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Uncertainty, learning design, and interdisciplinarity: systems and design thinking in the school classroom

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1. Introduction

This paper explores aspects of learning design for design thinking within a small (circa 100) remote rural secondary (12-18 year old) school in the Highlands of Scotland.   It introduces action research school teachers and final year (17 -18 year old) pupils which explored how "real world" learning experiences can be brought into the classroom. It does so by joining two areas that are often treated as distinct practices. These are, the use of system theory and community development approaches to identify and map complex issues (Bell and Morse 2012), and the use of ideas from co-design to include non designers in the design process (Sanders and Westerlund 2011). The paper takes a grounded approach to the application of these ideas, simply asking "do they work", and then "what", "how" and "why". In exploring those questions the paper tries to be open and transparent about learning design as a messy, uncertain and emergent process.

2. Background Context and Approach

This pilot arose out of a series of conversations with teaching staff in the school who were concerned about how they might introduce interdiscplinarity approach emphasised within the Scottish Governments Curriculum for Excellence (CfE). Interdisciplinary is a particular challenge for schools once pupils begin to specialise[1]. The pilot explores how schools might meet this challenge. Specifically the approach looked at the application of systems approaches like "rich pictures" to solving complex problems and how together with design approaches it might encourage a more holistic approach in education. The idea of joining these two areas as an educational experience stemmed from the observation that they are often treated as distinct, but were clearly related. Joining these means participants identifying the issues and design challenges and then developing solutions that address the issues they identified to create a more rounded and empowering educational experience. The paper uses the authors reflection, diaries, and the textual and visual outputs from the pilot to explore application of these tools and their usefulness of the approach as a learning experience for pupils and educators alike.

3. Scenario, Planning, Developing a "Design Brief"

The pilot ran for 8 weeks. It featured 8 face to face sessions, the first two over two lessons (45 minute) the remainder over one lesson. 17 pupils took part. After a short session on how to use "rich pictures" (Bell and Morse 2012) in three groups they were then asked to explore issues around "rural futures", and "rural challenges for young people".   While the design of the programme aimed to be as open and responsive as possible, these open practices often require long term engagement (Bjogvinsson *et.al* 2012), for example recent work with social housing tenants (Macintyre 2013) highlighted the importance of grounding these co-design practices in peoples everyday experiences.

The rural context meant a familiarity, and their expertise would be valuable and valued. In

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1   Based on attendance at a series of Government organised events on CfE and STEM subjects and subsequent meetings with teachers and Government officials.

many ways their were no surprises, connectivity was seen as key, though perhaps with a subtle shift. Digital connectivity was about mobile phones and internet on the move more than fixed access points in the home, and physical connectivity was about public transport, inter-village connections and trip chaining to urban centres. One theme that come out strongly was around rural demographics and the lack of young adults in the area, as part of their present social circle, and as a examples of what people might do if they returned to the area.

Based on the outcomes of the initial workshop and in consultation with teachers and pupils these three themes were then turned into design briefs for the teams. For each a pack was produced with background to the issues, additional resources about the issues, and guidance on how to approach them as a design problem. During the initial session pupils had been asked to fill in a short survey about their personal, academic interests, and future plans. Based on the survey, the teachers knowledge of the pupils, and the authors lack of knowledge pupils, they were allocated into groups. The intention was to mix peoples interests and skills in teams and then through the process of working on a design problem allow them to use existing and develop new competencies in a group setting. Once put into groups they were asked to select a design brief each team selected one of three blank white envelope. After some input over a double period on design thinking, the design process and time to ask questions and clarify the brief they were "put to work". The object was to work through the design cycle as far as a prototype solution.

4. Emerging Curriculum and Uncertainty
The pilot is about design practices , it is about introducing design thinking in the school, and about learning in for and through action (Kangas *et.al* 2013). Thus, the use of "rich pictures" was about introducing and learning about new techniques for the pupils, as well as exploring ideas. The emergent nature of the themes meant we were not able to prepare theme related content in advance. The transport group decided to collate the local travel information together online and to create a social hub for lift sharing. They wanted to develop an app to support this. While they were able to collect the data about local transport, and think through the safety implications of lift sharing, they needed help on how to develop their app design, for example input on "wire-framing" used to develop user interfaces for websites and mobile devices. This meant curriculum content emerged, and the identification and responsibility for content shifts, to being a co-creation between pupils and facilitators. Thus it was also about learning for the facilitators, who through learning (teaching staff) and applying (the author) these tools acquired new competencies themselves. One of the key learning points for teachers seems to be dealing with uncertainty.

In tertiary education it is common for educators to create spaces for independent inquiry, spaces that are explicitly about uncertainty (Mor *et.al* 2012). In secondary schools the norm is to resolve uncertainty and it was noticeable (and teaching staff noted themselves) that if they felt the pupils were uncertain they sought to provide solutions and clear direction to them. For example, the team exploring the attractiveness of the area to young people had a complicated and challenging brief. It was tempting to steer participants towards particular solutions, so that pupils could feel like they had achieved something. A temptation that was resisted even though it became clear that the team may have nothing to present in the final session. Standing back and being responsive places a great deal of pressure on the facilitators, not just to provide content "on demand", but also non intervention. Later conversations about this highlighted the role teaching norms around "good outcomes" and perceptions around parental pressure that pupils "should know what they are doing" had on teachers management of uncertainty.

5. Teams and Outcomes
The use of systems approaches like "rich pictures" were useful in identifying and later

refining the issues, likewise diagramming techniques were used to explore particular areas in more detail. Participants also found experience approaches like persona's and storyboarding as they worked on the design stages. However, two of the teams struggled to move from the ideas and development stage to the selection of an idea, and onto a prototype solution. They became caught in a creative loop, constantly revisiting ideas and contesting solutions. This appeared to relate to the relationships between group members, at the start teachers were confident that pupils knew how to work in groups. However, it became clear that we had not been explicit about group working. The freedom within the exercise led to issues, with some participants uncomfortable and seeking the familiarity of school structures, and others using the freedom to absent themselves from the process. In addition, as "the deadline" approached tensions arose as some team members started to look at the outcomes. As a pilot it was supposed to be about process, about skills and new techniques, not outcomes. However, schools are about outcomes, and this would not be a learning journey if everyone did not learn something. On reflection the pilot ought to have paid more attention to group dynamics and future iterations needs to explore how we build teams through the process. It is also clear the process focus of the exercise needs to be more explicit, while also sensitive to the needs of participants for an outcome.

6. Conclusion

This loose approach might appear to be at odds with traditional named approaches to curriculum development and design, where learning providers tend to emphasise the structure and certainty, neglecting the messy, imperfect and emergent properties that n characterise education as practice. This paper has attempted to be open and honest about these practices. The approach allows users the space to identify complex problems and then work on them as design briefs appears to provide a rounded educational experience that allows people to express existing and acquire new skills. However, the uncertainty places pressure on facilitators and participants. School staff, more used to the delivery of set curriculum and being the experts, found it difficult when they did not know, and were effectively co-inquirers with the pupils. While some pupils enjoyed the autonomy, others found it difficult, and were looking for the certainty found in the normal school day. They were also looking for outcomes, while the pilot was about process, the push towards outcomes was hard to resist, placing pressure on teams and facilitators to "produce something". Alongside this was the authors own uncertainty, having never worked in a school, or brought these aspects together in this particular way. It was a learning process for educators as well, teaching staff plan to apply similar approaches in their classes, and the author has learnt about the importance of uncertainty. In many ways the pilot is itself a prototype in learning design, and awaiting its next iteration.

7. References

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