



T-shaped individuals

Photo: Mark Bailey

Working at the edges

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Abstract

In this short article, the author explains how approaches to programme philosophy, curriculum structure and assessment design have liberated students to work creatively at the edges of their disciplines where they intersect with others. The article outlines the development of a Masters programme in Multidisciplinary Design Innovation.

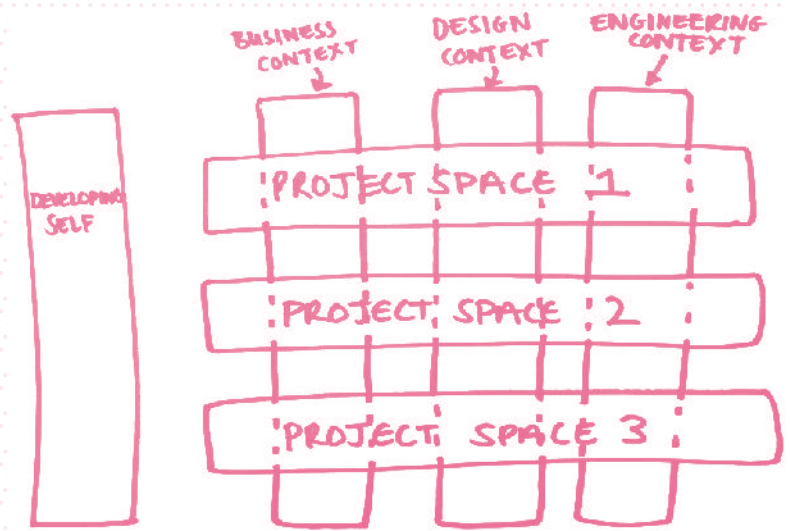
Background

In September 2007, three schools at Northumbria University (School of Design, Newcastle Business School and The School of Computing, Engineering and Information Sciences) came together in response to industry and governmental drivers which indicated that the development of a post-graduate innovation programme bringing together graduates of design, business and technology could yield a very rich learning experience and create graduates with valuable, relevant innovation practice skills. The development team decided to build the programme around the principles of 'Design-Thinking' in response to an emerging understanding of its potential value as a multi-disciplinary activity, developed and reinforced through a series of under-graduate pilot projects, and the 'Cox Review of Creativity in Business' (Cox, 2005). Design-Thinking is an approach to viewing business and organisational situations from a more interpretive perspective than that of traditional business analysis (Lester, Piore and Malek, 1998). To be truly effective, it relies on collaboration between activists typically, but not exclusively with specialist knowledge of

design, engineering technology and business, who are comfortable working with and have an understanding of, complementary disciplines. Such individuals have been described as 'T-Shaped' (Leonard-Barton, 1995) - they have deep knowledge of one subject (the down stroke of the 'T') and broad experience and understanding of other disciplines (the cross-stroke). Tim Brown, CEO of IDEO and Visiting Professor at Northumbria University states that T-Shaped individuals are 'not to be confused with a 'jack of all trades', T-shaped people have a core competency, but can easily branch out. And they possess curiosity, empathy and aren't afraid to ask why' (Brown, 2007). These people work around the edges of disciplines.

Pilot Studies

During a period of eighteen months, a series of six week projects were undertaken in collaboration with Lego, Hasbro, Unilever and Philips. In each case, a team of students of mixed disciplines worked together to understand and map a problem-space (identified by the client). They then defined a solution-space before focussing on a particular opportunity outcome. The range of projects included incremental-innovation opportunities represented by the Lego and Hasbro projects through radical Philips work to truly disruptive work with Unilever. The studies confirmed stereotypical view points of how different disciplines may behave. They showed that design students were more (but not completely) comfortable with the ambiguous aspects associated with 'phase zero' problem-space exploration and early stage idea generation. They would only commit to a solution when time pressures dictated that this was essential in order to complete the project deliverables on time and they were happy to experiment with, and develop, new methods without a clear objective in mind. In contrast, the business students were uncomfortable with this ambiguity and were more readily able to come to terms with incremental innovation projects where a systematic approach could be directly linked to an end goal. The technologists, were more comfortable with the notion of the



An early concept sketch for the programme structure

ambiguous approach leading to more radical innovation, but needed to wrap this in an analytical process that grounded experimentation. Meanwhile, the designers were unclear and unprepared to be precise when it came to committing to a business model.

As well as reinforcing knowledge of how each different discipline approaches a given problem, the pilot projects revealed three key insights;

Confidence – In order to express themselves and their disciplinary expertise or to question that of their peers, participants need to develop confidence in themselves, their knowledge and approach.

Language - Significant potential for misunderstanding to arise can result from the specificity of meaning attributed to key terminology as it relates to the different disciplines.

Ambiguity - A third observation was the challenge of dealing with the inherent ambiguity in exploring projects with a more disruptive intention where the scope of exploration is less clearly defined.

Three guiding principles were derived from these insights. These were used to shape the programme;

- To create a physical and mental (curricular) environment in which experimentation and creativity would be nurtured
- To develop a community of practice in which a 'common language' of practice would be established
- To promote shared values by developing confidence through self-awareness in pursuit of collaborative learning.

The designed programme

The programme is designed to be three semesters long, delivered on-campus over one year. It involves a multi-disciplinary cohort of students working under the guidance and teaching of a multi-disciplinary team of academic staff, each with expertise in their own field. Students take contextual modules in the complementary subjects; 'Understanding the Business Context, Understanding the Technology Context' and 'Understanding the Design Context' (see above). These run through the first two semesters and make the connection between theory and practice, increasingly exposing students to the language and practices of the host discipline.

Problem based learning is fostered through three, semester-long, modules involving Familiarisation Projects (Semester 1), Experimentation Projects (Semester 2) and Integration Projects (Semester 3) through which students working in multidisciplinary teams explore problem and solution spaces. These are large modules allowing students (and staff) the freedom to explore collaboratively through a series of externally linked Projects. This will be with commercial, public-sector and third-sector organisations. As students progress through the semesters, the client voice in their projects increases in volume; in the first semester as they learn to work together, projects are initially internal, based around personal projects and theoretical models. In the second, they work as teams but with a number of external clients working with the whole cohort whilst in the third, each team of three or four students has a client to manage themselves. This approach addresses key insights from the pilot studies; students are initially given a 'safe environment' in which to orientate themselves to the demands of multidisciplinary working and to develop the self-awareness necessary to separate 'self' from 'team'. As their awareness develops, so does the role of the client in their work until, in the final semester, they are able to focus much more on the project than on team behaviour.

From the outset, acknowledging the fact that innovation really happens when individuals work at the edges, there was the expectation that students would work outside their comfort zone. Therefore, the programme has adopted a strong self-reflexive approach. Students engage in the module 'Understanding the Interdisciplinary Self' spanning two semesters. This allows them to relate their project-based experiences to a theoretical framework so that they may understand where they fit in and how they can contribute to the multidisciplinary team. This strand feeds into their Design-Thinking Thesis in which they explore and define this position during the final semester.

Promoting Experimentation

The underlying principle behind Design-Thinking is that experimentation through visualisation, prototyping and 'telling stories' can bring clarity of focus to identifying problems and opportunities and developing emerging ideas (Young, 2009 and Young, Perzzutti, Pill & Sharp, 2005). It provokes an emotional as well as rational response allowing ideas to be generated, tested and evaluated more rapidly and to be more closely tuned to the end users' requirements. Whilst the >>



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approach is well established in commercial new product development practice it is increasingly proving to be very successful as a means of determining and making tangible business and technology strategy (Kimbell and Seidel, 2008). Organisations who successfully undertake practice in this way encourage uninhibited working where 'failure' in pursuit of success is recognised as a necessary part of exploring the boundaries of what is desirable, feasible and viable. Tom Kelley of IDEO suggests, 'fail early and fail often to succeed sooner' (the company's motto). In this way, disruptive, rather than simply incremental, innovation is promoted.

In order for true creativity to flourish, participants need to operate free from inhibition and confident that their contribution will be valued. Through committed engagement in a creative, explorative activity, deep learning is achieved and new opportunities can be discovered and a new self-confidence is developed. Essential to ensuring this is establishing a community where understanding is nurtured and freedom to experiment, 'fail' and create is celebrated. The programme is built upon these principles and a recognition that it must support the potential for what Toni-Matti Karjalainen refers to as 'creative abrasion' through which a deeper understanding is achieved (Karjalainen and Salimäki 2008).

Liberation by assessment

Encouraging students to adopt a more creative and experimental approach in their studies requires a shift in emphasis; supporting experimentation and growth rather than rewarding the delivery of 'safe' (or 'right') solutions.

Reviewing the assessment for learning strategies of the three contributing schools, identified that summative assessment through written assignment and examination would be the predominant experience of the Business and Engineering students, whilst the Designers would have more experience of assessment through project and written assignments. Additionally, comparing the engagement and outputs of students undertaking graded and non-graded undergraduate design project modules, it was apparent that students were far more likely to pursue more creative approaches when undertaking the un-graded modules.

The assessment and feedback for learning for this new Masters programme therefore needs to take a supportive role. To this end,

the programme is designed with the first two semesters un-graded thus promoting the development of self-awareness and confidence to participate. These semesters are simply pass/fail. Using the self-reflexive approach described previously, students become aware of the strength of their contributions and where they can afford to take risks in pursuit of the project objective and how to take best advantage of collaboration. This approach is supported by the likes of Winkel who states:

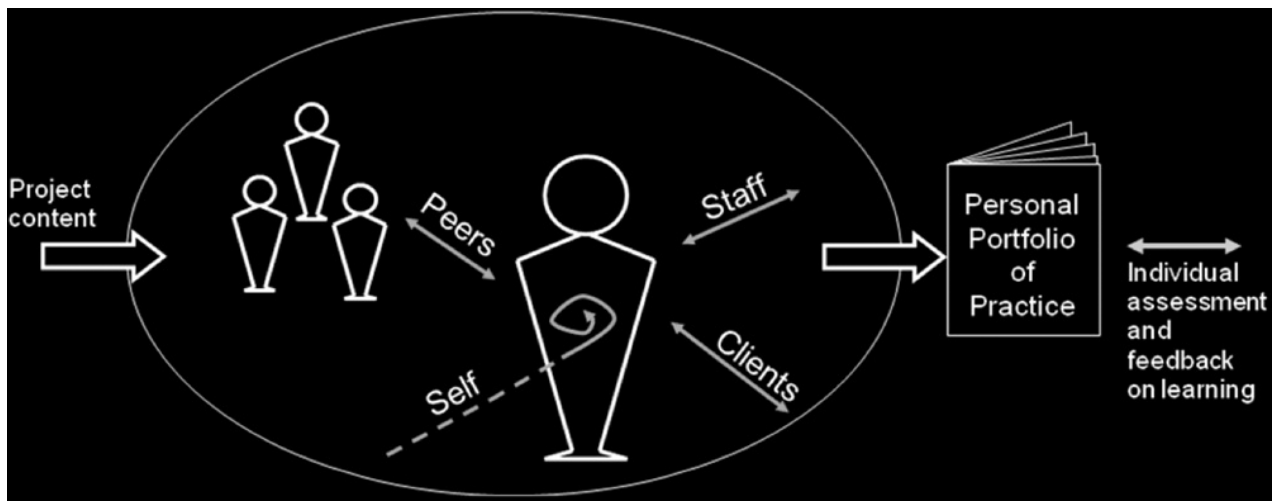
formative assessment takes place in the interaction among students and between students and teacher. Basically, the students "expose" their unshaped ideas and strategies, get feedback from classmates on their ideas, hone their articulation, and reject false notions. In so doing they clarify and move to a higher level of development. Observing and interacting with students who are going through this problem-solving process is an excellent way for the teacher to assess what students really understand (Winkel, 2006).

What is essential is that the academic structure is supportive enough to encourage this 'exposure', particularly in the early days of the cohort forming. A model of 'collaborative learning' is promoted through the project modules. Boud (2001) in summarising Bruffee's definition of collaborative learning, identifies the stuff of collaborative learning thus:

Critical thinking, problem solving, sense making and personal transformation, the social construction of knowledge – exploration, discussion, debate, criticism of ideas are the stuff of collaborative learning.[..] Dissent, questioning each other's views within a group, is a necessary part of learning.

Creating the right assessment and feedback structure to support collaborative learning and creativity borne out of this dissent meant separating notions of 'success' from learning; the project outcome from the approach, the team dynamic from the outcome and the individual from the team.

A model for an 'assessment journey' (see above) has been used to support students in developing their confidence to become active, uninhibited participants in innovation. In semesters one and two assessment is not of project outcomes, but of the individuals' learning derived from the various project and team activities undertaken through the module. This is presented in a 'Personal Portfolio of Practice' as a



Two-way Assessment Journey

factual account of what took place and a personal reflection of the consequent learning related to both theory and practice.

In this model, each individual student working within the project-space is continually assessed through their practice, but this is project-focused. However, the assessment structure of the programme is not interested in the quality of the project output, or even the team's performance. The formally assessable element is each student's individual reflection on their learning. The client and peers, and the individual students themselves, are interested in the team-performance and output, and assess and tutor each other accordingly. Academic staff members tend to play the facilitator role during the project engagement phase.

This is not, of course, a one-way activity. Just as each student is a recipient of assessment and feedback, they are a giver as well; taking on the role of both collaborative-learner and tutor.

Conclusion

In most cases, in the world of employment, industry is primarily interested in getting from A to B; the journey a client organisation may be on is one of survival where results are what count. In such an environment, employees are assessed and rewarded on the effectiveness of their engagement, contribution and commitment. Companies don't award 'A+' grades or percentage points; employees who deliver success are rewarded with promotion, esteem and increased responsibility. In the MDI setting, it is this close relationship with client organisations that motivates the students to deliver their best as they build relationships and credibility to take into their careers. Through this endeavour and the supportive community of practice fostered by the open approach to assessment, students are empowered to take full ownership of experimental and deep, shared learning.

In the two years that the programme has been running, our students have worked with 37 organisations, exposing innovative solutions and approaches in each case whilst growing from their disciplinary core to become individuals capable of exploring and shaping their future world.

Graduates of the programme are working as design and brand researchers in-house and in leading consultancies, running their own businesses and continuing their studies through PhDs. Employers, recruiters and careers professionals who have worked with these

graduates have noted a far greater self-awareness amongst them than they have seen in other masters graduates; they are able to articulate clearly how they see their personal knowledge, strengths and attributes contributing to an organisation or situation and have demonstrated the confidence to deliver on this potential.

Biography

Mark Bailey is a Senior Lecturer in Design for Industry and Programme Leader of MA/MSc Multidisciplinary Design Innovation at Northumbria University. His research interest in the interplay between different disciplines stems from his early career experience of working as a lone designer in the heavily engineering dominated aerospace industry and subsequent work in multidisciplinary consultancy. Mark is a Fellow of the HEA and Royal Society of Arts.

References

- Boud, D., Cohen, C., Sampson, J. (2001). *Peer Learning in Higher Education*, Kogan Page Ltd, London.
- Brown, T. (2007). *InterSections, Newcastle: Northumbria University October 2007*, Design Council, Available at: <http://www.designcouncil.org.uk/en/Design-Council/1/What-we-do/Our-activities/Intersections-07/>
- Cox, G. (2005). *Cox Review of Creativity in Business: building on the UK's strengths*, HM Treasury
- Karjalainen, T., Salimäki M. (2008). *Do offerings meet expectations? Educating T-shaped professionals in strategic design management: Proceedings from International DMI Education Conference Design Thinking: New Challenges for Designers, Managers and Organizations*, ESSEC Business School, Cergy-Pointoise, France, Available at: <http://www.dmi.org/dmi/html/conference/academic08/papers/Karjalainen/DMI%202008%20TMK&MS%20Final.pdf>
- Kimbell L., Seidel V.P., (2008). *Designing for Services - Multidisciplinary Perspectives: Proceedings from the Exploratory Project on Designing for Services in Science and Technology-based Enterprises*, Said Business School, Oxford.
- Leonard-Barton, D. (1995). *Wellsprings of Knowledge: Building and Sustaining the Sources of Innovation*, Harvard Business School Press.
- Lester, R. K., Piore, M.J. and Malek K. M., (1998). "Interpretive Management: What General Managers Can Learn From Design, March - April 1998. P88
- Winkel, J. (2006). *Formative Assessment During Complex, Problem-Solving*, Group Work in Class, The Mathematical Association of America
- Young, R., Perzutti, D., Pill, S., & Sharp, R., (2005). *The development of tools to assist the design of motion in system operated products*. Paper presented at the Design and Semantics of Form and Movement, Northumbria University, pp. 13-22.
- Young, R. (2009). Presentation to the IDBM Research Seminar on Multidisciplinary Design Management, Helsinki School of Economics, 18-19 December, 2008 - yet to be published