including the effects of such responses on others. Reflection on the gaps in attainment for specific groups of learners is an important further driver for pedagogy of care. Given the prevalence of such gaps, practices around providing feedback need special consideration. Embedding choices with respect to assessments and feedback can help to reduce barriers.

## Practising pedagogy of care in digitally mediated settings

There can be several practical steps an educator might take to practise pedagogy of care in online and digitally mediated settings<sup>4</sup>:

- Take time to **know your students**, their face and name, individually or in small groups if the numbers allow it. If numbers are huge, ensure there are (online) spaces where they can support each other, such as by setting up a digital common room.
- Create a hospitable environment and open relationship that would allow students to **share with you**. This may involve having a flexible policy around the use of cameras or allowing your household members to ‘appear’ on video conferencing calls sometimes, which can make you look more ‘human’. Creating a hospitable environment may also involve a reflection on how the default settings of digital tools put a lot of control in the hands of the teacher, such as privileges to mute/unmute participants or send them to breakout rooms without their choice, and how such power dynamics can be addressed.
- **Empathise/imagine** the difficulties your students might be going through. The shift to online communication often means we prioritise scheduled events over informal meetings and interactions. Try leaning in to that: send learners an email or a message on your institutional platform, ask if they’re OK, and encourage them to do the same with you<sup>5</sup>.
- **Respond**. This may involve preemptive care – e.g., practising how to use a digital tool with students before it gets officially introduced by institutional policies.



## Challenges and considerations

Practitioners adopting a pedagogy of care could face several challenges. One of these is personal exhaustion and burnout. This is because much of the discussion involving pedagogy of care seems to be focused on care performed by teachers towards their students, stressing that students' needs should be prioritised. It is important to consider self-care as a form of care among educators and others who support learning.

Drawing on pedagogy of care can at times lead to "a heavy burden of emotional labour that is insufficiently recognised or rewarded"<sup>6</sup>. Incorporating pedagogy of care into an institutional approach can help to reduce the burden, and create a different culture where care is not viewed as a burden but is key to a person's responsibilities.

A third challenge concerns the fact that emotional labour is often borne by the least privileged members of the university workforce, such as women and ethnic minorities. Such practices point to persistent systemic issues in education and lead to increasing inequalities in the workplace.

## Conclusions

Pedagogy of care, which prioritises empathy, equity, and well-being in the classroom is a much-needed pedagogical approach among the current global challenges. Pedagogy of care is associated with its own set of challenges, such as the risk of burnout among those who choose to care or the risk of adopting this approach leading to unrecognised and unrewarded labour. Caring in online and digitally mediated settings brings a further set of challenges, as online educators and students can feel removed from each other not only by space, but also often by time.

Nonetheless, to put a pedagogy of care into practise, there are several actions teachers can take, such as reflecting on the privileges that the use of digital tools confers on them or trying to empathise and imagine the difficulties their learners may go through at different moments of their studies. If learners have the experiences of being cared for or of seeing others model care, then they may feel a stronger obligation to care, both for the environment and for other people.



A nurturing learning space

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# Podcasts as pedagogy

## Embedding podcasts in teaching and learning practices

### Introduction

Podcasts (a blend of the words 'iPod' and 'broadcast') are a series of audio episodes focused on a particular theme or topic, such as gardening, health, business or politics. They are often free to access, but require the internet for streaming or downloading, and they do not follow a pre-determined length, format, or style of production level. They are sometimes monetised through advertisements and subscriptions. There are a wide range of technologies that can be used to produce podcasts (e.g., software such as Anchor or Buzzsprout) and to listen to them (e.g., Spotify or Apple Podcasts).

Podcasts are often listened to in leisure time, but interest in the use of podcasts in educational settings has been growing over the past few years. While podcasts and podcasting have been around for over a decade, they are experiencing a resurgence, with many educators critically engaging with this medium to ask questions about meaningful integration in teaching and learning<sup>1</sup>.

### Educational podcasts

There are two main ways that podcasts can be used in educational practices:

1. **Podcast curation** – using podcasts that already exist to enhance the content in a course.
2. **Podcast creation** – for example, by making customised content as part of multimodal resources to enhance course content or for use in assessment. Podcasts can also be created by students.

Further looking at these two types of use, it has been argued that there are three core aspects of podcasts that warrant further attention. The first is the *type and purpose* of the podcast – this means considering the format and structure of the podcasts and the teaching and learning purposes that underpin their production. The second is *student engagement* – this involves considering the ways in which students

engage with, experience, and use podcasts to develop their learning. Thirdly, the *content* of podcasts – this aspect involves considering the content that is developed and presented in educational podcasts and its relationships with other teaching materials and methods<sup>2</sup>. These three areas are explored in the sections below with reference to practical examples.

The use of podcasts in education can have many advantages. These include flexibility, control over how the podcast is listened to by students, the informality of podcasts which may appeal to learners, inclusivity, and the delivery of up-to-date content<sup>3</sup>. Similarly, podcasts have been incorporated into e-learning modules in higher education institutions through aspects such as audio lectures, expert interviews/case studies, assessments involving reflection, and recording of field trips<sup>3</sup>.

### Type and purpose

The type and purpose of educationally oriented podcasts has diversified in recent years. It is important to consider what the learning goals are when using podcasts, and what type of podcast you want to create or you want your students to create. Research has sought to categorise educational podcasts into three distinct types or genres<sup>4</sup>.

1. *'The Quick Burst'* – has a focus on succinct delivery of one key piece of information in each podcast episode. They are normally quite short in length (i.e., below 5 minutes). This genre of podcasts has been used in different learning areas such as science, language learning and history.
2. *'The Narrative'* – has a focus on telling a story about a topic and are much longer in length. This genre of podcasts has become popular in history.
3. *'The Chat Show'* – has a focus on a conversation between two or more participants to explore various ideas and concepts. This has been used in a variety of disciplines such as science and sport.

Choosing existing content that falls into these types and purposes or creating updated content that is directed towards a specific purpose can help to support the use of podcasting in education. In terms of purpose, for example, the ability to gather and share information through podcasts across time and space, coupled with the emphasis on dialogue, participation, and voice, could mean that podcasts may hold emancipatory potential (i.e., free a person from previous restraint)<sup>5</sup>.

### Student engagement

The use of podcasts in education involves considerations of the ways in which students engage with, experience, and use podcasts to develop their learning. Co-creating or structuring classroom tasks so that students generate their own podcasts for the purposes of assessment or revision is one example of promoting active and dialogic practices (learning through dialogue). Scholars have suggested that using narrative podcasts as a shared learning experience can enhance levels of engagement and foster better efficacy in critical thinking<sup>3</sup>.

One recent case study based in a university in Indonesia showed that through student created podcasts, the students involved gained knowledge, competence, and assurance from the experience, enabling them to do further independent research<sup>6</sup>.

### Content creation

Content creation refers to how podcasts are produced by educational podcasters, teachers and sometimes students. Due to the increase in affordable recording equipment and freely available software, the creation of podcasts is becoming more widespread. Content for podcasts is usually created using a script or prompt sheet to help structure the podcast.

For example, research has explored the experiences of women of colour who have produced independent podcasts focused on informal, adult education. The research revealed how the women, who are the podcast producers, found a sense of professional and personal growth through podcasts which also developed a sense of connection with their networks and audience<sup>7</sup>. Educators have commented on how the process of producing podcasts was welcomed as an opportunity to discuss core subject ideas in a more informal way and to develop their own communication skills<sup>8</sup>.

students gained knowledge, competence, and assurance from the experience, enabling them to do further independent research



Recording a podcast

At the University of Cape Town, an anthropology lecturer included podcasts in his course curriculum so students could interview people in their environment and share it as a podcast series to reflect the stories in their communities. This assignment allowed them to learn how to make their own podcasts by using the university's podcast studio, to record the interview and edit it themselves. They booked the studio, and at different times each student could interview participants from their community. This assignment allowed them to co-create the course content because their interviews were shared as part of a peer-learning exercise, and they could also reflect on concepts in the class. The convenor did not take a podcast that was already made and add it to the resources, but rather enabled and encouraged students to create their own podcasts and gain the confidence to learn a new skill. This is a good case for students co-creating podcasts, because the educator included it as a modality to respond to an assessment.

## Challenges and Limitations

Despite the optimism about podcast use in education, there has also been a degree of concern about their use. Aspects include the concern that the availability of podcasts might deter students from engaging with the weekly readings assigned to a course or reducing in-class attendance. As such, there has been a general perception that podcasting is only valuable as a supplementary tool to support the 'real' learning that takes place elsewhere. Challenges such as these can also be echoed by educators in relation to the creation of podcasts being time-consuming.

Other challenges to the use of podcasting in education include students' perceptions that podcasts are too long<sup>9</sup>, students feeling that they did not have enough time to engage with the material, lack of relevancy or too many distractions when listening at home. One way of considering how educators might address some of these challenges is by selecting or creating podcasts that are of a particular type or 'genre' that is tailored to the content they are seeking to explore.

Globally, the use of podcasts has been limited by the high cost of internet access with students requiring sufficient bandwidth to download or listen to podcasts.

Other limiting factors include lack of awareness of how to include podcasts in education, lack of training in how to produce podcasts and distribute them, as well as lack of funding for elearning centres at universities and schools. A recent study in Nigeria pointed out that podcasts have the ability to enhance teaching and learning by fostering a sense of inclusivity and belonging<sup>10</sup>. The main driver for their use was the underlying assumption that podcasts are easily integrated into course work, but the study validated the challenges facing universities and schools in lower income countries because of limited internet access, expertise and training.



A playful podcast on pedagogic theory, practice and research

## Conclusions

The use of podcasts in education or 'podcasts as pedagogy', has provided teachers and students with a means to engage with diverse types of audio content both inside and outside the classroom. Research has sought to categorise podcasts into several types of genres to tailor the podcast type to the education context that it is being used in. The approach has benefits for teaching and learning due to its ability to provide differentiated types of content and its communicative potential for both producers and listeners. Some constraints of this approach are that it often requires internet access, podcasts can be time-consuming to produce and listen to and they can be seen unfavourably by students if they are not engaging. Podcasts are likely to continue to diversify in terms of their content and structure, including students as producers of content and enabling differentiation of assessment practices.

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# Challenge-based learning

Rising to challenges to benefit individuals and societies



Teacher and students working together on a challenge

## Introduction

Challenges designed to provoke students to engage with complex topics can become powerful educational experiences. We live in societies that need better prepared citizens and professionals to deal with major societal challenges as well as more specific challenges and opportunities such as those provided by digital technologies. A challenge is a call to participate in a competition, a contest, or a special effort to achieve something worthwhile, for example to solve a problem, or something exceptional, such as to exceed what has been achieved before. It can be an individual or collective effort that may require certain capabilities or resources. It can be serious or fun. It is a common element in games and sports, and increasingly incorporated into the design of online interactions.

Learning takes place when students ask questions to understand and define the challenge, and when they take action to solve a problem or contribute to developing a solution. A major challenge will require a more complex process of reflection on action to see what needs to be understood or done next. Challenges may require multiskilled or multidisciplinary teams and working in such teams is increasingly seen as a valuable educational experience that prepares students for future work and contributions to society.



## Teaching and learning through challenges

Challenge Based Learning (CBL) is a structured approach that provides a framework for using challenges in education or training. It has three stages:

- **Engage** – where learners specify the actionable challenge they want to address
- **Investigate** – where learners explore solutions, guided by activities and resources
- **Act** – where learners implement evidence-based solutions and assess their impact

CBL builds on the foundation of experiential and constructivist learning: learning through experience and active participation to produce an outcome. It is based on the premise that challenges ‘provoke’ – they create a sense of urgency and spur action. Its key ideas include allowing all participants to become both teachers and learners; authentic use of technology; documenting and storytelling; and involving community members in a process to expand resources and enable authentic learning.

Because of its structured approach to learning, CBL shares similarities with other learning and teaching approaches, such as Project Based Learning (PjBL) and Problem Based Learning (PbBL):

- In both PjBL and CBL, students are engaged in real-world problems, represented as projects or challenges. However, in CBL students tend to work on more general issues and the students can determine the challenge to be tackled.
- In both PbBL and CBL students collaborate with each other to solve a problem, but PbBL tends to encourage students to determine possible solutions for the problem, while CBL has a focus on processes, including action, implementation and evaluation of the solution<sup>1</sup>.

There are also distinct learning and teaching approaches that help students to learn about, solve and face real-world challenges. However, they may use ad hoc and less structured teaching methods.

One such example is pandemic pedagogy, which adopts rapid problem-solving and troubleshooting, requiring at times fast redesign and adaptation of curricula to new formats and timeframes as an attempt to solve unplanned challenges brought about by dramatic circumstances and crises such as pandemics. Students are invited to participate and collaborate with teachers in the redesign, adaptation, and creation of the new curriculum, thus building an environment of partnership and inclusivity<sup>2</sup>.

### CBL examples

The Challenge Lab at Chalmers University of Technology in Sweden<sup>3</sup> aims to combine student learning with societal transformation, drawing on ideas from new learning environments often described as social labs or open innovation labs. Learners have reported developing skills in problem formulation, sustainable development and interdisciplinary ways of working with diverse stakeholders after taking part in CBL. While CBL projects may not reach the implementation stage, they have the potential to impact on society if they are developed further.

Challenges are an increasingly popular way of encouraging engagement in social media and apps. TikTok challenges are a way in which users of the social media platform TikTok encourage people to join a discussion or interact with their content. Aligning with the three CBL stages mentioned above, they can challenge people to create and post videos performing a specific action, ask them to investigate resources (e.g., other videos) and share what they found, and implement a solution and assess whether it works. Such challenges can be used in education; however, they are not always beneficial or enabling. Young people may take part in a challenge that results in them harming themselves or others, or that is teaching them unhealthy ways of living or non-respectful behaviours. CBL through TikTok should be treated with caution and with knowledgeable adults observing and monitoring the challenge.

## Opportunities and Limitations

CBL can be exciting for students and teachers. If it is well-structured and designed, CBL brings novelty and encourages independent learning, which could stimulate creativity and motivation. It can give learners and communities a sense of achievement and the experience of tackling real-world challenges. CBL has also been developed as a model to support innovation, communication, and teamwork. It can be implemented at various levels, from a class activity through to a whole-organisation approach.



it can give learners and communities a sense of achievement and the experience of tackling real-world challenges



However, CBL can be difficult to manage. It may be associated with risk and its outcomes are sometimes unpredictable. The initial adoption of CBL can be time-consuming for educators and students compared to more traditional learning and teaching approaches. For educators, additional workload can result from preparation of extra materials to support the diverse range of student tasks, especially if multiple challenges are being explored at the same time. Shortages of teaching staff, technical support, or appropriate and safe spaces for students to collaborate (physical and online), can also bring limitations to CBL. Assessment methods require careful consideration, in particular the approach to grading of group work where there might be differences in the contributions of individuals.

If the challenge is not well-structured and designed, it could bring uncertainty to students in relation to the learning process and how to navigate such an open-ended task individually or as a group. Other difficulties students might face are establishing an understanding as to what is expected in the task, dividing the task fairly among group members, so that they all make contributions, finding relevant and evidence-based resources, applying content knowledge to the challenge, managing time, and managing group processes. However, once students become familiar with the processes and procedures involved in CBL, they tend to appreciate and understand its benefits in the long run, as they can become more resilient and better prepared to face personal and professional challenges ahead<sup>4</sup>.

## Conclusions

Framing the process of finding a solution to a problem as a competition or a contest that learners are invited to take part in is an effective way of engaging them with the learning and teaching process. CBL emphasises the need to design educational material and activities that are meaningful to learners, relevant to their life, exciting and experiential. To be successful, CBL should be well thought out and designed, scaffolding students through the process of problem identification, finding solutions, implementing them in real conditions and evaluating them. Reflection becomes a key aspect of the process that should accompany any decisions students make as to how to address a challenging situation.

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# Entrepreneurial education

Students as change agents in society



## Introduction

Entrepreneurial education teaches the knowledge, skills, attitudes and mindset needed to start, manage and grow a business. Entrepreneurial education programmes can have varied goals, some of which move away from the traditional conception of starting and operating a business for making profit. As a pedagogy, it presents similarities with problem-based, project-based and experiential learning. The European Institute of Innovation and Technology explains that for someone to become an entrepreneur, there should be “a desire to solve a problem, a burning passion, and a nurturing environment to bring it all together”<sup>1</sup>.

Entrepreneurial education is a means to develop 21st century skills such as creativity, curiosity, critical thinking, problem solving, communication skills, teamwork, flexibility, taking risks, and a strong work ethic. These skills overlap with what is often described as the “entrepreneurial mindset”. In addition to 21st century skills, an entrepreneurial mindset includes an ability to work with available resources and an ability to create value.

It is an important and timely pedagogy for several reasons. It can lead to growth, job creation and economic success through the products and services created. It can develop skills needed to navigate an ever-changing society such as problem solving, adaptability and creativity, bringing joy and satisfaction to learners. It can bring innovation in society by updating processes and ways of communicating. Last and perhaps foremost, entrepreneurship can address societal issues and challenges at a community level and amongst people with common goals, e.g., within a neighbourhood or across communities with similar needs. The combination of business and social justice objectives has been described as social entrepreneurship.

## Goals and approaches

The goals of entrepreneurial education can vary, for example:

- a) developing learners' capabilities 'for' entrepreneurship (designed for individuals who want to start and run a business);
- b) 'about' entrepreneurship (follows academic traditions and conceptualisations);
- c) 'through' entrepreneurship (development of competencies for pursuing societal goals through entrepreneurship);
- d) 'in' entrepreneurship (acting and behaving in an entrepreneurial manner)<sup>2</sup>.

Entrepreneurial education has been using several pedagogical approaches to achieve the development of relevant skills and knowledge. Some examples are the use of entrepreneurial simulations that mimic real-world challenges, the use of business model canvassing (visual charts showing 'building blocks') to understand the key features of a business model, development of business ideas and pitching in front of judges, mentoring through pairing with experienced entrepreneurs, the use of design thinking to develop innovative solutions, and social entrepreneurship to solve social and environmental problems.

Of special interest is how entrepreneurial education can engage learners who do not identify themselves as 'entrepreneurial' and help them to develop their skills as future leaders. Research shows that seven teachable skills are essential for this purpose:

- a) problem solving
- b) tolerance for ambiguity
- c) failing forward
- d) empathy
- e) creativity with limited resources
- f) responding to critical feedback
- g) a teamwork approach<sup>3</sup>

A 12-week mandatory course based on experiential learning and simulations of an entrepreneurial environment managed to teach those skills to students<sup>3</sup>. The teaching approach was tested with second-year business undergraduate students in Canada. The students were asked to conduct interviews with end users, analyse data and draw conclusions about their ideas with facilitation from a teacher (the flipped classroom approach). A successful or failed idea was equally graded to promote learning through failure and help students understand that their ideas may not be validated by prospective customers and thus need to be changed or adapted to new information. There was access to open educational resources for educators to scale up and disseminate the proposed approach globally.

A study of engineering students participating in entrepreneurship programmes at a large institution in the US<sup>4</sup> showed that students were interested in the 'innovation aspect' of these programmes, which allowed them to engage in open-ended problems. The students stated that they preferred self-employment instead of working for a company, and they perceived the programmes as valuable for their personal development.

## Developing an entrepreneurial mindset

Design Thinking is an approach often used to develop an entrepreneurial mindset. It refers to the process of designing a new product, service or solution in a human-centred and participatory way, that is, considering and engaging end users throughout the process of design. As an approach, it is particularly suitable in solving 'wicked' (very difficult) or complex problems by understanding and analysing the context, testing solutions with end users, prototyping and evaluating. It has been extensively used in industry, with few implementations in primary or secondary education. There is a need to identify ways in which design thinking could be leveraged in education to help students learn how to think and act in order to find responsive and appropriate solutions to local, national and global problems. The Horizon Europe and Innovate UK-funded project, Extending Design Thinking with Emerging Digital Technologies, aims to pilot, develop and

implement teaching approaches based on design thinking, supported by emerging digital technologies. Emerging digital technologies are viewed as a means to enable design thinking applications in schools through, for example, the use of 3D modelling apps to model solutions, artificial intelligence (AI) to help teachers monitor student work, and 3D printers to produce and share what has been created.



entrepreneurial education is often viewed as contradicting conventional functions of education



## Challenges and limitations

While entrepreneurial education has been taught in higher education institutions for years, it has not been widely adopted and only recently has gained traction in other levels of education (such as secondary and primary) as a means to develop skills needed to cope with a changing society. Entrepreneurial education is often viewed as contradicting conventional functions of education, such as preparing students for the workforce, due to its focus on developing leaders who will bring change and innovation.

However, in terms of how this is implemented, entrepreneurship school programmes are mostly teacher-driven – a teacher is driving the learning process – with a low degree of autonomy by learners. Teachers set the learning objectives and activities and students complete these in order to develop relevant skills<sup>5</sup>. These skills are unlikely to be captured and measured. Most programmes promote economic value creation, while other forms of value, such as social and cultural, are encouraged but not required. Most schools do not have a vision and explicit objectives around entrepreneurial education that would guide the teaching implementation. Teachers have raised the need for more time and resources to support the development of their entrepreneurial teaching skills.

## Conclusions

Entrepreneurial education can help learners become agents of society, and develop key skills and competencies and an entrepreneurial mindset. Such a mindset is relevant, not only to launching new ventures, but also working for existing organisations and being a freelance professional. It is about developing skills to solve problems by making the best use of available resources. It is about coming up with innovative solutions and practising creativity. To become a viable learning possibility for all learners (including those who are not naturally inclined to entrepreneurial activities), entrepreneurial education needs to become more inclusive and accessible; it needs to redefine itself and show learners its relevance to societal changes and emerging practices.

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# Relational pedagogies

Working relationally in and across disciplinary and professional boundaries

## Introduction

Many of our personal and professional interactions in our lives involve relational work. They take place 'in the world'<sup>1</sup> through specific, often mundane, forms of communication that enable us to create relationships and connections with others. The 'others' can include humans, other species, materials, artefacts, technologies, and the natural habitat. Such relational work is "sometimes visible and sometimes hidden"<sup>2</sup> and this is particularly true in professions that rely substantially on aspects of care such as nursing and social work. It is, however, equally relevant in educational settings.

It is known that successful collaborations among professionals are often built on a strong understanding of one another's values and priorities<sup>2</sup>, which highlights the important role of relationships. That said, the focus on relationality has recently come to the fore more sharply in post-pandemic discussions on how to learn and work with and alongside others to solve very challenging problems that require collaborations beyond one's own expertise, discipline and practice. It also features prominently in recent discussions about automation and the deployment of artificial intelligence (AI), including human-machine collaboration.

Relational pedagogies consider human-to-human networks as well as human-to-non-human and their interactions<sup>3</sup>. They focus upon the role of relationships in educational settings and position meaningful relationships as fundamental to effective learning and teaching. They also consider the role of materials, which could be "all the spaces, objects and 'things' of education: laptops, classrooms, pens, desks, campuses, textbooks, teaching resources, assessment briefs, worksheets, buildings"<sup>4</sup>. Relational pedagogies are thus oriented towards relationship building and developing capacities for relational work that could be relevant in a wide range of situations, ranging from learning and teaching in higher education, to professional work and collaborations, and interactions between humans and machines.

## Developing relationships and expertise across practice boundaries

One way to think about relational pedagogies is by examining the role of relationships between colleagues: how people can learn from others within specific professional settings and situations (e.g., in higher education, in specific projects) and how they can support one another when working within challenging contexts and when working on novel cases or innovations. This involves establishing the conditions for recognising and valuing what others bring with them in terms of expertise, and also knowing whose expertise is the most relevant when tackling a new problem.

'**Relational expertise**' is a key concept that draws on the scholarly work of Anne Edwards<sup>2,5</sup>. She refers to this as the ability "to recognise and respond to what others might offer in local systems of distributed expertise"<sup>5</sup>, while at the same time being confident to engage with "the knowledge that underpins one's own specialised practice"<sup>5</sup>. Relational expertise is particularly relevant to work that evolves rapidly in response to ongoing and emerging global challenges. It refers to the capacities needed to work relationally with others to solve novel, complex problems, including the joint interpretation of the problem as well as the joint response, for example in the form of common knowledge or an artefact. It involves not only knowing who to reach out to, but importantly how to know who/ what can help, how one's work relates to the others' work, and how to influence them. Relational pedagogies are therefore about creating and sustaining the expertise needed for collaboration across practice boundaries. They prompt us to think not only about the types of activities and contexts in which professionals learn, but also about the ways in which working within and across professional relationships and boundaries may inform work activities and contexts for professional learning and development.



## Examples

An example is drawn from a study which focuses on developing relationships among health professionals working on the emerging global challenge of antimicrobial resistance (AMR). This study<sup>6</sup> explored whether a designed artefact, the AMR Toolkit, supports professionals to relate to people in diverse job roles and negotiate the objectives of joint professional action. Through a set of activities, the AMR toolkit aimed at providing opportunities for communication and contextualisation of knowledge in areas of work that are associated with the surveillance of AMR. It also aimed at touching upon issues of trust, power and working in silos that may characterise work in this field. The AMR Toolkit was drafted iteratively using participatory co-design methodology (an approach that involves stakeholders working closely together to design something) across twelve health facilities in low- and middle-income countries. Its development was facilitated by educational researchers and technical experts working closely with members of staff at each participating site who led group activities in their local settings. The study shows that the activities led to participants organising informal spaces and gatherings that offered opportunity for connections and contributions to discussions about their practice. These opportunities supported and built upon the diverse forms of practice that professionals in these roles brought to each local group. Their engagement helped form relationships that evolved as forms of trusted, valued affiliations that were needed to recognise areas of change required in their organisations and to anticipate and imagine future AMR work activities. The relational and material elements enabled by the AMR Toolkit helped to create an environment that encouraged relational agency—a “capacity for working with others to strengthen purposeful responses to complex problems”<sup>5</sup>.

Another example is related to teaching and learning in higher education and curriculum adaptation, drawing on a recent paper by Gravett, Taylor and Fairchild<sup>3</sup>. The authors refer to a certificate course that students must take in order to qualify as a teacher, and where there are several open curriculum decisions they can influence. These students come with their own interests and have already completed a degree. They are invited to co-design content to be used in their course, drawing on their interests and experiences. This enables a greater dispersal of power related to curriculum decisions. Students are also invited to compile and curate their own reading lists, working together with their lecturer. This opens up new possibilities for student-lecturer interactions and encourages deeper discussions around curriculum design. For the lecturer the approach invites deep thinking about the role of the contexts in which learning happens. Together this helps shape relationships and learning experiences.



informal spaces and gatherings offered opportunities for connections and contributions to discussions about their practice



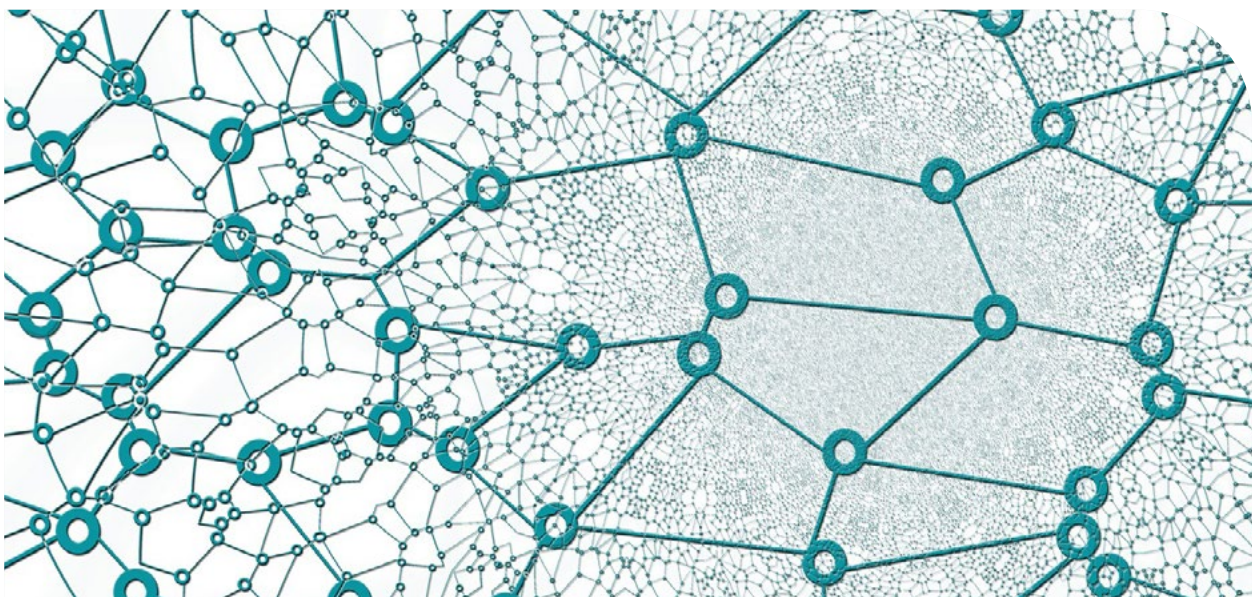
Finally, a relationship that has received less attention in higher education is the relationship with parents. Parental involvement in their children’s higher education is thought to represent “a cultural shift in the relationship between three perspective parties: student, parent, and institution”<sup>7</sup>. There are a number of reasons for this trend which has been noted in some countries: parents showing more interest in their children’s lives; a generational shift in which parents maintain closer ties with their children than before; rising education costs; and advances in technology which makes it easier for parents to communicate with their children<sup>7</sup>. At the American University of Sharjah, it has been observed that parental involvement for students on probation can boost students’ extrinsic motivation, mobilise family support and encourage students to take advantage of the university’s support resources<sup>8</sup>.

## Challenges and limitations

Relationships are not static, instead they are dynamic and pose certain complexities. It is often difficult for people to collaborate across practice boundaries, especially if they are based in different locations. Professional action is usually bound by norms and rules that govern particular settings. It is also shaped by institutional interpretations of regional, national, or international policies and developments. It is also the case that people often rely on long-established friendships and acquaintances; however, these relationships may not be the most relevant when tackling a new problem. What matters more is to know how to recognise the expertise of others, how to know who or what can help, and articulate one's own expertise. Finally, Gravett and colleagues<sup>3</sup> point to a persistent lack of understanding that in education, engaged human relationships should be seen as entangled within the spaces, places, contexts and environments with which they occur. As such, in higher education settings, for example, a major barrier could be lack of time and space for educators to engage in forging relational work with students and colleagues. To remedy this situation, more work is needed on the importance of connections within teaching and learning, professional practice and research, and on how materials impact upon relationships when learning and working in and across disciplinary boundaries and settings.

## Conclusions

Meaningful relationships are fundamental to effective learning<sup>3</sup>. A workplace is the space where actions may be designed and acted upon, either individually or collectively, and may lead to new learning and changes or improvements in work practice. Addressing complex problems requires people to sustain their specific expertise and link this to their environment to take action 'in the world'. Attention to relational pedagogies can provide a steer to educators and leaders, with direct insights into how to support students' learning for future workplaces and work. Relational pedagogies are very relevant for educators and leaders of interdisciplinary and inter-professional teams who need to co-design environments for complex teamwork and complex knowledge work and facilitate this type of relational work.



**Relational work takes place in networks of human-nonhuman-material relations**

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## Resources

- A practical online resource for professionals in healthcare settings that draws on the concept of relational pedagogies and is related to professional learning on the global challenge of Antimicrobial Resistance:  
AMR Toolkit - Fleming collection on the OpenLearn Create platform. Available at: <https://www.open.edu/openlearncreate/course/view.php?id=7828v> (Accessed: 25/4/23).
- SRHE event on Relational Pedagogies, 7 March 2023:  
Relational Pedagogies: Connections and Mattering in Higher Education. Recording available (you need the following passcode to access it: !94Gj&@X). Available at: <https://bit.ly/3UxxE0M> (Accessed: 25/4/23).
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# Entangled pedagogies of learning spaces

Connecting technology, pedagogy and all elements of a learning context

## Introduction

Teachers face many challenges as they adopt new technologies in their classrooms, but debates about whether technology drives pedagogy or pedagogy drives technology have become somewhat tired and unhelpful. Instead, approaches that reflect how people actually make choices about pedagogy and technology have been evolving. Tim Fawns, who researches digital and clinical education, considers that pedagogy and technology are entangled<sup>1</sup>. This view treats technologies, teaching methods, educators, students, and other stakeholders as elements that are not separate and isolated, but instead are situated and connected within a specific teaching and learning environment. Teaching and pedagogical design take place in complex environments and, although some aspects of teaching can be designed in advance, other aspects only emerge through the interplay of elements within these environments.



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## Guiding principles of entangled pedagogies

From an entangled perspective, educational activity involves multiple elements, each of which affects the others. Pedagogic choices are not only shaped by technology and methods, but they are also aligned with teachers' values, purposes, and contexts, as well as those of their students.

A useful term that foregrounds entanglement is the notion of 'orchestration'. Orchestration teachers select tools and resources, design learning activities and manage the flow of the activity throughout a learning process in order to guide and support students<sup>2</sup>. An entangled perspective notes that design, orchestration and action are rarely linear and ordered processes. Each is responsive to the others, so the relationships between them shift to suit their context.

Guiding principles of entangled pedagogy include:

- looking beyond individual tasks and arrangements to networks and collaborations
- recognising that pedagogical design starts much earlier than the teaching event
- recognising that in complex learning spaces, everyone involved helps to shape what happens – teachers do not have full control because the process of pedagogical design is entangled with other elements of the teaching ecosystem, including practices and policies regarding evaluation, procurement, ethics, policy making, etc.
- making explicit how various elements shape and inform the learning spaces

## Hyflex teaching and entangled pedagogies

Hyflex teaching includes classroom and online interactions. Some learners join the class in person, while others opt to engage virtually via a conferencing tool such as Zoom. If the teacher pays attention to only the pedagogy and does not recognise the benefits and limitations of the technology, they will not be able to make the most of this environment. It is likely that some students will not be engaged or will feel left out, even though this was never the teacher's intention. To start to address this requires being aware of how technology is entangled with the in-person and virtual environments, and how it impacts everyone involved, including those students who are not using technology. In a hyflex situation, the entangled pedagogy principle of 'looking beyond individual

tasks and arrangements' suggests looking more widely at small groups, the class, and the spaces they are using, as this can be a productive strategy when designing something new. It may be possible for groups that include both in-person and online students to work collaboratively in such an environment rather than in isolation. Another option is to arrange for co-located students to report back to those located in different spaces. The virtual and in-person environments are not separate; the technology, people and learning activities are entangled. Responsibility for the learning space and what happens there is distributed among everyone involved: teachers, in-person students, online students, technical support and any guest presenters.

The second principle is the need to plan ahead. When compared to less entangled teaching events, the pedagogical design for hyflex teaching needs to start much earlier and will involve planning ahead. Hyflex is not simply in-person teaching with some online activities. Nor is it teaching online with some students following in a classroom. Planning might involve guiding students through the use of specific tools or software, monitoring their progress, and providing feedback or support as needed. Preparing students for what to expect and acknowledging all participants are both important.

The third principle recognises that teachers do not have full control of what happens in a learning environment, particularly one as complex as a hyflex environment where students are engaging from multiple contexts and in multiple ways. There may be policies that dictate who can join classes in different modes, timetabling constraints, technical issues, or rules about how assessment should take place. There may be ethical principles guiding how everyone engages. Students may be constrained by time, access to technology or their ability to travel. Many of these elements are outside the teacher's control, but they intersect and impact pedagogical design.

Hyflex teaching is rarely simple and entanglements are likely to play out in surprising ways. Teachers will experience new challenges because their actions are entangled with many elements across teaching spaces. The final principle encourages making the entanglements explicit. This might involve appointing in-person student facilitators to 'buddy' with online participants. It could also involve developing protocols for how to engage if there is a loss of internet connection or drawing on experience to suggest changes to a policy or procedure.



**Context, pedagogy and technology are entangled in many modern learning situations**

## Generative AI and entangled pedagogies

Use of 'generative' AI (artificial intelligence) tools such as ChatGPT that can write all sorts of texts for teachers and students, provides another example of where technology and pedagogy are entangled in learning spaces. Access to rapidly evolving generative AI tools means that teaching and learning environments are becoming more complex and entangled with technology.

The first principle of entangled pedagogy speaks to how generative AI will need to be considered, not just in use for an individual activity but more broadly. Students may need to consider the potential impact and opportunities beyond their initial task in order to guide their ethical use of these technologies within the learning community. This could mean involving students who may not have used the technologies or are unable to use them. This will require some preparation to provide explanations about how generative AI tools work and how to critically evaluate their outputs in relation to intended learning goals. Teachers might provide examples showing what happens when instructions to AI tools are ambiguous, or when users take AI output at face value without checking that it is reliable. Students could work together to develop practices that help them and others to understand the use of generative AI tools for learning tasks as well as the implications of these within a professional context or domain area.

Even when use of generative AI is not part of their learning design, educators may choose to acknowledge or include these technologies as they teach, in response to issues that arise. This relates to the second principle for the need to plan ahead. Although teachers rarely have full control in entangled learning spaces, they will need to anticipate how the use of AI tools might impact different students and how they might respond, especially if there is conflicting information or unequal access. Because features of generative AI tools are rapidly developing, teachers and students are learning about these technologies at the same time. This provides productive opportunities for everyone in the environment to work together to develop new practices to support student learning in that context.

Use of generative AI in a learning space will be entangled with institutional policies and practices, as the third principle recognises. This has implications for matters of ethics, plagiarism, and assessment as well as issues of data, privacy, and procurement. These elements are part of a complex and evolving ecosystem, and they are likely to require attention because they shape, constrain, or enable what is possible. In some cases, teachers may need to highlight emerging issues, advocate for policy change or clarification, engage with others – such as learning technologists or librarians – or request resources for support and capacity building in AI skills and literacies.

Entanglements with AI technologies in learning spaces should be made explicit, as the fourth principle proposes. This can be done by teachers and learners sharing experiences and knowledge and also engaging with other teachers, disciplinary experts, educational developers, learning technologists, technology vendors, and service providers. A reflection and evaluation cycle is important to inform developments as practices related to the use of generative AI become more established, including the development of institutional policy and guidance.

## Challenges and limitations

'Entangled pedagogies' describes practices many teachers already undertake implicitly. Making them an explicit aspect of designing and describing a complex and changing learning space is important, but not straightforward. There is likely to be a burden on teachers in terms of their workload – managing relationships with other stakeholders; developing, evaluating, and redeveloping learning designs; and undertaking the practical and logistical aspects of engaging with tools and technologies. Managing and orchestrating the emergent aspects of entangled learning spaces requires a range of skills and competencies, which may be more readily available to a larger and diverse teaching team rather than a sole teacher managing a classroom environment.

Teachers may also be constrained in their ability to enact the principles of entangled pedagogies that encompass emergent learning designs, responsive orchestration and a willingness to relinquish some control of a learning space. This may be due to entrenched practices. Existing institutional policies may contribute to this, such as those governing assessment, academic misconduct, or course evaluations, since they cannot be changed without consultation and negotiation. The necessary changes may be difficult to introduce because teachers are often not decision makers when it comes to technology choices or policy development. Other challenges may include students' device and technology access, as well as the design and availability of physical infrastructure, which shape the potential for innovation in entangled spaces.

Despite these constraints, the act of making explicit the entanglements of complex learning spaces is an act of imagination and design that opens up new possibilities for a different type of learning environment that acknowledges complexity and shared responsibility. Many issues may not be anticipated and can be emergent. These make pedagogic design especially challenging until the teacher has more experience. If the principle of shared responsibility amongst various stakeholders is understood and adopted, then the role of the teacher, of students and of other stakeholders in creating learning spaces becomes more sustainable.

## Conclusion

Entangled pedagogies offer ways for teachers to recognise and change some of the more simplistic assumptions that are often made about the relationships between pedagogies, technologies, and the contexts in which these are used. These days, most teaching and learning includes both online and digital elements, either before, during, or after formal teaching sessions<sup>4</sup>.

The concept of entangled pedagogies recognises and responds to the challenges of teaching and learning in a technology-rich environment. It acknowledges that most education has online, digital or blended aspects, and that a learning environment is likely to include both formal teaching and independent or informal learning. This framing enables educators to move on from the need to choose between face-to-face and online or between technology and pedagogy and frees them to think more broadly about the purposes and contexts of learning and how they are shaped by entanglement<sup>5,6</sup>.



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# Innovating Pedagogy 2023

Exploring new forms of teaching, learning and assessment,  
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