

The research poster and how it consolidates and communicates key concepts of a research inquiry

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This paper discusses a joint project between the Schools of Design at the University of Newcastle in Australia and Massey University in New Zealand. It focuses on the role of the research poster as a learning tool in assisting visual communication design students develop expertise as researchers. Students at both universities followed a similar learning structure whereby, at the end of a thirteen week semester they were asked to summarise their research by designing a poster which captured the key ideas and findings of each student's project. We will put forward here the argument that this creative, kinaesthetic making activity allowed students to develop a clear understanding of the relationship between theory and practice, something which may not have been as effectively conveyed through an exclusively written essay structure. We also discuss the role creative, concept based imagery played in enabling students to draw attention and communicate key ideas within a research investigation.

Keywords: List of Keywords in Title Case, visualising research, consolidating essence, learning strategies

Introduction

Within any research field, whether it be in the sciences, humanities or the arts, the research poster is an important tool which can perform a number of critical functions; perhaps the most significant being the capturing, for audience engagement, the essence of a body of work (Hess & Liegel, 2009). This essence or gist can, to use Kintsch's (1983) terminology, be described as a macroproposition, a summarised understanding. Despite its prevalence and importance in academia, many find it difficult to encapsulate the essence of a research inquiry within a poster structure (Macintosh-Murray, 2007). This may be to do with the multi-modal nature of a research poster which in most, but not all instances, is a concise and summarised collaboration of written text and visual imagery (ibid). As such, a research poster is a designed artefact. As with any other type of poster, a research poster does not simply contain information, it is a piece of communication design which has gone through a problem solving design process. From a problem/solution perspective, the problem of research poster design is one of consolidation and layout structure (Hess & Liegel, 2009). The paramount goal or solution focus is to quickly convey key points of an inquiry as well as provide further supporting information within a hierarchical structure. This often requires a well considered relationship between the title, sub headings, the body text and imagery. Imagery in poster design can include, maps, graphs, photographs, drawings and illustrations. As such these can be thought of as supporting information or data (Grady, 2008). Imagery can also fulfil a second, creative function. This is where visual metaphor, typographic choice and use of colour can be used to communicate ideas. Therefore, there is considerable creative problem solving involved in summing up research into a poster format.

We argue here that for visual communication design students engaging in research as part of Honours study, the generation of a research poster provides students with an experiential learning opportunity which combines critical, analytical and creative skills as they consolidate their ideas and thinking about their research. We further argue that the generation of a research poster as a designed artefact brings together the usually separate objectives of a theory course and a studio course, serving more effectively the visual learning style of students who "tend to think in

pictures rather than words” (Yee, 2012, p. 471). Therefore, while we are not in any way undermining the value of the written word, we believe that design students will engage more productively in research if they are able to apply what Cross, 2001, would describe as “designerly ways of knowing, thinking and acting” (p. 5). As Cross suggests, design needs to “develop domain-independent approaches to theory and research in design” (p.4). Perhaps the research poster is a ideal medium for visual communication designers to not only share their ideas, but also develop a deeper understanding of the theory practice relationship embedded in their work.

Discussion

There is debate within the design research community as to how writing and designing should interrelate. There are those within the field who challenge the value of the written word in design education (Candlin 2000, Mitchell et al, 2000) and there are those who argue that writing is itself a form of design (Orr and Blythman, 2002, Mullin, 1998, Sharples, 1999). In addition to this there is a body of literature which argues that design students have a kinaesthetic, visual orientation which is not suited to the analytical skills required for reading and writing critically (Apps and Mamchur, 2009, Bhagat & O'Neill 2009, Blackler 2014, Yee, 2012).

As we are putting forward the proposition that a research poster is a designed artefact which goes through a design process, we require a discussion of the design process itself. A number of design researchers have in recent times called for design learning to be more explicit (Augustine & Coleman, 2012, Conole & Wills, 2013, Cross, 2001, 2007, Friedman, 2002, Oxman, 2001, Norman, 2000). This by implication, suggests that educators should incorporate teaching methods which will enable students to develop explicit understanding of their process (McAuley & Roxburgh, 2015). Conole & Wills say that most design educators teaching approaches are implicit based, “A key principle of learning design is to help make the design process more explicit and sharable” (2013, p. 1).

Awareness of process is problematic if we consider that there are numerous models which seek to describe the design process. Numerous researchers have sought to explain and describe the mechanics of the design process. However, if we were for simplicity sake, to reduce the process down to a very basic premise which few academics, if any would dispute, then we can comfortably throw into the mix the terms *analysis* and *synthesis*. We may, if we wish to pay full homage to one of the earliest design process theorists, John Chris Jones, extend analysis and synthesis to include *evaluation* which Jones introduced in 1962. Analysis and synthesis as cognitive domain terms were of course, introduced by Bloom et al (1956) in what popularly became known as Bloom’s taxonomy.

Jones (1992) describes the essence of design as a three way process. He describes this process as “‘breaking the problem into pieces’ [analysis], ‘putting the pieces together in a new way’ [synthesis], and ‘testing to discover the consequences of putting the new arrangements into practice’ [evaluation]” (p. 63). In our study we further extended Jones’ model with a variation devised by Swann (2002). Swann adds to the beginning of the process the term *problem* to suggest that analysis is a response to a perceived problem, which in a student assignment will be articulated in the brief. Prior to evaluation, Swann incorporates *execution* and *production* to more accurately differentiate the physical making process from synthesis which can be regarded as more of a thinking, idea generation process. By doing this we are able to separate analytical thinking from creative thinking and see them as different modes of thinking and doing. This can be very useful in a design learning environment where students are learning how to think and act as designers.

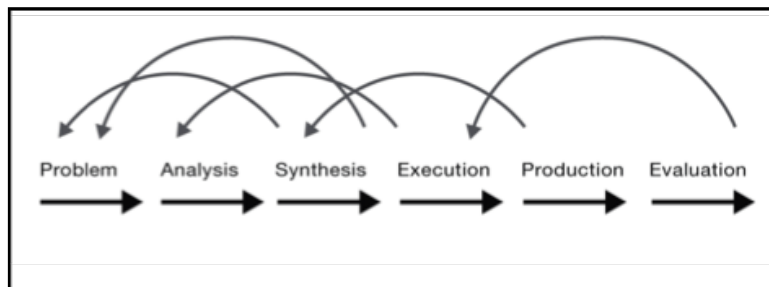


Figure 1: Swann's (2002) design process model.

In relation to Jones' (1962) notion of three distinct design process stages, *analysis*, *synthesis*, *evaluation*. Edelson (2002) also talks of three design processes; *design procedure*, *problem analysis* and *design solution*. As mentioned previously Swann, (2002) building on Jones' model lists six design process stages: *problem* – *analysis* – *synthesis* – *execution* – *production* – *evaluation*. Cross (2001) identifies four stages of designing: *problem structuring*, *preliminary design*, *refinement* and *detailing*. Wilson, (2002) identifies nine phases of design: *problem identification and definition*, *task planning and management*, *research and evaluation*, *ideation*, *idea selection and decision making*, *action and implementation*, *reflection in action*, *evaluation of process and progress*, *refinement and completion*. There are numerous other theorists who have devised models to explain the design process: Alexander (1962), Koberg and Bagnell (1972), Foreman (1967), Doblin (1987). However, despite their apparent differences, all design process models articulate the idea that creativity involves both critical and creative thinking.

The wide range and diversity of design process models as discussed above might seem problematic when using them within a research format, but if we accept their limitations, we can usefully compare and chart described student experience of poster design to a design process model structure. From an educational perspective, the use of any model can only provide partial insight into a complex process. Swann's (2002) variation of Jones (1969) provides this study with some of its epistemological basis.

The research poster

While in some respects a research poster can be compared to an abstract for a conference or journal paper (Bazermann, 1988), there are enough differences between these different methods to classify them as separate but linked activities. Swales (1990) describes them as *genres* and classifies these different means of communicating research as “a class of communicative events”, suggesting that they have similarity of purpose (ibid, p. 58). Räisänen, (2002), describes abstracts, posters, presentations and written papers as genre chains, “a sequence of genres within a system of genres”(p. 81). The key differentiation between a research poster and an abstract is the multi-modal nature of the poster. In some respects the poster can be described as an illustrated abstract, (Hess & Liegel, 2009). Macintosh-Murray (2007), says, “The poster is marked by the importance of the visual features, in a way that the abstract is not” (p. 352). Barthes, (1978) suggesting a hierarchical relationship, describes this multi-modal text/image relationship as one by which the written text provides “anchorage” to images which are “polysemous”, with “a ‘floating chain’ of signifiers, the reader able to choose some and ignore others” (p. 38, 39). This, in some respects privileges the written word as a provider of clarity, in

that without written text images resist being contextually tied down. As Barthes remarks, “it is not very accurate to talk of a civilisation of the image — we are still, and more than ever, a civilisation of writing (1978, p. 38). However, much has changed since Barthes’ seminal work. Rose, (2007), suggests that the visual image in our post modern world has placed itself in a stronger position as research due to the idea that “modern forms of understanding the world depend on a scopic regime that equates seeing with knowledge” (p.3). Grady (2008) also defends the role of the visual in research dissemination but does point out that “Pictures can confuse as much as illustrate, and distract as much as engage” (p.23). Again, as with Barthes, Grady’s concern is with the polysemous nature of images. Kress & van Leeuwen (2006), point out that despite some popular misconceptions, visual language when used creatively is not universally understood, relying as it does on cultural conventions to ensure an accurate encode/decode relationship. However, such a concern has little relevance here in that our discussion is aimed at an audience who are largely familiar with, or want to know more of, the conventions and currency of visual language. The work of information designers such as Edward Tufte demonstrate how picture driven narratives can have hierarchical dominance and provide anchorage to text, in the sense that Tufte’s images ‘anchor’ the written text and provide them with context. This is often done through the use of metaphor or scale comparison. So, part of what we wish to discuss in this paper is the role of the creative, conceptual image as a means of communicating research themes.

Case studies

Deonandan et al (2013) carried out a study which looked at the role research posters and audience presentations had in developing undergraduate science student creativity and innovation in students studying epidemiology, citing a need to address a “crisis in the teaching of creativity and innovative thinking in the Health Sciences” (p. 183). In response to this perceived crisis the researchers, as educators, asked their students to present their research orally and in the form of a poster. This was in contrast to the conventional method of a purely written discourse. The idea was that the poster would provide “synthesis of existing scientific knowledge” (p. 184). The students found the poster time consuming but more useful than writing a research paper. This is interesting considering that they would have had little or no tuition on how to design poster.

Macintosh-Murray (2007) looked at the role of communicating research through posters and presentations through an analysis of her PhD students posters, pointing out that novice researchers “may find it hard to comply with admonitions to keep it simple, resulting in a busyness paradox” (p.371). This study also discusses the difficulty of “narrowing things down, the formatting, and the need to create attractive visuals, all while trying to achieve an academic look with good information” (ibid).

While this conversation about the relationship between text and image poses some interesting challenges for visual communication researchers, we focus here on visual communication design students engaging in research as part of their final year Honours study. We consider whether the generation of a research poster assists them develop expertise as design researchers. We classify our students as ‘novice undergraduate researchers’ to differentiate them from post-graduate PhD students who are often referred to as novice researchers. All students involved volunteered to take part in the research and ethical permission was granted at both universities.

Background

Both Massey University in Wellington, New Zealand and the University of Newcastle (UoN) in New South Wales Australia, offer Honours as part of their Bachelor of Design degrees in visual communication design. Massey's course is a four year degree. Students who reach a prescribed grade average in third year continue on to Honours to complete their degree. Those who don't reach a prescribed grade average continue into their fourth year as non honours students. The University of Newcastle offers a three year degree with the option of another year's study for honours if, as with Massey, a prescribed grade average has been attained in third year. So, in many respects the requirements, attributes and attainments of Massey and Newcastle Honours students are similar. The course outlines for both courses, while worded differently have very similar objectives. Massey's semester 1 Honours course outline sets out '*to develop your ability to synthesise practice and theory*', while Newcastle's outline says that one of the key outcomes of the course will be to '*develop an adequate depth of creative, analytical and communication skills necessary for completion of an individual research project*'. Both explore the relationship between theory and practice and utilise appropriate research methods to assist in the generation of a body of design work. The terms *analysis* and *synthesis* are commonly used in both universities. In 2015 Honours students at both schools of design were asked to produce an A1 research poster which describes each student's individual project using summarised text and images. This approach had been used for some years at Massey, but this was the first time UoN students had worked this way. Previously UoN, students had to write a report which described their research. The intention of the poster was to describe the problem or issue being explored and discuss the intended design work to be produced in semester 2.

While it is expected in both universities that critical, analytical approaches to research will initially drive a student project, students are also encouraged to work creatively in semester 1 when this is the appropriate research method. The students propose and demonstrate their most effective design strategy in their research poster which is then continued in semester 2 as their major design production.

Swann's (2002) design process model (figure 2) usefully illustrates the activity focus of the Honours students at both universities as they progress from problem definition to solution. Both Honours courses are two semesters long, semester 1 being more critical and analytically focused and semester 2 being more focused on creative output.

As researchers and teachers of both design theory and studio, we both recognised similarities in our programs and decided to do a focused, collaborative study on the role of the research poster in assisting students develop expertise as researchers. At both universities the final assessed outcome of semester 1 2015, was an A1 research poster, the purpose of which was to describe the research carried out to date and provide a proposal for what the student intends to produce in semester 2.

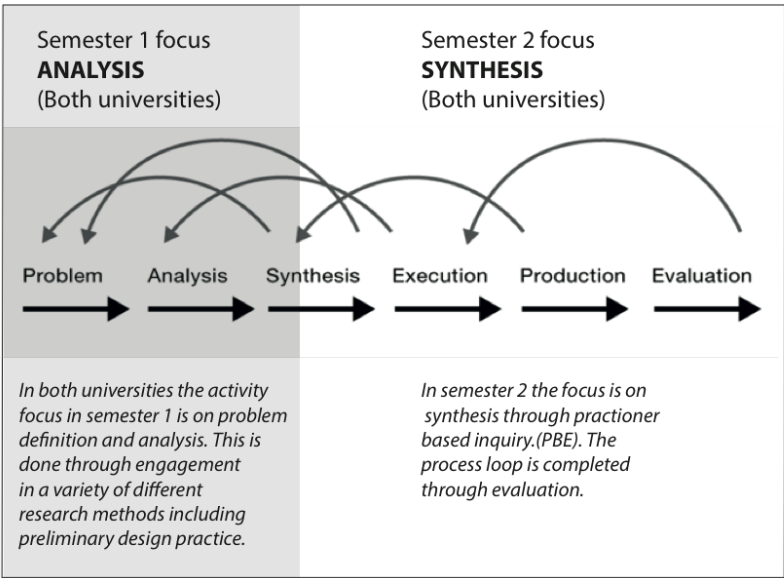


Figure 2: Swann’s (2002) Design process model in relation to student activity focus in both universities semester by semester.

Methodology

This is essentially a naturalistic phenomenological study. It accepts the epistemological premise that direct experience of an activity can be reflected on meaningfully and recorded (Curtis, 1978). Experiences of participants can be compared if there is *content validity*. This is done by ensuring there are clear similarities between those involved and the phenomena or activity being investigated (Cohen, Lawrence, Marion & Morrison, 2000). The activities around the creation of a research poster were, at both universities similar. Students were all final year visual communication design Honours students who had satisfied the pre-requisite learning criteria to enrol in Honours at their respective universities. The course of study at both universities ran in semester 1, 2015 and both lasted thirteen weeks. Therefore we had a *homogenous sample* of participants separated naturally as a consequence of their place of study. Homogenous samples refer to data in which all participants have similar expertise. Patton (2002) talks of “purposeful sampling” (p. 230) as being about deciding and selecting which type of focus will lead to information which is rich and measurable.

While we may put forward in this paper some argument as to the learning benefits of the research poster as an educational tool, it does not follow the methodological structure of action research, which from the start sets out to improve teaching practice (Kemmis & McTaggart, 2005). What it seeks to discover is what commonalities of experience there are between the students at both universities in relation to what each student learned through the activity of designing a research poster.

Analysis is based on (1.) a six question questionnaire which students at both universities responded to and (2.) a semiotic analysis of a sample of posters from both universities. This analysis is also triangulated through analysis of student comments in the questionnaire. Questionnaire analysis is based on holistic interpretation of each response and recurrence of adjectives which can be categorised as being of similar meaning. Hall (1980, p. 136) talks of three interpretive codes available to a reader, *dominant* or *hegemonic*, *negotiated*, and

oppositional. The dominant reading is the one likely to be most compatible with the writer's intention. The researchers analysed their own student responses looking for the dominant reading and then analysed those of the other students. Agreement was reached between both researchers as to intended dominant meaning in each student's response. Swann's (2002) design process model was used to build up a holistic picture of student activities in relation to analysis and synthesis. We describe these cognitive domains as *focus points*, in that while an activity will involve both analysis and synthesis, the overall activity of poster design will focus more on one area than the other at a given time. Swann's notion of *looping* is integral to this understanding (see figure 1 and 2.). Both researchers are design professionals and academics with similar experience of design practice. This insider perspective provides them with what Weber (1947) describes as *verstehen*, empathetic understanding based on experience. The numbers of students from both universities engaged in the research is comparable and while the number is not high (seven from each university) we believe there is depth of insight to be gained through comparison between the two.

Analysis

The questionnaire

The questionnaire set out to determine student conceptions of what they learned from designing a research poster. The questions revolved around issues of purpose (Q 1.), process (Q. 2), learning (Q 3.) , skill requirements (Q 4.), relationships between theory and practice (Q 5.), key concepts in the poster (Q 6.) Analysis of responses was done separately and then cross checked with the analysis of the other researcher. Consensus was reached as to the dominant reading of each response. Patterns were sought in the frequency of adjectives of similar meaning from both groups of students. This was merely to facilitate how we determined what the dominant reading of each response was, not the sole determiner. We provide below what we regard as representative examples of student conceptions.

Q. 1 Please describe what you see as the purpose of a research poster.

To provide comparison, one full reply and sample excerpts from both groups from each university can be seen below.

Q. 1. Please describe what you see as the purpose of a research poster

A research poster enables a researcher to **communicate the essence** of their project in a concise manner using illustrations as well as text
(Sally, Newcastle)

To visually represent a body of research in a narrowed sense. Being able to **articulate the most important aspects** of your research and using hierarchy to communicate how it is viewed and unfolded
(Olivia, Massey)

'communicates the core ideas' 'articulates the most important aspects' 'summarise quite concisely only the essence' (Massey students)	'visually contextualises the project' 'communicate the essence' 'communicate the key points' (Newcastle students)
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Figure 4: Students from both universities had similar conceptions about the purpose of a research poster.

As can be seen in figure 4, students from both universities appeared to have similar ideas about the function of a research poster; adjectives such as: *communicates*, *articulate*, *summarise*, and *contextualise* support this as do supporting terms: *core ideas*, *important aspects*, *concisely only the essence*, *key points*. Comments from both universities suggest that design students have a well developed understanding of the importance of encapsulation and communication in a research poster. Question 2 in the questionnaire sought to determine how students went about achieving that goal.

Q. 2 Please describe your process for creating your research poster.

The overall pattern to emerge is that student processes, to use Jones (1969) and Swann's (2002) terminology looped between analysis and synthesis, i.e. they used both critical and creative processes in designing their poster. As regards student conceptions of this, some described an analytical approach at the beginning, sorting out text content first while others started off through a creative process.

I started by sorting out my abstract, and made a lot of iterations... I left the visual stuff till later' (Emily, Massey)

I started by trying to come up with a headline that said something relevant about the project as well as being a bit 'snappy' (Sally, Newcastle)

Emily's reply was indicative of those students whose conceptions were that they started off with an analytical approach to designing the poster. Other's, such as Robyn said '*Initially, I looked at other research posters, particularly the layout that the designer used*', again, as with Emily, starting with an analytical as opposed to creative approach. Sally's understanding of her approach was that it began through a creative process whereby she sought to encapsulate the essence of her research by thinking up an encompassing title (see figure 7). All students looped between an analytical and creative approach to their poster design and were able to articulate their process in terms of a strategy. Most students described their approach as starting off through analysis. This is consistent with the idea that designing starts off with problem definition. Ward and Kolomyts (2010, p. 106) say "doing something creative often requires people to construct, formulate, or otherwise define the problem or task to be accomplished", suggesting that to be creative we must first of all understand what we are responding to. However, a sizable minority of students thought of their approach as starting off creatively, '*I brainstormed some visual metaphors*' (Kate, Massey); '*Visually, I tried to think of a scenario*' (Linda, Newcastle). We think it likely that those students whose conceptions were that their process started off creatively

had actually gone through an analytical, problem definition process. Their answers may suggest lack of meta-cognitive awareness of the problem definition process.

Questions 3-5 revolved around student learning, skill acquisition and student understanding of the relationship between theory and practice.

Student learning

The learning benefits of the poster were well articulated in student responses. Many of the responses discussed how the poster encouraged students to simplify the complexity of their work and in doing so, understand it more deeply. Some talked of how it helped them revise what they had learned, but overall, students learned how to focus their ideas down.

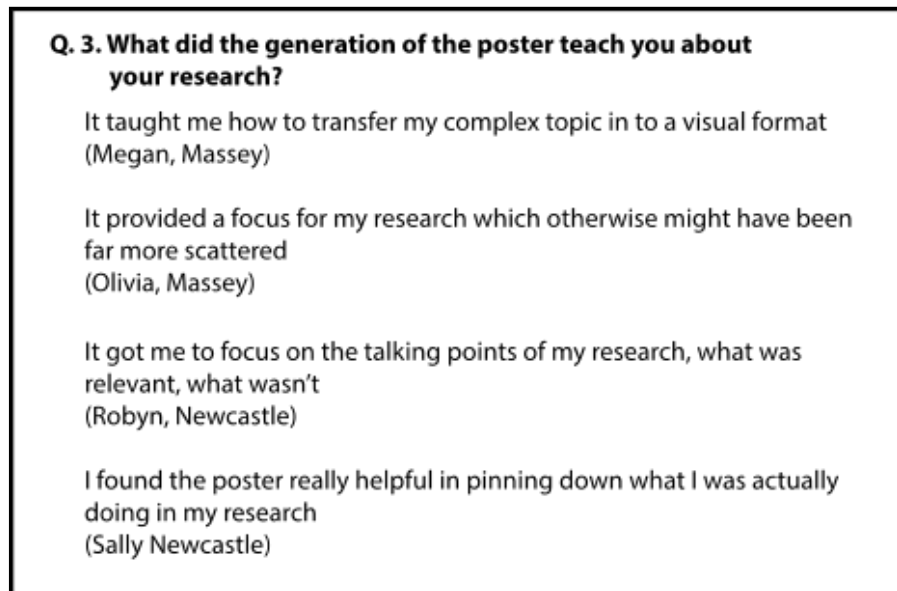


Figure 5: Feedback comments suggest the poster activity helps students consolidate their understanding about their research.

It is our position that the process of designing a research poster gave students a clearer understanding of the key ideas in their research than may have been possible in an essay format. The kinaesthetic, making structure of poster construction allowed them to combine critical and creative thinking.

Skill acquisition

Students were asked to describe what visual and written skills are necessary to make a successful research poster. As visual communicators their understanding of this clearly came from a discipline perspective. The most common adjectives were *succinctly*, *succinct*, *concise*, *simplicity*. It was also clear in student replies that audience understanding was important and that formalities of hierarchy in layout played an integral role in achieving that. Students also describe these relationships as text/image relationships.

I found understanding metaphor both written and visual were helpful. It helped me step back from the details and take a birdseye view. Using words and visuals together to create meaning is important, they enhance each others message (Kate, Massey).

... keep it simple, keep the number of typefaces to a minimum. Use a clear grid and a defined colour scheme (Sally, Newcastle).

Theory and practice

Within the context of designing the poster, students were asked what role the poster played in helping them develop awareness of the relationship between theory and practice. Student replies tended to be about how the poster helped them understand their own project as opposed to an overall understanding of the theory practice relationship. However, replies demonstrate that the activity helped students learn about the relationship.

Q. 5. What role did the production of a research poster play in helping you understand the relationship between theory and practice?

'It forced me to condense down research from a wide variety of sources that were previously unrelated, to one united piece of research'
(Kate, Massey)

'Early on, at the beginning of my project, the relationship between theory and practice was really disjointed, and it took a while for this to come together. In some ways I found that writing the content for the poster got me to focus on the connection between theory and practice'
(Linda, Newcastle)

Figure 6: While students were not able to generalise their answers, replies suggest that the process enabled theory/practice connections to be made.

Question 6 related to key messages in the research and will be discussed in relation to analysis of a sample of posters. Analysis by semiotic method seeks to determine meaning through observation of image and text structure. This is triangulated with student comments. We have chosen one poster from each university.



Figure 7: Research poster, Sally Cloke, University of Newcastle

The printed version of this poster when presented had at the top a handle to represent the idea that the poster was a shopping bag. The shopping bag and handle acted as a signifier for consumerism. *'I experimented with using a photo of a shopping bag as the background for the poster, but in the end decided just to suggest a shopping bag by adding a ribbon hand to the card rectangle of the poster'*. Together with the poster heading 'Conspicuous Disruption' the topic of the project was conveyed. Typographically the word 'disruption' was manipulated to look as if it had been attacked. In the questionnaire Sally uses the words *distorted* and *fractured* to convey this. The word disruption replaced 'consumption'. The signified is how to challenge our consumer habits. *'I chose Conspicuous Disruption as a play on Conspicuous Consumption'*. Together, the replacement of the word consumption with disruption act as signifiers to this. The research question 'Can the disruptive power of ritual stop us consuming ourselves to death?' further anchors the concept and informs us that ritual may be a means of solving the problem of over consumption.

The title, the shopping bag metaphor and the typographic aesthetic combine as a macroproposition and sum up what Sally's research is investigating and introduces the word ritual to suggest a solution. This invites the reader to know more and read the rest of the research.



Figure 8. Research poster, Philip Rubery, Massey University.

The second poster uses a large image that clearly implies that mobile technology is dysfunctional in some way. The image is further contextualised with the overlaid text referring to unwanted problems introduced by the ‘wireless revolution’. The student states ‘*My subject matter dealt with digital distraction so I wanted my poster to play with this concept ...*’.

The shape of a modern smart phone is immediately recognised, but is then disrupted by lines that could imply a network, broken glass, or perhaps a spider’s web. Either way, it is messy, obstructive, and clearly at odds with the smooth symmetry and function of the smart phone. The overlaid text at first explains the lines as unwanted “strings attached”, and adds further irony when it also refers to the “wireless revolution”. This use of image and text, with both elements required to tell the full story, is a well known approach used in graphic design, journalism and advertising. It is effective as it requires cognitive engagement from the reader, which in turn

produces a small physiological reward, increasing a reader's sense of involvement. Here we see it being used effectively to convey the student's research thematic. The topic is then focused with the central proposition of *'Digital design can encourage a proactive culture that prioritises live interactions over on-screen communication'*. The student states *'The title left just enough unexplained that viewers should feel compelled to read further'*.

As stated already, this student also felt that the poster process enabled a refinement of theory and practice, *'it really made me think about what would and would not work as a tactical solution'*. The poster then includes pertinent information as graphs, diagrams, photographs and illustrations. The type of information is supportive, and does not visually compete with the primary imagery.

Conclusion

Research posters are very much part of the genre chain of formats which characterise academic discourse. And while they serve the prime function of providing an audience with an encapsulation of a researcher's current work, they also, within an educational context, provide learning opportunities for novice visual communication design researchers to develop their critical and creative skills. Through an active process of making a poster, students are able to combine their critical and creative skills in such a way as to communicate the key ideas of their research. We do not argue that this learning process is unique to visual communication design students. It may be that all novice researchers' learning can be enhanced through the engagement of designerly ways of working. Design thinking is after all no longer seen as the domain of those involved in the creative arts; its reach is now well noted in business and entrepreneurial activities. As Simon (1996) famously points out, "everyone designs who devises courses of action aimed at changing existing situations into preferred ones" (p. 111).

A research poster is a designed artefact which brings together words and images in a condensed form. Visual communication design students learn how to communicate through developing a sophisticated understanding of image and text hierarchies. They also learn how to use symbolic language effectively. The students engaged in this study benefitted from the learning structure of research poster design. We argue that this approach may be more useful to a design student than the alternative of explaining their research through a text dominant format in a report or essay. Encapsulation through metaphor, as seen in the research posters discussed demonstrate how powerful this method of communication is. As Lakoff & Johnson (2003) point out, metaphor is not simply the currency of artists and poets, it is a cognitive faculty available to all researchers, novice or otherwise. While it is not something even design students will use spontaneously as a problem solving method (Goldschmidt, 2001) it can be formally incorporated into a learning situation.

There were no noticeable differences between the two student groups as regards questionnaire responses or design outputs. Student comments suggest they benefitted from the process of articulating their research through designing a poster. We argue that this is because design students enjoy an active kinaesthetic making process when they are engaged in typical studio activity. A typical studio design brief provides a student with a particular problem with parameters, specifications and limitations in which to work. Research projects are in contrast, individually driven, based on a novice student researcher's particular interests. So while, within the research poster activity, students had to individually determine what their research was seeking to resolve, the theory/practice synergy allowed them to actively loop between critical and creative thinking. This allowed students to recognise relationships between theory and practice by using their design skills to unpack the essence of their research and use creative visual skills to get their ideas across. The poster design, in a sense 'applied' student understanding of theory through the process of design 'practice'. A number of student recollection of process suggest lack

of meta-cognitive awareness, in that a number of students said that their process started off creatively rather than analytically. As a number of design researchers are calling for design process to be made more explicit, this may be an area to explore in further work.

The implications of this study are wide. Visual communication strategies can be of value to all novice and professional researchers who create research posters. While we have established that research poster design helps visual communications design students develop their research skills, we also argue that for novice researchers and professionals in other fields, there is much to be gained from a designerly approach.

REFERENCES

- Apps, Linda, and Carolyn Mamchur. 2009 "Artful Language: Academic Writing For The Art Student." *International Journal of Art & Design Education* 28, (3): 269-278.
- Augustin, Sally, and Cindy Coleman. 2012 *The Designer's Guide To Doing Research: Applying Knowledge To Inform Design*. John Wiley & Sons.
- Barthes, Roland. 1978 *Image–Music–Text*. London: Cape.
- Bhagat, Dipti, and Peter O'Neill. 2009 "Writing Design: A Collaboration between the Write Now CETL and The Sir John Cass Department of Art, Media and Design." *Art, Design & Communication in Higher Education* 8, (2) 177–182.
- Blackler, Alethea. 2014 "Using A Visually-Based Assignment To Reinforce And Assess Design History Knowledge And Understanding." *Design Big Debates: Pushing the Boundaries of Design Research* 1244–1259.
- Candlin, Fiona. 2000 "Practice-Based Doctorates And Questions Of Academic Legitimacy." *Journal of Art & Design Education* 19, (1) 96–101.
- Clark, Herbert H. 2004 *Using Language*. Cambridge University Press
- Cohen, Louis, Lawrence Manion, and Keith Morrison. 2013 *Research Methods In Education*. Routledge.
- Conole, Gráinne, and Sandra Wills. 2013 "Representing Learning Designs–Making Design Explicit And Shareable." *Educational Media International* 50, (1): 24–38. Retrieved 13 July, 2015, <http://ro.uow.edu.au/cgi/viewcontent.cgi?article=1407&context=asdpapers>
- Cross, Nigel. 2001 "Designerly Ways Of Knowing: Design Discipline Versus Design Science." *Design issues* 17, (3): 49–55.
- Curtis, Bernard, and Wolfe Mays (ed) 1978 *Introduction to Phenomenology and Education*. Routledge Press.
- Deonandan, Raywat, James Gomes, Eric Lavigne, Thy Dinh, and Robert Blanchard. 2013. "A Pilot Study: Research Poster Presentations As An Educational Tool For Undergraduate Epidemiology Students." *Advances In Medical Education And Practice* 4: 183–188.
- Friedman, Ken. 2002 "Design Curriculum Challenges For Today's Universities" In A Davies (Ed.), *Proceedings of the CLTAD Enhancing Curricula: Exploring Effective Practices In Art, Design And Communication In Higher Education* (pp. 27–63). London: The Centre for Learning and Teaching in Art and Design.
- Edelson, Daniel C. 2002 "Design research: What We Learn When We Engage In Design." *The Journal of the Learning sciences* 11, (1): 105–121.
- Goldschmidt, Gabriela. 2001. "Visual analogy: A Strategy For Design Reasoning And Learning." *Design Knowing And Learning: Cognition In Design Education*: 199–219.
- Grady, John. 2008. "Visual Research At The Crossroads." In *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research*, vol. 9, (3). Accessed November 27, 2015 from <http://inbn-resolving.De/urn:nbn:de:0114-fqs0803384>

- Hall, Stuart. 1980. "Encoding/Decoding" *Centre For Contemporary Cultural Studies, Culture, Media, Language: Working Papers In Cultural Studies*, (pp. 128-38). London: Hutchinson.
- Hess, George, Kathryn Tosney, and Leon Liegel. 2009. "Creating Effective Poster Presentations: AMEE Guide (40)." *Medical teacher* 31, (4): 319–321.
- Jones, John Chris. 1992. *Design Methods*. John Wiley & Sons.
- Kemmis, Stephen, and Robin McTaggart. 2005. "Communicative Action And The Public Sphere." *The Sage Handbook Of Qualitative Research* (3): 559-603 Thousand Oaks: Sage Publications
- Kintsch, Walter. 1998. *Comprehension: A Paradigm For Cognition*. Cambridge University Press.
- Kress, Gunther, and Theo Van Leeuwen. *Reading Images: The Grammar Of Visual Design*. Psychology Press, 1996.
- Lakoff, George, and Mark Johnson. 2008. *Metaphors We Live By*. University of Chicago Press
- MacIntosh-Murray, Anu. 2007. "Poster Presentations As A Genre In Knowledge Communication: A Case Study Of Forms, Norms, And Values." *Science communication* 28, (3): 347–376.
- Mitchell, Sally, Victoria Marks-Fisher, Lynne Hale and Judith Harding. 2000. "Making Dances Making Essays: Academic Writing In The Study Of Dance " *Student Writing In Higher Education: New Contexts*: 86–96. Open University Press
- Childers, Pamela B., Eric H. Hobson, and Joan A. Mullin. 1998. *ARTiculating: Teaching Writing in a Visual World*. Heinemann, 361 Hanover Street, Portsmouth, NH 03801-3912.
- McAuley, Mike, and Mark Roxburgh. 2015. "Learning Theory Through Collaboration, Visualisation And Audience Presentation." *Journal of Design Research* 13, (4)
- Norman, Janis. 2000. "Design As A Framework For Innovative Thinking And Learning: How Can Design Thinking Reform Education?" *Proceedings Of The IDATER Design And Technology Educational Research And Curriculum Development: The Emerging International Research Agenda* (pp. 90–124). Loughborough: Department of Design and Technology. Loughborough University.
- Norman, Janis. 2000. *Design As A Framework For Innovative Thinking And Learning: How Can Design Thinking Reform Education?* Loughborough University
- Orr, Susan, and Margo Blythman. 2002. "The Process Of Design Is Almost Like Writing An Essay." *The Writing Center Journal* 22, (2): 39–54.
- Oxman, Rivka. 2001. "The Mind In Design: A Conceptual Framework For Cognition In Design Education." *Design knowing and learning: Cognition in design education*: 269–295.
- Patton, M. Q. 2002. *Qualitative Research & Evaluation Methods*. (3) Sage Publications: Thousand Oaks.
- Räisänen, Christine. 2002. "The Conference Forum: A System Of Interrelated Genres And Discursive Practices." *The Language Of Conferencing*: 69–93.
- Gillian, Rose. 2001. *Visual Methodologies: An Introduction To The Interpretation Of Visual Materials*. Thousand Oaks, Calif
- Sharples, Mike. 1999. "How We Write." *Writing As Creative Design*. London and New York: Routledge.
- Simon, Herbert A. 1996. *The Sciences Of The Artificial*. MIT press.
- Schön, Donald A. 1983. *The Reflective Practitioner: How Professionals Think In Action*. Vol. 5126. Basic books.
- Swales, John. 1990. *Genre Analysis: English In Academic And Research Settings*. Cambridge University Press.
- Swann, Cal. 2002. Action Research And The Practice Of Design. *Design Issues* 18, (1): 49–61.
- Ward, Thomas B., and Yuliya Kolomyts. 2010. "Cognition And Creativity." *The Cambridge Handbook Of Creativity*: 93-112.

JOURNAL TITLE

- Wilson, Jenny Toynbee. 2002. "Understanding Learning Styles: Implications For Design Education In The University." *Proceedings Of The CLTAD Enhancing Curricula: Exploring Effective Practices In Art, Design And Communication In Higher Education*: 393-416.
- Yee, Joyce SR. 2012. "Implications For Research Training And Examination For Design PHDS." *The SAGE Handbook Of Digital Dissertations And Theses: SAGE Publications*: 461–492.

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