

Project-Based Learning to Decolonising Assessment in Higher Education

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Decolonising the curriculum (DtC) is an emerging concept that continues to challenge higher education institutions globally, with educators and scholars increasingly recognising how traditional curricular structures, content, and pedagogical practices can reinforce colonial biases and marginalise certain student groups. DtC can be seen as a process rather than a phenomenon, one which is ongoing and multiplexed, consisting of elements that aim to dismantle the hierarchy between staff and students and question the ways in which knowledge is produced, valued, and disseminated. The expected outcome is to provide students with an education which is equitable, inclusive, and relevant to their personal lives and experiences. Efforts in DtC have continued to gain traction, but assessment practices remain overlooked as a crucial component, with most decolonising efforts focussed towards content and pedagogy.

Keywords: project-based learning ; science, technology, engineering, and mathematics (STEM) subjects ; decolonising the curriculum (DtC)

1. Introduction

The landscape of higher education is undergoing a significant transformation as educators and scholars grapple with the imperative of decolonising the curriculum (DtC). This concept challenges the traditional structures, content, and pedagogical practices that have been rooted in colonial biases, leading to the marginalisation of certain student groups ^[1]. It is an ongoing process aimed at dismantling hierarchies, questioning knowledge production, and fostering an education that is equitable, inclusive, and resonates with students' personal lives and experiences ^[2].

Movements like the #FeesMustFall protests in South Africa have propelled decolonising efforts to the forefront, with much attention given to reshaping content and pedagogy ^[3]. Assessment, however, often remains an overlooked part of this journey, despite its role as a powerful tool that profoundly impacts the learning experience. It is an area ripe for decolonial exploration, especially within science, technology, engineering, and mathematics (STEM) subjects, where the objectivity and neutrality associated with these disciplines can mask underlying colonial influences.

2. Project-Based Learning: A Comprehensive Approach to Decolonising Assessment

2.1. Introduction to Project-Based Learning

PBL emerges as a promising and comprehensive approach that integrates and addresses the shortcomings of prior decolonisation efforts within higher education assessment, demonstrating the ability to incorporate several decolonial elements alongside academic benefits to student learning and understanding.

PBL is a student-centred, inquiry-based instructional approach, in which learning is achieved through hands-on activities centred around questions, challenges, or real-world problems ^[4]. The approach is based on constructivism theory, which proposes that "what the individual learns and understands is constructed by the individual", and that this construction occurs through social interactions (making collaboration an important part of PBL) and the integration of new knowledge with prior knowledge and experiences ^[5]. As such, instead of being passive recipients of information, students build their own meaningful and relevant understanding of the subject matter. PBL has demonstrated notable efficacy as a learning method and has been widely implemented in numerous educational institutions, as evidenced in studies by Gavin (2011) ^[6], Xu & Liu (2010) ^[7], and Kokotsaki et al. (2016) ^[4].

Beyond its pedagogical benefits, PBL presents a unique opportunity to incorporate and address decolonial elements within the context of higher education assessment. Among these elements are engagement with community knowledge,

development of transferable skills, cultivation of collaboration and cohort identity, and promotion of student agency and ownership. In both direct and indirect ways, PBL is also able to challenge power relations and hierarchies, an objective central to the DtC movement but often difficult to address. In the following analysis, researchers delve into each of these elements to explore how they are integrated within PBL and evaluate its potential as a decolonised method of assessment.

2.2. University of Sussex Case Study

To explore the application of PBL as a decolonised assessment method, researchers investigate a study conducted at the University of Sussex that implemented a PBL assessment mode in a foundation, first, and second year BSc Biomedical Sciences course [2]. This serves as a case study to exemplify how PBL can effectively incorporate the aforementioned decolonial elements to challenge traditional assessment practices. The detailed method, findings, and analysis of the study can be accessed at Pranjol et al. (2022) [3].

The aim of the study was to evaluate the effectiveness of PBL in achieving the following outcomes:

- “Consolidating and integrating knowledge, from other modules, into a disease setting”;
- “Encouraging students to collaborate, and to build a sense of community in the cohort”;
- “Develop transferable skills, such as effective communication, problem-solving, time management, and team building”.

Students were randomly divided into groups of 3–4 and introduced to a formative PBL exercise, tasked with creating a digital revision resource for a certain disease condition over a period of 3 weeks. The product would be shared with the entire cohort to be used for exam revision. For example, the task given to year 1 students was to:

“produce a revision guide that describes what happens when *Staphylococcus aureus* bacterial antigen in staph infection is detected by our innate immune system. The guide should include the following details: bacterial cell structure, bacterial metabolism, assessment of the presence of bacteria in patients’ samples, the immune system, available antibiotics.”

Students were free to choose their resource format; some example formats included a PowerPoint presentation or video.

The final product was assessed formatively by two staff members and was marked based on the following criteria:

- “The clarity of presentation—information presented clearly with relevant figures and diagrams, labels and figure legends”;
- “The detail and quality of content that sufficiently covers the key learning outcomes”;
- “The creativity of the revision material, e.g., interactivity”.

Feedback was then given via the “sandwich method”, in which improvement areas were suggested in between positive feedback.

The study results were measured both quantitatively and qualitatively. Student performance was compared in two assessed modules before and after the introduction of the PBL task. Data from the academic years 2018/19 (pre-task introduction) and 2020/21 and 2021/22 (during task implementation) were collected from the school database and anonymised. The analysis aimed to determine whether the students achieved higher module grades following the task’s introduction, presented as mean values with standard deviations.

The study also utilised a questionnaire to assess the student experience with the PBL task. The questionnaire included both quantitative and qualitative aspects, consisting of close-ended questions with nominal scale and Likert-rating scale for quantitative analysis and open-ended questions with free-text boxes for qualitative analysis.

The study report then discusses the findings and implications of the PBL approach, exploring its effectiveness in achieving the study aims and improving the student learning experience, albeit without an explicit focus on decolonising assessment.

2.3. Integration and Consolidation of Knowledge

The PBL task required the students to respond to a big-picture, real-world question, compelling them to draw from various areas of their learning and synthesise disparate elements into a coherent context. This facilitates cumulative learning, promoting a deeper and more holistic understanding of the subject matter ^[8]. The study results indicated success in achieving the consolidation and integration of knowledge. A total of 74% of the surveyed students explicitly indicated that their participation was helpful in facilitating the integration of knowledge from previous modules and experiences. When the students were asked in the questionnaire to evaluate the effectiveness of the activity, as measured by “Q16—One aim for this activity was for you to consolidate and integrate your knowledge. How useful was this activity in consolidating your knowledge (0 being not useful and 5 being very useful)?”, the mean result was 4.1 ± 0.8 .

The integration and consolidation of knowledge in this manner also yields decolonial benefits alongside academic ones. Students draw not only from prior academic knowledge but may also draw from their personal experiences and backgrounds to contextualise the scenario posed by the PBL task. The study describes a “semantic wave” pattern of learning to illustrate how this consolidation and integration of knowledge occurs, starting with an “abstract concept or questioning followed by a descending wave of unpacking knowledge and information” ^[9]. In this descending wave, students make sense of this abstract concept, assigning their own meaning and understanding to the subject matter; this can occur through application of prior knowledge and prior experiences from the context of their own lives and histories. Students then undergo an ascending wave, in which they “repack knowledge and link back to the abstract concept”, thereby constructing a deeper and more meaningful understanding that resonates with their unique perspectives ^[9]. This promotes the empowerment and validation of students, acknowledging that their voices and experiences are important to their educational process and allowing them to see how their learning can have relevance to their own lives. The curriculum also becomes more enriched with a multitude of perspectives, ultimately fostering a more inclusive, diverse, and decolonised academic environment.

2.4. Collaboration and Cohort Identity

The case study also demonstrates how collaboration and cohort identity are fostered through PBL, in alignment with the study's objectives. The study design divided the students into groups, providing a shared task and purpose and thus encouraging the students to work together towards a collective goal. This process of co-creating knowledge, especially in the form of a revision resource that benefits the entire cohort, helps to build cohort identity, nurturing a sense of belonging and community for the students and fostering a more inclusive learning environment. The task appeared successful in achieving collaboration and cohort identity, with 66% of the students agreeing that “the PBL tasks enabled them to build cohort identity”.

The benefits of collaboration in deepening learning and understanding are numerous. Group work almost inevitably involves disagreements or differences of opinion, necessitating discussion at different stages of the knowledge-production process that results in a more “in-depth social knowledge construction” through a sort of “testing and verifying” process that strengthens understanding ^[10].

The discussions and negotiations that occur in group work are also able to achieve decolonial effects. Through collaboration, students can share their experiences with each other, promoting a more inclusive learning environment in which diverse viewpoints, values, and knowledge systems are recognised and acknowledged. Adam (2020) describes this decolonial approach to education as “situating one's culture at the centre of one's learning while still drawing on other cultures”, thereby valuing the exchange of perspectives for academic benefit ^[11]. This can be seen as a form of engagement with community knowledge, as students are exposed to new and perhaps previously overlooked perspectives.

Collaboration and cohort identity are also able to address power relations and hierarchies in assessment, as the group work that occurs in the study offers a more horizontal approach, in which knowledge is co-created. Cain and Cocco (2013) describe this as a flat leadership model, in which “leaders are situational and collaboration is dynamic and non-coercive” ^[12]. This differs from the traditional top-down method, in which knowledge is transmitted by the educator; in this case, the educator is no longer the sole authority on knowledge and the power dynamic is shifted such that students have a voice on what is relevant and meaningful.

2.5. Transferable Skills

Another aim of the study was to develop transferable skills. These can be defined as “a set of achievements, understandings, and personal attributes that make individuals more likely to gain employment and be successful in their

occupations”; the development of such skills also has benefits in students’ personal lives ^[13]. The PBL exercise fostered this, as the students needed to channel teamwork skills, organisation, time management, leadership, communication, problem-solving, and other skills in order to successfully collaborate and respond to the question framed. From a decolonial perspective, transferable skills can be inserted and assessed in the curriculum to challenge the Eurocentric perspective that learning and knowledge is solely about content and information, thereby highlighting the importance of diverse forms of knowledge and expression ^[14]. In this case study, transferable skills were not objectively assessed but self-reported by students in the survey; this nonetheless opens the door to expanding assessment criteria and achieving a more comprehensive and holistic evaluation of a student. Again, this would challenge the Eurocentric-rooted norms of assessment, providing a more inclusive approach that values diverse competencies beyond traditional content-focused metrics.

Decolonisation through transferrable skills is also achieved through engagement with personal and community knowledge, allowing for an assessment method that meets local needs and acknowledges diverse perspectives ^[14]. In developing transferable skills, students are prompted to apply them to real-world scenarios and projects, which naturally leads to students drawing from their lived experiences and cultural backgrounds to help contextualise the skills they are learning. These skills can also become relevant and applicable to individual students’ lives, mirroring the traditional model of pre-colonial education in Africa, which was characterised by its relevance to local life and strong connection to daily activities ^[15]. As such, teaching transferable skills breaks away from the colonial paradigm in which cultural contexts and traditional practices are ignored and instead attempts to build on the strengths, capabilities, and needs of individual students and local communities. This is well exemplified in New Zealand’s policy on Māori education, which “states that schools, while meeting academic achievement targets, must also have the goal of Māori succeeding as Māori” ^[16]. A more inclusive and culturally responsive assessment process is fostered, one in which students are empowered through the acknowledgement of their identities and experiences. Power dynamics are also shifted as students shape their own educational experience based on their lived realities.

Hierarchies and power dynamics can be further disrupted through transferable skills development in the context of “colonial dependencies”; this occurs where previously colonised countries are perceived as dependent on the knowledge and technology of colonisers, resulting in a perception that the former are merely users of knowledge rather than creators of it ^[17]. PBL disrupts this power dynamic by providing students with tools and techniques that enable them to engage with knowledge, adapt it to their contexts, and create new knowledge in future contexts, thereby increasing student empowerment and agency. This encourages students to be innovators and creators rather than just passive recipients of knowledge and information, helping to stop the perpetuation of colonial dependency dynamics.

Finally, this method helps shape world-class students with “globally transferrable skills” that can be applied across several contexts. As our world becomes increasingly connected, students are required to engage in a global community; assessments should prepare students for this reality, empowering them as global citizens that can navigate diverse cultural, social, and economic landscapes ^[18]. Winberg and Winberg (2017) assert that students can “interactively learn how to use and adapt tools, determining effective approaches to use the tools and apply the theories in order to develop solutions to realistic problems” ^[17]. Equipping students with globally transferrable skills achieves decolonial influence in breaking away from traditional assessment methods designed to evaluate knowledge within specific cultural and historical contexts; adapting these methods to meet the needs of the 21st century and acknowledging the diversity of global experiences represents a departure from colonial-era practices that prioritised one dominant perspective and instead embraces the multiplicity of viewpoints.

As such, the opportunity to develop transferable skills through PBL demonstrates its ability to disrupt several colonial practices as a decolonised method of assessment.

2.6. Multiple Modes of Expression

The PBL task also offered students the freedom to select their preferred format for their revision resource, allowing for a more inclusive and decolonised approach to assessment.

Traditional assessment methods in STEM higher education often involve a written output and are limited to certain formats such as lab reports, essays, or multiple-choice question (MCQ) exams ^[19]. These formats are designed based on tradition rather than recent evidence, perpetuating a monocultural perspective on knowledge that disregards the varied ways in which different cultures and individuals comprehend, internalise, and convey information ^[20]. For instance, in a biology course, a standard MCQ may assess a student’s ability to recall information on a subject but might fail to capture their ability to apply the knowledge in a real-world scenario; this can be disadvantageous for students who excel in practical application or creative problem-solving but are hindered by the constraints of MCQs ^[20]. Furthermore, traditional

assessments can perpetuate a narrow view of knowledge representation that privileges Western norms and cognitive styles [20]. Physical lab reports, for instance, may align with Western academic writing conventions, which would not adequately accommodate the strengths of a student from a non-Western background who might excel in visual representation or storytelling [20]. As such, these formats cannot capture the true nature of student learning and understanding, leading to the exclusion of students who may have successfully achieved the learning outcomes albeit through alternative ways of knowing and expressing knowledge [21].

Assessment must instead recognise that students have unique learning styles, strengths, and interests that are informed by their individual histories and should value the full range of characteristics of students [21]. As such, PBL offers the opportunity to embrace diverse modes of expression in a decolonial approach to assessment. In the PBL case study, the students were required to collectively and collaboratively decide on a mode of expression based on each group member's individual strengths, acknowledging that students possess varied skills and ways in which they contribute to their learning community and thereby challenging the inherently colonial tendency towards uniformity in assessment methods [20]. The collaboration required in deciding the assessment mode also helps students develop valuable transferable skills such as communication, teamwork, decision-making, and problem-solving, further shaping adaptable students prepared for global citizenship and helping achieve the decolonial impacts.

Supporting multiple modes of expression also allows for a shift in hierarchy, whereby students have a stronger voice in their educational experience; by placing the authority to choose assessment formats in the hands of students, educators signal a departure from teacher-centric models of education and embrace a collaborative approach that promotes the empowerment, ownership, and accountability of learners [1]. This increase in ownership is also essential in fostering intrinsic motivation and engagement. When students have the agency to select their assessment modes, they are required to critically evaluate their strengths and learning styles: this self-reflection fosters a deeper level of engagement with the subject matter, as students are not just passive recipients of information but active participants in shaping their learning experience [18].

Perhaps most importantly, supporting multiple modes of expression provides students with the power to showcase their creativity and adjust according to their strengths and differences to meet the learning outcomes. Ajjawi and colleagues (2022) assert that "assessment should not disadvantage students because of characteristics or abilities extraneous to the outcomes being judged"; essentially, a fairer and more accurate evaluation of whether a student meets the required learning outcomes can be achieved if their strengths and characteristics are considered in the assessment process [22]. The freedom to choose from a range of formats shows value for the diversity of learning styles within the student body and contributes to a decolonised learning environment where students can excel in their own unique ways.

It is important to note that students may become anxious or overwhelmed when given the opportunity to choose their own assessment formats as they try to make sense of what is expected of them with various formats [23]. This freedom can also be challenging for educators in managing and evaluating a wide variety of formats. In this case, it may be more effective to provide a choice of certain assessment formats to choose from, providing a variety of formats that meet student needs and that educators are comfortable with managing. Co-creation should be considered, and student voices should be involved in choosing the options of formats, helping to challenge the hierarchy associated with assessment processes in higher education.

The aforementioned elements thus illustrate how incorporating freedom with multiple modes of expression in PBL is a decolonial assessment method; it sends a clear message that knowledge is multifaceted, and its representation should reflect the richness of human culture and experiences. By diversifying assessment methods, educators acknowledge that learning can take shape through various pathways, respecting the value of non-Western epistemologies and alternative modes of understanding that may have previously been marginalised or excluded.

2.7. Culturally Sensitive Feedback

Traditional feedback methods can lack cultural sensitivity and fail to recognise the diverse backgrounds and perspectives of students, leading to a one-size-fits-all approach that may overlook individual needs and hinder a truly inclusive learning environment. The ability to provide culturally sensitive feedback is thus a key decolonial element, one that can be harnessed with the PBL approach.

Culturally sensitive feedback requires a respect for diverse perspectives; feedback needs to recognise and acknowledge that different cultures will have different communication styles. Understanding and appreciating this diversity is essential, as the way feedback is provided significantly influences how it is perceived and acted upon. For example, certain cultures respond best to direct and specific feedback, while other cultures may respond better to indirect and gentler feedback [24].

In this specific case study, the revision resource produced for the PBL task was assessed formatively and feedback was given in a “sandwich method”, in which improvement areas are sandwiched between positive feedback. This method emphasises respectful yet constructive feedback; by encouraging open communication that recognises students’ strengths, the sandwich method can contribute to a more balanced and equitable exchange of ideas, challenging traditional feedback practices that may reinforce power imbalances. Educators practicing culturally sensitive feedback thus demonstrate their commitment to meeting students where they are, helping to contribute to the broader decolonial goal of dismantling homogenising practices and ensuring that education serves the needs and aspirations of all students with respect for their cultural backgrounds.

Respect for diverse perspectives in culturally sensitive feedback also necessitates the careful selection of feedback delivery and format; PBL offers a valuable platform to put this into practice given its inherent flexibility in accommodating various feedback formats. Similarly to providing alternative assessment formats, providing diverse feedback formats is an important decolonial element, as it aligns with the broader aim of dismantling a “one-size-fits-all” approach and recognising the diversity of learning preferences and communication styles among students. For example, while traditional formats might adhere to written outputs that follow a standardised template, educators can opt for video feedback, audio recordings, or interactive discussions in an attempt to dismantle the Eurocentric biases that might underlie rigid feedback structures ^[25]. This approach also empowers students with a more active role in their learning journey; students can voice their opinion on the feedback format that best resonates with them, and decolonial influence is achieved as student identities become acknowledged and valued. Another important decolonial element of delivering culturally sensitive feedback is using inclusive language. Language is not universal, and students will interpret it differently based on their backgrounds and personal histories; it is thus essential to consider this diversity when choosing words for feedback to ensure that the language used respects the unique perspectives of each student ^[26]. Educators should conscientiously select words and expressions that promote a sense of belonging for students, demonstrating an attunement of the impact of language on students’ sense of identity, self-worth, and engagement with the subject matter ^[27]. This is particularly relevant in contexts where traditional education systems may have historically marginalised certain groups or reinforced colonial hierarchies. Through use of inclusive language, educators can help deconstruct these historical power imbalances and create a more positive and equitable learning space. Using inclusive language can be easily applied in a PBL scenario with the help of teacher training and awareness.

A further way to exercise culturally sensitive feedback within PBL is to encourage a reflective and dialogical approach; this is inherently decolonial, as it disrupts the hierarchy between teacher and student and improves student empowerment and agency ^[28]. PBL feedback can be constructed as a conversation between teacher and student, one in which the student is able to voice their opinions and responses to their feedback, allowing for a deconstruction of the hierarchy in which the teacher normally exercises an absolute judgement over the student’s work. It empowers students to take ownership of their learning and provides opportunities for both students and educators to learn from each other, particularly as educators shape how they provide future feedback.

A final way in which PBL achieves decolonial influence through culturally sensitive feedback is through peer-to-peer feedback, with the collaborative nature of PBL granting students the opportunity to assess both their own work and that of their peers. As the product of the PBL task is a revision resource that benefits the entire cohort, this should ideally foster a culture of constructive critique moving beyond simple fault-finding ^[8]. This peer-to-peer feedback within PBL aligns with decolonial principles primarily by disrupting the power dynamic that exists when a dominant figure holds absolute authority over what is considered correct or incorrect; it once again acknowledges the value of diverse viewpoints and contributions, helping to create an inclusive environment where knowledge can be co-created, shared, and critiqued collectively ^[14].

Culturally sensitive feedback thus has several clear decolonial elements, and its ease of integration within PBL exercises further positions PBL as a valuable decolonised assessment method.

3. Advantages and Limitations of Project-Based Learning

PBL appears to represent a strong approach as a decolonised method of assessment, one with clear links to decolonial elements as discussed in the previous part but one that is also successful in deepening student learning and understanding. The fundamental principles of PBL, fostering problem-solving, critical thinking, collaboration, and real-world application, as well as the decolonial elements it has been linked with, prove valuable and applicable irrespective of the subject matter.

Both the study and PBL as an approach are not without limitations. It is important to note that the study did not specifically focus on PBL in the context of decolonisation and did not measure its efficacy; the links made between the PBL task and decolonial elements are theoretical and not directly evaluated. A potential issue with PBL's implementation is addressing heterogeneity within student groups. It is possible that power dynamics could emerge within these groups, not just between students and staff, but for instance through "social class differences, gender and attainment hierarchies" [29]. This can impact the distribution of agency within the group, manifesting as varying levels of participation, decision-making power, and engagement; some students may dominate discussions while others may feel marginalised or find it challenging to voice their ideas and opinions. Thus, teachers should be provided with an opportunity to learn about and address power dynamics and social inequalities in the classroom and become equipped with effective facilitation and conflict resolution skills.

4. Conclusions

The pursuit of decolonising higher education is of paramount significance. In this endeavour, the focus must extend to assessment, an aspect often overshadowed by content and pedagogical changes, particularly in the domain of STEM. PBL is just one potential approach to decolonising assessment in STEM higher education; although it appears comprehensive in nature and its academic strengths and decolonial capabilities are clear, its implementation is not an all-encompassing solution for decolonising assessment. This can be seen as a positive—the lack of a single solution for decolonising assessment opens the door for pedagogy to be even more diverse and contextually relevant. It is important to note that while the focus on decolonising assessment is necessary, its achievement is not possible without the decolonisation of content and pedagogy, and thus it still requires us to challenge the entire educational framework. Decolonising assessment necessitates a continual examination of the assumptions and values that underpin current methods as well as the incorporation of more inclusive and representative approaches such as PBL. This ongoing process holds the promise of transforming our educational landscape into one that is truly inclusive, equitable, and open to diverse knowledge systems, ensuring a richer learning experience for all.

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