



Queensland University of Technology
Brisbane Australia

This is the author's version of a work that was submitted/accepted for publication in the following source:

[Blackler, Alethea](#) (2014) Using a visually-based assignment to reinforce and assess design history knowledge and understanding. In Lim, Younkyung & Niedderer, Kristina (Eds.) *Design Big Debates : Pushing the Boundaries of Design Research*, Umea Institute of Design, Umea University, Umea, Sweden, pp. 1244-1259.

This file was downloaded from: <http://eprints.qut.edu.au/74741/>

© Copyright 2014 [please consult the author]

Notice: *Changes introduced as a result of publishing processes such as copy-editing and formatting may not be reflected in this document. For a definitive version of this work, please refer to the published source:*

Using a visually-based assignment to reinforce and assess design history knowledge and understanding

Alethea Blackler, Queensland University of Technology, Brisbane, Australia, a.blackler@qut.edu.au

Abstract

This paper presents a visual timeline-based assignment used in an undergraduate Industrial Design History, Theory and Criticism unit. The assignment was developed in order to find a better way of supporting design history learning than an exam or essay assessment. It was developed using constructive alignment and it allows design students to use their strong visual thinking skills to understand unfamiliar content, develop their visual literacy of design history, and think deeply about the links between the designs, styles, movements, events and people in their timeline. The task produced a variety of responses, from websites and electronic presentations to large paper timelines, scrolls and 3D models. These have been admired by peers and used for end of year shows and permanent displays. Questionnaires were issued to students to gain feedback about the assessment. Students stated that the visual nature of the assignment helped them to understand how different aspects of design history related to each other, assisted with retaining the information, and that it was more interesting and fun than a report or an exam. This paper explores the theories behind and the benefits of using such methods of assessment for design history courses.

Keywords

design education, design history, visualisation, visual literacy, constructivism

Introduction

This paper explores an assessment task which involved creating a timeline for industrial design history. This task has been implemented in a unit called Industrial Design History, Theory and Criticism for the past three years. The unit has been taught over a 12 week semester within the third year of a four-year undergraduate Bachelor of Design (Industrial Design). It comprises 6 weeks of lectures on design history, supported by set readings and tutorials. This is followed by 6 weeks on design criticism based on a framework I have been using for more than a decade (Blackler, 2001). The three assignments are the timeline (worth 30%), a group criticism project (30%) and two discussion papers based on the set readings that accompany the history lectures (40%) (Blackler, 2013). This paper will focus on the timeline assignment and how it has

worked to strengthen students' understanding of industrial design history.

When teaching design history I have found that it is necessary to develop some appropriate way of supporting and assessing learning of the facts and figures involved. One may argue that learning facts and figures should not be a part of design history education, preferring instead, as Crotty and Roberts (2009) suggested, to teach the why rather than the what. However, I believe it is not possible for students to discuss and criticise designs, designers and other aspects of design history if they do not have a good idea of what was designed, approximately when and by whom. In the past when we asked a sample of 198 first year students whether they had previously studied any kind of history at high school, college or university, only 37% said they had (Sim and Blackler, 2007). By the time they reach this third year unit then, the majority have only studied history in one multi-disciplinary first year unit; Introducing Design History (Sim and Blackler, 2007). Since the basic content of industrial design history is not covered in any curriculum prior to my unit, it falls to me to give them this knowledge, upon which they can build to develop an understanding of the whys behind the facts, and also an ability to criticise design.

I argue that a chronological approach for this type of foundational understanding is the most effective as it is already familiar to students and forms a known structure for them to build on. Where they go from there in terms of the design of the timeline, how effectively it shows links between entries and how flexible it is to navigate in non-chronological ways is up to the students. Crotty and Roberts (2009) also conceded that understanding key points in history through a chronological narrative can help students to see the broader temporal framework and to understand change over time. When trying to grasp the development of a discipline, this would seem to be essential.

Theoretical Framework

I developed this assignment to replace a multiple choice exam that I had run in this unit and a previous similar unit. The objectives of the exam were to get students to; 1) thoroughly digest the lecture content from 6 weeks of industrial design history lectures, and 2) retain the information for the long term in order to form a base of design knowledge that they could access during their careers. However, I found that even by the next year they had forgotten much of the information, and also the exam was not a very effective way of helping them to recognise and understand images related to design history, which could build their visual literacy. Exams are also unpopular with students, and in my units there was generally a low average grade. Setting a personal essay or research project assignment tends to lead to students learning only about a very specific topic. Therefore, I replaced the design history exam with a timeline exercise.

On top of the two exam objectives, the timeline assignment had the additional objectives of 1) helping students to relate various events, people and designs to each other and understand the causal links between them, 2) allowing them to work with their strengths by encouraging use of visual thinking, and 3) strengthening their visual literacy. This is not a research assignment - all images and dates that are required are provided through the lecture notes and slides, and students have to design a graphical timeline (in any format) that shows the development of industrial design history through the 18th, 19th and 20th centuries. This involves including at least 200 events, designs and movements and somehow showing the relationships between them. In 2012 and 2013, a starter file was provided in Excel with a list of dates and events. Despite this, it was made clear that the timeline was to go beyond this. The exercise requires thorough reading of the lecture notes and perusal of images provided, which is the kind of activity required when revising for an exam. However, it is intended to go further than the exam in helping students to think more deeply about links between people, things and events, to visualise 300 years of design history and so build better visual literacy, and have a record to keep for their future reference. This section explores the theoretical framework used to develop an assignment that would facilitate all these things.

Deep Learning

A deep approach to learning involves theorising, applying and relating, not simply memorising and note-taking, which are surface levels of engagement (Biggs, 2003). Ramsden (2003) explained that all students are capable of both deep and surface approaches, and which one they use is dependent on the task they are undertaking. The timeline encourages deep learning in three ways. Firstly, it is more engaging than exam revision or essay writing, which is likely to encourage a deep approach (Ramsden, 2003). Secondly, the assignment forces students to go through all the lecture notes and accompanying images to find appropriate facts, dates, events and images to put into the timeline. This encourages comprehension. It does not allow for skimming as it requires thorough coverage of the lecture content. Thirdly, it requires them to make links between events, people, movements and styles and therefore fosters true understanding and empathy.

Constructive Alignment

For deep approaches the students typically need to be more active in their learning. Biggs (2003) therefore recommends using “constructive alignment” to ensure more students adopt a deep approach. All components in the teaching and learning system need to be aligned. These include lecturers, students, the curriculum, teaching methods, assessment procedures, climate created through interactions, and institutional climate. Particularly important are curriculum, teaching methods, and assessment procedures. When there is alignment between what we want, how we teach and how we assess, teaching is likely to be more effective. The curriculum is stated in clear objectives,

teaching methods are chosen to realise those objectives and assessment tasks address what the objectives state the students should be learning (Biggs, 2003).

Criterion Referenced Assessment (CRA) can help to achieve the alignment between objectives and assessment, but Biggs (2003) stated that teaching methods must also be appropriate to the subject matter. This is where constructivism comes in. According to the constructivist approach, the activity students undertake in order to construct their learning is fundamental in ensuring effective outcomes (Biggs, 2003; Reeves and Reeves, 2012; Stewart, 2012). The acquisition of information does not change the students' world view, but the way they structure that information and think with it does. This is conceptual change. Meaning is created by the learner through this process and so constructivism focuses on the nature of the learning activities that students undertake.

Therefore, Biggs' called his whole system constructive alignment, as it is based on the twin principles of constructivism in learning and alignment in teaching. Constructive alignment means using constructivist theory to help decide what teaching methods to use and then aligning all aspects of the teaching, which Biggs claimed would lead to a greater likelihood of students engaging in appropriate learning activities, constructing their knowledge their own way.

I developed the timeline assignment as I saw it as the most appropriate and engaging way to align the learning objectives, the lecture content and the assessment task to make sure that what students were learning was what I intended them to learn. The activity required for this assignment is very thorough and active. Arranging facts, designs, people and events into a chronological structure of their own design allows students to construct their own understanding and meaning. It also allows them to use a structure they already understand – that of chronological time – to build from to construct their understanding, which aligns even more closely with constructivism (Reeves and Reeves, 2012). Reading notes and listening to lectures cannot all do this for them – it is the active part of the learning that allows students to create their own knowledge. The hope is that this will also help them to retain the knowledge as they have constructed a structure to contain it. Several studies have suggested that using constructivism helps to aid retention due to the active nature of learning (Stewart, 2012).

Learning objectives for the unit state students should:

1. have a broad understanding of the role of design within the recent history of human civilisation
2. understand, recognise and identify the various historical styles applicable to Industrial Design

3. be able to analyse and discuss the interrelationship between design, technology and society
4. have the ability to think critically about design and designs
5. have the ability to write and verbally communicate an argument or critique
6. have an understanding of relevant design theory and discourse

The design history lectures cover objectives 1, 2, 3 and 6. The timeline addresses objectives 1, 2 and 3, allowing students to convert knowledge from the history lectures into their own format for maximum understanding. Objectives 5 and 6 are covered by the discussion papers, and 4 and 5 by the criticism project. The timeline assignment was designed to be aligned with the lecture content and associated resources provided on the Blackboard online learning management system, as well as with the CRA sheet used for assessment.

Visual Literacy

In generic terms, visual literacy is defined as the ability to read and comprehend visuals and also to generate understandable visuals. It has also been defined as the ability to construct meaning from visuals (Rourke, 2008). Visual literacy in the context of art and design history education involves the development of familiarity with the tradition and technology of visual representation. Students need to develop skills in decoding qualitative semantics and syntaxes. This aids them in learning to appreciate and critique art and design (Rourke, 2007). To put it another way, it is an understanding of the visual code that is being used and how that relates to the purpose or function of the work of art (Cunliffe, 1992). Rourke (2007, 2008) recommends longer viewing times of relevant images, simple lecture presentations and the use of comprehension and categorisation of examples to assist students in developing visual literacy of design history.

The timeline was designed to assist students in developing design history visual literacy by requiring use of the provided examples of designs and styles, thus forcing students to re-view all these images. This means that viewing time is increased, as recommended by Rourke (2007). Comprehension of visuals is encouraged through the creation of a visual overview of three centuries and through students making links between artefacts, events, designers, etc, with similar styles or visual characteristics. Also, the act of categorising and placing the images into the timeline in the correct place helps students to consider and understand how and why they fit within a context (e.g. place, Movement, style, designer, time period).

Visual Thinking

There is a body of research around the idea of “graphicacy” as an important component of literacy (Cross, 1984), increasing calls for it to

be applied in education at various levels and to benefit various disciplines and learning styles (e.g. Anning, 1997), and an understanding or assumption by many authors that designers are visual thinkers (Cross, 1984; Do and Gross, 2001; Goldschmidt, 1994; Purcell and Gero, 1998; Schon and Wiggins, 1992). Designers have a high level of interaction with their own sketches (Menezes and Lawson, 2006) and use them as a way of thinking (Soygenis, Soygenis, and Erktin, 2010) in order to construct meaning (Schon and Wiggins, 1992), as shown by studies which have analysed design processes through sketches and verbal protocols (Goldschmidt, 1994; Purcell and Gero, 1998; Schon and Wiggins, 1992). However, there is surprisingly little literature on how designers may benefit from using visual methods for any activity other than designing, or how educators can exploit their visual thinking skills to help them absorb other important knowledge (e.g. materials and manufacturing, technology, design history and theory). This was therefore an ideal opportunity to try and exploit students' preferred learning style in strengthening their learning in a theoretical subject.

The timeline takes advantage of the visualisation skills and visual thinking style of many design students because it is in a graphical format. This means that students can work with their strengths in understanding complex and sometimes dull information such as dates, names and facts. It allows students to see design history visually, according to a format of their own choosing, and get an understanding of how things link together by viewing them juxtaposed in a chronological format. Poracsky, et al. (1999) stated that since graphic images can illustrate patterns, they can allow connections to be captured, recognised and analysed. When done well this assignment assists students in literally seeing causal links between events, designs, designers, styles and movements. Fleming (2001) found a higher student performance in courses where learning activities matched students' learning style. However, we should not simply assume that all design students are visual thinkers (Claxton and Murrell, 1987) and so this unit had three assignments, each with a different focus and encompassing visual, verbal and kinaesthetic learning styles.

This section has shown that the assignment was carefully designed to maximise learning, understanding and retention of design history. The next sections will showcase examples of the work and discuss the feedback provided by the students.

Examples of Student Work

The timeline assignment has produced a variety of responses over the past three years, from websites and electronic presentations to large paper timelines, scrolls and 3D models (Figures 1-11).

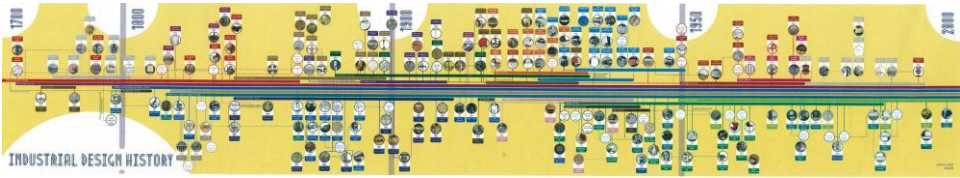


Figure 1: Overview of a paper timeline covering three centuries. Clour coding has been used to categorise and link the entries.

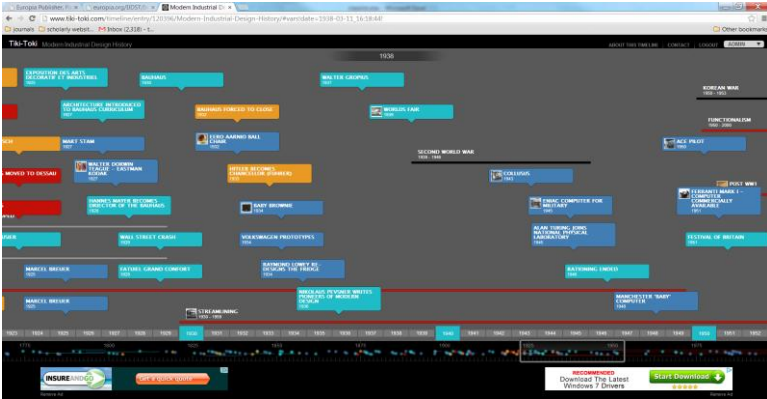


Figure 2: A timeline presented on the website tiki-toki.com (overview mode) Links and categorisation are generally shown using colour codes on this program.

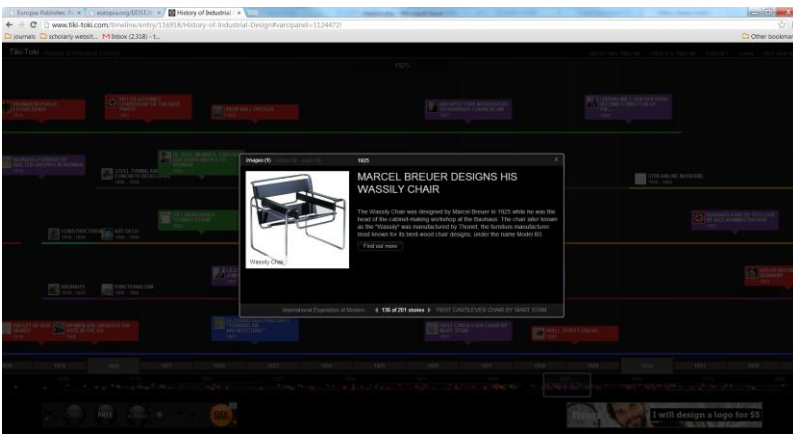


Figure 3: A tiki-toki timeline showing detail of one entry.



Figure 4: Timeline designed using a snakes and ladders framework. The snakes and ladders were used to illustrate links.



Figure 5: A very large 3D timeline which used pins and thread to create links between entries.



Figure 6: Detailed 3D timeline organised by decades with colour coding to show categories. An excellent assignment with a lot of information provided for each entry on the reverse of the cards.



Figure 7: A spiral design which succeeded in communicating the depth of time passing, and used colour coding for categories, but did not make the most of the spiral format in making links across time.

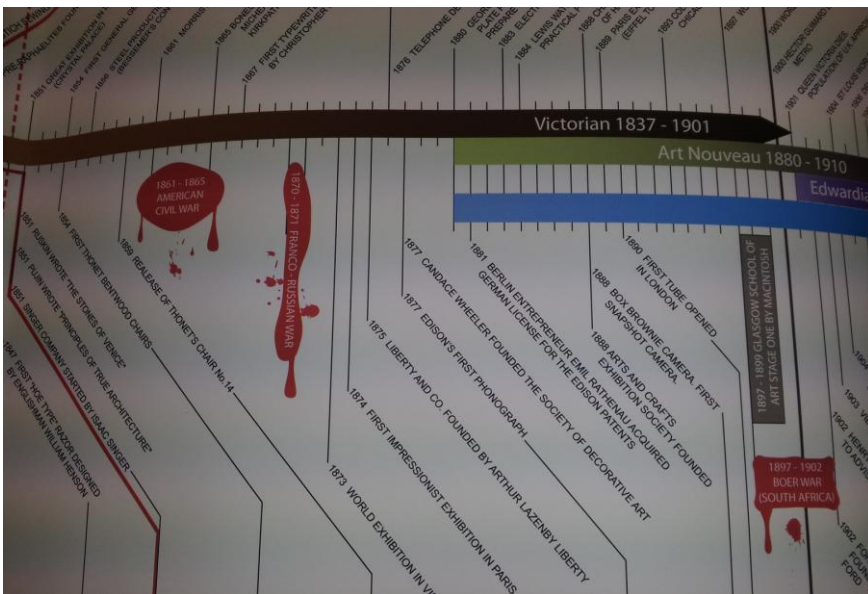


Figure 8: Section of a paper scroll which showed wars in a unique and very graphic way. Red solid and dotted lines were also used to show various links.



Figure 9: A folding timeline mounted on plywood.



Figure 10: A 3D timeline built on a metal frame. Three categories are juxtaposed to show interaction between the categories.



Figure 11: A lampshade timeline using a 3D spiral to convey time passing. Richness of design history comes across through the thick and crowded nature of the spiral layers, which use colour coding to categorise entries and have a papier-mache finish.

Assessing the Assessment

Timelines from this unit have been admired at discipline reviews and used for end of year shows and permanent displays. Peer reviews have suggested that this is seen as an innovative assessment which is far superior to an exam format. In 2012 and 2013, a survey was issued to students to gain feedback about the assessment. In 2012 there were 40 questionnaires completed in a class of 53, in 2013 27 in a class of 43. Using a Lickert scale, students were asked to rate the assignment from 1 (not at all informative/engaging) to 5 (very informative/engaging). Feedback was very positive (Table 1).

2012	Mean Score
Informative	4.4
Engaging	3.9
2013	
Informative	4.1
Engaging	3.7

Table 1: Student ratings of the timeline assignment

Students were also asked an open-ended question; “Do you feel the timeline assessment is useful in helping you to understand and retain an overview of industrial design history. Why?” 34 students in 2012 and 20 students in 2013 responded to this question (examples in Table 2).

Code	Sample responses	Orientation	Tally
Uses visual thinking	<ul style="list-style-type: none"> ...because we are design students – visuals are always best when it comes to understanding something. 	positive	12
Understanding links and relationships	<ul style="list-style-type: none"> Using the linking ... made it a lot more fun and engaging. ...provides a further understanding of how the designs are connected together. 	positive	11
Allows an overview to be developed	<ul style="list-style-type: none"> It provided a bigger picture of the historical story. 	positive	11
Time consuming	<ul style="list-style-type: none"> I grossly miscalculated how long it would take. 	negative	10
Research developed understanding	<ul style="list-style-type: none"> Because once I was on a topic I liked I went and researched it further. 	positive	8
Retention of history facts	<ul style="list-style-type: none"> Heaps of fun...great, I remember so much more general information about industrial design history. 	positive	8
Weighting of marks	<ul style="list-style-type: none"> Amount of time/effort in making it does not reflect its weighting. 	negative	6
Constructing timeline themselves led to improved learning	<ul style="list-style-type: none"> Makes you understand because you're involved. Yes, cause I had to organise the timeline myself. 	positive	3
Understanding lecture content	<ul style="list-style-type: none"> Having to make the timeline reinforced the lecture content. 	positive	3
Better than exam/report	<ul style="list-style-type: none"> an interesting assignment compared with a report. I learnt a lot more than I would have studying for an exam. 	positive	3
Future reference tool	<ul style="list-style-type: none"> It is something we can go back and look at on the future. 	positive	3
Helps but painful	<ul style="list-style-type: none"> Yes however painful it is searching for dates it does help. 	negative	3

Table 2: Results of coding open-ended responses from questionnaire 1

Coding was applied to the open-ended responses to determine which issues students most commented on in relation to the timeline assignment, and also to understand the proportion of positive and negatively orientated responses. All 54 comments from both cohorts were coded. Codes were developed out of the comments themselves rather than set *a-priori*. All applicable codes were applied to each comment, so that the total number of coded responses is more than 54. It should be noted that students were told that this exercise was developed to replace an exam, but had not been made aware of the pedagogical theory behind it (eg visual thinking, deep learning,

constructivism). However, the issues of understanding and retention and the word overview were mentioned in the open-ended question itself. Results are shown in Table 2.

Responses were largely positively orientated, with 63 positive codes compared to 19 negative ones. The majority of negative responses related to the time consuming nature of the task, which in my experience is to be expected from any student feedback on any task. The next most common was to do with weighting of marks in relation to time taken to do the task. This has now been addressed and weighting adjusted for this task, up to 40% for 2014 from 30% in 2012 and 2013.

Positive responses addressed the main objectives I had for the task, such as using visual thinking, understanding links and relationships and retention of content, including using timeline as a future reference tool. However, some new issues emerged. For example, developing an overview of the 300 year period seems to be important to students. From some of the comments there is a suggestion that this is linked to visual thinking as the overview is a visual one, but not all the comments state this so the factors were coded separately. Also some commented that doing research helped them to understand the content. The task was not set as a research task as all the required information was in the lecture notes and slides plus the starter file. However, some students also did extra research to find and include different resources in their timelines.

The one important issue not thoroughly addressed in the comments and mentioned by only three students was the activity of constructing their own learning. This is an important aspect of constructive alignment and it is disappointing that it has not come through more strongly. However, on reflection, other comments relating to understanding links and getting an overview of the whole period could flow from the experience of constructing their own learning but not be consciously acknowledged by students. Whether briefing students more thoroughly about the pedagogy behind the task would be beneficial to their learning or not is currently unknown, although it may have resulted in more mentions of this issue in the responses. Talking about the pedagogical approach will be expanded in 2014 as a trial to see whether or not students being more aware of this actually helps their learning.

The 2012 and 2013 cohorts also completed an extra questionnaire at a later date. This occurred around 6 months after the 2013 cohort completed the timeline assessment, and 18 months after the 2012 cohort completed it. 34 students (17 from each cohort) rated how much they felt they remembered of the Design History Content (from lectures and tutorials) on a scale from 1 (nothing) to 5 (everything). They also answered an open-ended question; "Looking back now, do you feel the timeline assessment was useful in helping you to retain (remember) an overview of industrial design history in the long term? Why?"

The 2013 cohort mean rating was 2.9. For the 2012 cohort it was 3.3, with an overall average of 3.1. This result indicates that students felt they retained a degree of information closer to everything than nothing, although there is no data from previous exam cohorts to compare. Although this score is not as high as it could be it does suggest that retention is occurring, especially when combined with the open-ended responses.

23 responses to the open ended questions were coded by theme in the same way as the previous responses. The themes show what aspects of the assignment contributed to retention of information but since there were no relevant negative comments the orientation was not coded. Results are shown in Table 3. The largest category was the visual overview – students commented that creating a visual timeline helped them to remember the information. The issues of gaining an overview of design history and using visual thinking were two of the most common responses in the first questionnaire so it is clear that these issues remain important for the students in the long term.

Code	Sample responses	Tally
Visual overview	<ul style="list-style-type: none"> • It helped me to map it all out. • It works well seeing the sequence of events in order. 	8
Resource to keep	<ul style="list-style-type: none"> • I found it useful in the way it became a tangible timeline, allowing me to go back and reference the events. I have used it 3-4 times recently. 	4
Some but not all retained	<ul style="list-style-type: none"> • ...I remember the general styles, practitioners and eras, but cannot link them together very strongly 	4
Research/new content	<ul style="list-style-type: none"> • It introduced me to products and designs I normally wouldn't know of. 	2
Forced to review content	<ul style="list-style-type: none"> • It made me go back to the lecture content... 	2
Making links	<ul style="list-style-type: none"> • ...forces you to link historical happenings with the evolution of industrial design 	2
Constructing own structure	<ul style="list-style-type: none"> • I remember a lot of facts and links between facts I put in my timeline because it was a personal timeline 	1

Table 3: Coding of open-ended responses from questionnaire 2

Another important factor in retention appears to be having a resource to keep. Other issues raised in these comments include the fact that some students felt they retained only some information. Most of these commented that dates and details were not retained. The expectation I had was that students would retain an overview of events and detail of major designs and artefacts. It would appear that an overview is retained even by those who do not remember the details. More investigation would be required to test whether details of important designs, movements, events or designers are being retained.

Marking criteria involved an equal weighting of completeness, accuracy, and comprehension and presentation. Criterion referenced assessment was used for this assignment and the top mark criteria stated that:

- Timeline is complete and includes all events, movements and designs discussed in lectures and readings
- All entries in timeline accurately placed and illustrated
- Innovative timeline design which successfully shows links and is attractive and usable

The level of student engagement with this timeline exercise has been reflected in the marks, as the average mark was substantially higher than those gained for exams in the past. The mean mark was 77% in 2012 and 76% in 2013.

Conclusion

The timeline assignment was designed to make the student learning experience in design history deeper and richer by aligning it within the teaching program and using a task based on constructivism. It appears to have been a success from the point of view of student engagement, quality of the learning experience, and marks achieved. It also appears that students are retaining these facts. The existence of the finished timeline that they can access when needed, along with the experience of designing the timeline format and visually organising the entries, assists with retention.

There is also evidence that increased understanding has occurred – the students have had to relate designers, designs and styles and movements, which should have assisted with the development of design history visual literacy. In addition, appreciating the causal links between historic events, artefacts and people involves a deeper understanding than the previous multiple choice exam could assess. Students stated that the visual nature of the assignment helped them to understand how different aspects of design history related to each other, and also assisted with retaining the information, and that it was more interesting and fun than a report or an exam. I argue that this type of assessment task has great potential for design history learning.

Acknowledgements

I would like to thank the tutors in this unit over the past three years; Andrew Cave, Alison Livingstone and Shayne Beaver

References

- Anning, A. (1997). Drawing Out Ideas: Graphicacy and Young Children. *International Journal of Technology and Design Education*, 7, 219-239.
- Biggs, J. (2003). *Teaching for Quality Learning at University*. NY: Open University Press.
- Blackler, A. (2001). *Teaching Industrial Design Criticism*. In Proceedings of ICSID Educational Seminar 2001 Seongnam, Seongnam City, South Korea.
- Blackler, A. (2013). *A new approach to understanding readings for design students*. In Proceedings of Consilience and Innovation in Design, IASDR, Tokyo, Japan.
- Claxton, C. S., & Murrell, P. H. (1987). *Learning Styles*. Washington, DC: George Washington University (ERIC).

- Cross, A. (1984). Towards an understanding of the intrinsic values of design education. *Design Studies*, 5(1), 31-39.
- Crotty, M., & Roberts, D. A. (2009). Introduction. In M. Crotty and D. A. Roberts (Eds.), *Turning Points in Australian History* (pp. 1-17). Sydney: UNSW Press.
- Cunliffe, L. (1992). Why a Theory of Symbols is Necessary for Teaching Art. *Journal of Art and Design Education*, 11(2), 143-153.
- Do, E. Y. L., & Gross, M. D. (2001). Thinking with Diagrams in Architectural Design. *Artificial Intelligence Review*, 15, 135-149.
- Fleming, N. D. (2001). *Teaching and Learning styles: VARK strategies*. Christchurch, NZ: N.D. Fleming.
- Goldschmidt, G. (1994). On visual design thinking: the vis kids of architecture. *Design Studies*, 15(2).
- Menezes, A., & Lawson, B. (2006). How designers perceive sketches. *Design Studies*, 27(5), 571-585.
- Poracsky, J., Young, E., & Patton, J. P. (1999). The Emergence of Graphicacy. *The Journal of General Education*, 48(2), 103-110.
- Purcell, A. T., & Gero, J. S. (1998). Drawings and the design process. *Design Studies*, 19(4), 389-430.
- Ramsden, P. (2003). *Learning to Teach in Higher Education* (2nd ed.). London: Routledge Falmer.
- Reeves, T. C., & Reeves, P. M. (2012). Designing Online and blended learning. In L. Hunt and D. Chalmers (Eds.), *Understanding Learning: Theories and Critique* (pp. 112-127). Melbourne: ACER.
- Rourke, A. J. (2007). *Cognitive load theory, visual literacy and teaching design history*. In Proceedings of ConnectED 2007 International Conference on Design Education, Sydney.
- Rourke, A. J. (2008). To be or not to be a Visually Literate Design Student: Should Teaching Design History Include Teaching Visual Literacy Skills? *Design Principles and Practices: An International Journal*, 2(1), 49-55.
- Schon, D. A., & Wiggins, G. (1992). Kinds of seeing and their function in designing. *Design Studies*, 13(2), 135-156.
- Sim, J., & Blackler, A. (2007). *Making History relevant for designers: breaking down barriers in the mind and across disciplines*. In Proceedings of ConnectED: International Conference on Design Education, Sydney.
- Soygenis, S., Soygenis, M., & Erkin, E. (2010). Writing as a Tool in Teaching Sketching: Implications for Architectural Design Education. *International Journal of Art and Design Education*, 29(3), 283-293.
- Stewart, M. (2012). University teaching in focus: a learning-centred approach. In L. Hunt and D. Chalmers (Eds.), *Understanding Learning: Theories and Critique*. Melbourne: ACER.

Alethea Blackler (PhD) is an Associate Professor in Industrial Design at Queensland University of Technology, Brisbane, Australia. Her principle area of research interest is intuitive interaction, in which she is one of the world leaders. She pioneered the work on intuitive interaction with the first empirical work in the field. She leads the Intuitive Interaction theme in the People and Systems lab at QUT. Associate Professor Blackler has led a prestigious ARC Discovery project on Facilitating Intuitive Interaction for Older People. Her teaching work is focussed on design history, theory and criticism, applied design research and PhD supervision. She has published extensively, been invited to give presentations at international workshops and is the recipient of several awards. She has regularly reviewed papers for international conferences and journals. Associate Professor Blackler is a member of the Design Research Society (DRS) (a.blackler@qut.edu.au).