

Formalised Approaches for Multimedia Design – Are They Used by Australian Designers?

Debbie Augusteyn, Karen Gunn & Ying K Leung
Swinburne Computer Human Interaction Laboratory (SCHIL)
School of Information Technology
Swinburne University of Technology
P.O. Box 218, Hawthorn 3122
Victoria, Australia

Abstract

This paper describes a study which investigates the extent to which multimedia developers apply formal design approaches when creating educational multimedia titles. For the purpose of this study a formalised design approach is defined as one which is documented and repeatable. The findings of this study suggest extreme diversity in the approaches used to design educational multimedia, and a low level of use of any formal methodologies. This can be attributed to a general lack of understanding of formalised design approaches and a reluctance among developers to create design methodologies due to the resource investment required and a concern that use of methodologies could inhibit creativity.

Keywords: Multimedia design, methodologies and guidelines, work practices

1. Introduction

In Australia, multimedia design is a challenging process that is currently more ad hoc than scientific. A number of approaches are available to designers, however, a completely integrated approach to multimedia design does not seem to be available. Current approaches generally relate to components of multimedia design, such as graphical design or instructional design, rather than guiding the entire design process.

The lack of fully integrated multimedia design methodologies may be attributed to a number of factors. Firstly, multimedia is a relatively new discipline. This means that multimedia designers are still working out how to do things themselves, so they are not at the stage where they can document processes thoroughly.

Secondly, multimedia is a multidisciplinary field that must incorporate aspects of methodologies from all of the

contributing fields, such as graphical design, instructional design, sound production, software development, human factors and so on.

Thirdly, multimedia design approaches are developed in either university environments or by commercial organisations. Communication between these two groups is generally very poor. Most industry-based multimedia developers are also not involved with universities, as a consequence, they do not hear about the latest findings, theories, and approaches.

Fourthly, most commercial organisations do not publicise their methodologies. This means that less experienced multimedia designers cannot learn from the more experienced ones.

Given the high profile of the multimedia industry in the state of Victoria, Australia and the state government objective of promoting best practice, this study sets out to investigate what kind of design practices are currently being employed in the multimedia industry. The focus is on how multimedia designers make decisions regarding the interaction style, types of media presented, presentation style, and the characteristics of the user interface and to what extent these choices are influenced by formal design approaches such as methodologies, guidelines, and standards. To narrow the scope of this study, only educational multimedia systems are considered as they are taking an increasingly important role within the education and training field.

2. Four multimedia design approaches

The approaches to multimedia design that exist vary in the level of prescription provided. For the purposes of this study, the approaches to multimedia design have been classified into four categories, based on the level of prescription. A formalised approach was defined for the purpose of this study as one which is documented and repeatable.

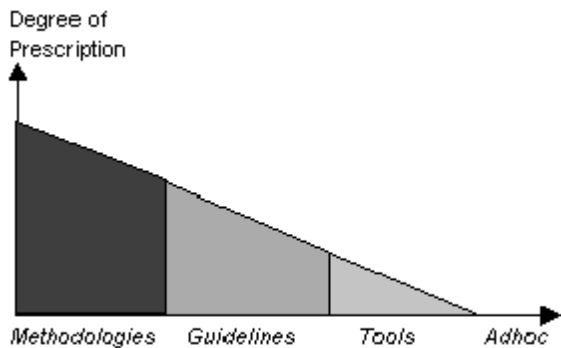
Methodologies—a documented repeatable process for the design of multimedia. Methodologies are usually process-based, that is, they reflect a process for doing something. Examples of this category include eMMa [5] and the Hypermedia Design Model [3]

Guidelines—principles, standards, and styles set forward to determine a course of action when designing multimedia. Guidelines are usually knowledge-based, that is, they provide general advice to the designer. Examples of this category include Koller’s work on his MULTEX system [4] and Faraday and Sutcliffe [2], and the Design Guide for Multimedia published by the European Usability Support Centres[10].

Tools—an instrument used to help design multimedia. Tools are usually action-based, that is, they help to perform an action. Examples of this category include SEIPA [9] and Designer’s Edge (<http://www.allencomm.com/>)

Ad hoc—there is no documented approach to the design of multimedia.

These categories represent a continuum in terms of the degree of prescription provided by the approaches. Figure 1 below reflects the relationship between these approaches and the degree of prescription.



Multimedia Design Approach

Figure 1 The relationship between multimedia design approaches and the degree of prescription.

A literature review conducted suggests that there are no formal approaches specifically for multimedia design, though there are a number of related methodologies. Incomplete guidelines and tools are also available.

It appears that the ideal approach to multimedia design combines a formal approach and creative talent. Nanard and Nanard [6] studied the hypertext design environment by observation and came to the following conclusions regarding the design process:

“ ... designing is not simply following a formal design technique. It is an incremental and opportunistic activity

that takes place in a two-axis space. One axis represents the stages generally identified in formal design methods. The second represents categories of the designer’s mental activity.”

3. Method

3.1 Participants

A total of ten designers of educational multimedia systems from ten companies in the state of Victoria participated in this study. The subjects were selected from World Wide Web listings of multimedia development companies on the Multimedia Capabilities Directory page (<http://www.isite.com.au>) and the New Media Consultants page (<http://www.amfd.com.au/AMFD/newmedia.htm>), and from professional contacts of the authors of this paper. Each participant had worked on at least one educational multimedia development project and had a thorough understanding of all aspects of the development of that project.

3.2 Materials

This study involved the use of a questionnaire to gather data. (Due to lack of space, the questionnaire is not included in this paper.) This questionnaire was designed around the findings from the literature review. The questionnaire was kept as brief as possible with as few as possible questions requiring long written answers. The questionnaire was divided into the following three sections:

Multimedia project details—details of the project to which the participant is referring in this questionnaire.

Multimedia design approaches—details about the design approaches used by the participant.

Profile details—details of the participant’s educational background, experience, current position, and company.

The questionnaire was pilot tested on a multimedia developer to evaluate its effectiveness as a data collection tool. After the pilot test, the questionnaire was revised and was used to gather data from the ten participants.

3.3 Procedure

A number of multimedia development companies were contacted to establish whether they had experience with educational multimedia development and to ascertain whether they were willing to participate in the study. The majority of the thirteen organisations contacted were happy to participate—only one person refused, while two were rejected on the basis of having insufficient experience of educational multimedia development. The initial contact was via the phone.

A copy of the questionnaire was sent by email to the participant prior to the interview. This gave the participants time to think about their responses and

prepare for the interview. The interviews lasted approximately one hour. The answers provided in the questionnaire were discussed in the interview and any ambiguities clarified. In some situations, the participants had not answered the questions correctly in which case the responses were amended in consultation with the participants.

After the data collection stage was completed, the responses were analysed. They are discussed in the following section.

4. Results and discussion

The result of this study supports the findings of the National Design Review Report [7] which found that there is insufficient understanding in industry of how the design process should be integrated into business strategy and planning. All of the developers interviewed claimed to know about and use multimedia design methodologies, however, upon closer examination most of them did not understand the concept of a formalised design methodology and did not in fact use one. Similarly there was a low level of use of guidelines and standards. The use of tools was, however, prevalent.

The results indicated that all projects used a minimum of three media. Since a multimedia project was defined as one which uses at least one medium, all of the projects studied met the criteria. There seemed to be a relationship between the number of media used and the extent of use of methodologies. The more media used, the greater the use of design methodologies. It is unclear whether this is a result of more complex multimedia requiring more formalised design approaches, or whether having more formalised design approaches allows for more complex multimedia.

The questionnaire gathered information about the roles of team members working on the projects. All projects studied had a project manager and a programmer, however, other roles were not always present on projects. All of the projects studied were educational and involved graphics, but not all projects used instructional designers and graphic designers. Only two of the seven projects involving animation used an animator.

The average size of the project teams investigated was small, and this may have limited the opportunity to involve a number of specialists. A solution to this might be to employ specialists at different stages during a design project. For example, an instructional designer may be involved for the first half of the project and a programmer for the second half.

These findings suggest that some of the projects view project management and programming to be core skills required on a project, and instructional design, graphic design, and animation as peripheral tasks that can be performed by the programmer.

4.1 Methodologies

Two out of the three projects that did not have an instructional designer on the team claimed they did not use any form of instructional design methodology. These two projects also claimed to have little or no familiarity with the instructional design methodology. This suggests a lack of understanding of the importance of instructional design in the development of educational multimedia systems.

Most of the project teams claimed to be familiar with a graphic design methodology. Three of the projects studied, however, did not involve a graphic designer. Two of the projects with no graphic designer on the project team claimed to have followed a graphical design methodology completely. We believe that the projects that did not use a graphic designer and claimed to be familiar with a graphic design methodology did not give an accurate response. This might be explained by their lack of understanding of graphical design methodologies and their application (contrary to what they claim). They may believe they know all there is to know because they don't fully understand the benefits of a graphic design methodology.

User-centred design was a methodology that some of the multimedia developers claimed to use. The post questionnaire interview, however, shed a new light on those developers who claimed to use user-centred design methodologies. In three cases, the participants who claimed to employ a user-centred design approach were actually referring to obtaining client feedback. These developers regarded the client as being representative of the user on the grounds that the client understood the users' needs best. It is also interesting to note that none of the projects studied had a usability specialist within their design team. Only one developer employed an educational psychologist who may have had some familiarity with user-centred design approaches.

The level of familiarity with instructional design, interaction design, and user centred design varied between the projects from not at all completely. There does however, seem to be a pattern in responses by each project for each methodology. That is, if a project gave a low score for one methodology, they were likely to give a similar score for the other methodologies. This could be explained in one of two ways. Firstly, the participant's view of a formal methodology might apply consistently to all methodologies. That is, if methodologies are seen as being valuable, they will be used consistently for all aspects of design. Similarly, if methodologies are not seen as valuable, they will not be used for anything. An alternative explanation could be that there was response bias, where the participant responded in the same way for all questions regardless of its accuracy.

All of the projects claimed to use some sort of methodology, whether it was documented (7 projects) or

undocumented (3 projects). We believe that the projects using undocumented methodologies did not actually use methodologies, but rather considered aspects of these methodologies when developing their product.

Of the seven projects that claimed to use a documented methodology, four projects used the methodology for limited aspects only. This shows perhaps, a willingness to use a methodology, but a lack of knowledge and understanding of all of the available methodologies.

This means that only 30% of projects used a documented methodology that covered all aspects of multimedia design. Two of these were developed in house and the third was web-based.

One of the companies that used a documented methodology was a large company. Larger companies may be more likely to be able to afford the investment in developing methodologies. They are also more likely to work on larger projects for which a methodology is more important due to the number of people working on the project. This is supported by the participants' comments about the benefits and drawbacks of a formal design approach.

The educational background and their area of expertise affected the participants' responses. The range of educational backgrounds among the participants varied from one who was educated to high school level, in the case of the least formally educated, to one with a bachelor of arts and graduate diploma in instructional design, being the most qualified. Participants with an educational background in graphical design were more likely than those with training in other areas to attribute good design to innate ability rather than formal education. Competent design, they felt, could be taught, but good design was something you either had or you didn't. Most participants had a graphical design background, which is unlikely to encompass many formal multimedia design methods.

The findings from this study suggest that formalised methodologies are not widely used. This is probably due to a lack of understanding of existing methodologies, the absence of any single approach that could be applied to educational multimedia design, the lack of resources to develop a formalised approach, and the variety of educational backgrounds of the project leaders.

4.2 Guidelines

The study found that eight of the projects claimed to use guidelines of some sort. Closer examination, however, revealed that two of these were undocumented guidelines. We believe that these two projects did not actually use formal guidelines, but rather that the design team used their experience and general knowledge.

Four of the projects used guidelines that were developed in-house. The other two projects that used documented guidelines used guidelines from books.

Four of the projects claimed to use other guidelines, however, none of these guidelines related to design. Most of them related to Quality Assurance (QA) and testing.

Two of the projects used incomplete guidelines that did not cover all aspects of design. This means that 40% of projects used documented guidelines for all aspects of design. Again, this indicates that there is a lack of knowledge of guidelines.

One possible explanation for this is that there are very few publicly available guidelines. Most guidelines are developed by organisations for internal use and are not publicised. Developing a complete set of guidelines is a very time consuming task which most smaller organisations cannot afford. This is suggested by the fact that some of the participants identified the time to develop a formalised approach as being a major drawback.

Another possible explanation for not using guidelines is that sometimes different guidelines offer conflicting advice. Even fewer (none) exist that cover all aspects of the multimedia design process from conceptualisation to interface design to usability.

4.3 Standards

The results showed that eight of the projects claimed to use standards of some sort. Upon closer examination, two of these projects did not have documented standards, and two participants were referring to standards that did not relate to design.

This means that only 40% of the projects used formally documented standards and only half of these covered all aspects of design.

The low usage level of design standards is consistent with the findings reported above, namely low usage of any formal approach to educational multimedia design.

4.4 Tools

The data showed that 90% of the participants claimed to use at least one type of tool. Graphic design tools in the form of software packages were the most popular tools. In addition to these graphics software tools, six of the projects used graphics from libraries. All six of the projects involving sound used sound libraries.

The least commonly used tools were instructional design tools. This is probably due to the small number of instructional design tools available and the low level of formal training in instructional design among the participants.

The other tools used did not relate to multimedia design. They were the tools used to develop the multimedia, such as Asymetrix Toolbook™.

Most of the tools used by the multimedia developers are readily available to businesses and are well known because of advertising. They assist with the implementation of a design and are probably popular

because they increase design team's productivity and help to counter some of the time/money trade-offs mentioned in section 5.9.

4.5 Characteristics of a formal design approach

Participants were asked what they considered a formalised design approach to be. Their responses explain to some extent why formalised approaches are used so little by multimedia developers. The level of understanding of what a formal approach means varied greatly across the participants. Responses ranged from not understanding the concept of a formal design approach at all to providing a detailed series of steps that comprise a formal design approach. Two participants said that there is no such thing as a formal design approach to multimedia design. One participant perceived formal design approaches to be akin to the style guides used by multinational companies such as Disney. The level of prescription implied by this is well below what we believe a formalised design approach to be. In summary, only four of the participants described a formal approach to the authors' definition.

4.6 Benefits of a formal design approach

According to Callaway "*...the seemingly dry and often overlooked area of best practices, process management and development methodologies are the key to ensuring that Web projects come in on time, within scope and under budget.*" [1]. The developers interviewed seem to have a high level of agreement with this sentiment when referring to use of multimedia design methodologies. Participants in the study were able to cite a large number of benefits associated with using a formal design approach. Primary among these were quality control, adherence to time schedules and budget, product consistency, and greater efficiency within the design process.

4.7 Drawbacks of a formal design approach

One reason why design methodologies may be so poorly understood and so infrequently used by producers of educational multimedia is that they are viewed as being obstructive to the creative process. This was encapsulated in the responses given to the question about the drawbacks of a formal design approach. Only one participant said that there were no drawbacks associated with a formal design approach. Perceived drawbacks of a formalised design approach were described as limiting the design team's outlook, making the interactivity boring, and reducing creativity.

Another barrier to adoption of formal methodologies was the perceived set up time to create a methodology, mentioned by two of the participants. Multimedia design involves such a number of disciplines (graphic design,

usability, instructional design etc.) each with a significant body of theoretical knowledge and experience. A huge effort is required to combine this information into a single methodology. Most organisations do not have the resources to do this.

It would appear that the existing methodologies are not well understood, and as pointed out in the literature review, none of the existing methodologies cover all aspects of multimedia design. In order to use a formal design methodology, developers would have to construct their own. The survey results indicate that some organisations feel that the time investment required to develop a methodology is not worthwhile.

4.8 Design trade-offs

All of the participants were able to refer to trade-offs that had been made during the design process for the educational multimedia title.

The trade-offs mentioned by participants fell into two broad areas. The first of these were technical trade-offs, mainly due to hardware and software restrictions (e.g. colour palettes) and budget/time/resource problems. Clearly trade-offs do affect design decisions but the use or otherwise of methodologies, and guidelines appears to stem from other issues such as a lack of understanding and knowledge and reluctance to invest the time and resources required to develop them.

4.9 Methods of staying up-to-date

All of the participants claimed to be actively involved in staying up to date on multimedia design issues but unless they attend international conferences or read international journals they are unlikely to be exposed to the material cited earlier. Nine participants mentioned magazines or journals as a means of keeping up to date on multimedia design approaches while three of the ten mentioned conferences. Without knowing exactly what magazines these multimedia developers are reading or conferences they are attending it is difficult to ascertain whether they are being exposed to the methodologies, guidelines, and tools mentioned in the literature review. If they are reading popular computer magazines that relate to multimedia hardware and software such as internet.au or Desktop rather than reading more academic journals it seems unlikely that developers of educational multimedia will be exposed to the design approaches presented in this paper.

4.10 Impact of client requirements

While this topic was not directly addressed via a specific question in the questionnaire, during the course of the interviews it became apparent that the requirements of the client had a significant impact on several aspects of the design process.

On those multimedia projects studied that were being built for an external client rather than for in-house use, the influence of the client appeared to have a major impact on the design approach used. This was predominantly in the area of content selection. Content was altered very little by the developer when supplied by the client. The developers seemed to assume that if the content could not be changed, then the learning style also could not be changed. This perhaps shows a lack of understanding of information presentation techniques. Despite what the developers claimed, modifying the learning style does not affect the content.

Some of the projects also claimed that their approach was dictated by the client's methodology, guidelines, and standards. This was why they did not have their own.

5. Summary and recommendations

The ten educational multimedia projects can be described as inconsistent in terms of design approach, attitudes, and staff resources. These findings indicate a low level of use of formalised design approaches within the Australian multimedia industry. Most of the projects would sit in the lower half (not very prescriptive) of the model in Figure 1.

The lack of awareness and understanding of formal design approaches explains this phenomenon to some extent. This is compounded by the lack of any single multimedia design approach within academic literature. There is no design approach available which covers multimedia design with or without consideration of the additional requirements for designing an educational multimedia title.

Multimedia Victoria's Co-operative Multimedia Centres has taken a first step towards this goal with the release on October 10, 1997 of the publication, *Use and usability: a guide to designing interactive multimedia for the public* [8]. This publication presents a number of guidelines, checklists, and recommendations for multimedia design, but still does not present a complete design methodology.

The development of a universal multimedia design methodology only partially solves the problem. Once such a methodology is developed, it must then become publicly known, available, and accepted. This research suggests that the multimedia developers in Victoria have minimal professional development and it is based mainly on networking and reading of magazines. Opportunities do however, exist to introduce training in formal design methodologies to courses allied to multimedia development such as programming, graphic design, and project management. This means that the next generation of multimedia developers will be introduced to the multimedia methodologies. In addition, publicity about a new methodology should be directed towards more

commercial publications such as newspapers, trade magazines rather than academic journals.

After a new multimedia methodology is developed and readily available, it must actually be accepted by industry. Gaining acceptance for incorporating a design methodology into the development process would, in our opinion, present short-term challenges due to the disparity in educational backgrounds of multimedia developers.

Reluctant to adopt any approach that might impact on creativity is another factor which would inhibit uptake of any formal design approach. This is again a barrier which can only be solved through education. Showcasing of excellent and creative educational multimedia titles that have been developed using formal design approaches could be an appropriate strategy.

The findings of this research suggest the need for a comprehensive multimedia design methodology to be developed and introduced into the multimedia industry in Australia if the goal of worlds best practice is to be achieved.

6. References

- [1] Callaway, J. 1997, Method from the Madness, *PC Week*, 14, 5, pp 99.
- [2] Faraday, P. & Sutcliffe, A. 1997, Designing effective multimedia presentations, *Proceedings of CHI'97*, pp. 272-278.
- [3] Garzotto, F., Mainetti, L. & Paolini, P. 1995, Hypermedia Design Analysis, and Evaluation Issues, *Communications of the ACM*, August, Vol. 38 (8), pp. 74-85.
- [4] Koller, F. 1992 Multimedia Interfaces, in Galer M., Harker, S. & Ziegler, J (Eds) *Methods and Tools in User-centred Design for Information Technology*, Elsevier Science Publishers B.V., Holland, pp. 299 - 315.
- [5] Nakakoji, K., Suzuki, K., Okhura, N. & Aoki, A. 1997, A framework to support creativity in Multimedia Information Design, *Proceedings from Interact '97*, pp. 212-219.
- [6] Nanard, J. & Nanard, M, 1995, Hypertext design environments and the hypertext design process, *Communications of the ACM*, Vol. 38, (8). pp. 49-56.
- [7] National Design Review Steering Committee through the Australian Academy of Design NSW, 1995, *Computing by Design*, The National Design Review Report cited in National Board of Employment, Education and Training, 1995, *Converging Technology Work and Learning*, Australian Government Publishing Service, Canberra.
- [8] Schofield, J. & Flute, J, 1997, *Use and Usability: A guide to designing interactive multimedia for the public*, Multimedia Victoria, Melbourne.
- [9] Thuring, M., Hannemann, J. & Haake, J. 1995, Hypermedia and cognition: Designing for comprehension, *Communications of the ACM*, Vol. 38 (8), pp. 57-66.
- [10] Vosser, P, Maguine, M, & Heim, J. 1997. *European Usability Support Centres Design Guide for Multimedia*, Version 2.1.