Design thinking and Systems Engineering in the course design process

Dan Trowsdale

Project Overview

The project explored the use of creative approaches to module design such as Design Thinking, Human Centred design, Systems engineering, Flow and Play (Plattner, et al, 2008, McKay, et al 2021, Csikszentmihalyi 2020, Brown 2008).

My initial research started with exploring the new product development process can be applied to course design. I overlayed one of the simplest of design processes, the design thinking process, to course design. Empathise, define, Ideate, prototype, test (Brown 2008,). This immediately highlighted difficulties in several specific areas, empathy with the users (students), visualising a course design beyond the module description and importantly how to prototype designs for testing.

I initially explored ideas of how physical prototypes could be built by staff or students as co-designers,

Firstly, I adapted Lego Serious Play® (James, 2013, Gauntlett, 2014) as a way of including staff and students in the co-design of courses. Literature on students as partners (Bovill & Bulley, 2011) and students as agent for curriculum change underpinned this approach.

Lego Serious Play for students as co-designers of modules.

Lego Serious method is well established as a tool to develop business strategy (Roos & Victor, 2018) and there is growing interest for use in education, but it has not been applied fully to educational strategy or course design. I identified and explored Lego Serious Play® (LSP) as an accessible way for non-designers to build physical prototypes as representations of course structures. LSP uses bricks as metaphors and is based on the power of creative flow and play. I devised a process to test the LSP method and persuaded module leaders to let me test my process on their modules. I asked small groups of students to reflect on an existing module by creating a physical Lego model representing their experience of the module. When students are asked to explain their model, I found that they can deliver rich reflective stories of their lived learning experiences. Once this 'module review' is shared with the group, each student builds an improved module design. The final stage is to combine ideas into the perfect module design. Notably these new designs are typically not structured around a teaching structure, but around learning, so take on unique structures and formats. By sharing photographs and audio recordings of the module reviews and new designs, staff gain new insights from a student (user) perspective.

My LSP sessions have created many examples of student focussed insights. Some very simple and some complex. One simple example of improving a discovery course was adding MCQ's early in a course to check learning. Then adding group work later in the module to build peer-to-peer discussion to reinforce learning. Although simple and relatively obvious changes to the students these changes were very easy to implement. The module leader stated that these student-focussed changes,

"became very useful, particularly during covid, when the formal structure of timetabled sessions was removed alongside a need to remotely engage students in their learning without the field trips".

I am now a regularly invited speaker to explain the use of LSP in education as part of our PGCAP as part of our internal staff development function. Several staff have also purchased Lego for use in their own teaching. In 2019 I was invited to demonstrate the method with our Partner University South West Jaiotong University in China. One attendee said the process, "revealed timings to deliver better language support during a project." And in 2022 I was invited to run a workshop with the Dahlem Center for Academic Teaching at the Berlin Friei Universität - the team, "plan to using Lego Serious Play for their re-design of the institute's interdisciplinary North American studies curriculum."

Berlin Lego® Workshop website link here

It also happens to be a lot of fun and therefore a great way to build teams developing courses together.

If you would like to know more about Lego Serious Play® please have a look at my website pages here or do contact me to discuss running an LSP course design workshop for you d.b.trowsdale@leeds.ac.uk

Prototyping curriculum alignment using visual thinking and systems engineering

The second output from my LITE fellowship was the design of EdVee, a visual course prototyping tool I designed to enable staff to visualise the pedagogical design of an existing or new course based on curriculum alignment (Biggs & Tang, 2011)

This tool is underpinned by systems engineering. The tool creates diagrammatic prototypes of curriculum alignment early in the course design process. The EdVee was initially designed to support staff to collaborate on course design, specifically for online platforms, but has now been applied to face-to-face modules. Modules in Higher Education (HE) have historically been designed by sole module leaders, whereas online and blended modules often involve multiple contributors such as a learning designers, editors and technical staff. Perhaps due to the added complexity of hybrid and blended approaches it is becoming more

common to have multiple staff in the process of module design. This means that tools which support collaboration in teams, such as EdVee, will likely become more relevant and important. Prototyping, particularly early in the design process is recognised as a critical aspect of the product design process to gain input from multidisciplinary stakeholders and users (Shrage,1999) The main aim is to create a focal point for testing of ideas and also dialogue between design team. In course design this is a challenge, how do you build a prototype? In very basic terms EdVee is a one-page visual prototype to test curriculum alignment, a visual module descriptor. Module designers populate the EdVee in four areas; Intended learning outcomes (LO's), Content, Assessment and Learning activities. By using visual links it quickly becomes clear if all the elements are constructively aligned. Grids used for this purpose usually have only align two elements not four. They also do not include conceptually splitting learning and teaching. Such issues of non-alignment have a massive impact on the design for learning so a prototype which highlights them early the process has been shown to be very valuable, particularly in forcing the course designers to talk about the design, focus on the LO's and perhaps rethink them.

EdVee framework

EdVee has been used in the Leeds University Business School to restructure five flagship modules and is currently being used by the University of Leeds Learning Design agency as part of our 10 year long 'Curriculum Redefined' initiative. Some learning outcomes have been found to be entirely not taught or addressed. Cathy Malone, an experienced Academic Development Consultant and part of the UoL Learning Design Agency asked to use EdVee with academics to support the design of creating several modules as part of a new online MSc. Following a number of design sprints using EdVee as a design and presentation tool, Cathy said,

"EdVee provides a holistic view….something concrete and tangible to build and share early in the design process… useful to visualise the overriding constructive alignment……… it highlighted the distinction between the content and the learning journey for the staff…….it was very useful to having something to point to enable a focussed dialogue on pedagogical issues".

As a result, many learning outcomes were significantly enhanced, new learning activities were implemented and assessments adjusted to better reflect on the learning.

Paper explaining EdVee (published 2023) by Dan Trowsdale and Alison McKay linked here

Link to EdVee video linked here on Dan Trowsdale's website www.dantrowsdale.co.uk

https://dantrowsdale.co.uk/edvee-design-tool-course-prototype-and-diagnostic-tool/

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