RETHINKING THE COMPETENCIES OF INSTRUCTIONAL DESIGNERS AS INFORMATION ARCHITECTS

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ABSTRACT

In this paper, the author depicts how the work of the instructional designers can be re-thought within the framework of information architecture. The paper briefly provides an overview of the main definitions of the information architect along with the major information architecture designs by describing the changing landscape in more detail from the perspective of the Articulation theory. It then moves into a discussion of the similarities between an information architect and an instructional designer. The paper concludes that the instructional designers should adopt a multidisciplinary perspective in order to design effective learning spaces and that there must be a link between the information architecture and the previously un-articulated disciplines in order to develop a disciplinary identity of instructional designers.

Keywords: **Architect; articulation theory; instructional designer**

INTRODUCTION

Due to the speed with which the Internet is evolving the information landscape is rapidly changing whereas organizing the content relies no longer on a single model. As a consequence, the design of online learning spaces requires the instructional designers to adopt the various skills of information architects (IA) such as organizing the content semantically, providing navigation systems and creating interaction designs in addition to the content classification. The objective of this paper is to use the experience that already exists to find suggestions for practice that might be, to some extent, generalisable to other contexts, even though generalisability is not the aim of the evaluation.

DEFINITION OF THE INFORMATION ARCHITECT

The term "Information Architect" (IA) has become ubiquitous nowadays where a few decades earlier there was rarely a mention of it (Wurman, 2001). As there arouse a need to transform data into meaningful information, this term was firstly coined by Wurman. Information architecture is often compared to traditional architecture. Similar to a traditional architect's responsibility for creating blueprints for a building, an information architect creates blueprints for a website. Content, images, and downloads, for example, are "housed" within the site according to a logical, planned structure.

According to Wurman (1996), the term "Information Architect" can be defined as follows:

- **The individual who organizes the patterns inherent in data and makes the complex clear**
- **A person who creates the structure or the map of information which allows others to find their personal paths to knowledge**
- **The emerging 21st century professional occupation addressing the needs of the age focused upon clarity, human understanding and the science of the organization of information**

Robertson and Hewlett (2007) undertook a study about the work of the IA's perceptions of their own work based on workplace interviews with 26 interviews with people who call themselves information architects. The study revealed that these people did a variety of work that was crucial for the design process in their organizations. None of these IA's interviewed in their study associated their work with site maps, wire frame diagrams (sketches and mockups of common information layouts) or navigation models (Robertson and Hewlett, 2007).

For them, fluidity, filling the gaps, holding both the process and the product together, having a sense of ownership for their product were the underlying concepts of their work. Consequently, the authors define the work of IA's as a sociotechnical action and conclude that their work is shaped by situated and contingent practices of those involved rather than solely by the technology itself (Robertson and Hewlett, 2007).

As Boersma (2006) states since the creation of information by mankind there was a need to organize the results. While before the invention of the World Wide Web use of meta-data (data about data), controlled vocabularies (limited sets of names for items) and indexes (references to items) were sufficient for the IA to organize the content, a lot of other professions such as industrial design, graphic design, interaction design, usability engineering, copywriting, computer science and communications became involved in the work of the IA's after the establishment of the World Wide Web and the arising complexity (Boersma, 2006). Boersma (2006) called the latter one as the "Big Information Architect" whose role is similar to the one of an orchestra conductor who has to conceive a vision in order to move the team forward.

According to Boersma (2006), there are two types of IA's. The deep and shallow IA's task entail organizing large amounts of information, indexing or adding metadata that defines the data, allowing for searching and finding, and representing the information in a meaningful way.

The business IA is related to predicting and measuring the cost and impact of the use of information, with creating an organization that promotes and use information most efficiently and an organization that knows where it can improve the use of information (Boersma, 2006). Boersma (2006) further asserts that regardless of their classification, all IA's are in fact user experience professionals having an insight into how they can create engaging user experiences.

Moreover, Warren (2001) puts forward that the primary role of and IA is to fulfill the tasks related to the analysis and design processes by gathering the "content-related" requirements, translating them into a cohesive "content model", translating these needs to other less savvy colleagues, converting the existing content into a repository and finally proving its usability and integrity and educating the end users about this new content model.

In short, IA is seen as the best resource for architecting the highly complex set of relationships between audiences, content, authors, sources, publications and other entities.

In a similar manner, the interlocking of these complex relationships within an organization has been illustrated by Wiggins (2000) as the "Leavitt diamond". According to this figure, the structure refers to the objectives, rules and standards whereas the processes encompass all the activities concerning the transformation of inputs into planned outputs via use of hardware, software and taxonomies.

According to Gilchrist (2003), since all these four quarters interact with each other, the IAs should take into consideration the potential contributions from all the sub-elements within each quarter.

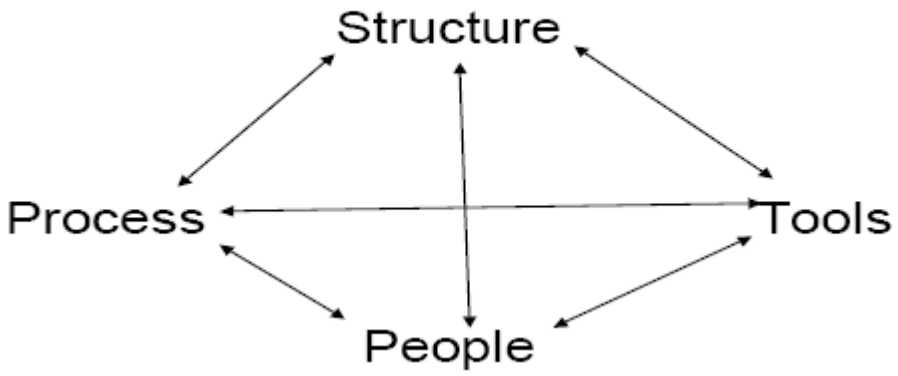

Figure: 1
The Leavitt Diamond (Dillon, 2000)

According to Denn and Maglaughlin (2000), in order to define the term "information architecture", a distinction should be made between the client for whom the information architecture is developed and the end users of that architecture as a various fields ranging from computer science to anthropology contribute to work in information architecture.

So, drawing from a variety of sources, information architecture seeks to balance the competing demands from technology, content, and context providers (Denn and Maglaughlin, 2000).

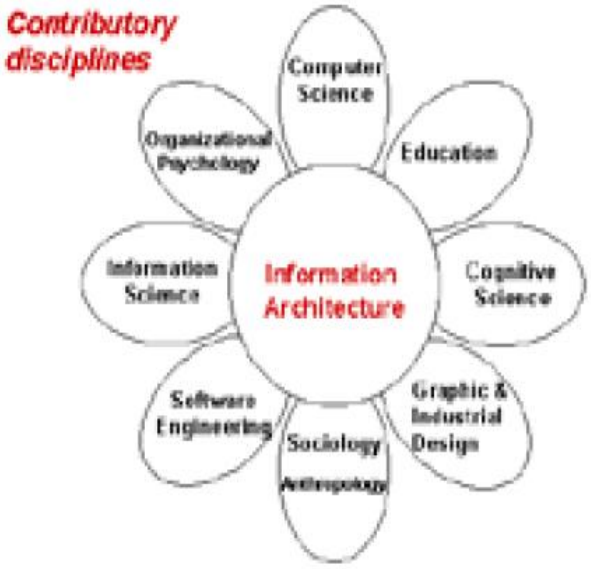

Figure: 2
Possible scope of information architecture (Dillon, 2000)

Similarly, Dillon (2005) defines information architecture as "the process of designing, implementing and evaluating information spaces that are humanly and socially acceptable to the intended stakeholders". According to Dillon (2005), this field should be seen as craft rather than engineering since it creates the design elements by utilizing less formal methodological abstractions. Assuming that information architecture encompasses both the design and analysis of information spaces, major tasks of IA's include, but are not limited to (Dillon, 2005):

- **Creating content organization systems: Identifying and classifying the content types, and establishing labels to provide naming consistency**
- **Creating semantic organizations: Coding a set of data with overlapping schemes that are required for browsing, searching and learning**
- **Creating navigation systems: Providing points of access to associated information via the provision of simple Web links, animations or functional menus**
- **Creating interaction designs: Creating displays for information such as simple wire frames and adapt them to more specific templates**

These dynamic elements of information are also embedded in webblogs (blogs) and wikis to facilitate communication and collaboration, so the use of the highly structured units of information will gain more importance as the use of these Web 2.0 tools increases (Dillon, 2005):. Additionally, the semantic web that is based on a well-defined meaning according to the user-driven tasks may also further make use of the IAs that will be acted on automatically on behalf of individual users or organizations (Dillon, 2005).

MAJOR INFORMATION ARCHITECTURE DESIGNS

Throughout the literature, there has been often a mention of the following information architecture designs (Danaher, McKay, Seeley, 2005):

- **Free-form matrix design with little information structure**
- **Hierarchical design where information is arranged in an organized fashion**
- **Tunnel design where a narrow path with a predefined series of steps has been defined**
- **Hybrid design made up of various modules with the related information architecture design**

The related descriptions for each of these designs as provided by Danaher, McKay, Seeley (2005) can be summarized as follows:

Matrix Design

Based on the principles of hypertext and the Web this information architecture design utilizes the hyperlink capabilities so that users can freely browse through the content of their interest. Once the links anticipate the user's search preferences and prevent them from getting lost in hypertext, the maximum amount of content can be made available. This information architecture is mostly suited for small websites that are designed for highly educated users who are already equipped with the required navigation skills.

Hierarchical Design

In this information architecture design, there exists a top-down organization of information where the users can view the small chunks of information in a non-sequential manner. Due to the fewer links between pages, the desired content can be found by locating a broad theme and then drilling down into detailed information. This similarity to a table of contents design and tree-like-file directory structure prevents users from getting confused. Yet, this design may not be appropriate when the content that is nested too deeply or when the user's mental model of content grouping doesn't refer to the way content is organized on the website.

Tunnel Design

In contrast to the matrix design, tunnel design is based on a step-by-step (page-by-page) approach. Most of the e-learning courses utilize this design where they include a series of lessons that present the content, test for comprehension, remedial loops and other conditional branching.Main challenges in this design arise due to the fact that when it comes to Web applications and software interfaces the rules of the hypertext and the Web should be broken to guide the user's experience. In order to cope with these challenges, several recommendations such as including navigation bars or error messages and the display of extra information in pop-up windows are taken into consideration in e-learning that prevent the learners from getting frustrated once they cannot find the required information in an unfamiliar online environment. So, one of the main challenges with the tunnel design is to encourage the users to be patient enough since they may not get engaged in their typical information seeking behavior in the unfamiliar program interface.

The tunnel IA design is particularly well-suited to fostering the type of *dialog* that can be associated with multi-session programs in which users are assigned tasks to do at home on their own in between online sessions. Based on the problems the learners faced during the tests of knowledge or comprehension of key learning points tailored feedback and recommendations can also be provided.

Hybrid Designs

Hybrid designs are composed of multiple information architecture modules, such as matrix, tunnel, and hierarchical designs.

Tunnel designs require few navigational controls other than the *prior* and *next* buttons. Yet, changing navigational tools as users move from ancillary pages back to the sequential tunnel pages can present usability challenges due to the fact that ancillary
Web pages may have far richer content that requires additional navigational controls.

It should also be noted that whenever necessary, the information architecture of a Web-based program can be changed from a tunnel to a matrix design so that the users can freely access any of the available content. For this purpose, carefully modularized, data-driven websites that display content based on the interaction of logic scripts (e.g., PHP, ASP, ColdFusion), SQL databases, and cascading stylesheets are utilized. By capturing and interpreting user data, and then manipulating scripts, databases, and stylesheets, it is possible to adapt the appearance and behavior of websites in real time.

Hybrid designs can give users more guidance than the matrix information architecture designs. Hybrid designs also allow the user to break free from the lock-step sequence of pages found in a tunnel design. Offering alternative ways of interacting with content can be refreshing.

It is also important to note that hybrid designs may well reduce attrition by users who find the tunnel experience to be too constraining. No matter how efficacious a tunnel-based program is found to be, its effectiveness can be seriously undermined if users find the experience too unfamiliar, inflexible, and, thus, unpalatable.

Changes in the Information Landscape

One of the underlying theories for viewing the changing information landscape is the articulation theory.Stuart Hall (1996) argues that "[t]he so-called 'unity' of a discourse is really the articulation of different, distinct elements which can be rearticulated in different ways because they have no necessary 'belongingness.' The 'unity' which matters is a linkage between the articulated discourse and the social forces with which it can, under certain historical conditions, but need not necessarily, be connected." From the perspective of the Articulation theory, information architecture makes links between previously un-articulated disciplines in order to develop a unity via articulation of separate elements when forming a disciplinary identity. As the Articulation theory examines the acts of articulation as a means for organizations to gain power it can also serve as a mechanism for making explicit the areas of contention between competing discourses.

According to the Articulation theory, "[a]n identity might be a subject, a social practice, an ideological position, a discursive statement, or a social group" (Slack, Miller, and Doak, 1993). Information architecture can, indeed, be seen as a subject, a social practice, or a social group, depending on the definition. When technical communicators change their jobs and professional identities they are engaging in practices of articulation, disarticulation and rearticulation. So, within the context of the information architects, their identity is culturally agreed on in ongoing processes of disarticulation and rearticulation enacted by themselves. In this process of articulation and definition of information architecture, there is often a debate between the overlapping areas of the two practices of information architecture and design. Occupying the same grounds of technical communication, human factors and visual design, both fields are associated with the management of the overall process of information production and are often used interchangeably. Yet, there are some distinctions between the two terms as explained by Wurman (2001):

Different concerns

While the information architecture is primarily about cognition — how people process information and construe relationships between different pieces of information, information design is primarily about perception — how people translate what they see and hear into knowledge. So, while the information architect tries to make the complex clear and to create meaning and understanding by structuring information in the digital landscape so that people can fulfill their information needs, the information designer tries to make an impression with the look of their work.

Different skills

Information architects come from a variety of backgrounds. Information designers, on the other hand, tend to be oriented toward the visual arts. As a result, the majority of information designers come from exactly one discipline: graphic design. Yet, as Eyman (2003) asserts, technical communication and rhetoric should be acknowledged in both practices.

Different milieus

Information architecture belongs to the realm of the abstract, concerning itself more with the structures in the mind than the structures on the page or screen. Information design, however, couldn't be more concrete, with considerations such as color and shape fundamental to the information designer's process.

INFORMATION ARCHITECTURE IN EDUCATIONAL SETTINGS

In order to actualize the human potential, learner-centered and constructivist models are increasingly becoming widespread. As a result, there is paradigm shift from the traditional way of teaching. Similarly, educational technologies professionals often emphasize an object-oriented, modular infrastructure and a deep view of multimedia instructional design. So, the fields of information design, interactivity design and media design begin to integrate with each other. Lasnik (2003) asserts that the creation of these student-centered and collaborative online spaces may ultimately make students manipulate the learning objects and research problems of their interest while exchanging their ideas as they were in an open-ended marketplace.

This amalgamation of both the product and the process may foster the problem-solving capabilities and incidental learning more (Lasnik, 2003). So, rather than reinforcing the division between content and the learning experiences, the following cognitive and social constructive assumptions are made by the instructional designers (Lasnik, 2003):

- **Real-world knowledge occurs as a result of hands-on experiences within meaningful contexts.**
- **This knowledge is cross-disciplinary, problem-oriented and multi-dimensional.**
- **The experience of learning is active, meaning-seeking and intrinsically motivating.**

From these perspectives, we can think of instructional designers as information architects who integrate the content concerning the active learning process and structure the context-rich and problem-oriented activities so that critical thinking skills of learners can further be increased. Besides, in order to overcome the different learning styles of learners, the instructional designers develop an information architecture where learner-centric, outcomes-based and problem-oriented pedagogy is central to their task.

One of these information architectures for online learning has been suggested by Melia and Pahl (2007). Their layered architecture is made up of a domain model, a goal and constraint model, a learner model, a course specification, and a validation model (Melia, Pahl, 2007). The layers of this model can be summarized as follows (Melia, Pahl, 2007):

Domain Model

This model refers to whether the course is structured in alignment with the domain being taught. At its simplest level, this is a conceptual graph depicting the relationships between concepts. Ideally, a domain model should be pedagogically neutral.

Goal and Constraints Model

This model is used to determine both the course objectives and instructional constraints such as prerequisite concepts.

Learner Model

This is used to capture the assumed knowledge of the learner as a result of his taking a particular course. Related assumed information about the learner such as pre-existing knowledge can also be modeled by using this model.

Course Layer

This is used to formalize the course and demonstrate the conceptual associations between learning objects.

Validation Model

By utilizing this model, one can easily specify whether the pedagogical principles for the course are valid or not. Validation concerning both the domain concept and how the course proceeds can be both ensured.

It should also be taken into consideration that in order to develop these value-added tools as information architects, the instructional designers must critically and continuously think about their methods and strategies.

Apart from the standard instructional design tasks such as the use of technology to address instructional needs and the formative evaluation, items such as team building, project management, story scripting, the training of learners in the use of technology and the development of an administrative policy should also be included when rethinking the work of instructional designers as IA's. So, instructional design is a complex process requiring extensive interactions among a team of instructional product designers and developers as well as collaboration when designing and selecting the learning strategies.

Furthermore, Gibbons (2003) asserted that when instructional designers move through the following series of phases for approaching their design:

- **Media-centrism design: Designers construct their designs using the vocabulary of the medium rather than using the design as a medium for facilitating learning interactions.**
- **Message-centrism design: In this phase, the emphasis is on media constructs rather than the demands of the message itself.**
- **Strategy- centrism design: Rules are utilized to govern the delivery of interaction components.**
- **Model-centrism design: Designers think in terms of system and model constructs that support problem-solving.**

Gibbons (2003) contended that instructional design consists of multiple layers of decision-making which include model, strategy, control, message, representation, media-logic and management.

Moreover, as Kenny, Zhang, Schwier and Campbell (2005) stated that in order to learn how to architecture the online learning environment, a case-based method of teaching entailing realistic situations rather than problem-solving heuristics may be appropriate for the designers.

As there is a shift towards learner-centered instruction architecturing effective online spaces becomes crucial. While doing this, the typical activities of instructional designers range from determining instructional needs, defining production processes, advising on pedagogical principles and use of media to conducting research and planning team meetings. As a result, the instructional designers must possess the following competencies of the information architects:

- **Communication skills: Similar to the IA's instructional designers must be equipped with good communication skills for an effective communication with other team members such as subject matter experts or clients.**
- **Knowledge of information architecture designs: Apart from various learning theories and instructional design models they should be familiar with the information architecture models.**

- **Problem-solving/decision making skills: In order to overcome the challenges with regard to the roles of IA's instructional designers must be able to step into new roles when necessary.**
- **Technology skills: Instructional designers must be familiar with the related software tools as well as keep track of new technologies.**

CONCLUSION

While instructional designers may make use of the various design models as explained above they don't follow them in a rigid fashion and they also have to fulfill other tasks regarding project management or communication as it has been stated throughout the literature. Apart from the instructional design processes and the instructional designers' skills and practices a social-constructivist view of instructional design should be taken in order to understand the meaning of their work for the society in general. In other words, rather than focusing on functional elements, questions such as "How do instructional designers see their contributions within the larger context of learning and society?" or "How do they construct their professional identities?" may be useful for understanding the role of the instructional designers as leaders in the enterprise of learning.

Although the rationale for using any of the information architect designs is largely theoretical rather than universal in order to deliver effective online learning, the instructional designer's work as an IA should not be undermined. This paper highlighted that the instructional designers should adopt a multidisciplinary perspective in order to design effective learning spaces and that there must be a link between the information architecture and the previously un-articulated disciplines in order to develop a disciplinary identity of instructional designers.

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REFERENCES

Andrews, D.H., & Goodson, L.A. (1991). A Comparative Analysis of Models of Instructional Design. In G. J. Anglin (Ed.). *Instructional Technology, Past, Present, and Future* (pp.133-155). Eaglewood, CO: Libraries Unlimited. (Reprinted from the Journal of Instructional Development, Vol.3, No.4, pp. 20-25).

Boersma, P. (2006). User Experience: The next step for IA's? In Dillon, Tumbull (ed.) ***Encyclopedia of Library and Information Science*****, pp. 70-80.**

Danaher, B. G., McKay, H.G., Seeley, J. R. (2005) The Information Architecture of Behavior Change Websites. ***Med Internet Res.*** **Vol. 7, No. 2, pp. 30-35.**

Dillon, A., Tumbull, D. (2005). Information Architecture. In Dillon, Tumbull (ed.) ***Encyclopedia of Library and Information Science*****, pp. 10-20.**

Eyman, D. (2003). ***Articulating Information Architecture*****. In Dillon, Tumbull (ed.)** ***Encyclopedia of Library and Information Science*****, pp. 40-45.**

Gibbons, A.S. (2003, September/October). What and how do designers design: A theory of design structure. ***TechTrends,*** **Vol. 47, No.5, pp. 22-27.**

Gilchrist, A. (2003). Taxonomies and Information Architecture. In Dillon, Tumbull (ed.) ***Encyclopedia of Library and Information Science*****, pp. 30-40.**

Hall, S. D. Morley, & K. Chen. (1996) ***Stuart Hall: Critical dialogues in cultural studies*****. London: Routledge.**

Kenny, R., Zhang, Z., Schwier R. A., Campbell, K. (2005). A Review of What Instructional Designers Do: Questions Answered and Questions Not Asked. ***Canadian Journal of Learning and Technology*****, Vol.31 No.1, pp. 60-68**

Lasnik, V. E. (2003) Architects of Knowledge: An Emerging Hybrid Profession for Educational Communications. STC's 5th Annual Conference Proceedings, pp. 3-6.

Melia, M., Pahl, C. (2007). An Information Architecture for Courseware Validation. In Dillon, Tumbull (ed.) ***Encyclopedia of Library and Information Science*****, pp. 10-18.**

O. Denn, S., Maglaughlin, K. L. (2000). World's Fastest Modeling Job, or Information Architecture: What Is It? The Multidisciplinary Adventures of Two Ph.D. Students. ***Journal of the American Society for Information Science*****, Vol. 26, No. 5 [Online]. Available from: http://www.asis.org/Bulletin/June-00/dennmaglaughlin.html [Accessed 13/07/08]**

Robertson, T., Hewlett, C. (2007). Computer Human Interaction: 6th Asia Pacific Conference, APCHI 2004, Rotorua, New Zealand, June 29-July 2, 2004, Conference Proceedings, pp. 2-9.

Slack, J. D., Miller, D.J., Doak, J. (1993). "The technical communicator as author: Meaning, power, and authority." ***Journal of Business and Technical Communication*** **Vol. 7, No. 12., pp. 6-9.**

Warren, R. (2001). Information Architects and Their Central Role in Content Management. ***Bulletin of the American Society for Information Science and Technology*** **Vol. 28, No. 1, pp. 8-11.**

Wiggins, B. (2000). *Effective document management*. Aldershot: Gower.

Wurman, R. (1996). *Information Architects*. Switzerland: Graphic Press Corp.

Wurman, R. (2001) *InformationAnxiety2*. USA: QUE.