Annotated Bibliography

In this annotated bibliography I have chosen to write about topics that affect design. The topics I have chosen will take me from the definition of objectives, to the principles that affect design and the on to issues that affect digital resources in particular. From there I look at creating screencasts and the area of interface design. I feel that these topics will provide me with guidelines for the various challenges that we may encounter at different stages during the design of our resource.

Clarke, R. Colvin & Mayer, Richard E. (2008) Applying the Multimedia principle: Use words and graphics rather than words alone. *E-Learning and the science of Instruction: proven guidelines for consumers and designers of multimedia learning.* (pp. 51-66). San Francisco: Pfeiffer

In this chapter the use of graphics and words to promote learning rather than words alone is explored. The authors begin by defining terms such as words, graphics and multimedia and suggest that multimedia presentations promote active learning as they leverage the channels that learners use for processing visual and auditory materials enabling the learner make sense out of the material and integrate it with existing knowledge.

The authors provide the instructional designer with a description of the various types of graphics and content and provide practical advice regarding the most appropriate graphic that should be used for each content type. Clarke & Mayer suggest that the use of multimedia presentations containing suitable graphics encourages active processing in the learner by stimulating construction of the pictorial and verbal representations of the content and allowing the learner to link them. Their conclusions are supported by research carried out with students who used multimedia presentations versus those who used text or graphics alone. Having proven that successful learning can be achieved through the use of multimedia the authors go on to point out that multimedia presentations work better for the novice rather than the more experienced student as the more experienced student is automatically able to construct the visual representation of the content. Surprisingly the reader is informed that static images are more effective than animated images as they allow the learner to control pace and manually animate the static image. However the authors concede that there are certain situations where graphics should be animated such as when demonstrating a motor skill or in the illustration of otherwise invisible phenomena to the learner. To conclude the

authors identify areas that are still unknown about visuals such as the cost effectiveness and the long term effect on knowledge transfer.

The difference in content for the novice or more advanced student may be obvious to the instructional designer; however Clarke and Mayer have added an extra dimension for me in that I must also think about the method of delivery of this content and how it can differ depending on the level of prior knowledge the student may have. Currently I am designing content on mind mapping for our resource. I had located several informative You Tube videos on mind mapping that I had intended to use; however having reflected on the author's suggestions I have decided that I will include video content for students who have some working knowledge of mind mapping and create content based on more static images for the student who has not encountered mind mapping before. For me this is consistent with the focus suggested by Seale, Boyle, Ingraham, Roberts and McAvinia (2007) *Designing Digital Resources for Learning* and how the learner can affect the design of the content which leads to designing content in a way that recognises and encourages the learner's ability to use the resource.

Gagne, R. & Briggs, J. (1974). Defining Performance Objectives *Principles of Instructional Design* (pp. 75-97). USA: Holt, Rinehart & Winston Inc.

In this chapter the authors suggest that objectives should be defined in order to determine what capabilities will be learnt by the student. They argue that language has a tendency to be ambiguous and so for objectives to be of value for instructional planning they need to be precise. An objective should have a single meaning and provide concise information regarding capability.

To start the process of writing objectives Gagne and Briggs propose that the Instructional Designer should begin with general statements regarding the purpose of the course which concentrate on what the student will be able to accomplish on completion of the course within a current timescale. These general statements are the basis for more specific statements which should be written using 5 components - situation, learned capability, object, action and tools or other constraints. The authors suggest that objectives written in this manner will allow any person answer the question – How will I know when the purpose has

been achieved? Gagne & Briggs are aware that their components are similar to those used by other authors such as Mager (1962) and Popham & Baker (1970) but argue that the difference lies in the distinction they make between verbs that indicate the learner's action and the learner's capability. The chapter goes on to provide the reader with numerous examples of objectives written using the 5 components and the authors provide the reader with a list of the verbs that should be used when defining capability. The examples provided amply illustrate to the reader the manner in which objectives should be written and how ambiguity can be avoided. As the chapter comes to a close the authors acknowledge that objectives have a direct implication on assessment and allow the teacher to design situations that allow the learned behaviour to be observed.

Gagne & Briggs describe their objectives as being formal and cumbersome as a result of using the verbs outlining capability and my tendency as I read the chapter was to agree with them. However on completion of the chapter I followed their suggestion to use both types of verb in the objectives I had outlined for the resource. I found that their use brought the clarity and precision promised by the authors for me in my role as Instructional Designer. The only drawback to writing objectives in this way for me was that they were written in a formal manner and I was conscious of a discussion that took place in the early stages of the Instructional Design module where Damien spoke about the use of objectives with students just starting a module. He mentioned avoiding the use of jargon and suggested that objectives should be written in simple straightforward language. My inclination is to agree with him and in the story board we have used simple language to outline the objectives of our resource with the focus suggested by Briggs and Gagne on what the student will have achieved having used our resource. Where I see the value of the more formal wording advocated by the authors is firstly in providing a focus for the Instructional Designer on what will be achieved by the resource and so avoiding the inclusion of any extraneous material and secondly in providing guidelines for students as the module progresses regarding the end of module assessment.

Gillani, B. (2003) Visual design and e-learning. *Learning theories and the design of e-learning environments* (pp. 131-151). Lanham, MD: University Press of America

In this chapter the author looks at perceptual design. Gillani explains that how we interact with everyday things depends on our past experiences. If we encounter something that we

don’t understand how to interact with we rely on our past perceptual experiences to guide us. Our perceptual knowledge develops throughout our lives as a result of interaction with our surroundings. Designers rely on their knowledge of human perception to design new objects that are compatible with human perception. Gillani suggests that in order to achieve effective perceptual design there is a need to have an understanding of perceptual theories and their effects on the visual design process.

Gillani outlines the two theories of visual perception – the ecological and the constructive approach and identifies how these approaches impact on design. He explores the constructive approach further by outlining the Gestalt Laws of Perceptual Organisation that are subconsciously used by the brain when establishing patterns and provides examples of how designers have used the information to influence their design. As the chapter progresses Gillani suggests that the main objective of perceptual design is to translate a three dimensional world into the two dimensional computer screen and proposes that designers are obliged to communicate visually with the user. Gillani cites Mullet and Sano (1995) who explain the term visual language as the visual characteristics of a set of design elements and the way they are related to one another. They suggest that the basic elements of design are the formal vocabulary and there is a visual syntax describing how the elements may be combined to produce visual communication. In this chapter Gillani looks at the syntax of design under three headings; elegance and simplicity, scale and contract and organisation and visual structure. Gillani provides the designer with techniques to achieve the three principles outlined.

This chapter has provided me with valuable advice on layout and design. As with Tabbers, Kester, Hummel and Nadolski; Gillani has suggested that there is a need to become objective and design around the user rather than the designer’s preferences. Whilst Gillani proposes that this is the first rule of effective web design, he acknowledges that according to Mullet and Sano (1995) simplicity is the most important element of design. His suggested techniques of reduction, regularisation and leverage of content lead to what Tabbers et al advise in that only essential information is delivered and all elements should be reviewed to decide whether they should be retained or if they can be integrated. Whilst it is encouraging to see that as a group we have already incorporated some of Gillani’s suggestions into design such as the use of regular form, colour, size and graphics there is now a need to review all the elements created with a view to retention or integration to further improve the website design.

Mayer, R. (2009). Signalling principle. *Multimedia learning* (pp. 108-117). Cambridge; NewYork: Cambridge University Press.

In this chapter Mayer explores the principle that students learn more effectively when cues that highlight the organisation of the essential material are added. Signalling can take the form of verbal cues that occur in the narration of content or visual cues such as greying out parts of the screen to direct the learners' attention to certain content.

The author makes the point that signalling does not add any new information to the content. So it could be argued from a behaviourist perspective that signalling does not achieve anything other than make the lesson longer. However from a cognitivist perspective Mayer acknowledges that as signalling guides and helps the learner organise key material cognitive load is reduced. In this chapter Mayer looks at the research that has been carried out on the signalling principle. Whilst there has been research carried out that points to the effectiveness of signalling in areas where the content is text only the author is encouraged to study the effects of signalling on multimedia learning. This is an area that I am particularly interested in as I want to include some visual signalling in the form of on screen arrows in addition to narration of a graphic. Mayer found that where visual signalling was incorporated on a complex graphic display with narration the transfer of learning improved.

In the chapter I reviewed by Clarke and Mayer they suggested that static graphics are more effective for the novice learner. Using a static graphic in Articulate to explain the various areas of a mind map to a novice learner I felt there was a need to provide more focus for the learner and signalling has provided this. I rerecorded the module in Articulate using the annotation tool to provide the visual signalling that Mayer suggests. Reviewing the changes as a result of including signalling I feel the content will be more effective for the novice learner as their attention is guided at all stages to the area on the mind map being discussed reducing the possibility of confusion. In addition when reviewing other content I had created I felt that signalling would improve the structure. I included some pointer words in the narration of the overview of the module as suggested by Mayer. I followed this up by including a slide with the heading of the topic inserted at the beginning of each topic. From a design perspective I felt the updated content had an improved flow and a clearer structure for the learner.

In conclusion I agree with Mayer's suggestion that signalling can be effective in organising content in poorly designed lessons. I feel it has improved the content designed and in the

evaluation phase it would be interesting to review the learners' opinion. To reflect on my professional role for a moment, I have come to realise that feedback we have received from learners regarding some content that we have created is regarding the lack of signalling in the content and the preference to have more verbal signalling included. This is an aspect I hope to review in the future.

Merrill, David M. (2009) First principles of instruction. In C. Reigeluth & A. Carr-Chellman (Eds.), *Instructional-Design theories and models: building a common knowledge base* (vol III) (pp. 41-57) New York: Routledge

The instructional designer is faced with numerous challenges when setting out to design any type of learning be it a single topic or full curriculum. In this essay Merrill has completed a lot of hard work on behalf of the instructional designer by reviewing various instructional design theories, models and research and compiling a set of prescriptive design principles. The author clarifies the position of the principle by stating that it is not a model or a method of instruction but a relationship that underlies the model or method used and the degree of efficiency of the model will depend on the degree to which the principle is implemented. Merrill presents the instructional designer with five principles that should be considered when designing for learning. However before the principle could make it to the final list it had to meet five standards. Firstly it had to be included in most of the theories or models reviewed. It had to promote more effective, efficient and engaging learning and it had to be supported by research. The principle had to be general and finally it had to be design orientated.

As they are presented in the essay the principles are listed as follows

1. Demonstration principle
    a. Learning is promoted when learners observe a demo
2. Application principle
    a. Learning is promoted when learners apply new knowledge
3. Task Centred Principle
    a. Learning is promoted when learners engage in task centred instructional strategy
4. Activation Principle

    a. Learning is promoted when learners activate relevant prior knowledge or experience
5. Integration Principle
    a. Learning promoted when Learners integrate new knowledge into the everyday world

In presenting each principle the author outlines how it promotes learning and what needs to be done to enhance the learning achieved. The principles are most appropriate for generalizable skills. These skills are those that can be applied in two or more specific situations and are categorised as concept classification or kinds of, carrying out a procedure or how to and finally execution of a process or what happens.

What strikes the reader as they progress through the essay is that there is nothing particularly new in the information provided. Yet the author argues that most of the theories or models reviewed failed to include activation or integration in any form so the use of guidance to relate new material to previously learned material using a structure is not included. Towards the end of the essay Merrill presents the four principles of activation, demonstration, application and integration as a four phase cycle of instruction. I thought it was interesting that the task centred principle was not mentioned as part of the cycle. Whilst reading the essay I felt that the task centred principle was similar to the application principle. For me both principles deal with the application of new knowledge as the learner comes to terms with a new skill or task. To conclude much of the information provided by Merrill is known to us, however it is obvious that the principles are not applied in total to the majority of instructional strategies. As I mentioned earlier Merrill has done all of the hard work and provided the instructional designer with the principles and how best they can be applied in one essay.

Raftery, D. (2010). Developing educational screencasts: A practitioner's perspective. In R. Donnelly, J. Harvey & K.C. O'Rourke (Eds.), *Critical Design and effective tools for e-learning in higher education theory into practice* (pp. 213-226). Hershey PA: Information Science Reference.

Screencasts are a digital recording of computer screen activity and often contain narration. In this chapter the author looks at what screencasts are and the various issues involved with

creating screencasts from a pedagogical and instructional design focus as well as the technical and practical issues. He explores why screencasts should be used and the benefits that are associated with them. Having provided an outline of what screencasts are Raftery goes on to provide some insight into his own personal experiences with using screencasts; how he introduced them into his own practise with students and how students use screencasts in different ways. From an instructional design perspective he provides suggestions as to where screencasts can be used effectively in the teaching and learning process and a four step approach to creating screencasts.

Raftery suggests that screencasts offer a multimedia rich option to support student learning. Having read this I reflected on how this would conflict or not with the views held by Clarke and Mayer that video content can be less effective than static images for the novice learner. I was interested to see that Raftery used screencasts with novice learners which would challenge Clarke and Mayer's view. In his practise he integrated screencasts during practical sessions with students. In his experience this allowed students to work through exercises as required with full control over pausing and replaying particular sections. This would suggest that students were in as much control of their learning as they would be with the static images suggested by Clarke and Mayer. It may be the case that screencasts work for novice students where a teacher is present and can clarify aspects of the screencast if required whereas students working by themselves may benefit more from static images. The topic of the screencast may also have an impact on the successful interaction of the novice learner with the screencast.

Raftery highlights that a criticism of screencasts is that they can have a teacher focus rather than a student focus and lack interactivity (Educause 2006). However this would not seem to be the case from his personal experience of using screencasts with students just prior to exams. His findings were that students used the screencasts in a variety of ways, ways that most suited their personal learning style. The author suggests that there is a need to make a call with regard to publishing simple screencasts with little editing or creating screencasts with interactive elements. The fact that the same content created by the author has been used either by novice learners, as quick revision for students at a more advanced level or as a first point of reference for former students making contact would suggest that the extra time involved in creating the content is well spent.

Seale, J., Boyle, T., Ingraham, B., Roberts, G. & McAvinia, C. (2007). Designing digital resources for learning. In G. Conole & M. Oliver (Eds), *Contemporary perspectives in e-learning research: themes, methods and impact on practice* (pp. 121-133).London: Routledge

This chapter deals with understanding how best to structure and create individual resources to ensure that they underpin the learning process. The authors suggest that for resources that are emerging from contemporary learning technologies designers do not always have this understanding. In order to develop this, the authors address three key design issues with a focus on a different partner within each issue.

The first issue addressed is designing for learning and the focus is on the designer. Seale, Boyle, Ingraham, Roberts and McAvinia suggest that when designing for learning the designer should take an orientation, assume a stance and acquire a posture. These descriptors seem to me to suggest someone who is immovable and rigid however this image is dispelled as Seale et al outline what each aspect attributes to the resource and it is seen that through these aspects designers invest something of themselves in the resource such as their beliefs of what constitutes effective learning. The second issue addressed is designing for accessibility and the focus here is the learner. Seale et al discuss the challenge for the designer as being should they design for all learners or should they design for the specific needs of some learners. The discussion raises issues such as designing for the learner with disabilities and suggests that in designing for all, the product designed will better serve the needs of all users. The final design issue that is addressed is designing for reusability and the focus is on the resource. Seale et al provide the designer with valuable advice on how to ensure that the resource they design can be reused. There is an interesting discussion on how reusable learning objects can go against recent pedagogical research in that they become containers for the transmission of information however the authors refer to Boyle & Cook (2001) who state that learning objects should be micro contexts for learning. Each micro context contains content and appropriate interactivity around achievement of educational goal.

As the design of our resource progresses I have found that the authors' reference to the need of the designer to take stance has become more significant for me. The approach which I may favour may not always be the most appropriate for what is to be achieved and indeed having listened to the outline of the other resources that are being created by my fellow students it has become obvious that the designer must look at what they want to achieve

through the resource e.g. will the resource solely provide information or does the designer aim to change a behaviour. Having made this decision the designer can use the appropriate pedagogical approach and take the appropriate stance. This leads on to the authors conclusion that although they have provided guidelines for design it is not just a matter of conforming to guidelines but designing in a way that recognises and encourages the learner's ability to use the resource. I'm reminded of our guest speaker from Google and a note I took from her slides – think of the learners and all else will follow. For me this chapter has highlighted that although the design issues have been discussed from the view point of the designer, the learner and the resource the central focus of each discussion is really how the learner can benefit from or affect the design of a resource, an aspect that as the authors point out can easily be overlooked.

Tabbers, H., Kester, L., Hummel, H. & Nadolski, R. (2004). Interface design for digital courses. In W. Jochems. J. Van Merrienboer & R. Koper (Eds.), *Integrated e-learning implications for pedagogy, technology &organization* (PP. 100-111). London: Routledge Falmer

In this chapter the Tabbers, Kester, Hummel and Nadolski suggest that the most important delivery medium in integrated e-learning is the computer interface not only because it is suitable for providing an environment where students can work collaboratively but also because it is possible to present content in many different ways . Despite this importance Tabbers et al point out that there is a lack of clear guidelines regarding where content should be placed on the screen and most existing ideas are based on the designer's intuition rather than theories about how students learn from a computer screen. The authors make it clear that prior to the design of any interface analyses must be done regarding the user, the tasks and the context and usability testing should be ongoing throughout the process, however they provide some generic guidelines with regard to two important areas of interest which are the layout of the screen and the way that multimedia content is presented.

There are a total of 14 guidelines suggested by the authors. While the first 8 are related to the design of the interface these guidelines relate not only to the actual interface itself but also to the learners interaction with the interface. As the interface may present content in a number

of modalities the final set of 6 guidelines relate to the presentation of multimedia content. Regardless of whether the guidelines refer to the interface or the presentation of content the common theme in all guidelines is not to overload the learner with elements that can disrupt the learning process.

As I began to upload content onto our web pages I was conscious that although we had agreed a general layout for each page I was tending to work on the basis of my own preferences and tried to become more objective as I worked on the site. As a result of this I was interested in authors' comments that it is necessary for the designer to look through the eyes of the lay person and avoid the thought that the user will automatically understand the features of the screen. Having read this chapter and with the added benefit of not looking at the site in a while I have started to review not just the layout but also the navigation. I feel one area that needs to be changed in particular is the navigation tabs to each of the site pages. Currently each tab contains a single letter from the mnemonic VARK. My suggestion to the group will be that a word or words should appear on these tabs to make it more obvious to a new user what information they will access if they click on the tab. Ideally we had hoped to conduct some user evaluation of the site prior to its submission until that can be done I will also suggest that the group need to review the site from an objective view point and make any changes required.