

Harnessing the Power of Decontextualised Learning and Co-Creation in Immunology Education

Severina Peneva¹, Ross Davey¹, Sean Holm¹, and Nigel Francis^{2*}

¹ Faculty of Medicine, Health and Life Sciences, Swansea University, Swansea. SA2 8PP. UK

² School of Biosciences, Cardiff University, Cardiff. CF10 3AX. UK

Corresponding author: francisn10@cardiff.ac.uk

Abstract

This opinion piece explores the transformative potential of combining two pedagogical strategies in higher education to teach immunology. The power of decontextualised learning and co-creation, two approaches that have shown promise in enhancing student understanding and engagement, are explored. More specifically in the context of using these strategies in the development of Immunology Wars, an educational resource that uses the metaphor of the Star Wars movies to teach complex immunological concepts. Immunology Wars simplifies immunological concepts and makes them more relatable for students, thereby enhancing their understanding and making the learning process more enjoyable. Furthermore, the involvement of students as co-creators has educational benefits, including increased engagement, deeper understanding, and the development of valuable transferable skills. The research suggests that educators should embrace innovative approaches and incorporate them into their teaching practices to enrich the learning experience for students and inspire a new generation of learners.

Keywords: Decontextualised Learning, Co-Creation, Immunology Education, Immunology Wars, Videos

Introduction

In the ever-evolving landscape of higher education (HE), the search for effective teaching strategies that engage students and facilitate deeper learning is an ongoing endeavour. This pursuit became even more apparent due to the COVID-19 pandemic, which necessitated a paradigm shift in the delivery of education. The transformative impact of digital technology on pedagogical methodologies was brought into sharp focus during this period, with a dramatic increase in the use of asynchronous video (Veletsianos and Houlden, 2020). This shift was not only a reaction to the circumstances but a strategic adaptation that leveraged the potential of digital tools to enhance learning.

Videos as a learning tool have a firm theoretical foundation. Paivio's dual coding theory suggests that the brain processes information more efficiently when presented in both auditory and visual formats (Paivio, 1969). This theory underscores the potential of videos to enhance learning by engaging multiple sensory channels. However, the use of videos in education is not just about presenting information in a different format. It is about using this medium to create a more engaging and interactive learning experience, which can lead to deeper understanding and better retention of information (Mayer et al., 2020). Here, video resources are used as part of the decontextualised learning approach, co-created by student partners.

In addition to the use of videos, integrating decontextualised learning (Roberts et al., 2018) and co-creation strategies (Gros and Lopez 2016) have shown promise in enhancing learning at many different educational levels. Decontextualised learning, often associated with language learning, refers to the process of presenting information or concepts in a way that removes them from their original context, allowing students to focus on the core concepts and principles (Roberts et al., 2018). This approach can be particularly effective in teaching complex subjects, where the context can sometimes

obscure the underlying principles. By stripping away the context, students can focus on the core concepts, making it more enjoyable and easier for them to understand and remember (Berk, 2009). The use of pop culture is a central element of the approach described here; aligning the resources to a well-known movie franchise has several proven positive benefits including improved student engagement and motivation (Ruane and James, 2012) as well as enhanced study skills such as critical thinking (Scanlan and Feinburg, 2000).

Co-creation, on the other hand, refers to the collaborative process of creating knowledge or educational materials between educators and students (Gros and Lopez, 2016). This approach recognises that students are not just passive recipients of knowledge but active participants in the learning process. By involving students in the creation of educational materials, co-creation strategies can enhance student engagement, foster a sense of ownership over the learning process, and promote deeper understanding (Walker and Lazar, 2022), which can help address threshold concepts and troublesome knowledge (Meyer and Land, 2005).

In this piece, we explore the power of decontextualised learning and co-creation in immunology education, highlighting their potential to enhance student understanding. Drawing on our experiences in developing and implementing these strategies, we aim to provide insights into their practical application and effectiveness. We believe that these strategies, when appropriately integrated into the educational process, may significantly enhance the quality of learning and teaching in higher education.

Decontextualised learning

Through decontextualised teaching using popular culture, learners can extract key principles and abstract knowledge from seemingly unrelated contexts.

This process allows them to develop critical thinking skills by making connections between different domains of knowledge (Turner and Plant, 2016). Additionally, when students engage in creating their own content within these contexts they become active participants rather than passive recipients of information. This active engagement promotes a deeper understanding and greater retention of the material (Chi and Wylie, 2014). By leveraging the interplay between contextualisation (i.e., relating theoretical knowledge back to real-world scenarios) and decontextualisation (i.e., extracting generalisable principles), educators can optimise their instructional design towards achieving the desired learning objectives. The interplay between these processes is vital for maintaining dynamism in educational settings.

There is, however, a risk that the overuse of pop culture can have a detrimental effect on student learning. Some students, especially in diverse multicultural classrooms, may be unfamiliar with certain franchises and may disengage as a result (Rucynski Jr., 2011), or academics may try too hard to find parallels in the source material, which may ultimately confuse learners (Fink and Foote, 2007). These concerns can partially be mitigated through careful design and use of the resources.

Students as Co-creators

Co-creation in education is a pedagogical approach that involves the active participation of students in the design and development of educational materials. This collaborative process not only enhances student engagement and motivation but also promotes a deeper understanding of complex concepts. It is a shift from the traditional teacher-centric model of education towards a more inclusive and participatory approach that values the contributions of students (Cook-Sather et al., 2014).

By empowering students as co-creators, educators ensure that the learning resources are more relevant, meaningful, and impactful for their intended audience. This is because students, being the primary consumers of these resources, have a unique perspective on what works best for them (Black and William, 2009). They understand their learning preferences and challenges better than anyone else. Therefore, their input can be invaluable in creating resources that are tailored to their needs and that address their specific learning challenges (Kaur and Norman, 2020).

Additionally, this partnership between students and teachers provides valuable insights into areas where learners encounter difficulties or struggle to grasp certain ideas. Consequently, specific attention can be directed towards these challenging topics through targeted instructional strategies or supplementary resources. This feedback loop can lead to continuous improvement in the quality of educational materials and teaching methods (Kaur and Norman, 2020). Co-creation can also help address threshold concepts, as posited by Meyer and Land (2005). Threshold concepts often act as bottlenecks in the learning process beyond which students may struggle to progress without additional guidance (Lucas and Mladenovic, 2007). Co-creation can serve as a powerful pedagogical tool for helping students overcome the challenges posed by threshold concepts. It allows for the customisation of educational materials and strategies, thereby making them more effective in addressing the specific learning challenges that threshold concepts often present (Meyer and Land, 2005).

This inclusive approach to teaching fosters an environment of shared responsibility for learning outcomes. It encourages students to take ownership of their learning, which can lead to increased motivation and engagement. At the same time, it promotes constructive interactions among all members involved in the educational process. Students are no longer passive recipients of knowledge but active participants in the creation and dissemination of knowledge (Bovill et al, 2016).

The process of co-creation can also provide students with valuable skills that go beyond the classroom. These include critical thinking, problem-solving, creativity, and collaboration - skills that are all highly valued in the 21st-century workplace, with Hinchcliffe and Jolly (2013) describing co-creation as fostering an “entrepreneurial mindset”. This requires students to become proactive in their learning, resourceful and innovative, a mindset that is particularly beneficial for the 21st-century workplace. Thus, co-creation in education not only enhances learning outcomes but also helps with the formation of a graduate identity, preparing students for their future careers where adaptability and lifelong learning are highly valued (Hinchcliffe and Jolly, 2013).

Engaging students as partners is not, however, without its challenges, not least that the traditional roles of students and teachers can become blurred, which can create tensions that need to be carefully managed (Bergmark and Westman, 2016). The relationship between academic and students plays a key role in the success of co-creation. A strong relationship can enhance the co-creation experience, while a weak one can hinder it (Kasnakoğlu and Mercan, 2020). Perhaps most importantly from the student perspective, while co-creation can support students in developing their voices by positioning them as pedagogical partners, it requires a careful balance to ensure that their voices are genuinely respected and heard (Cook-Sather, 2020).

Immunology Wars

Immunology Wars (<https://www.immunologywars.com>) is a pioneering, co-created digital educational resource that leverages the power of decontextualised learning and student co-creation to teach introductory immunology (Figure 1). Used as an alternative, non-compulsory teaching resource, it utilises the metaphor of the Star Wars movies, a cultural phenomenon familiar to many, to help students grasp complex immunological

concepts in an engaging and relatable context. Through a series of videos and supporting resources, the immune system is presented as a galactic battle of good versus evil between the body's defences (represented by the Rebels) and invading pathogens (represented by the Empire). Through this metaphor, students can visualise and elucidate the intricate mechanisms of key immunological processes in a way that is both relatable and memorable.



Figure 1: Screenshot of the Immunology Wars website.

With its intricate network of cells, tissues, and soluble factors, the human immune system is a marvel of biological engineering. Its complexity, however, can be daunting for students encountering it for the first time. The terminology of immunology, with its myriad of cell types, molecules, and interactions, has been likened to learning a completely new language (student feedback). Traditional teaching methods, while effective to a certain extent, may not fully engage students or facilitate the understanding of such a

multifaceted system. This is where Immunology Wars can play a transformative role.

Immunology Wars offers a novel approach to decontextualising learning. By associating the cells and components of the immune system with the characters and storylines of Star Wars, a familiar context that aids in the comprehension of abstract concepts is created (Table 1). This innovative approach not only simplifies the learning process but also makes it more engaging and enjoyable for students. The use of popular culture references in education is not an entirely new concept (Turner and Plant, 2016), but we believe that Immunology Wars is one of the first applications of this approach in immunology teaching.

Table 1: Summary of Immunology Wars episodes and their immune system focus

Episode title	Key Immunological themes
The Prequel	Introduction to immunology
Episode I - The Unseen Threat	Innate immunity
Episode II - Attack of the Clones	Adaptive Immunity – primary response
Episode III - The Host Strikes Back	Adaptive Immunity – memory formation
I'solo'ation	COVID-19 Immunology
The Rogue One	Cancer Immunology
Episode IV - A New T-cell	T-lymphocyte formation and maturation
Episode V - The Body Strikes Back	Autoimmunity

The co-creation aspect of Immunology Wars is particularly noteworthy. Four undergraduate students were actively involved in the extra-curricular

development of the resources, mapping characters to features of the immune system and contributing their ideas and insights to ensure that the content is relevant, accessible, and engaging. The co-creation process occurred with a self-selecting group of students prior to teaching rather than as a curriculum-based co-creation approach. This collaborative process not only enhanced the quality of the resource but also provided those students with a sense of ownership and investment in their learning. Furthermore, it fostered a deeper understanding of the subject matter, as the students had to grapple with the complexities of immunology and translate them into the language of Star Wars. As noted above, students as partners can be challenging to implement at scale and, in this example, a lack of Star Wars knowledge would be a clear barrier to engagement in the creation of resources.

Impact and Student Perception

The impact of Immunology Wars extends far beyond the initial setting in which it was developed. Based on YouTube and website usage data, the resource has gathered an international audience with over 3,000 video views on YouTube, and nearly 17,000 unique website visitors. Alongside a Twitter/X (@ImmunologyWars) following of nearly 1,700, it is clear that Immunology Wars has resonated with a wide audience and evidences the global reach and potential of innovative educational resources in enhancing learning and engagement.

The international usage of Immunology Wars is a testament to its accessibility and appeal. By leveraging the universal popularity of Star Wars, the resource transcends cultural and geographical boundaries, making complex immunological concepts accessible and engaging for students around the world. However, it is important to note that a lack of knowledge, or passion for, Star Wars may be a barrier to engagement with this set of resources.

Feedback on Immunology Wars has been overwhelmingly positive. Students and staff have praised the resource for its unique and engaging approach to teaching immunology.

"Thank you very much to you and the rest of the team for making these videos, they are a unique and fun way to learn immunology."

"Immunology Wars is a quirky, fun, and slightly geeky way to learn about immunology."

The use of the iconic Star Wars opening crawl text was particularly well-received, with one student commenting,

"The opening crawl text is iconic, and I got a nice laugh reading about Generals T and B Lymphocyte."

These comments reflect the positive perception of Immunology Wars and highlight the resources' effectiveness in making learning enjoyable and engaging. As educators, these insights are invaluable in guiding our efforts to enhance the quality of the resources and foster a love of learning among our students.

Developing and using resources

Academics wishing to create their own resources should consider engaging students early. Their insight into the development of resources is invaluable, helping educators identify concepts that would benefit most from decontextualised learning. Creating educational resources like Immunology Wars requires an approach that marries creativity with academic rigour. Key points to consider include:

1. Identify a popular cultural reference: choose a popular and widely recognised cultural reference that resonates with your target audience.

2. Simplify complex concepts: break down complex academic concepts into simpler elements that can be easily associated with elements from the chosen cultural reference.
3. Create analogies: develop analogies that draw parallels between the characteristics or roles of elements in your cultural reference and the concepts you are teaching.
4. Engaging visuals and narratives: consider creating visuals or narratives that incorporate elements from the cultural reference to illustrate academic concepts vividly.
5. Iterative content development: plan for a phased rollout of content, allowing for regular updates and additions based on feedback and evolving educational needs.
6. Encourage curiosity: design resources with the goal of encouraging curiosity and fostering a deeper interest in the subject matter.
7. Feedback and engagement: create avenues for feedback and encourage engagement to build a community of learners who are invested in the resources.
8. Accessibility: ensure that the resources are accessible, considering diverse learning needs and preferences.

By adhering to these guidelines, resources can be created that are not only educational but also engaging, fostering a deeper understanding and appreciation of complex concepts through the lens of popular culture.

Immunology Wars is primarily used as an additional resource that students can access in their own time. Providing these asynchronous videos and resources provides an engaging and novel means for students to explore key concepts covered in formal taught sessions. Key to their success is the optional nature of the resources, students who are enthused by immunology, and enjoy the Star Wars franchise, naturally gravitate towards them to provide additional learning opportunities. Those students who do not wish to engage are not disadvantaged, as the resources are only ever an optional

extra and no additional concepts are covered in the videos that are not also introduced in more formal taught sessions.

Future studies

Moving forward we wish to continue developing additional resources and to track individual student engagement with these resources to determine whether this has a positive effect on examination performance. Furthermore, the resources might be adapted for public engagement use, to help educate the public about immunology and its fundamental role in our development and survival.

Conclusions

Resources like Immunology Wars represent a significant step forward in the realm of immunology education; it demonstrates the potential of an innovative, decontextualised learning strategy to make a complex subject more accessible and engaging for students. By presenting intricate immunological concepts in the familiar context of the Star Wars universe, Immunology Wars simplifies these concepts and makes them more relatable for students. This innovative approach to teaching not only enhances students' understanding of the subject matter but also makes the learning process more enjoyable.

Furthermore, Immunology Wars provides a platform for students to become co-creators in their learning journey. By involving students in the development of the resource, it fosters a sense of ownership and investment in their learning. This active participation enhances their engagement and promotes deeper understanding. It also promotes valuable transferable skills such as

critical thinking, problem-solving, creativity, and collaboration, which are highly valued in today's graduate workforce.

As educators and creators, we should embrace such approaches and incorporate them into our teaching methods. By doing so, we can enrich the learning experience for our students, making it more engaging, interactive, and meaningful. We also have the opportunity to inspire a new generation of learners, fostering a passion for immunology that could lead to significant advancements in the field.

Immunology Wars' tagline "May your immune system defend you!" could very well be the rallying cry for a new generation of immunologists, inspired by an immune system in a body far, far away...

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Disclosure

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