Cocreation across Spaces of Uncertainty

Interdisciplinary Research and Collaborative Learning

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ABSTRACT

Broad Vision was a program for art/science collaboration that adopted a model of interdisciplinary learning, teaching and research. It brought together students and tutors from art and science subjects to work collaboratively on emergent projects based around a different theme each year. In this case study, the authors discuss the critical success factors and learning gained from an interdisciplinary cocreated curriculum. This includes looking at how collaborative learning and working at the intersections of the disciplines enabled students to develop new knowledge and understanding in both their own and other subject fields.

THE BACKGROUND

Broad Vision was an art/science learning and research program that ran across the faculties of the Media, Art and Design program and the Science and Technology program at the University of Westminster from 2010 to 2015. Each year, the program brought together six tutors, three teaching assistants and approximately 30 second-year undergraduate students from disciplines including biosciences, contemporary media practice, illustration, imaging science, photographic arts and psychology. The program created an interdisciplinary space for collaboration and cocreation, as well as the exchange and exploration of different research and working practices. (See online supplementary file 1 for more details of the program.)

The scope of Broad Vision has offered many opportunities to look at the program from numerous positions [1,2]. In this case study, we explore the critical success factors for learning within an art/science program and the learning gained from a cocreated emergent curriculum. We focus on aspects of interdisciplinary learning and the role of the student as cocreator of the curricula.

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RESEARCH DESIGN

Throughout the five-year life of the program, a series of observations and semistructured discussion groups were conducted. The educational researcher focused on the physical environments, the range of teaching methods and the social interactions between students and tutors and students and their peers. During separate semistructured discussion groups with either students or tutors, participants' perceptions and experiences of working within this interdisciplinary and collaborative educational model were identified. Data was gathered by the educational researcher and the project lead from multiple sources, including weekly feedback on sticky notes, capturing students' reflections on their learning experiences at the end of scheduled sessions and students' critical evaluation of their learning at the end of the module. The authors conducted an in-depth qualitative analysis of all material collected to identify the critical success factors of the program and the learning gained from a cocreated curriculum.

INTERDISCIPLINARY LEARNING

The program encouraged interdisciplinary learning by introducing a core stimulus, such as the use of a microscope, a set of images or a theme—establishing a central focus for interpretation and exploration. This mode of learning created a liminal space, inviting students and tutors to synthesize methods and procedures (for example, an artist sculpting with scientific material), leading to unfamiliar working practices. This approach challenged preconceptions of the various disciplines involved and led to new ways of interpreting and representing the world around them. Furthermore, it introduced both artists and scientists to a new set of materials, enhancing individual practice by embracing working methods of the other disciplines. (See online supplementary file 2 for more detail of interdisciplinary learning.)

During the initial phase of the program, students from each discipline collaborated with each other to design and deliver a series of 30-minute "taster" activities. These intro-

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duced students to the ways of working in each other's discipline areas. For example, the biomedical science students ran a taster session exploring histological tissue section viewed under a microscope, allowing students from outside of the sciences to experience working in a scientific laboratory. Conversely, photography students introduced science students to the functions of a large-format camera in a studio. During this phase students became teachers, sharing their disciplinary knowledge, communicating to nonspecialists and reinforcing their confidence in their own disciplinary knowledge. Likewise, tutors switched roles, becoming learners, enabling students to take ownership of the learning process, as a science student commented: "It's really valuable to have the opportunity to try and teach others what you have been taught, [it] helps to condense and revise." The taster activities informally introduced students to a collaborative mode of learning, which established a foundation for their interdisciplinary learning.

A second set of activities encouraged students to share their initial thoughts and ideas in response to the theme set that year. Activities such as silent brainstorms and collaborative mind mapping created discursive spaces, inviting students to view ideas from different disciplinary perspectives. Tutors created an environment that encouraged openness and supported students in finding ways to articulate their thoughts to students from other disciplinary backgrounds, as this student comment illustrated: "There were as many interpretations, points of view, as there were people who took part. Each person's brain is wired up differently and although we can reach consensus, it is incredible to hear how someone else sees something." (See online supplementary file 2 for more detail on the pedagogic approach.)

Research project ideas emerged from the creative conversations, allowing students to self-organize into groups based on their common interests. Students further explored these ideas, making use of different tangible and online resources using information technologies to research and share artifacts with peers and tutors, rather than having a lecturer dominate the provision of knowledge. This approach to teaching, which begins with the student's experience, tallies with Lev Vygotsky's suggestion that the teacher ought to construct the learning environment so that the students teach themselves: "Education should be structured so that it is not the student that is educated, but that the student educates himself. . . . The real secret of education lies in not teaching" [3].

Students showed the merits of this mode of interdisciplinary learning by demonstrating a fueled sense of curiosity and motivation. Norman J. Jackson and Malcolm Shaw referred to such a notion in this manner: "the great engine of academic creativity is intellectual curiosity—the desire to find out, understand, explain, prove or disprove something or simply to imagine something different" [4].

Students looked for different patterns and meanings in the materials they were exposed to. Further benefits of this approach were the opportunities to expand one's knowledge base and develop confidence and openness in working across disciplines. The use of different disciplinary languages contributed to the development of enhanced negotiation and communication skills, as this photography student expressed: "Collaborating with a scientist has added new meaning to my work, and the process of sharing ideas and thoughts has enabled me to feel more confident working with others." Moreover, the experience of working in different ways, researching, capturing and presenting "data," exceeded the skills acquired within a single discipline, as a science student commented: "Today I saw evidence of how science and technology related to the real world. Studying theories is not enough; one should engage with people of different backgrounds and dare to explain the theory behind the living world."

Broad Vision enabled students to produce new knowledge during the process of experimentation by bringing together the unfamiliar and the untested. Students situated ". . . themselves within a pedagogical process, whose meaning and purpose they understand, production of knowledge is revealed not as something that is already discovered and static (i.e. dogmatism) but is uncovered as '*dynamic context of its own appearance*' " [5].

As one of the science students observed: "Felt very good today. Getting hands dirty, so careless. . . . It is exactly the opposite of my course, where, to start with, we wear gloves and more often than not, there is only one way, a right way, to do something."

This statement reflects on the traditional way science is taught: Students learn the rules and follow them, not break them. Scientific practical classes are usually designed so that experimentation results in predictable outcomes. Michael Brooks exemplifies this: "the politics of a curriculum which keeps to the rules and excludes elements of risk or imagination is about persuading us that science is safe" [6]. By encouraging science students to explore scientific materials and processes in an undefined way, Broad Vision changed the way in which science students looked at science itself.

Throughout the program students drew on the knowledge and expertise of each other, forming a "community of discovery" [7]. Through the collaborative process students learned how to articulate their own thoughts and communicate their disciplinary knowledge to a nonspecialist, helping to reinforce their confidence in the subject. Central to the collaborative learning process was the students' openness and willingness to explore different disciplinary practices and cultures. The program created a safe learning environment by building trust between participants and by using assessment methods that focused on the collaborative learning process rather than outputs. According to Helen Klebesadel and Lisa Kornetsky, a core expectation of such learning processes is the need for "experimentation and risk-taking with permission to learn from mistakes" [8]. In order to explore the world around them from a different perspective, students were encouraged to embrace the notion of "successful failures," as well as be comfortable with uncertainty. New meaning-making required students to collaboratively "develop fluency in multiple literacies . . . to be able to model, to experiment,

to visualize, to verbalize, to write, and to film" [9] through cross-disciplinary cultural exchange.

The program encouraged students to draw on the disciplinary expertise of others rather than attempt to master other disciplinary positions themselves. This is in accord with Laura J. Murray et al., who observed that successful interdisciplinary collaboration occurs when "work is produced not by one researcher foraging from other disciplines, or several researchers operating in parallel, but by several researchers together in collaboration, each rooted in specific knowledge and methodologies" [10]. Or as one of the psychology students expressed: "The benefits of interdisciplinary group work, however, is that each individual comes with unique knowledge in terms of theory, methodology and thinking style. I believe that this uniqueness offers the individual a particular role in the group, which is highly beneficial for productivity and sense of individual responsibility."

STUDENT AS COCREATOR

Recent educational literature has introduced higher education to various models of the student as cocreator. These include students as "change agents," "partners," "active collaborators" and "coproducers" [11–14]. While the models might differ from each other in their focus, they all place the student at the center of learning and teaching; they also share the common goal of giving students a voice in the design of their education to potentially transform student experiences.

The structure of Broad Vision facilitated cocreation between students and tutors at various stages. Each year students participated in early planning sessions of the program, generating the theme and developing initial activities for the week-by-week schedule. During the planning and delivery of the taster sessions, students generated content and teaching methods for the workshops. This ranged from creating health and safety instructions to setting up laboratories and studio spaces to preparing material and required resources.

The teaching approach adopted during the program was student-centered and interactive. This encouraged students' engagement and autonomy by using their ideas and creations as starting points for developing critical thinking and practice. This approach is echoed in Graham Gibbs's observations in regard to supervision of student projects: "The starting point is what the *student is doing*, not what the *teacher knows*. As a result, the relationship between teacher and student is profoundly altered. Students can find this change of relationship and roles—the shift from dependence to autonomy, and from an academic focus to a focus on practice—both exciting and disorienting" [15].

During the evaluation of the program by the educational researcher, students commented on how relationships and roles shifted. Arts students predominantly welcomed low hierarchy in their working with tutors and embraced the freedom to initiate and develop their own ideas. From this approach, another significant form of cocreation emerged, which was that of cocreating projects with tutors. For students to fully realize their ideas, the experience and expertise of the tutors were necessary, with the students requesting input rather than the tutor imposing it on the students. Many of the science students were less prepared for this form of self-directed study, as they were more familiar with instructive teaching methods, as this psychology student confirmed: "In . . . science, one must follow instructions and rules or their work is not valued and is considered meaningless."

The Broad Vision program's ethos of providing authentic learning opportunities for students led to students coauthoring articles, coediting books, cocurating exhibitions, coleading workshops for the public and copresenting at conferences and symposia [16]. The impact of these engagements on the student experience could not be better summarized than by this photography student: "I have never been part of an exhibition before, or had something commercially printed, or spoke at a symposium, or been included in a book. Not to be melodramatic, but that's life changing." For tutors the experience of working with students across a range of cocreated activities was incredibly positive and invigorating. The level of commitment from a student when invited to contribute to a real-life event, such as embracing the opportunity to collaborate with a scientist or artist in producing artwork for a public exhibition, exceeded the tutors' initial expectations.

The module tutors assessed the students' individual contributions to the collaborative project by producing a research journal and a critical evaluation, focusing on their learning gained through interdisciplinary practice. When collaborating with each other, students and tutors had to discover their own way of negotiating different research practices and disciplinary languages, as this art student's comment showed: "The difficulty for us all is not being able to use technical words, work as fast or even have a hugely ambitious project. Primarily this is down to the fact that we are working with people who know nothing or very little about our discipline. This, however, was also a benefit as I personally felt like I learned how to explain my ideas and the technical elements of our project."

Encouraging some students to be rigorous when documenting their research was a challenge. A balance had to be struck between how much direction to give and how much structure to impose while allowing students to take ownership of the process. The variety of documentation styles used added another layer of complexity to the assessment process due to the need to align different disciplinary styles to a single set of assessment criteria. (See online supplementary file 3 for more details.) Furthermore, tutors approached the assessment process from the perspective of their own disciplines, requiring careful moderation of grades. These observations are similar to those of Carl Gombrich:

> Interdisciplinary work challenges notions of rigour. On the one hand, it can generate new ideas, create new ways of working and generate new products which stand outside standard templates and procedures of assessment. And, by definition, it crosses boundaries so that established disciplinary experts may not know what they are looking at and be hard-pushed to say whether a piece of work is rigorous or not [17].

One of the criticisms of interdisciplinary practices is the depth of engagement with individual disciplines and methods. W.J.T. Mitchell questioned whether interdisciplinarity is "a grab bag of problems left over from respectable, well-established disciplines" [18]. This was reflected in the approach that some participants in Broad Vision took, who "played safe" by not moving outside of their field nor engaging with other disciplines in a meaningful way. In some cases, this led to unequal contributions when working on collaborative projects. However, when students embraced the risk of the uncertain terrain, the work they produced was enriched by its breadth rather than being diminished by a relatively limited understanding of disciplinary languages and tools.

CONCLUSION

In this case study, we have explored the critical success factors for learning within an art/science program and the learning gained from a cocreated curriculum. We focused on aspects of interdisciplinary learning and the role of the students as cocreators of the curricula, working in partnership with tutors, and how they switched roles between learner, teacher and researcher.

Broad Vision brought together participants from the arts and sciences to work collaboratively at the intersections of each of the disciplines. By having no predefined curriculum, students were expected to explore unfamiliar practices and territories. The cocreation of taster sessions at the start of the program opened up a space for collaborative learning, enabling students to explore each other's disciplines and engendering increased levels of curiosity among students. This departure from conventional curriculum design was critical to encouraging openness to new ways of working and challenging preconceptions when developing ideas for emergent projects during the creative conversations. This led to students self-organizing into project teams, enabling them to take full ownership of their learning. This process formed a foundation for cocreation of new knowledge and understanding, resulting in the production of novel artifacts that encouraged students to question their own practice and that of their peers.

The critical evaluations that students completed particularly emphasized the transformational impact of the learning gained from participating in Broad Vision. Reflections included consolidating one's disciplinary knowledge; learning to look at one's own discipline from a different perspective; using different disciplinary languages and developing enhanced communication and negotiation skills; developing confidence and self-awareness; embracing uncertainty; and being open to new forms of communication, new materials and working in new environments. This list of attributes confirms the value of the model of learning explored during Broad Vision and highlights how it prepares students for 21st-century working practices that are inherently multi-, trans- or interdisciplinary.

We hope that our case study has sown a seed of inspiration to consider how this model could be adapted to other disciplinary fields and intersections.

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