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A Case Study of Interdisciplinary Live Projects in Art and Chemistry

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Authors

Sam Illingworth

Megan McLean

Daksha Patel

Abstract

This article describes a set of interdisciplinary live projects that were carried out at Manchester Metropolitan University over the summer of 2014, between arts and chemistry undergraduate students. It was found that by working as part of an interdisciplinary team, the students were able to develop an understanding of the learning perspectives derived from different disciplines, thereby helping them to reflect on their own approaches to process and development. However, a number of difficulties also arose, mainly because of logistical and communication issues. By reflecting on the respective accomplishments and difficulties of the projects, this study provides a set of recommendations for interdisciplinary live projects, which should help the development and implementation of future schemes within higher education.

Introduction

The Royal Society of Chemistry had as its theme for the year 2014 the idea of Chemistry and Art. It was perhaps apt then that through the summer vacation period of 2014, Manchester Metropolitan University sponsored two sets of students to develop projects that looked at the relationships between the two subjects, attempting in the process to transcend the notion of Chemistry in Art, or Art in Chemistry, on which much has already been written (see e.g. Fink 1934; Berry 1999; Lerman 2003)

Two pairs of Art and Chemistry undergraduates worked to produce exhibition pieces that were to be displayed as part of a science festival. These collaborations formed a live project that was both a case study in interdisciplinary learning and an opportunity to assess student experience in an original and unique setting.

This article reports on the learning experiences encountered by the students, and also serves as a reference point for future interdisciplinary collaborations between both students and academic staff in higher education, as well as external stakeholders. Whilst the sample size is small, it is believed that the critical reflections, by the supervisors of the interdisciplinary live projects that are reported here will be of great benefit for any such future endeavours.

Live projects and interdisciplinarity

Live projects are where real-time, real-world, problems are used as educational tools (Gibb 2002). They are intended to allow the students to develop a solution or product for an actual client, and to provide the students an actual means of interaction with those clients (Chase, Oakes, and Ramsey 2007).

Live projects provide students with realistic situations, strict timelines, teamwork, written and oral communications skills (Tan and Phillips 2005). They also provide them with the experience of working with real clients with changing needs (Poger and Bailie 2006), and can both empower the students and also lead to employability (Chiles and Till 2004). Chase, Oakes, and Ramsey (2007) note that one of the biggest problems that face live projects are the access to data and materials, with other challenges including formalising the responsibility of the supervisory team and finding suitable projects that can be supported over an appropriate timeframe.

Interdisciplinarity generally refers to the appropriate combination of knowledge from many different specialties, especially as a means to shed new light on an actual problem (Brewer 1999). The benefits for interdisciplinary knowledge and partnerships are manifold, with Nissani (1997) outlining ten clear reasons to pursue this line of inquiry, including: bridging fragmented disciplines; helping to breach communication gaps in the modern academy; and the fact that ‘immigrants often make important contributions to their new field’. With repeated exposure to interdisciplinary thought, learners also develop more enhanced critical thinking ability, and an understanding of the relations among perspectives derived from different disciplines (Ivanitskaya et al. 2002). Potential barriers to interdisciplinarity include: different cultures and frames of reference; different

'languages' within the disciplines; and personal challenges related to gaining the trust and respect of those working in other fields and disciplines (Brewer 1999).

According to Lélé and Norgaard (2005, pp. 967):

> "Participants in interdisciplinary projects need to be self-reflective about the value judgments embedded in their choice of variables and models. They should identify and use a core set of shared concerns to motivate the effort, be willing to respect and to learn more about the other, be able to work with new models and alternative taxonomies, and allow for plurality and incompleteness."

Outside of the classroom, students working on interdisciplinary problems can apply these insights to a deeper understanding of the ways in which they approach problems (Ivanitskaya et al. 2002). Live projects can thus be considered a useful way of instigating and achieving interdisciplinarity between students from different disciplines.

Going live

As discussed in the introduction, the live projects described in this study involved two pairs of art and chemistry undergraduate students from Manchester Metropolitan University, working together to produce an exhibition piece for a science festival. The external client for the students was a museum, where the exhibitions were to be displayed on a specific day during the festival.

It is important to note that the work undertaken during these live projects were as paid six-week summer studentships, and did not form part of any assessment relating to the students' studies. The students were selected for these studentships using an interview process, in which they were asked about their interest in the two subjects, and also asked general questions relating to professionalism and collaboration.

After the students had been selected, the supervisors of the live projects (the authors of this paper) paired up the four students into two interdisciplinary partnerships. The pairs were then introduced to their partners and were given details of the meetings that had been arranged for them with the external clients. The expertise of the supervisors was also interdisciplinary in nature, and as well as being available to the students for advice and throughout the project, they also met regularly, both with the students (for progress reports) and without (to discuss how well the students were answering their original briefs).

Throughout the procedure the students were asked to write blogs in their pairs, to keep track of their progress and to reflect on their learning experiences to date. These blogs were made public, and so could be viewed by anyone with an interest in the interdisciplinary nature of the projects. The supervisors also used them to monitor progress and to form the basis of future discussions in the progress reports.

The progress reports themselves were fairly unstructured, with the supervisors meeting beforehand to determine a loose agenda and issues that needed to be addressed. The students were also made aware that this was an opportunity for them to ask for help and guidance, as well as to report on their development. These progress reports were held on an approximately fortnightly basis, and lasted between one and two hours in duration. The supervisors were also available throughout the period via email or phone, and were able to respond to any comments or questions efficiently.

During the first few progress reports, the students were asked to relate their experiences to date, and to explain what their plans and ideas were for the exhibition. In these early progress reports, both pairs showed good progress in working together to produce an innovative design. This was also evident from their blogs, which demonstrated good reflective practice, i.e. a consideration of both 'seeing' and 'action' to enhance the possibilities of learning through experience (Loughran 2002). In these progress reports, the supervisors were also able to deal with any issues that the students had and to help facilitate encounters and experiences with other experts across the two disciplines, in order to help, inspire and enthuse.

As the students progressed in their projects, it was clear that the two pairs were both experiencing issues relating to materials and space, and that one of the pairs was also having problems with effective collaboration.

Regarding materials, there was a very limited budget for the students to work with, which was in contrast to some of the students' proposed ideas that involved expensive processes such as the use of corrosive dyes and hydrophobic substances. Where possible the supervisory team suggested alternatives means of achieving similar results, but budget constraints were a problem that the students had not experienced in their academic careers to date. In hindsight, more could have been done to make the students aware of the budget constraints, and to have shared accessibility, as this interdependence or shared responsibility between instructor and student is an essential part of the educational process (Sierra 2010).

Concerning the issues of space, there were sometimes access issues regarding the Manchester School of Art and their workshops, and initially there were also issues regarding a space in which the students could work, and store their equipment and materials. This latter issue was eventually resolved, but throughout the project the students were not able to use the spaces in the Manchester School of Art as they had wished. In hindsight, this was an oversight of the supervisory team, as due to the summer vacation, there were fewer technicians available to supervise the students, and also there was not an existing protocol in place for public liability insurance regarding undergraduate students working outside of term time.

The effectiveness of the collaboration between the students was notably different for the two sets of pairings. Whilst both sets of students learnt to deal with some of the uncertainty and contingency that live projects can present (Sara 2006), one pairing proved to more adept. From the progress meetings and through talking to the students, it became clear that this greater

competency was because of their willingness to collaborate and to focus on similarities rather than differences. It was also the case that the pairing that fully embraced the use of reflective blogs as a learning tool, was also the pairing with a more effective collaboration. This further strengthens the argument that blogs can be used to help foster effective collaboration between students (see e.g. Imperatore 2009).

Towards the end of the project there arose two major difficulties that proved to be insurmountable. The first of these related to a complete breakdown in communication between one of the sets of pairings, whilst the other concerned the relationship with the external client.

Throughout the live projects, the external client had made it clear to the students that this was to be an autonomous process, and that they would be adopting a very hands-off approach to the development of the exhibit. It was then somewhat surprising when the client made contact with the supervisory team a week before the exhibition date to say that they were cancelling the exhibition because of a lack of contact from the students. This turn of events was unfortunate, but thankfully an alternative venue was found that enabled the students to still display their exhibitions as part of the science festival.

This breakdown in communication between the students and the client was an unforeseen complication, as during the progress meetings the students had told the supervisory team that everything was going as planned, and that the requisite contact had been made with the external client. Speaking to the client and the students individually, it became apparent that this whole series of events could have been avoided if the external client had been invited to take part in at least some of the progress reports. This was an oversight on behalf of the supervisory team, and is something that will be a requirement for all future projects of this nature.

Regarding the breakdown in communications between one pairing of students, things reached such an impasse that they were unable to produce a final exhibition piece; this was despite interventions from the supervisory team. Reflecting on the projects, and after speaking to both of the individual students, there were two main reasons for this outcome. One was the fact that the two students had to live with their families (i.e. away from Manchester) during the summer vacation because of financial issues, and the second was because of a clash of personalities. The more successful pairing also experienced this first issue, yet they found a work around via communicating digitally and meeting up when the occasion allowed. Regarding the clash of personalities, this is something that could have been avoided, by involving the students more during the selection process, for example by running an assessment centre, in which the students could interact with one another.

Whilst the students were not being assessed for any of their work, the pairing that worked the most effectively together were also the pairing that appeared to have the greatest sense of ownership in relation to their project. By not assessing the students, there is a chance that they did not work as proactively as they might have done for an assessed live project. As noted by (Hargreaves 1997, pp. 401), ‘Teaching, learning and assessment are inextricably linked and

assessment is the most significant motivator for learning.' Whilst the students were paid a stipend to support their work over the summer vacation period, it is thought that this was not motivation enough, and that future live interdisciplinary projects should be linked to accredited units within the students' degree programmes, or extracurricular activities. In order to increase the sense of project ownership in the student participants, perhaps more decision-making roles in terms of management (see e.g. Stefanou et al. 2004) could have been given to the students, for example by asking then to set more formal agendas for the progress reports.

Kolb (1984, pp. 38) defines experiential learning as, 'the process whereby knowledge is created through the transformation of experience,' and one of the major strengths of this project is that the students have had the opportunity to both share independent knowledge, and also create it together, collaboratively. Through the reflective blogs and progress reports with the students, it is evident that the experiences of working together has had a profound effect on their understanding of collaboration.

The progress meetings with the students involved some very interesting and lively interdisciplinary dialogues, in connection with similarities and differences between the two subjects and the language and terminologies used by different systems of knowledge. For example something that was constantly discussed throughout the process, both by the students and the supervisory team, was the concept of 'failure', with the art students initially being more ready to accept that this was a necessary part of the design and delivery process. Outside of academia, organizations are widely encouraged to learn from their failures, but it is something that many individuals still find difficult to implement (Cannon and Edmondson 2005). By exploring the nature of failure, in particular collaborative failure, at this stage in their academic development, it is hoped that the students will be better prepared for innovative thinking post-university.

This type of interdisciplinary live project evidently got the students to really start thinking about not just their discipline-specific subjects, but the philosophical implications of their desired approach, and how their field of expertise had an influence on, and was influenced by, the outside world. Some of these thoughts and opinions were recorded in the blogs, but more could have been done to document the process, for example by capturing some of these discussions in video and/or audio format.

Recommendations

Based on discussions with the students involved in the projects, as well as the external clients and the supervising members of academic staff, the following five recommendations are made for future interdisciplinary live projects:

1. The students should be involved in the group-matching processes. These could be run as a focus group, or as part of a more formalised selection process.

2. The project should begin with the tutors and students visiting all of the locations in which the students will be working (both internal and external to the university) together.
3. The supervisory team should secure the internal spaces for the duration of the project, and determine definite times for access to any spaces that are external to the university, where appropriate.
4. The external clients should be involved in the progress reports that take place throughout the projects.
5. The students should be encouraged to record everything that they do, via a range of multimedia.

Conclusion

Interdisciplinary live projects are highly challenging to both the students and the supervisory team. Through the experiences that were encountered during the projects discussed in this study, it is vital for effective communication between the three parties (students, supervisory team, and external clients) to occur throughout.

By working as part of an interdisciplinary team, the students were able to develop an understanding of the relations among perspectives derived from different disciplines, and to reflect on their own approaches to process and development. Working as part of a live project exposed them to having to deal with personnel from outside of academia, and whilst the original brief was not met, they were still able to deliver an exhibition piece for the science festival.

Despite the difficulties encountered, this project has helped to form a best practice framework within MMU, from which future interdisciplinary collaborations between art and chemistry undergraduates, and also the academics, will, and in some cases already have, spring forth.

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Sam Illingworth

Sam Illingworth is a lecturer in science communication in the School of Research, Enterprise & Innovation, at Manchester Metropolitan University, UK. His research includes investigating the relationship between science & poetry, and how theatrical technique can be used to improve effective communication skills. Sam Illingworth, School of Research, Enterprise & Innovation, Manchester Metropolitan University, John Dalton Building, Chester Street, Manchester, UK, M1 5GD, 0161 247 1203, s.illingworth@mmu.ac.uk

Megan McLean

Megan McLean is a senior lecturer in analytical chemistry in the School of Science and the Environment at Manchester Metropolitan University, UK. Interests include broadening the skills of undergraduate chemistry students by offering activities that interface with industry, schools, local community and other subject disciplines. Megan McLean, School of Science & The Environment, Manchester Metropolitan University, John Dalton Building, Chester Street, Manchester, UK, M1 5GD, 0161 247 1413, m.mclean@mmu.ac.uk

Daksha Patel

Daksha Patel is an AHRC-funded Fine Art practice-led researcher at Northumbria University. Her practice and research engages with the medical body. She exhibits her work both nationally and internationally and is currently undertaking a residency in brain imaging at the University of Manchester. Her recent commissions include new work for the Wellcome Trust 'Brain: The

Mind as Matter' exhibition, and 'Cravings' a touring show from The Science Museum, London. Daksha is an associate lecturer at Manchester Metropolitan University and a visiting lecturer at the University of Creative Arts, Surrey. Daksha Patel, Northumbria University, Faculty of Arts, Design and Social Science, Room 123, Lipman Building, Northumbria University, Newcastle upon Tyne, NE1 8ST, +44 (0) 191 227 44936, daksha.patel@northumbria.ac.uk

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