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Enhancing Empathy for Justice: A Methodology for Expansive Teacher Professional Development through Creative Body-Based Learning

Simon N. Leonard ^{1,*} , Deborah Devis ¹ , Belinda MacGill ², Paul Unsworth ¹ , Jill Colton ² and Sam Fowler ¹ 

¹ Centre for Change and Complexity in Education, University of South Australia, Adelaide 5000, Australia; debbie.devis@unisa.edu.au (D.D.); paul.unsworth@unisa.edu.au (P.U.); sam.fowler@unisa.edu.au (S.F.)

² Centre for Educational and Social Inclusion, University of South Australia, Adelaide 5000, Australia; belinda.macgill@unisa.edu.au (B.M.); jill.colton@unisa.edu.au (J.C.)

* Correspondence: simon.leonard@unisa.edu.au

Abstract: This paper reports from a design-based research project seeking to reduce bullying, and so, contribute to the sustainability goal of improving (understanding of) justice. Goals such as this call for holistic and interdisciplinary ways of thinking that are quite at odds with the linear and reductionist epistemologies available with globally dominant ‘neoliberal’ discourses on education and educational decision making. To achieve goals such as improving justice, sustainable education and educators must explore and champion expansive ways of knowing that acknowledge and celebrate the complexity of everyday learning contexts. Responding to this need, this paper presents a case study of how we, as a group of educational designers and teacher educators, have explored how the arts-based pedagogy known as Creative Body-Based-Learning, when coupled with Engeström’s expansive theory of learning, can provide an alternative structure and methodology for teacher professional knowledge production. The paper will also outline the use of the research methodology of computer-aided phenomenography as a means of evaluating this kind of complex learning where simple testing and self-reporting are typically inadequate.

Keywords: expansive learning theory; cultural-historical activity theory; teacher professional learning; virtual reality; creative body-based learning; design-based research; sustainable education; phenomenography



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1. Introduction

Within the context of education, the concept of ‘sustainability’ points to the need for holistic and interdisciplinary ways of knowing, thinking and learning that incorporate systems thinking, cultural empathy and experiential learning [1]. Such needs are widely recognised and well-articulated as goals within global educational policy development [2]. These goals, however, have not been easy to implement within the dominant neoliberal discourses and infrastructures of educational governance and design [3]. In short, these infrastructures and discourses have valued reductionist and linear approaches to generating knowledge about education [4] that are frequently at odds with sustainable education. Alternatives must be found.

This paper seeks to explore a different method for generating professional educational knowledge. The case study it presents is framed within a methodology known either as ‘design-based research’ (DBR) [5] or ‘educational design research’ (EDeR) [6]. The use of this framework is not particularly innovative. Over the last two decades, DBR has emerged as the ‘signature’ research methodology of the subdiscipline of educational research known as the Learning Sciences, although some literature reviews suggest that the use of the methodology is more frequently an aspiration rather than a realisation [7,8]. DBR, which should always be understood as a context-responsive framework and never

as a detailed and prescriptive method, calls for the generation of educational knowledge through or alongside the designing of educational practices, resources or environments. The innovation that this paper offers lies in its use of knowledge-generation techniques drawn from the creative and performing arts education within the DBR framework.

The case study presented in this paper emerges from an ongoing project that is interested in using immersive virtual reality (iVR) within educational programs concerned with reducing bullying. Bullying perpetuates racial, social, economic and gender inequality, and requires critical attention to address goals 4, 10 and 16 of the United Nations (UN) 17 sustainable development goals, particularly in regard to justice [9,10]. Justice is an essential component of sustainable education. It is important to note, however, that this paper is not directly about either iVR or bullying per se. Rather, bullying and iVR serve as a context for a wider consideration of the kinds of knowledge building that can support the development of education for sustainability.

The bullying project is an interesting context for an investigation into educational knowledge building. It is a context that does not lend itself to a simple ‘what works’ research question. The educational *design* goal (as opposed to the *research* goal) of the wider project from which this paper emerges is to use technology to assist students in developing a holistic and empathetic sense of SDG 6 that is reflective of the UN’s sustainable development goals. This is a goal that does not come with a ‘correct’ answer. Indeed, the educational activities that are designed within this project are likely to play out differently in each iteration and with each new cohort of students. This creates an interesting challenge with respect to the kinds of teacher knowledge that need to be developed within the project. In short, the educational designs that the project is creating will require teachers to develop a greater empathetic awareness of how students are engaging in the activities and environments being designed.

The approach to achieving this kind of teacher professional learning explored in this paper is the use of an arts-based learning framework known as Creative Body-Based Learning (CBL) [11]. The research question driving this paper, therefore, is ‘can the arts education pedagogical methods of ‘Creative Body-Based Learning’ provide a structure for teacher professional learning when that learning inherently must ask teachers to engage in practices that are complex, boundary-crossing, and novel?’

In addressing this question, our specific *research* goal is to expand the theoretical and pedagogical options for those who seek to use DBR or similar models for collaborative design as an approach to teacher professional development within the context of technologies [12,13]. We do so with an awareness that most researchers within the field of the learning sciences or other subfields of education based on cognitive science are trained in research methods with a positive bias [14]. That is, we are trained to look for what is there, for concrete evidence of learning. Education for justice and for learning outcomes related to constructs such as empathy and attitudes that are conducive for sustainable thinking, though, do not offer much that is concrete. In this context of research practice, we are seeking to explore the possibilities of the intersectional approaches of art-based educational approaches and to evaluate their efficacy to support learning design when the desired end-state of the learning is now yet known and is probably not knowable of each new implementation of the design.

DBR is a research framework that deals with the messiness of the real world. The findings that emerge from this framework tend to be contingent rather than universal [15], and this paper is no exception. The paper will begin with an extended discussion of the messiness of the educational design work being undertaken within the larger anti-bullying project that led to the theoretical conjecture that CBL might be educationally useful in the context of the wider anti-bullying project. The paper will then briefly describe the use of CBL within the project before turning to an exploration of the use of phenomenography [16,17] as methodology to evaluate the impact of CBL as a design innovation. In the end, the paper will conclude that CBL can provide a useful way of generating knowledge

within a DBR context. This finding, though, is nuanced. CBL appears to be a useful tool when used with many other tools.

2. Theoretical Innovation

Design-based research [18–21], can be seen as the ‘engineering’ arm of educational research. DBR seeks to develop new knowledge through the iterative design and improvement of real-world educational technologies, resources, practices and so on [22]. In this project, DBR was being used to explore how a set of iVR equipment donated to our university by a prominent global consumer technology company might be best used. In the early studies or ‘design trials’ from which our anti-bullying project emerged, we had worked with practising schoolteachers and their students at a large Catholic high school in metropolitan Australia, as well as with our own initial teacher education (ITE) students, in processes of codesign, coconstruction and collaborative inquiry to produce virtual tours of local environments. These studies provided an affirmation of the potential of iVR as an active and creative rather than simply passive educational technology because it allowed students and teachers an expansive experience with justice. As they touched on Aboriginal understandings of place, these studies also informed our group of the potential for positioning culturally responsive [23] and relational socio-affective content [24] within learning designs that use iVR. Collectively, this highlighted the potential of iVR both as a learning tool and a driver of sustainable education pedagogy, particularly because the emotional aspect of justice cannot be separated from anti-bullying programs if they are to be effective. As a result, the questions our teacher-partners and our ITE students were asking started to move from technical questions like ‘how do we use iVR?’ to culturally, socio-affective questions like ‘how do we use iVR to address learning goals like the reduction of bullying?’, and, so, an anti-bullying project was born.

Through the early stages of the anti-bullying project—design stages involving experts on both iVR and bullying—we had identified a largely unrealised potential for educational design that used iVR to integrate the cognitive and aesthetic domains to explore complex socio-cultural experiences like bullying [18–21]. Alongside the rise of an awareness of the socio-affective possibilities of iVR, though, we almost immediately felt a parallel rise in teacher—and teacher educator—uncertainty. Our teacher-partners in this project had readily imagined lessons in which iVR was used to explore the human circulatory system, a nearby creek, and the surface of Mars. When we started working with material closer to the emergent anti-bullying agenda, however, we encountered hesitation. When working with an iVR tour of the Anne Frank House [25], for example, or a virtual rendering of the world in which Lord Byron wrote his poetry [26], we found a tendency to turn towards, but then a dissatisfaction with, familiar frameworks drawn from literary studies and history. These methods built on the analysis of text were familiar, but to ‘read’ the iVR experience as ‘text’ seemed difficult. Experiential learning models such as the one from the Kolbs [27], however, also seemed a poor fit. In iVR we seemed to have found an educational terrain that was not quite text but not quite ‘experience’ either. We found we were turning to a theory-in-use that seemed to involve little more than vague references to ‘osmosis’. This was of concern, as many of these worlds specifically addressed the issues of justice and socio-affective understanding that we were seeking to access [28].

2.1. Expansive Education and Activity Theory

To put this challenge another way, and to introduce the language-expansive education and structures of cultural historical activity theory, CHAT, [29] that will underpin the argument throughout this paper, our project demanded that we ask teachers to adopt a number of new elements within an already established array of activities for teaching and learning. In CHAT, often referred to simply as ‘activity theory’, human activity is understood to emerge from its cultural context and to have a history [30]. That is, what teachers do—and indeed what all humans do when engaged in meaningful activity—is conducted with reference to related activity in the culture around them, and with reference

to how the activity has been carried out before. As such, CHAT is concerned with the (often tacit) system of rules and tools that both govern and support an activity, as well as with the communities of practice and divisions of labour of the people who carry out the activity. This is typically communicated through the triangular activity system diagram reproduced in Figure 1. The inevitable challenge such activity systems create for learning *new* things is that new elements in an activity system frequently conflict with older elements within the system.

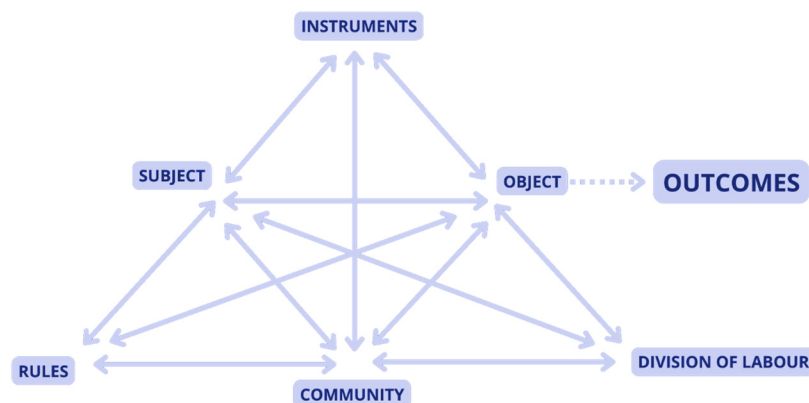


Figure 1. The CHAT activity system.

The anti-bullying project sought to introduce several new elements to the activities of teaching and learning in schools but recognized that it could not be approached with linear thinking. The most obvious new element was the new technology, the immersive virtual reality devices and the content that they could provide. Of equal importance, though, we were trying to support teachers to work with this highly visual medium and to make use of its aesthetic potential to assist young people in understanding their emotional responses and decision making [31], and so to develop an empathetic awareness of justice.

Research in educational technology has clearly shown that what we were seeking to do was ambitious. When faced with new technologies, teachers are known to be far more likely to simply substitute a new technology for the old rather than use the technology to significantly modify or redefine their learning activities [32]. This presents a problem for sustainable education, as these practices perpetuate linearity. The early design experience within this project was entirely consistent with this research. In early trials, for example, we found teachers readily able to substitute in iVR in place of text. This is a pedagogical approach we also see with the use of standard video, and books. That is, the technology is used as a method for the uni-directional transmission of information that does not reflect the way technologies will be used by students in the future, or indeed even currently. iVR, however, provides capacities to very different modes of engaging with stimuli and information; nevertheless, we found that they were too different from existing practices for teachers to readily access them.

2.2. Double Stimulus and Learning for What Is Not Yet There

In his work that has greatly extended the use of CHAT in learning contexts over the last three or four decades, Engeström [33,34] has referred to the kind of challenge that our project was facing as that of ‘learning what is not yet there’. Engeström has long argued that such educational challenges require an ‘expansive’ response [35]. This underscores the critical need for transformative approaches in educational technology, especially in the context of sustainable education, where expansive and boundary-crossing thought is necessary for achieving justice. This challenge is not unique to research like ours in educational technology and has been explored in a diversity of professional learning contexts. Engeström and his team, for example, have taken on the challenge in contexts as

diverse as the surgical department of a major hospital and a university library [33], using formative interventions that they have termed ‘Change Laboratories’ [36].

The Change Laboratory approach seeks to promote participant learning through engagement with a real-world and relevant problem. This problem is the ‘primary stimulus’ for learning. Importantly, the Change Laboratory also makes use of a technique based on Vygotsky’s concept of the ‘double’ or ‘secondary’ stimulus [37,38]. That is, in addition to the stimulus of a particular problem to solve, a second ‘neutral’ or, perhaps, ‘ambiguous’ stimulus is introduced into the learning system. The secondary stimulus can really be any artefact that is filled with meaning and can be turned into a sign. Importantly, it is an object/sign that can become the focus of action. Vygotsky’s classic example was the ‘waiting experiment’ in which participants were brought into a room and left to wait without explanation. Vygotsky predicted, and Sannino [39] confirmed, that participants would resolve uncertainty on what to do with reference to an object such as a clock—‘I will leave when the time reached half-past the hour’. From his own research, Engeström [33] provides examples, such as an organisational chart within a hospital, and highlights that such a stimulus may be introduced by the participants of the learning activity themselves.

2.3. Secondary Stimulation and CBL

Through serendipity more than clever planning on our part, however, our project team included an arts educator. An expert, as those of us with greater experience in less physical or ‘concrete’ [40] disciplines soon learned, at bringing ‘not-quite-text-not-quite-experience’ together in the form of dance and drama and myriad other forms of artistic expression. As we learned more from this member of our team, we chose to step back from our work with teachers and spend some time learning about and from each other’s epistemologies.

The philosopher Deleuze [41] wrote of the ‘virtual’ as not the opposite of ‘reality’, but rather the opposite of the ‘actual’. A memory, for example, is real even though it has no material actuality. In this sense, the virtual can be very real, and it served as a useful metaphor for our purpose in working together. Perhaps, we thought, we might find new realities—new ways to deal with our not-quite-text-not-quite-experience problem—by finding virtual entries into each other’s epistemic realities. When, elsewhere, Deleuze wrote of something in the world that forces us to think as ‘an object not of recognition but of a fundamental encounter’ [41] (p. 176), we had also found an alternative name to the practice of double stimulation we intended to undertake: encounter.

The idea of encounter, we thought, was useful. We really were a diverse group of scholars. One of us was a technologist, one a historian and policy sociologist and one, as we have mentioned, an artist. (Our fourth author, an English and literacy specialist, joined us in the sense-making phase of the work we report later). Our engagement in a series of encounters would be as representatives of these different disciplines, coming together with diverse beliefs and experiences relating to justice and purpose. We were to engage in epistemic encounters.

The secondary stimulation our arts educator had provided was CBL. CBL utilises the strategies and principles of drama-based pedagogy (DBP) developed by Dawson and Lee [21], but applies them to wider contexts. It is informed by the emancipatory and transformative project of critical pedagogy [42], and the concept of physicality is central to an embodied notion of CBL as critical pedagogy. Far from being an obstacle to learning, the body is seen as a vehicle for human understanding [43] with sensory abilities that can provide a rich source of understanding [44–47]. As the body moves and experiences, it interprets these experiences physically and cognitively such that bodily memories continue to exist within the body and sense of self [48]. Importantly, bodily activity is understood as intimately connected not only with intellect but also with affect—a key point relevant to what emerges from experiencing or preventing bullying. Learning evolves from and is deepened by the body’s power to feel, sense, respond and imagine [49]. In this sense then, we were actually to use our own bodies as the object for Vygotskian double stimulation within our educational design work.

Our encounters were built on the premise that CBL could provide a design process that was very different to the kinds of ‘design thinking’ that have emerged from the business services sector [50] and established a strong presence in education [51–53]. Indeed, our premise was that CBL might allow us to work differently even to the design thinking programs that have placed greater emphasis on feelings and emotions, at least in the problem identification phase, such as the Designing for Change organisation in India (<https://dtg.dfcworld.org>, accessed on 2 October 2023) or Stanford University’s d.School. While the approaches taken by these organisations do open up emotion within the design process, they tend to revert to highly cognitive problem solving, which may neglect the attitudes and emotions necessary to achieving justice. We sought to find a design approach to keep emotions ‘in play’ more deeply into the design process. In the context of sustainable education, this emphasis on preserving and nurturing emotional engagement throughout the design process can be instrumental in fostering a more empathetic, values-driven, and holistic approach to addressing challenges or adopting new technologies, where both cognitive problem-solving and emotional intelligence play an equal and pivotal role in inspiring positive, long-lasting change to justice practices.

3. Educational Intervention and Double Stimulation

Our first activity was to engage in a group reading program. Our work seeks to tackle the complex and serious problem of bullying, a topic about which we all knew a little, but in which none of us had deep expertise. We were aware that a deeper level of knowledge about justice was required if the design work we were planning to undertake was to have more than trivial outcomes. By reading, and then sharing, we learned that bullying is a major cause of mental health conditions, which are endemic in schools around the world [54]. People’s cognitive and emotional states due to the impact of bullying continue to be critical justice issues that require a positive ‘mental wealth’ approach [55]. Bullying, the intentional and repeated harassment of a person or group, involves an abuse of power that evokes emotions. At times, these behaviours can have devastating impacts on people’s lives including somatic and psychosomatic conditions, anxiety and depression [56]. Poor mental well-being entrenches generational inequality and poverty, and so is of critical concern in the UN’s sustainable development goals [9,10].

Once we had completed our joint reading program, we invited the arts colleague from outside our initial team to facilitate a series of epistemic encounters using CBL. The first of our encounters used a CBL dialogic meaning-making strategy called Cover the Space (<https://dbp.theatredance.utexas.edu/teaching-strategies/cover-space>, accessed on 5 October 2023), to establish what participants know in relation to both bullying and iVR. In Cover the Space, participants walk around a designated area with the facilitator, offering three provocations that emerged from our reading program.

The next encounter used the Guided Imagery strategy (<https://dbp.theatredance.utexas.edu/content/guided-imagery>, accessed on 5 October 2023) and involved moving from the actual world and into the virtual reality headsets. In pairs, one of us shared the virtual guided tour we were taking with a colleague outside in the actual world. Touring the virtual Anne Frank house, for example, we were also asked to articulate the emotions that a person might have felt in the actual Anne Frank house when hiding from Nazi soldiers and how power and control can look and feel spatially.

After completing rounds of guided imagery through a range of virtual content, we joined together to collectively engage in a process called simply ‘describe, analyse and relate’ (DAR). The DAR strategy enhanced the reflexive practices of self-interrogation, reciprocity and criticality through scaffolded dialogic activity that spiralled to an in-depth understanding of the links between the virtual scenario we had explored, emotions and the literature on bullying. This was a step-by-step approach of describing what one experienced, sharing this with the group and communicating about the very event, then moving to the analysing phase where students outline how emotions are being mobilised and finally relating these emotions to bullying.

For a final encounter, we used a CBL strategy called It Made me Think (<https://dbp.theatredance.utexas.edu/teaching-strategies/it-made-me-think>, accessed on 2 October 2023), which enabled us to consolidate our thinking about what we had experienced and begin to identify how we could use what we'd learned for educational design. Further, it supported a way of thinking that encouraged us to consider more deeply the way in which we re-read the world [57] in iVR.

4. Method

We began this paper noting the limitations that currently dominant educational policy and management discourses and infrastructures create for the design and evaluation of educational initiatives responding to key needs in sustainability, such as justice. Our dominant discourses are neoliberal. These discourses assume that competition between institutions leads to 'better' learning, and to enable competition, they require the infrastructure of simple measures of educational attainment to act as a 'price signal' within the educational 'marketplace' [58].

The use of simple measures of learning is arguably useful when evaluating the development of basic skills. We can be reasonably confident, for example, to make truth claims based on randomized control trials and quasi-experiments that isolate specific constructs that students' development of fraction concepts in mathematics will improve when teachers provide effective feedback, when the learning design pays attention to student cognitive load, and when student anxiety is validated [59–61]. That said, it is worth noting that even in this simple example, we are beginning to build a multifactorial model, and such a model is needed because in everyday educational practice there are always multiple relevant factors in even basic learning activities.

Our educational design ambition in applying CBL, of course, is far from basic. The development of competency in the empathetic application of an ambiguous concept like justice is not only multifactorial, it is complex [62]. Our learning design—making use of CBL as a secondary stimulus—was similarly complex. Methodologically, this context demanded an approach that would allow us to evaluate nuanced changes not only in understanding but also in meaning. In a sustainable world, 'justice' is not a technical term that we need students to be able to define; it is an enacted concept that we need students to live [63].

As researchers, our normal approach to investigating meaning making lies in qualitative research methods such as phenomenology [64]. Such methodologies provide powerful insights into the meaning that different people give to the things that they experience. In the context of this project, however, phenomenology has two major drawbacks. Firstly, the experiences we were designing were collaborative and demanded ways of understanding the similarities and differences of meaning making across the participating cohort. Secondly, like most qualitative research, phenomenology is time-consuming and expansive.

To address these drawbacks, we turned to the use of computer-assisted phenomenography [62,64–66]. While less widely known, phenomenography is similar to phenomenology in that it is interested in human experience. The emphasis in phenomenography, however, is in the variations between the experiences of different people [64]. Phenomenography builds on variation theory, an approach that assumes there are critical aspects of a given phenomenon that learners must simultaneously be aware of and focus on in order to experience that phenomenon in a particular (desired) way [67].

The phenomenographic analysis reported below was aided by the use of the Leximancer v4.5 software [68]. Leximancer uses a corpus linguistic method of textual analysis to automatically identify key themes and map the relationships between concepts. In an iterative process, the software inductively develops a thesaurus of concepts based on how words within the text are used in relation to each other and then maps the co-occurrence of the concepts found. Leximancer has been shown to have high face validity in that its analysis is stable and reproducible when working repeatedly with the same texts [69]. Evaluations of how Leximancer analysis compares to manual analytical method remain limited largely

because examples of validated human-coded inductive rather than deductive analyses are rare [69]. When used to assist rather than replace human analysis, however, the technique has been found to have high functional validity and has been used for a range of studies, such as tracking changing themes and concepts over time in an academic journal [70], identifying communication patterns between medical staff in a complex environment [71], and examining the focus of mentor teacher feedback in preservice professional experience placements [72]. In a comparison with a phenomenographic study using manual and automatic coding using Leximancer, Penn-Edwards [66] found the automatic analysis to be more efficacious in that the researcher ‘was able to deal with large amounts of data without [coding] bias, identify a broader span of syntactic properties, increase reliability, and facilitate reproducibility’ (p. 253).

The analysis presented in Figure 2 was based on the transcripts of a series of interviews undertaken with the educational design team of the anti-bullying project. The interviews were undertaken by a ‘critical friend’, the xth author of this paper. Taking a semi-structured approach, they sought to explore the understandings each of us held with respect to the role of CBL, our individual roles, outcomes, surprises, and the kinds of knowledge that the CBL activities generated for each of us.

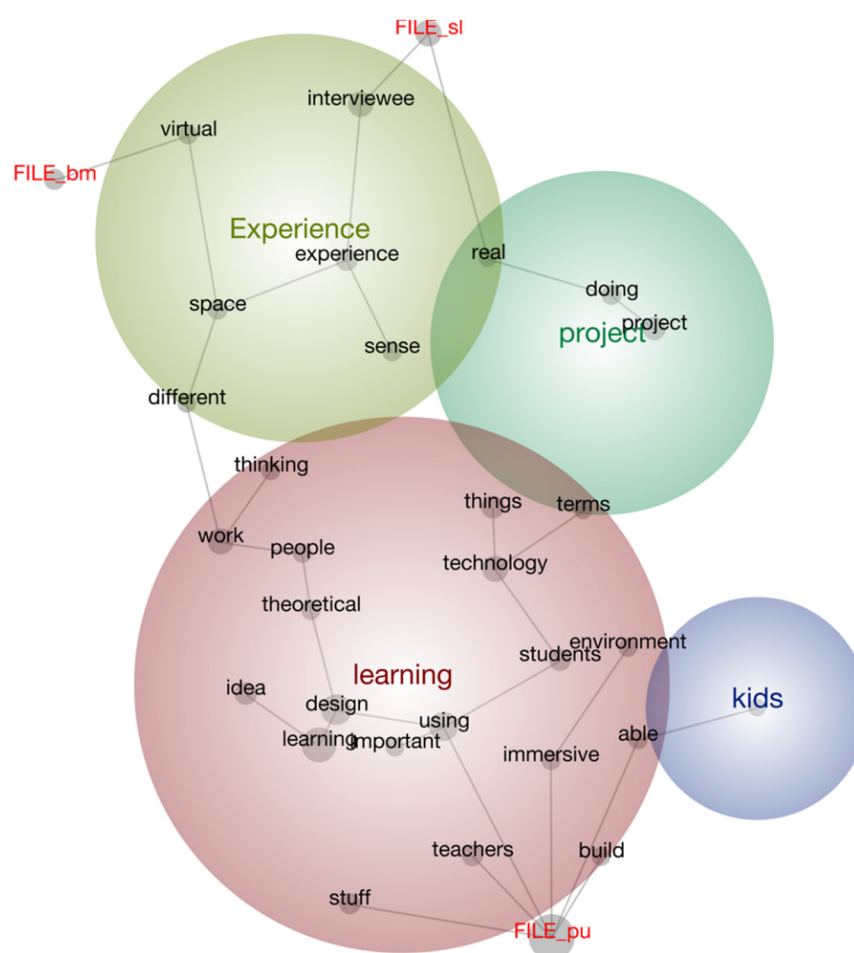


Figure 2. Mapping our conceptual differences.

The starting questions were as follows:

1. What was ‘the problem’ from your point of view?;
2. How did CBL ‘solve’ the problem—from your point of view?;
3. What was your role—what knowledge did you bring to the project?;
4. What was produced by the encounter?;
5. What surprised you?;

6. What knowledge has this encounter generated for you?

We acknowledge the limitations of conducting these interviews internally within our design and research team. Clearly, it will be desirable to further explore the use of this technique once the wider project is rolled out for use by teachers and children. For now, however, the purpose of this case study is to report upon the potential of this technique an approach that is practical within the time and financial constraints of everyday educational contexts, over and above the specific findings.

The relationships automatically identified are represented through a concept map such as the one presented in Figure 2. The software also provides the statistical data on which this map of ‘graph’ is based [66], and, importantly, it provides access to the underlying qualitative data upon which the analysis is based. This allows the researcher to read down into the corpus and check for the meanings that the AI is detecting. For reasons of space within this manuscript, we have chosen not to provide the extensive quotes that qualitative researchers will typically deploy when asking the reader to trust their interpretations. However, a copy of the experts underlying each theme identified by the software has been included in the Supplementary Materials associated with this article.

Usefully for phenomenographic analysis, the software is also able to represent where different contributors are positioned within the entire corpus. In Figure 2, this is represented in the format ‘FILE_x’, where ‘bm’ is our artist, ‘sl’ is our historian, and ‘pu’ is our technologist.

5. Results and Discussion

The purpose of this study was to investigate a new methodology for understanding and affective epistemic beliefs of teachers to be more expansive, adaptable and boundary-crossing. We explore the arts education pedagogical methods of CBL as a potential framework for achieving this.

First, we sought to understand the different epistemic beliefs held by the subjects. We found that beliefs about the purpose of educational design and technology diverged.

Inspecting Figure 2, it can be seen that ‘experience’, which is associated with humans and senses, is a key theme for both the artist (bm) and the historian (sl). On the other hand, the map reveals that the technologist (pu) was more concerned with the ordering of the learning environment.

Establishing these differences was pertinent to stimulating boundary crossing. It is likely that teachers will also have diverging epistemic beliefs about the purpose of technology, which will inevitably affect their pedagogy when teaching about how technologies can be used in justice programs. Interestingly, the artist (bm) and historian (sl) identified ‘experience’ as key to their education design, which placed them in a position of looking at justice as a wholly experiential human concept. However, the technologist’s (pu) approach is potentially more in line with traditional professional development programs and technologies [73].

This highlights a dichotomy: On one hand, the experience of justice becomes the purpose on which anti-bullying programs are structured, and on the other hand, the historically defined ways of ‘doing’ learning predefine how justice can fit within that structure.

Both epistemic beliefs have merit, but the dichotomy presents a barrier to implementing justice programs. For example, the programs could be designed to focus on experience and not realistically fit into the structure of a school, or a more traditional educational structure could reduce the necessary expansive nature of sustainability.

The differences we find here are perhaps not surprising. At this stage, we had been working together for many months, we’d worked our way through the CBL encounters together, and we still clearly had different views—different epistemic positions—on the focus of the educational design principles. These differences prevented us from designing educational frameworks that would drive long-term change in justice programs—that is, the state of our inability to communicate our epistemic differences had made our attempts at development unsustainable and so was inherently unsustainable in and of itself.

We, therefore, needed to find a way to understand both epistemic positions; that is, we sought to cross these epistemic boundaries.

5.1. Stimulating Boundary Crossing

As educational designers and teachers of educational design, and notwithstanding our collective prior interest in theories of embodied learning, we began the work we have described in this paper because we were not able to fluently move the focus of our collective design practice into this medium that has been at the periphery of formal education. In discussing the phenomenographical analysis reported above, though, we have been able to see ways to be more fluid and to explore what for each of us, individually, have been qualitatively different conceptual approaches to our educational design task. This approach exemplifies the outcome of the boundary-crossing methodology we report in this paper.

Our technologist (pu) entered into our CBL encounters with a strong belief in storytelling and meaning making through technological tools. His previous work with digital applications had focussed strongly on students building their own technology, creating their own projects and producing their own stories. Through the CBL process though, his concept of the role of technology expanded. He saw that iVR was perhaps not a technology for abstracting experience to capture it in (educationally valued) text, but could provide new kinds of embodied, and therefore emotional experiences that represented legitimate learning about justice in its own right.

The concept of the role of technology also expanded for our historian (sl). For him, the CBL process drew his attention away from the technical side of working with the new and helped him to return to what he saw as ‘a historian’s perspective [that] emphasised emotional recollection and imaginary connection’. By engaging deeply with the virtual environment, as a participant, he observed he moved from thinking how to navigate students ‘through’ the space, and instead started to explore his own ‘historical understanding... sensitively... ethically... bodily’. The humanity of the encounter from this position the most salient aspect, with the technology positioned as ‘a virtual environment’ in which ‘realisation’ about justice came through role play, drama and imagination.

For our artist (bm), the movement has been in a different direction. Her engagement in our collective design practice has highlighted a need to use the signal systems of the iVR technology to guide student experiences of justice. She put the collective result this way:

So in a way we’re thinking about how we could have a scenario and think about a big idea, how we could implement a sequence of strategies that would encourage the participant to actually go through a complete journey around unravelling connections and understandings to emotions, as well as the narrative itself, because the narrative provides such rich and complex ideas to explore that gives everyone a voice to offer insight into their own experiences.

As a group of teacher educators teaching learning design with technology, we were finding iVR to be a blunt instrument and we were aware of our own lack of capacity to give due consideration to how mind, body and emotion work in combination. The frameworks for educational design with which we were familiar did not provide us with a path towards greater nuance that was necessary in teaching or developing justice programs [74]. The technology was not the limitation; instead, our own inflexibility and lack of understanding of the system within was unsustainable and created a rigid barrier to effective justice program design. In CBL and deliberative practices, we drew from phenomenography, however, we have found a framework that has enabled something new. We have found ways to move our thinking around a new technology away from the affordances of the technology, and instead to the embodied human practice the technology allows [75,76]. We have found ways to connect with both the imagination and the aesthetic domain [75,76], and to use the technology to engage in deeper authentic aesthetic experiences of justice [77,78]. We have engaged in a gestalt process through an embodied sensual experience that informs new knowledge and holistic understanding [79,80]. By the end of our journey, we became sustainable products ourselves because we understood justice and the role of

technology in teaching justice better. We conclude with a call for research informing still greater diversity of epistemic positioning in the education of teachers around emerging educational technologies.

5.2. Complexity of Sustainable Education and an Arts-Based Approach to Professional Learning

The definition of sustainability or sustainable education is somewhat ambiguous. Sustainable development is defined as that which ‘meets the needs of the present without compromising the ability of future generations to meet their own needs’ by the World Commission on Environment and Development [81], so professional learning must be designed to allow adaptability for the future. To teach sustainability requires a mindset that aligns with sustainability: that is, a mindset that considers problems as holistic, complex, integrated and nonfragmented [28,82]. However, this is at odds with the more linear, segmented nature of education institutions, where systems are traditionally broken down into smaller parts of ‘right answers’ to the detriment of understanding connectivity and cause and effect [82–84]. Sustainability then becomes a niche part of other subjects—particularly STEM—instead of a practice. This is incompatible with future-focused solutions where the problems are unknown and must be imagined [36]. This can prevent progress of the use of technology for achieving justice and peace, which may not be recognized within the scope of STEM.

It is clear, then, that simply upskilling teachers to utilize new technologies in a linear way only prepares teachers for current issues relating to technology and justice. It cannot adequately equip them with the skills to overcome future problems relating to sustainability because the focus is not on the future.

However, sustainability—both when considering justice and the environment—is inherently future-focused, so it requires an imagining of what is yet to come [36]. A purely scientific approach to professional development and using iVR may have the unintended consequence of reducing the complexity of sustainability to what can and cannot be proven. It is, therefore, necessary to take an intersectional approach and supplement a scientific approach with an arts-based approach, to envision what has not yet arrived. The focus of professional learning with technologies, then, must be on developing positive, future-focused attitudes towards critical and adaptable problem solving and citizenship through an intersectional framework [85].

It is exciting to explore the possibilities of an arts-based approach—underpinned by a scientific approach—to broaden the lens of what it means to ‘see’ futures and how technology may fit into it. The explorative, imaginative and emotional nature of this intersectional methodology may better align teachers with a changing world where they are continually adapting to unknown problems, within their personal school contexts.

In recognizing this, we framed professional development through the lens of CHAT, and sought a new approach to changing teacher attitudes to embrace more holistic, complex and adaptable pedagogy. Instead, we viewed teacher professional learning—much like the natural environment—as a growing, adapting system itself and explored how an arts-based methodology may create continuing change.

This research paradigm diverges from a traditional study precisely because traditional methods are insufficient in fully incorporating a holistic view of justice.

DBR projects like ours should offer a pathway to expansive learning that is critical to promoting sustainable education. It makes intuitive sense that, by bringing different people together to work on a significant problem, those people ought to be able to learn from each other and act as part of a greater sustainable system. It makes further intuitive sense that collaborative learning should be at its most effective when those collaborating bring different knowledges, skills and dispositions to the collaborative task. In the area of educational research where collaborative design occurs most frequently, however—the learning sciences with its ‘signature’ methodology of design-based research [86]—the evidence that the collaboration drives high-quality and sustainable professional learning is sparse. Indeed, reviews of DBR [7,8] show that the essential purpose of a preponderance of

DBR projects reported in the literature has been the refinement of the initial and dominant design conjecture. Even in contexts where the dual knowledge outcomes sought through DBR are absent, the use of design thinking in education has been critiqued [87] for a tendency towards reductionism that ignores the interconnectedness and complexity of implementing design knowledge.

For collaborative design and design-based research to achieve their potential in driving teacher professional learning that grows and adapts, however, greater theorisation of that learning is needed.

5.3. Sustainability of CBL as a Method for Expansive Teacher Professional Development

It is clear from our experience that CBL was effective in affecting epistemic beliefs, but the sustainability of such a protocol within a professional learning context requires further investigation.

CBL provides a more bespoke style of justice-related professional learning that can adapt to the specific school context in which the learning occurs [88,89]. However, this also means that the method may be more labour intensive to apply, and benefits from multidisciplinary viewpoints [88]. On the surface, this may appear to hinder the scalability of CBL, but these roles may be filled by the teachers in the program. First, teachers will already have varying viewpoints, and in bringing together, say, music teachers and physics teachers, these multidisciplinary ideas will be naturally filled within a CBL professional learning context. Further, teachers can participate in long-term, light touch versions of CBL through partnerships with phenomenology experts or universities, so the expected time commitments for professional learning may be less intense. Finally, as AI becomes more sophisticated, the phenomenological analysis may be supported within the school through technologically mediated professional learning communities, where teachers may collect a ‘video diary’ instead of a formal interview so multiple smaller CBL cohorts can participate in conjunction, or at various times throughout the school year.

In addressing the complexity of rapidly evolving technologies, it is clear that more traditional methods of professional learning were unsustainable due to the propensity to become quickly outdated [90]. However, CBL provides an opportunity to develop sustainable thinking skills, where teachers gain the critical and creative thinking to flexibly approach new technologies or justice programs. In particular, our experience highlighted the importance of viewing empathy as a necessary skill when addressing sustainability and justice, which is often absent from traditional methods of professional learning that are more oriented towards a technician style [91]. Targeted social justice professional learning experiences can cause reflexive self-awareness, so, when successful, this flexibility of thought could affect a teacher’s ‘mission’—their chosen purpose and goals for incorporating technologies—to better align with justice practises long term [92,93].

Regardless, further studies into how this methodology would be adopted sustainably in schools, and longitudinal studies to understand the long-term effects of CBL on pedagogies and program design are necessary for addressing justice program improvements at a wider scale.

6. Conclusions

In this paper, we have shown that Engstrom’s theory of expansive learning and the use of double stimulation has greatly assisted our diverse team in achieving entirely unpredictable—expansive—learning outcomes that are important for our own sustainable professional practice. We commend the use of CBL and phenomenography within design approaches to professional learning. Further, we argue in favour of an expansive investigation of these and other methods that might assist professionals in implementing the knowledge they gain through collaboration and design. Through this, we reframe sustainable education to highlight the importance of empathy and experience for justice.

Importantly for the possibilities of what iVR might be used to achieve, we learned that emotions play a key role in bullying and structure the relationship between the bully

and his or her victim and bystanders [94]. As such, many anti-bullying programs aim to explore not only the common elements of bullying behaviour but also the corresponding emotions produced by repeated harassment and empathy for those affected [95]. We noted that a major barrier to addressing bullying was the inability to communicate epistemic beliefs and develop the emotions and empathy to prevent bullying long-term. However, current professional learning does not provide a framework to develop this. The linearity of substituting an old technology with new, without addressing epistemic beliefs, is an unsustainable practice and form of thinking because it is not expansive [35]. However, CBL may provide a context in which empathy can be formed to better achieve justice.

The sustainability of such an approach at a scalable level requires further investigation. Nevertheless, we see here that expansive nature of our experience impacted our empathy and attitudes about justice, both in regard to the use of technology for sustainable education and towards designing anti-bullying campaigns. We see our experience with CBL, then, as a preliminary starting point to affecting teachers' attitudes about technology and justice in society.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/su16010095/s1>, Table S1: Underlying themes identified through phenomenology.

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