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“Look and Feel” Interface Design Tool for Educational Multimedia Courseware

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Abstract: This paper discusses issues related to design approaches used by software development teams to create user interfaces for educational software. A research study that focuses on the description and analysis of different approaches, used in the in development of educational multimedia products, and their impact on the overall quality of the final product is discussed. Within the study, the inherent need for the “client-centred” design approach, in the development of educational software, was noted. A new approach to UI development that utilises an advisor tool is discussed. The advisor is used to help courseware development teams quickly produce the first draft of the “look and feel” UI design and discuss it with the client. This tool could potentially save time and money, which is currently being spent by educational courseware development companies on the preliminary interface design, a design that is often rejected by the client during the first meeting.

Introduction

The software development community frequently uses several design approaches to develop user interface (UI) for software products. For example, Palanque and Bastide (2003) describe five of these approaches:

- Abstraction first: architectures at the forefront
- Semantic first: metaphors at the forefront
- Implementation first: toolkits at the forefront
- Process first: user centred design
- Model first: model-based approaches

The “abstraction first” approach is based on the description of a typical structure of an interactive system in terms of abstract functionalities to be covered. This approach is based on the Seeheim and Arch design models (Bass et al., 1991). The “semantic first, metaphors at the forefront” approach is usually involves the use of metaphors to provide the unifying view of software elements. Toolkits are used to make the life of the software designers easier. However, most of UI toolkits are hard to master and are usually poorly documented. UI design based on the “process first” approach is an iterative, incremental, user-centred design process. Initially it involves low fidelity software prototypes, and then moves towards high fidelity prototypes influenced by user feedback. The last UI design approach is model-based. It supports many models, such as the domain model; task model and scenarios; the user model, the platform model that links to the toolkits and to the environment; and the presentation model that is based on the appearance of the application, etc. (Palanque and Bastide, 2003).

Model-based UI design is reviewed and thoroughly described by Szekely (1996). He describes a generic model-based interface development architecture consisting of four main components: modeling tools, a model, automated design and implementation tools. Modeling tools may include a “design critics and advisors” component. This component provides a set of tools to evaluate UI design. Design advisors frequently use a knowledge base of design

knowledge, typically represented as rules, where the condition part of the rule presents a design element and the action part presents a way of refining the matched design element.

There are some well-known difficulties with the automated UI design approach. The main concern is the quality of the interface produced using the automated tools. In addition, it is frequently not feasible to produce high quality interfaces from just data and task models (Harning, 1996; Wilson, 1996). Consequently, some of the model-based interface design environments (MB-IDEs) are moving away from automation and towards the use of computerized advisors.

In this paper the authors focus on the model-based and user-centred design approach. Van Duyne et al. (2002) describe in detail user-centred design, or rather customer-centred design approach, for Web applications. In their book they are using the term “customer-centred” design rather than “user-centred” design and argue that the term customer “evokes the fact that successful Web sites account for issues that go beyond ease of use and satisfaction...”(van Duyne et al., 2002). In educational courseware development, we believe, the appropriate term should be “client-centred” UI design, as the client normally has a significant impact on the UI design and, especially, on “look and feel” issues, as shown by the research study described below.

Who Has the Most Impact on the Final Look and Feel?

One of the authors of this paper recently conducted a research study that focuses on the description and analysis of different approaches in development of educational multimedia courseware, and their impact on the overall quality of the final product. In particular, this research study investigated what could be done to improve the overall visual quality and learning impact of educational multimedia courseware.

Numerous educational multimedia products are used in educational institutions today. Sometimes they are developed by “Lone Rangers” – educators that are experts on the subject, with the combined skills of computer programming, and graphic and computer interface design. However, most often a multimedia development team for educational materials consists of a project manager, subject matter expert, instructional designer(s), software developer(s) and graphic artist(s). These days the customary approach to the development of a multimedia product places instructional designers as major leads in the overall “look and feel” of the final product and gives them the last word on what material goes into the final product (Rose, 2000). This approach could be named “Instructional”.

The foreseen problem with the “Instructional” approach is that the instructional designers are, in general, not well prepared for the multimedia design and decision making task because, typically, they are insufficiently trained in the art of multimedia and, especially, in the art of visual presentation. To give some examples: in the program curriculum for Graduate Studies in Instructional Design, Development & Evaluation at the Syracuse University’s School of Education (University of Syracuse, 2003) there is only one course, out of 34 available, that teaches students some basic literacy in visual communications, and this course is not a required course, but an elective! The same applies to the curricula of the University of Houston, the University of South Alabama College of Education (University of South Alabama, 2003) and the University of Memphis Instructional Technology Programs (University of Memphis, 2003), where visual and media literacy is at the bottom of the course list, or not taught at all.

It is interesting to note that the International Board of Standards for Training, Performance and Instruction (IBSTPI), in the Instructional Design Competencies document (IBSTPI, 2000), states that the ability to effectively communicate in visual form is an essential professional foundation competency for instructional designers. However, after thoroughly reviewing several books that are considered to be essential reading for instructional designers, the authors did not find any mention about the importance of visual communications skills. In addition, the authors reviewed several respected educational scholarly journals, such as Educational Technology Research and Development and Educational Technology for the past three years, and found only one article remotely related to visual communications in instructional design.

Educational researchers debated the efficiency of using multimedia in education for a long time. One approach to the issue is that "...simply adding multimedia elements to a bad learning program won't improve it" (Rosenberg, 2001, p. 56). Some state that: "Existing instructional authoring tools tend to emphasize delivery, games, flashy graphics, and animation rather than instruction or learning" (Merrill, 2002, p.15). The advocates of this view are stressing the paramount importance of instructional design in the educational products and emphasize that multimedia could potentially make the bad learning design worse (Rosenberg, 2001). They emphasize that, in developing educational multimedia materials, the most attention should be paid to the learning design, and not to how the product looks, whether it is boring, etc. The problem with this view is that, when the multimedia product is developed using the "Instructional" approach, there is not a single person on the team who is considering the final result, as a personal multimedia creation. As a result, the visual quality, and the "look and feel" of the final educational multimedia courseware suffer.

Let's take a look at another, and quite successful, example within the multimedia development industry – the gaming industry that drives digital entertainment. Contrary to the "Instructional" development process, used in educational multimedia, the gaming industry is using a "Creative" approach to develop computer games. Within the game development team, typically, there is one person – a creative director, an animator or a graphic artist who has the overall responsibility for the "look and feel" of the final multimedia product. The creative director establishes the style guide for the entire project and facilitates the creativity of other members of the team, including graphic designers, instructional designers, animators, and programmers. Creative directors, typically, have a formal education in design or visual art and have a command of all media forms and their uses in multimedia applications (Welsh, 1998).

The research study was carried out as case studies involving several multimedia development projects, e-learning and multimedia companies and a University-based e-learning development team. Data collected included interview forms, observations and visual artefacts. The study included projects that involved the development of several different multimedia presentation formats, thus giving the researcher the opportunity to study the use of multimedia for different types of learning, such as online or offline (CD-ROM).

Research data collected show that the "Instructional" design approach is widespread in educational multimedia development. Instructional designers are leading multimedia development teams and, most often, are in decision-making positions on the overall "look and feel" of the final educational product. Research also confirms that Instructional designers, in general, are not well prepared for this task. One of the most interesting research findings of this study is that the final "look and feel" decisions for the educational courseware are, to the greatest extent, influenced not by the team's instructional designers or graphic designers, but by the client's preferences. One of the study participants expressed a great deal of frustration with the amount of time and money wasted by educational courseware development companies on preliminary interface design that is often rejected by the client during the first meeting (Goldfarb, 2004).

Client-Centred UI Design Approach

User-centred design is defined in the ISO 13407 standard. It typically "entails involving users in the design and evaluation of the system so that feedback can be obtained" (Nunes, 2003). However, in educational courseware development, as we mentioned previously, the "client-centred" design approach should be considered instead. This design approach is very close to the "customer-centred" design approach that is proposed for Web site design (van Duyne et al., 2002). There are some obvious differences between Web site design and educational courseware design, but, considering that many courseware products are designed for the Web, and also accounting for some striking similarities with issues related to "technology-centred" design and "designer-centred" design approaches for both domains, it would be useful to discuss the arguments of the "customer-centred" design proponents. We need to look at the value of their approach by comparing it to other design styles.

First of all, the customer-centred design builds on the *user-centred design* by fusing marketing issues with usability issues. Marketing issues, indeed, are quite important in the e-learning industry, where the client is usually not buying "shrink-wrapped" software product, and, from the beginning, actively participating in the courseware development process. Utilizing the customer-centred design approach should help to escape the pitfalls of the *company-centred* design process, where the needs and interests of the company dominate the structure and the

content of the final software product. The fatal flaw in this is that what company thinks should be in the product is not necessarily what customers, or, in case of courseware development, clients, need or want.

Products developed using the *technology-centred* design approach are often built with little upfront research about customer needs and business needs, resulting in products overloaded with animations, audio and graphics and often looking amateurish. This, unfortunately, is often the case with educational multimedia products where flashy graphics and animations substitute for educational values.

The *designer-centred* design approach is the one that is the most difficult to escape. Often the thinking is: “What the client sometimes doesn’t understand is the less they talk to us, the better it is. We know what’s best” (van Duyne et al., 2002, p.11). In the designer-centred approach the needs of clients are placed beneath the creative and expressive needs of the designer. This approach normally will not work well in the courseware development environment, where, as mentioned before, client’s preferences have the most impact on the design outcomes.

As follows from the previously mentioned study (Goldfarb, 2004), in educational courseware development only careful consideration of the client needs will help to achieve long-lasting success. Considering the nature of the educational courseware development, it is highly appropriate for instructional designers to lead courseware development teams. However, knowing the instructional designers’ lack of training in the art of visual presentation, it is proposed that the development team leaders be aided by with the stand-alone “look and feel” software advisor tools. These tools will help in creating presentation models that could be used for initial meetings with clients. During the meeting the clients would be presented with a range of professionally designed courseware interfaces that they can give feedback on and clearly express their preferences. By properly recoding the clients’ preferences and reaction to the proposed interfaces, the discussions during the meeting could be quickly translated into the successful and client-centred “look and feel” UI designs.

“Look and Feel” Advisor Tool

The proposed advisor tool leads the developer through a set of steps in defining the “look and feel” of the courseware interface (Goldfarb, 2004). The steps in this process are the general design steps, starting with choosing the style, and then selecting colours, choosing the layout and graphics, typography, etc. For example, a designer would begin by choosing from a selection of styles like Art Deco, Graffiti, Modernism, Neoclassic, Renaissance, Rave Colour, etc. (Figure 1).

The advisor will then offer a choice of colour combinations compatible with the style chosen, giving the designer the opportunity to select one colour combination. The choices of colour combinations could be based on the existing colour combination Image Scales similar to the one developed by Kobayashi Ltd. in Japan (Kobayashi, 1991). In the Image Scale developed by Kobayashi, the colour combinations have some particular key words assigned to them with a defined feeling attached to a key word, for example a “cheerful” or a “fresh” feeling. Key words that convey similar feelings are grouped into broader categories and the names of these categories are taken from terms used in fashion, such as “elegant” or “romantic”.

As the next step, the designer will choose the layout, graphics and typography. The advisor tool offers a choice of layout designs based on the style chosen. Graphics choices are based on the style and the colour combinations selected before, and the choice of typography is based on the style, colour and graphics chosen. The typography choice, in particular, could be based on typestyles classifications, similar to the one developed by Will-Harris (1990). In his classification all typefaces are divided into two large groups, Formal Typefaces and Casual Typefaces. Each of these groups is further divided into body and display type groups and these groups, in turn, are further divided into six subgroups expressing different feelings such as “friendly”, “serious”, “cool”, “warm”, etc.

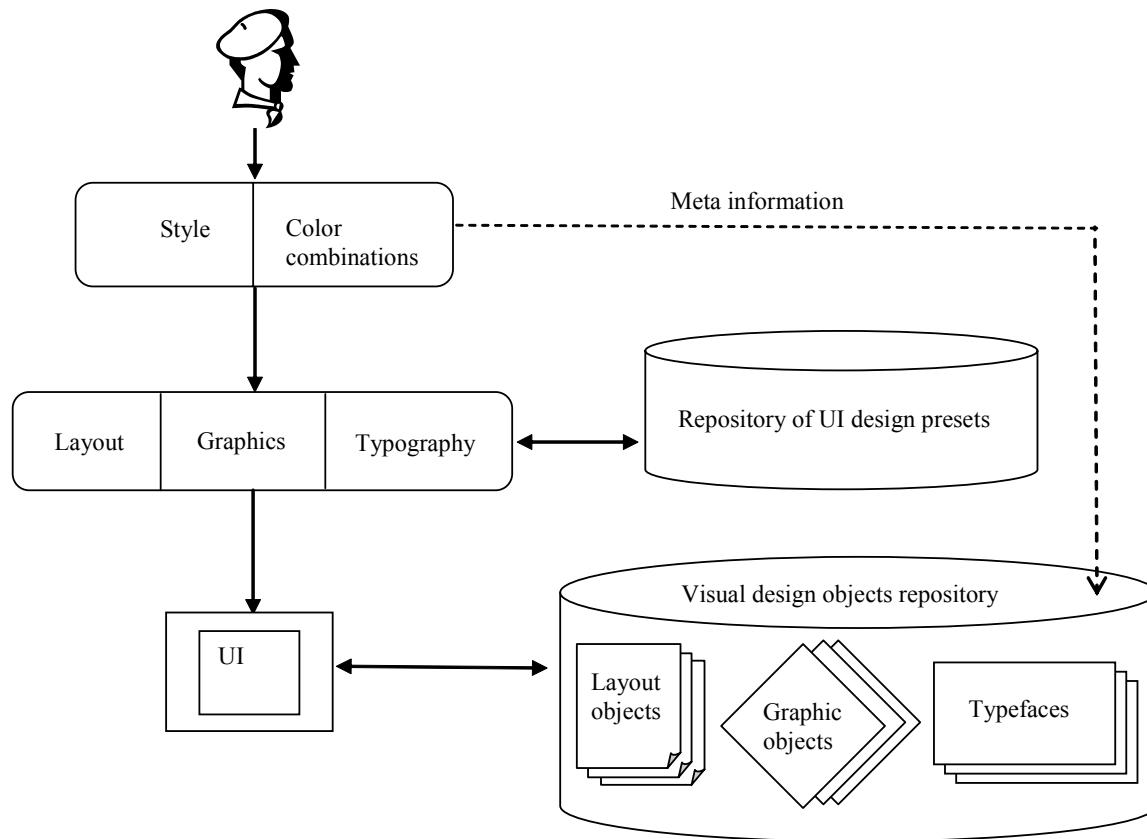


Figure 1: “Look and feel” advisor tool architecture

The “look and feel” advisor (Lafa) should be designed to work with the visual design objects repository that contains graphic objects, layout objects and typefaces. The purpose of this repository is to provide extra choices and support for the design team in refining the UI design after or during the meeting with the client. Objects in the visual design object repository shall contain “meta” information that reflects style and appropriate colour combination. This will help in customizing the “look and feel” of the user interface according to client’s preferences. This approach also helps in escaping the pitfalls of the fully automated UI design that is shown to be undesirable in the following context: the computer might not be as creative as a good UI designer, or there may be some problem in the design that is out of the scope of the automatic code generator (Belenguer et al, 2003).

Conclusions

Research shows that in educational courseware development only careful consideration of client needs will help to achieve long lasting success and client satisfaction with the “look and feel” of the final product. In view of this, the authors believe that the client-centred model-based design approach will be the most suitable in designing user interfaces for educational courseware products.

We propose a new approach to UI development utilizing the “look and feel” advisor as a tool that helps courseware development teams to quickly produce the first draft of the “look and feel” UI design and, during the meeting with a client, effectively identify the client’s preferences for the product interface design. This will lead to savings in time and money, currently spent by educational courseware development companies on preliminary interface design that is often rejected by the client during the first meeting.

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