

new media & society

# Extending Knowledge Domains for New Media Education: Integrating Interaction Design Theory and Methods

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## **Abstract**

Over the last ten years, *New Media* has ascended to a prominent place in many fields that utilize communication technologies. At the same time, New Media education has evolved in such a way that students are often not prepared to understand the social context of New Media design and development. To produce New Media professionals who are adequately prepared to meet the needs of an online hyper-social marketplace, New Media curricula must reflect those human-centered theories and practices found within the discipline of interaction design, in addition to formal New Media technical knowledge. After showing the findings from two exploratory studies to support this argument, the authors propose a new three-by-three theoretical model, referred to as Knowledge-Operators-and-Domains (KOD). Applying this model suggests an approach that extends the practical boundaries of New Media to include a range of human-centered theories and practices, such as ethnography and usability-based studies.

## **Keyword words**

new media, education, design, ethnography, interaction design, human-centered design

## **INTRODUCTION**

New Media has ascended to a prominent place in the business, entertainment, education, scientific visualization, and military sectors. This is because New Media entails a high degree of creative and technical convergence as seen in the application of e-commerce, gaming, and a wide range of other interactive and communication technologies. As a powerful venue for the expression of ideas and profitability, the New Media market will increasingly demand that products pass through quality assurance. This will often include product assessments and other methods of usability testing to assure customer satisfaction. While New Media faculty provide students with a foundation of design and technical knowledge, they cannot neglect giving adequate attention to those human-centered theories and practices found in interaction design<sup>1</sup>.

### **Building New Media Knowledge**

The interaction design community has an avid interest in what users do. One of the great contributions of classical human-computer interaction (HCI) has been the establishment of user-testing as a fundamental aspect of system design (even though we know that in reality, testing is often done too little, too late, or not at all). While some New Media practitioners are happy to proceed on the basis of intuition, an increasing weight is being placed on the validation process obtained through user data analysis and its direct link to product value (Donoghue 2002).

The authors argue that New Media faculty must be concerned with teaching those aspects of human factors related to interaction styles and usability related to ease of use and learning. What often occurs is that New Media courses become “skills” courses rather than academic ones, failing to integrate cognitive theory and conceptual modeling within a design framework (Cockburn & Bell 1998) that can support a user-centered understanding of product design. As a result, students may inherit a creative model of art and New Media design education, but are unprepared to rigorously evaluate the products they design. Pedagogical models currently employed by some New Media programs risk limiting student job opportunities by not equipping them with an adequate understanding of interaction design methodologies that include the practical relationship between design, media arts technology, and usability. As Foley et al. hold, in a “user-centered economy, usability and attractiveness of the interface is a real marketplace concern” (Foley, Dam, Feiner & Hughes 1990, p. 392).

As the Enlightenment philosophers realized, close study of any phenomenon is an antidote to prejudice, superstition, and careless thinking (Schmidt, 1989). Of course, if interaction design practitioners only concentrate on human metrics, thereby failing to grapple with the more qualitative nature of observation, they will miss the more implicit and subtle forms of user behaviour. As a result, both performance-based testing and ethnography or other qualitative forms of observation, provide a balance of data gathering techniques in the development of any New Media product. Notwithstanding, students must also be able to adapt and utilize a full range of innovative thinking and problem-solving skills in designing software and New Media products that address our information-rich and social-sensitive culture (Agre 1998).

Today, there is a critical need for a philosophical transition in New Media education that

engages students with the social context of real-world problems. On the contrary, New Media programs are at times technology-centered with short-sighted goals of designing products that clearly demonstrate the inclusion of standard usability practices, such as, a concern for user preferences or an inquiry into the socio-cultural context of the target audience. Although considerable progress in forming multidisciplinary curricula has been made, historically, there has been a lack of interest in integrating design and social science methods together in the development of interactive media. At the very least, a suitable range of knowledge domains that address human-centricity should be included.

We continue our discussion by describing the changing context for and demands on New Media education and propose a teaching strategy composed of theories and applications that educators may implement in response to those changes.

## **Grounding the Assumption: New Media Faculty Respond Regarding Interaction Design**

As computing becomes ubiquitous, losing its association with particular kinds of hardware, interaction design theory and methods will need to be adopted by, and perhaps subsumed into, New Media practicum across a wide range of fields. How New Media faculty will respond to these proposed changes in curricula is unclear. For this reason, we conducted a pilot study and an informal survey to give ground to our assumption about the basic position of New Media faculty. The broader research question asks: “Do New Media faculty teach or have an interest in teaching any content related to interaction design theory and methods, especially usability best practice.” We believe our findings suggest that there continues to be a need for such interaction design content within existing New Media curricula.

### *The Pilot Study*

In this pilot study, we sent an online questionnaire to New Media faculty ( $N = 576$ ,  $n = 63$ ) from 122 U.S. universities.<sup>3</sup> New Media faculty were queried on their views regarding whether they believed students needed to know interaction design theory and methods, and if so, to what degree should it be integrated into their existing New Media curricula. Regarding the extent to which interaction design theory and methods were taught, 24% said it was not taught at all. However, of those faculty who said this area of study was not taught at all, 62% said they are currently developing such content or will develop such content in the future. At the same time, 8% said there was at least one dedicated course just for interaction design and usability, while 49% said it was taught as a portion of at least one course. Concerning the reasons for interaction design theory and methods not being taught, 22% said there were no faculty interested or qualified, 35% thought that students had no need for such a skill-set, and 6% said there was no space in their curriculum for courses of this nature.

Although our initial findings were more encouraging than we expected, they still suggested that a majority of faculty concurred with our assumption that interaction design theory and methods are not adequately represented within existing New Media curricula. For example, although half the faculty said such content was only taught as a portion of one course, we can assume it is not receiving adequate attention. We also suggest, but with even more assurance, that interaction design is not adequately represented within existing New

Media curricula based on: 1) only 8% of faculty said that at least one course was focused on interaction design and 2) over one-third of faculty stated that New Media students have no need of such course content.

### *Informal Survey*

During an informal paper survey, we concentrated on New Media faculty ( $N = 77$ ,  $n = 16$ ) in one British university.<sup>2</sup> Our intention was to uncover additional support for the findings of our earlier exploratory study, outlined above. The focus of this survey asked faculty if they taught the rudimentary principles of user-centered design theory and testing in their New Media courses. Of several questions posed, one had particular relevance to our argument. This question asked faculty if they directed their students to test their New Media products using target users. Slightly more than half said that they sometimes direct their students to test their New Media products, while slightly less than half said they do not or will not integrate any form of objective user testing in their courses.

In summary, the findings of the informal survey showed that only a slim majority of faculty appreciated the need for such an inclusion of interaction design theory and methods in New Media courses. From a review of all the data, the findings suggested that those who supported New Media usability tended to consider it as an indispensable aspect of a New Media education, while those of the opposite view were equally convinced that it had no value or relevance in the teaching of their discipline.

### *Summary of the Findings*

The findings of both the pilot study and informal (survey) study suggested similar findings. Although neither inquiry allowed us to draw any statistically significant conclusions, there were two defining viewpoints regarding the relevance of interaction design within New Media curricula, including the appropriateness of user testing. Based on this trend, we suggested that among faculty in New Media programs, there is an awareness of and interest in integrating some form of interaction design theory and methods into course projects, but not an overwhelming interest.

## **NEW MEDIA EDUCATION**

Today's New Media education continues to evolve from within a range of disciplines, such as art, design, communication, and programs that strictly identify themselves as New Media, e.g., those with media arts course content (Faiola 2002). As Figure 1 illustrates, the spectrum of New Media ranges from fine arts to communication. In this paper, our general use applies to this spectrum of disciplinary applications, including those programs with varying degrees of interaction design theory and methods. More commonly, New Media students are encouraged or mandated to take courses in programming as part of their curriculum requirements, in which case they may be exposed to some aspects of interaction design. For the most part, however, interaction design and other forms of user-centered and social science are limited. In part, this is because teaching interaction design theory and methods demands a unique interest on the part of New Media faculty to provide courses that can educate students about the value of the human-centered approach. Moreover, educators

must have a vested interest in enhancing student knowledge and skill-sets that issue in a form of *user consciousness*. As a result, their approach to New Media problem solving will be far more objective in the way they conceptualize interface design. At the same time, they will include other important design and testing techniques such as information architecture, cognitive modeling, and related aspects of quality assurance that depend on performance and preference testing.

If students have an interest in learning interaction design, but New Media programs are not equipped to teach it, students may go elsewhere to find the knowledge and skills needed. If this happens, however, they may find that New Media is rarely discussed in the context of social or user-centered design and development. This is because many technology-centered programs often focus on system or software design and testing from the perspective of quality control, rather than user satisfaction or product performance. Although many interaction design principles and practices can be applied to New Media, if taught out of context, students may find it difficult to make the connection between building dialogue boxes for software and specific human-centered issues related to the design of New Media content.

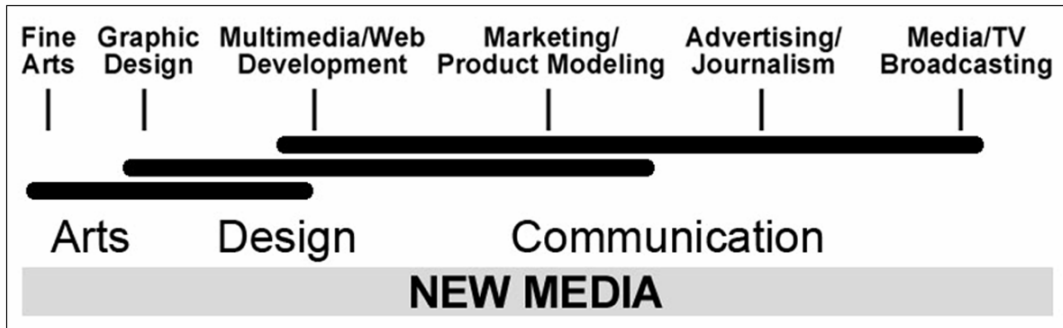


Figure 1. Three disciplines that overlap the broader field of New Media.

Ultimately, students need many opportunities to apply well-formed knowledge into activities that have the proper foci, i.e., the user and social context. Without these opportunities, their newly acquired conceptual understanding will remain abstract and possibly erroneous, having no apparent significance in the real world and as a result will not be readily transferable to other learning situations (Bransford, Sherwood, Hasselbring, Kinzer, and Williams 1990). This idea of learning, which is integrated and grounded in real-world activities, can be traced back to the educational philosophy of Dewey (1933).

Wicklein (1997) concurred when he argued that many programs: 1) “present rigid linear models that relegate students to prescriptive solutions as if there was only one approach to the problem” and 2) “devote the vast majority of classroom time to specific and sometimes obscure technical skill development” (p. 33). Simply put, learning is not a linear process of adding or placing one skill on top of another. Rather, normal pedagogical experiences emerge when students transfer one body of knowledge to another with a contextual application.

In light of these challenges, the authors hold that New Media curricula should provide students with a broader and more unified approach that includes an interaction design perspective of the New Media problem space, i.e., a place where users, technology, and

context converge. A new pedagogical model might include knowledge domains and techniques that draw upon mainstream concerns for socio-cultural context, communication, design strategizing, and media development and testing (Faiola, 2007; Faiola 2003). Hence, the proposed model includes a framework that provides both a theoretical underpinning and a practicum for designing and assessing New Media products that follow usability guidelines.

## **THE KNOWLEDGE-OPERATORS-AND-DOMAINS MODEL**

The authors propose a three-by-three model, referred to as Knowledge-Operators-and-Domains (KOD) (see Table 1). In this model, the Knowledge Domains (ethnography, design, and media) and the Knowledge Operators (theory, application, and management) extend the boundaries of New Media theory and practice to include a more integrated approach to knowledge management that is far more centered on user interaction design theory and methods. The KOD model is an argument for a pervasive application of not just human-centeredness, but also a humane approach, in which New Media developers take into account the differences among individual humans and their needs (Cooper & Reimann 2003; Raskin 2000).

The KOD framework entails the collection, analysis, and interpretation of human-centered knowledge and its relevance to achieving a more effective design, development, and deployment of New Media products. Although the human-centered approach is not new, the proposed KOD model emphasizes a unified structure for managing New Media knowledge domains, with an expanded framework for conceptualization, development, and administrative processes.

In sum, KOD provides educators with a strategic and unified approach to New Media development by providing a basic systematic structure to manage knowledge and human assets acquired through processes related to ethnography, media design, and usability testing. Programs that teach New Media have a responsibility to emphasize an integrated methodology that transcends a preoccupation with content and technology. Concurrently, the authors argue that “design” cannot be neglected, but rather should be understood as supporting those changes that have been “wrought by computer-inflected technologies.” For the New Media students, this includes understanding the difference between “processing data and designing its output” or the “modes and strategies by which the designer organizes it and offers visual, conceptual, and technological affordances to the material” (Lunenfeld, 2004, p. 67). Finally, the pedagogical relevance of KOD is its framework of interrelated domains and operations, initiated with ethnography and contextual inquiry, which in turn is a means to obtain and utilize design knowledge as a means to arrive at interactive media that have passed through the scrutiny of usability processes.

Regarding the self-explanatory nature of each section of the KOD matrix, shown below, time limits the unpacking every bullet point. Notwithstanding, in the following three subsections we discuss the meaning, significance, and application of each of the three KOD knowledge domains and their interrelationships.

<b>KOD MODEL</b>				
		<b>KNOWLEDGE DOMAINS</b>		
		<b>Ethnography</b> (Socio-Culture)	<b>Design</b> (Communication & Interaction)	<b>Media</b> (Building & Testing)
<b>KNOWLEDGE OPERATORS</b>	<b>I. Theory</b> (Foundations)	<ul style="list-style-type: none"> <li>• Social Sciences (as applied to HCI)                             <ul style="list-style-type: none"> <li>○ Psychology (behav. / cog.)</li> <li>○ Anthropology / Sociology</li> </ul> </li> <li>• Social computing                             <ul style="list-style-type: none"> <li>○ Computer-mediated comm.</li> <li>○ Computer-supported collaborative work</li> <li>○ Cross-cultural communication</li> <li>○ Gaming as social interaction</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Graphic / information design</li> <li>• Interface design</li> <li>• Interaction design</li> <li>• Information visualization</li> <li>• Human-centered design</li> </ul>	<ul style="list-style-type: none"> <li>• System modeling</li> <li>• Information architecture</li> <li>• Computer science</li> <li>• Usability engineering</li> <li>• Quality assurance</li> </ul>
	<b>II. Application</b> (Processes)	<p style="text-align: center;"><b>Pre-Design</b></p> <p><b>User Requirements:</b></p> <ul style="list-style-type: none"> <li>• Contextual inquiry</li> <li>• Field / observational studies</li> <li>• Interviews &amp; focus groups</li> <li>• Questionnaire / surveys</li> </ul> <p><b>Data Analysis:</b></p> <ul style="list-style-type: none"> <li>• Use cases &amp; scenarios</li> <li>• Interpretation / data analysis</li> <li>• Content analysis</li> </ul>	<p style="text-align: center;"><b>Design</b></p> <p><b>Design Iteration Processing:</b></p> <ul style="list-style-type: none"> <li>• Problem space identification</li> <li>• Conceptual modeling</li> <li>• Static (paper) prototyping</li> <li>• Cognitive or pluralistic walkthroughs</li> <li>• Design iteration</li> </ul>	<p style="text-align: center;"><b>Post-Design</b></p> <p><b>Dynamic Prototype Development:</b></p> <ul style="list-style-type: none"> <li>• Scripting /HTML/ Visual Basic</li> <li>• Flash / Director</li> <li>• Java / C++ / etc.</li> </ul> <p><b>Usability Studies: )</b></p> <ul style="list-style-type: none"> <li>• Quantitative                             <ul style="list-style-type: none"> <li>○ Performance testing: time-on-task usability studies</li> <li>○ Heuristic inspections</li> <li>○ Predictive modeling</li> </ul> </li> <li>• Qualitative                             <ul style="list-style-type: none"> <li>○ Post-task questionnaires</li> <li>○ Interviews &amp; focus groups</li> </ul> </li> </ul>
	<b>III. Management</b> (Administrations)	<p><b>Coordinate ethnographic assets within an interdisciplinary design team:</b></p> <ul style="list-style-type: none"> <li>• Deploy existing skill-sets through cross-disciplinary dialogue, thus facilitating communication that profits all stakeholders.</li> <li>• Administrate data gathering processes; thereby improving the documentation, organization, and sharing of contextual-based requirements information across knowledge domains.</li> </ul>	<p><b>Based on the requirements data, direct an informed design that includes the prototyping of the system and user interfaces, including:</b></p> <ul style="list-style-type: none"> <li>• Conceptualization &amp; design innovation</li> <li>• Give attention to visual clarity, aesthetics, &amp; other interaction design issues</li> <li>• Manage creative design processes of new technologies that have portability with functionalities.</li> </ul>	<p><b>Construct the product and oversee the usability and quality control of final product development, such as:</b></p> <ul style="list-style-type: none"> <li>• Product building and testing</li> <li>• Integration and summation of data analysis</li> <li>• Final recommendations</li> </ul>

Table 1. *The KOD Framework with three knowledge domains and operators.*

## Ethnography

As an interpretive methodology, ethnography has found growing acceptance among software and Web designers as a means to explore the various techniques for testing human-computer interaction (Fetterman 1998). As Myers (2004) argues, the main goal of ethnography is to improve our understanding of human thought and action through interpretation of human actions in context. And, as Gouveia and Gouveia (2002) suggest, qualitative findings from ethnographic studies can provide additional results to better inform the design process about the refinement of human measurement.

Conversely, interpretive research done with ethnography has historically been considered

an invalid means to secure data while studying information systems. However, Hemmings and Crabtree (2002) argue that the appeal of ethnography follows the recognition by designers that the development of interactive systems increasingly relies upon social circumstances. The problem is that traditional techniques systematically deconstruct human action in the work place, and in so doing: 1) obscure or misrepresent the empirical process within a particular socially organized environment and 2) fail to give adequate attention to the social nature of work. On the other hand, the focus of ethnography is on “social practices which enable the very processes which analytic methods identify, but which they decontextualize” (Hughes, King, Rodden, & Andersen 1994, p. 430).

In the context of KOD, ethnography and other social/observational processes (derived from psychology and sociology) are playing a greater role in providing system designers the support needed for design decisions from a human-centered perspective. Within the social science domain, interpretive methodologies, such as ethnography, have found acceptance among interaction design professionals as a viable means to inform system design. Nardi (1996) points out that the real significance of these methods has been their ability to make visible to the technologist the objects and processes of a contextually social world.

Ethnographic approaches have been considered since the mid 1980's (Suchman 1987) as a viable approach to providing a more in-depth analysis of system design. The advent of this new tool caused system designers to seriously consider human interaction with computers in social context for the first time. This approach gained momentum when computer systems moved out of the laboratories and into the workplace (Grudin 1990). Hughes et al. (1994) suggest that, “given this turn to the social and the need to study the real world character of work, drifting toward sociology through ethnography is almost a natural inclination” (p. 429). The authors concur in that they believe that social science theory and practice, and the broader inclusion of an interpretive approach, as depicted in the KOD framework, can provide New Media students with significant insight into the context of the social and organizational phenomena of New Media.

Moreover, the use of ethnography in the KOD model provides New Media designers a way to understand a social setting as it is perceived by those involved in that setting, making the contextual world of the human and computer visible through a detailed description of activities observed (Beyer & Holtzbalatt 1998; Geertz 1994). It demands a considerable degree of commitment to immerse oneself in a social context to gain a clear understanding of the interactive elements under evaluation. One of the most valuable attributes of ethnography is that it enables New Media designers to do what traditional usability methods, such as time-on-task performance studies, cannot. For example, methods such as contextual observations, interviews, and focus groups allow designers and users to co-direct a dialogue of inquiry that can get to the heart of user requirements. In this way, both stakeholders arrive at a better understanding of the problem space of a New Media product through a co-creative process where ideas and solutions are mutually discovered and shared.

In the initial phase of New Media development, ethnography is of paramount importance for gathering the requirements needed to understand the user-technology relationship. Hence, the traditional utility of New Media development, which often lacks the acquisition of contextual knowledge, can be substantially enhanced with processes set in a social setting,

with real human-media interactions. Howard (2002) holds that researchers in several disciplines are “navigating a range of methodological challenges in studying essentially the same social phenomena” (p. 551). As scholars are increasingly interested in the behavior of people and organizations that make use of new communication technologies (Howard), New Media designers should be especially cognizant of ways to observe the various patterns of behavior that can inform the design process. To do this, ethnography, as one knowledge domain of the KOD model, can help students “adapt their methods in order to best capture evidence” (p. 551), thus providing a better means to describe human behavior based on first-hand observation.

## **Design**

### *Designing for User-Centricity*

In the minds of many academics, design is mere form-making, giving visual style to interactive products, but as Buchanan (2004) states “design ...is not focused solely on form giving” (p. 36). Designers “explore not only form and function, but also form and content, since content is what human beings seek in digital experiences” (Buchanan, p. 2). Educators should then direct their students to understand these digital experiences as products of design thinking, while maintaining a profound concern for human-centricity.

Winograd (1996) became the first visible advocate for shifting software engineering away from computing and toward design. During this time, Kapor (1996) argued that although engineering plays an important role in product development, it must take its direction from design to acknowledge the context of use and user needs. He referred to this as a “process of intelligent and conscious design” (p. 4). By the end of the 1990s, we witnessed a gradual acceptance of the human-centered model of teaching interaction design within most design programs in the United States and Europe. This pedagogical shift has redirected the focus from what the computer could do to how users can better interact with them (Shneiderman 2002).

Practitioners who are increasingly concerned with user-centricity and the social context of computing, are slowly adapting to the displacement of technology as the focal point of New Media production. In an attempt to go beyond the mere cosmetics of interface design, the notion of “human-centered design” suggests a far more complex problem space of new and emerging technologies that New Media faculty must confront. This new theoretical direction of product modeling shows that the theory driving the research is changing, the domains and types of users are diversifying, and what is being designed is significantly different (Barnard, May, Duke, and Duce 2000). As a result, the application of interaction design methods is now much broader in scope.

### *Constructing Design Solutions*

Norman’s (1993) early work in the psychology of HCI initiated a fundamental paradigm shift in understanding the development of interactive products. More recently, Norman’s (2004) discussion suggests that “affect and emotion are not as well understood as cognition, but are both considered information processing systems, with different functions and operating

parameters” (p. 38). He stresses that design affects human emotion and changes how well we perform cognitive tasks. Norman (2004) asserts that good design should now refer to artifacts that “embody both beauty and usability in balance” (p. 40).

This change of emphasis in Norman’s writings is further evidence of a move from considering interaction design in terms of simple utility to a richer understanding of other human factors that contribute to the success of New Media solutions. For example, despite a wealth of course content dedicated to software training, New Media students often lack an adequate understanding of problem-solving as an enterprise of design that maintains its human-centricity. Greenberg (1996) asserts that “good design” is a matter of providing students with knowledge concerning what is usable to people, while implementing the creation of an interface.

DeBono (1990) suggests that the creative process is not objective analysis, but subjective rearrangements of knowledge into restructured patterns of information. Canaan (2005) also argues that “no one ever ‘creates’ anything; [but rather] ...reorganize[s] existing elements” (p. 236). Hence, not only does design result from a convergence of knowledge, but it becomes the desire and hope that a new concept could be realized. In like manner, what interpretation is to ethnography, the convergence of knowledge is to design thinking, and the ushering in of new insights derived from understanding the social context of New Media technologies. From this point of view, design is a process of human ingenuity, whereby the designer discovers patterns and associations of design knowledge to formulate new solutions that can support New Media users.

Another discussion surrounding “design knowledge” centers on the work of Lowgren and Stolterman (2004), who argue that thoughtful interaction design is about design reflection, i.e., a process that is built on a “thorough understanding of the design process, design ability, the designed product, and design as part of a larger context” (p. 2). This larger context includes a culture that acknowledges “design as knowledge construction” (p. 2). Here, the emphasis is not placed on artifact production, but rather on “retrospective reflection,” where designers provide “arguments and ideas that could explain a specific design” (p. 60). They suggest that this novel perspective of design is a process of design management, or “designing the design process” (p. 41).

Design theories and processes, as outlined in the KOD model, help New Media students formalize the conception and management of ideas in response to an existing problem space. Subsequently, design becomes the fusion of ethnographic and creative processes that bond a product’s purpose and identity with its value. This implies that traditional New Media educators need to understand the enterprise of design as an embodiment of processes, i.e., the sifting, refining, and forming of knowledge through multiple and evolving iterations of conceptualization. As recommended by Lim and Sato (2001), designers need a more diverse disciplinary perspective from which to develop clear plans to manage knowledge that can inform the creative process of interactive systems. Lim and Sato go on to suggest that within these rather sophisticated design information structures, designers create an “effective knowledge-intensive design environment that reinforces their capability of accessing, exchanging, capturing and generating knowledge in design activities” (p. 33).

Thus far, we have suggested that design is a co-evolutionary process that emphasizes the

integration of problem finding and problem solving (Smithers 1998, 2002; Maher 2000; Dorst and Cross 2001). Hence, innovative New Media development, as framed by the KOD model, requires fresh associations of design knowledge that is given form through an ethnographic investigation of the problem space. Within such a process, stakeholders, such as clients, users, designers, managers, and others, all share in a “social process” (Lowgren & Stolterman 2004) of constructing design knowledge. In this scenario, design is driven by particular social needs related to technology that eventually emerge through the actual process of data gathering and co-designing (Zamenopoulos and Alexiou 2004).

Central to our argument is the fact that design is a process of exploration and discovery, wherein the designer “exploits the experience of searching for a problem structure in order to transform an initial belief (insight) into a final design” (Jones, 1992, p. 10). In such a participatory and collaborative experience, all processes and participants merge in a well organized framework of domains and operations.

## **Media**

Media, in the context of KOD, is narrowly defined as the theory and application of building and assessing the usability of New Media products, such as Web sites and portals and other forms of interactive media, including hand-held technologies. Most students in New Media programs are able to obtain a relatively sound understanding of communication technology, programming, and/or graphic software applications by the time they graduate. However, relatively few have a grasp on New Media design relative to interaction design theory and usability practice.

For this reason, KOD provides usability tools for developing interactive media. Usability or usability engineering is derived from human factors, an interdisciplinary field that focuses on the study of human abilities, including human memory, learning, and human interaction with technology. Although the field of human factors psychology forms much of the basis of usability testing, HCI is a field that seeks to apply the study of human factors specifically to the way humans interact with computer systems, including the logic and functionality of the software or other interactive media products.

If provided with both the knowledge and the incentive to take an analytical approach to New Media, students can expand their learning potential by applying a range of validation processes to achieve higher levels of product effectiveness. Through a pragmatic approach to design, development, and testing New Media deliverables, the users interactive experience can improve considerably. As Foley et al. (1990) argue, “good design requires careful consideration of many issues and patience in testing prototypes with real users” (p. 392).

Through New Media courses that embrace a theoretical model focused on designing for human behavior in a contextual world, educators can shape curricula that improve upon those of traditional New Media programs. KOD provides a media context in which students learn usability methods that allow for a social scientific approach to collecting and analyzing interpretative and quantitative data to validate product creation. Without such processes of inquiry that provide objective measures, the long-term impact on product quality will be evident.

## **KOD Summary**

While traditional ethnography refers to a set of methods used by anthropologists in field work, it remains a pre-design approach through which New Media professionals can make valuable contributions to design. Unlike task analysis methodologies that can also be used in the collection of requirements data, ethnography offers a qualitative means to model New Media user expectations. For example, data derived from task analysis techniques or performance-based testing cannot provide insight into an existing new situation or support the envisioning of a new product. This is because these methods of investigation are focused on a higher level of abstraction. Moreover, the outcome of these techniques usually includes the modeling of procedural knowledge, e.g., cognitive processes relative to physical actions.

In either case, the pre-design approach must include more than a system perspective, while giving more concern for the contextual design of the product. For example, use cases and scenarios used in conjunction with observational studies and other qualitative forms of engaging target users, can provide foundational knowledge about goal-driven user actions. These methods can provide New Media students a means to better understand and gather data about the context of a user's experience and behavior, which in turn will better inform the conceptual phases design innovation.

Ethnographic techniques and usability testing are at opposite ends of the design process. However, because ethnography is about data discovery and defining the problem space, it is less connected to product quality. At the same time, because usability testing occurs later in the process of New Media product development, it shares a more immediate connection with product quality. Hence, a human-centered experience strategy ensures that New Media development is informed and enhanced at every step by user feedback during the ethnographic stage, from which techniques such as prototyping and usability testing can be applied.

In sum, the KOD model provides for the acquisition of knowledge related to pre-design user requirements, product design and development, and product assessment through performance testing and heuristics inspections, as well as other methods of obtaining user feedback. As a result, energy spent testing a finished product is imperative to validate earlier requirements derived from contextual requirements and design iteration.

## **APPLYING KOD TO NEW MEDIA PROJECTS**

In the Indiana University-School of Informatics, HCI Graduate Program (IUPUI), KOD provides an overarching framework from which course content and related project assignments derive cohesion and relevance. As students work through the life-cycle of New Media product design, they apply knowledge outlined within the KOD model from lectures, course readings, and class discussions. To allow students to fully benefit from the breadth of KOD, they are guided through a real-world project assignment with a particular theoretical underpinning. The project is placed within the context of a problem space that keeps students focused on the relationship between KOD theory and best practice. In each case, New Media knowledge building remains integrally tied to project management and strategizing.

### **Class Project Examples**

Students work in teams or individually, depending on the class structure. Because of

the breadth of the KOD model, it is impossible for any student to acquire all the knowledge domains and operators from one course. As a result, several courses are needed within the HCI program for students to increasingly build both core knowledge and New Media skills that encompass the scope of the KOD framework. For example, in the two class projects illustrated below, select elements from KOD are used. If one compares the following list with Table 1, it is evident which KOD theories and practices have been extracted to complete this project.

- Ethnography: including defining the problem space and target users, and requirements gathering, i.e., use cases scenarios and interviews; and the analysis of the data.
- Design: including the conceptual design, interface and interaction design, and paper prototyping.
- Media: including the dynamic interactive prototype (using Flash) and product evaluation, i.e., usability testing, questionnaires and interviewers.

Briefly described below are two examples of New Media class projects.

## **Focus and Problem Space**

The theoretical focus of this New Media class project required students to understand the area of social computing, with direct applications to computer-mediated communication (CMC), e.g., how to design a New Media technology that could facilitate social awareness, communication, and interpersonal interaction, as well as the management, dissemination, and accessibility of information. In each case, human-centered design principles were integral to the best practice of ethnography, design, and product development and testing.

The problem space required students to give adequate reflection to the conceptualization of an innovative social computing tool that could enable a translucent and context-aware exchange by means of visual, verbal, or other interactive cues about the presence and activity of all participants. Examples might include systems that enable users to convey attentiveness, emotional conditions, peer pressure, or other forms of communication that are often implicit, ambiguous, or non existence in traditional forms of CMC. These psychological, or often emotional, conditions of participants are not easily conveyed in the virtual world of online computing. New Media technologies might include a combination of distance learning, online forums or chats, 3D gaming spaces, or acquiring, using, and manipulating multiple forms of information, databases, news repositories, etc.

### **First Student Solution**

The student project example, titled AhHa Learning Environment, was designed as a New Media online application that could enable students and instructors to have more intimate synchronous communication. Specifically, the intention of the application was to provide a creative outlet for students and teachers of math and science to mutually share ideas from their perspectives to support online learning. The product was designed to provide a balance of entertainment and educational motivation to create strong learning experiences. Aspects of a learning environment often missed in virtual environments—like whispering, outbursts, looking at other students work, student emotional status, and recognizing question urgency were addressed with features within AhHa.

The application provided a quick-to-use interface with many horizontal features not requiring the user to dig into the menus, making the interaction features ever-present on the main interface. The application will provide tools for communication through text, drawings, and video that is largely organized by the users as well. The primary users will be students and teachers in traditional classrooms or engaged in distance learning. The site will require dynamic content through a scripting language like JSP or ASP to manage data stored in a database or XML documents along with an active media server to handle synchronous text, voice and video options. The site will also provide a highly visual interface via Flash.

Use case scenario: While conducting a live online class/tutor session a teacher may choose to address individual questions in a class of 25 students in a chat session. Each student will be able to see a representation of a question queue and the “bird’s eye view” of the class activity to gauge when their question may be addressed. Also, the student questions will have a weighting of importance so the instructor understands the demands of the class. Moreover, the instructor will have a view of all the student icons representing their emotional state. For example, if Jane (student) has an urgent question and does not show engagement with other users, then the teacher will know to communicate with her as soon as possible. At the same time, another student who is anxious to get help will be able to convey their feelings of anxiety through their color profile, while shouting (brief large text visible by everyone) and peeking at other student drawing boards for clues to help their understanding. The student may also chat with other students privately as he/she waits for the teacher to respond.

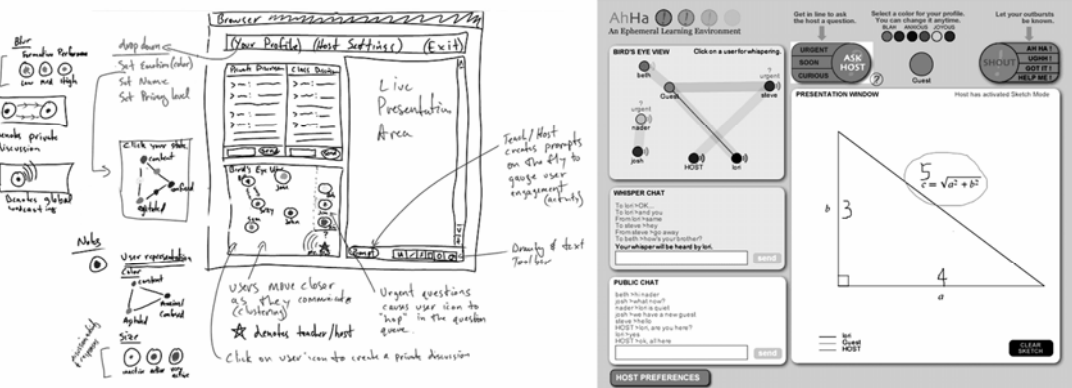


Figure 2. The AhHa Learning Environment interfaces: The paper prototype (L) and dynamic prototype interface (R).

## Second Student Solution

On-the-go professionals, 18 and over, both male and female, are the target users of this world-wide-area network Smart-Phone. This New Media system enables users to communicate using real-time messaging in chat rooms, sharing videos and photos and a broad range of information, while playing simple turn-based strategy and card games with multiple players. Regarding the technology, a context-aware GPS system is available to locate nearby friends, while cell phone tower pings or direct communication between devices using Bluetooth is also available.

Social computing implications include the ever-increasing pace of modern life that makes it difficult to keep in touch with friends and fellow-students, distant family, and coworkers. It is often impossible to arrange a common time and place to meet, so a flexible communication method is required that allows people to interact from different physical locations and at different times of the day. Users would have the ability to hide their location from other friends if they wish.

Use case scenario: Jocelyn and Zoe agreed to meet at the mall, but Jocelyn cannot find Zoe when she arrives at the predetermined location. It's Saturday night and the mall is crowded and noisy, making voice communication very difficult. Since they both have smart phones with GPS, Jocelyn is able to bring up a map that shows the location of Zoe. The system tells Jocelyn that Zoe is about 100 yards away to the north, right outside the food court. Much to Jocelyn's delight, she sees that her friend Tyra is also only two stores down, so she sends a quick text message to Tyra saying that she and Zoe are meeting at the food court and inviting Tyra to join them there.



Figure 3. Three prototype interfaces of the “World View” and Chat room.

After devising the adequate user and system requirements through the ethnographic processes, the students were ready to design a compelling and innovative human-centered conceptual model that required reflection on the existing user-media context. Finally, they built their final dynamic prototype and applied a range of usability assessment techniques to improve the product.

Through collaborative projects like the two mentioned here, students were able to work out product concept, functionality, and usability issues, from which they executed the final dynamic prototype. Learning objectives were achieved through course assignments tailored to challenge each student’s knowledge and design skills using problem-based scenarios and KOD’s design management framework. Management of design knowledge in projects like those cited is essential to the education of future New Media professionals. With the increasing number of skills needed to build interactive media, New Media students must become proficient in many knowledge domains, processes, and tools, especially those that address the social context of user interaction.

## CONCLUSION AND FUTURE

To be competitive in today's New Media industry, students must gain learning experiences by solving applied problems in course projects. Companies that provide the best compensation increasingly expect New Media specialists to understand the fundamentals of good design, while arriving at product solutions based on user-experience modeling, rather than personal bias. Foley et al. (1990) argued that for interface designers, it is important that their "ego be submerged, so that the user's needs, not the designer's are the driving factor" (p. 392). For this reason, extending the knowledge domains of New Media students is imperative if they are to grasp the larger context of product development. In addition to core knowledge specific to New Media technologies and production, students must grasp a fundamental understanding of the human-centered model, the creative management of time and resources, group design problem-solving, and the synergy that comes from team strategizing.

Increasingly, New Media marketing standards will demand higher quality products that secure greater product value and long-term customer satisfaction. To meet this demand, traditional New Media theory and methods are essential, but limited, when delivering a full range of knowledge that students need to design communication technologies in an evolving and complex marketplace. To specifically meet these challenges, KOD provides a unified and holistic approach for students to connect the profound and often ambiguous aspects of user requirements with New Media production. To do this, knowledge acquisition is a structured process, controlled by management channels that direct the work of designing, developing, and evaluating interactive media products.

In such a learning atmosphere, students can ask questions, obtain answers, and make decisions to build knowledge (Owen 1998) that can inform better decision-making. By constructing curricula that teaches students this broad range of interaction design tools, techniques, and theoretical models, educators will open the door to far more opportunities for their students, while addressing the inevitable future of New Media emerging technologies.

## Notes

1. The phrase "interaction design," for practical purposes, also refers to the core discipline of human-computer interaction (HCI). The field of HCI has existed for over two decades, during which time a substantial degree of discovery has taken place to identify models and methodologies that better address usability and human-centricity in system design. HCI is multidisciplinary, with a broad range of theoretical perspectives, where researchers and system designers explore methodologies that conform to human abilities and needs in context. Hence, when interaction design is used in this paper, it refers to broad range of theories and methods that can lead to the decrease of user error, while increasing the efficiency of task execution. Ultimately, the goal of applying interaction design is to improve the design and behavior of New Media products, i.e., to create products that generate less frustration and higher levels of productivity and satisfaction for users. Interaction design methods firstly include researching and understanding user needs and experiences, then designing to meet and even exceed those needs. Theories include an integration of knowledge domains, such as the cognitive, behavioral, and social aspects of users. Also, inclusive of the field is an understanding of those concepts underlying usability engineering techniques such as performance testing, systematic design methods, and ethnography. Related design practices may also include participatory design and contextual design to increase system functionality.

2. The sample was selected from one Web site that listed schools from art, design, and related fields. (For unknown reasons, the site is no longer operating.) Although smaller in scope, the list provided schools from each state, very similar to two current online sites that feature art and design schools from the U.S., provided on request. Upon entering each site, the online departmental listing of faculty was reviewed, whereupon all the names available were chosen if their area of expertise applied to any of the discipline areas within New Media. In each case, only the email addresses were copy-pasted into a MS Word document, i.e., no other personal or academic information was collected from which to track the potential respondents. The copying of emails continued until all the schools listed within the 50 states were reviewed, giving a total of 576 names. During the time of the survey, the phrase HCI was used instead of interaction design. For all practical purposes of the survey and this paper, the meaning remains the same as defined above. Although some interaction designers may choose to give slightly different definitions, the focus on the design and testing of interactive systems is key. Participants were then asked to respond to 12 questions, each including a clickable bullet to mark the appropriate answer, from which the online tracking system recorded the data. The online questionnaire was composed of three demographic and nine research questions.
3. Participants were recruited from the art and design faculty who teach primarily undergraduate courses in the School of Arts at the University of Middlesex, UK. A questionnaire was circulated by email and regular campus mail to all faculty. The questionnaires were returned in the same manner they were sent. Faculty were only required to give their disciplinary background, i.e., art or design. The questionnaire included closed-ended and open-ended questions. Closed-ended questions required a choice of self-reported measures, including: Always, Usually, Often, Sometimes, Never, or Null; asking questions like: Organize peer evaluation, Ask students to test their projects on sample users, and Use other forms of evaluation. Open-ended questions including, for example: I do NOT ask students to user-test their projects because..., I ask students to user-test their projects because..., and The kinds of user-testing I ask students to do are...

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