A Methodology to Determine Skills Needed By Web Page Developers

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Abstract

The problem that this study dealt with is the lack of research conducted to determine some of the competencies needed by web page developers in the year 2003. This study used a Delphi instrument to determine the general needs for the preparation of computer technology competencies of web page developers for the 21st century. The panel of experts contributing to the data includes 24 participants from the Association of Internet Professionals (AIP) and the World Organization of Webmasters (WOW). The study consisted of three rounds of a Delphi instrument transmitted over the Internet telecommunications network. An instrument was developed from the responses generated by the first round, the second round involved rating the statements, and the third round was used to determine consensus on items.

The findings of this study present a list of competencies concerning integration skills needed by web page developers. For the purposes of this study, integration skills were defined as those in the area of content-management needed to assess, apply, and adapt microcomputer technology. Findings and conclusions of the study include statements about competencies that may be included in curriculum related to information systems courses which provide training in the area of web page development. This paper presents one part of the findings of the study, and at the time of submission, additional findings were in progress.

Keywords: Internet, Integration Skills, World Wide Web, Delphi Research

1. INTRODUCTION

In the advent of the 21st century, the relatively recent promise of e-business has become real. Both businesses and individuals are using the World Wide Web to buy products and services. Consumers and producers want to extend the reach of e-business to new environments. Consumers want to check accounts, access information, and make purchases with their personal computers, cellular phones, and PDAs (personal digital assistants). Businesses such as banks, airlines, and retailers are competing to provide the most ever-present and convenient service for their customers. This new economic and information exchange media has created an overwhelming demand for a new type of systems architect. To be successful, this new architect must possess both end-

user and developer skills needed to design an aesthetic interface with applications that take advantage of the rich-rendering capabilities of advanced desktop browsers as well as low-level text presentation for devices which have little or no graphics capability.

The architects of this rapidly changing media need integration skills to utilize end-user interface, authoring languages, multimedia, and graphics (Britton, 2001). Integration skills are those in the area of content-management skills or competencies needed to assess, apply, and adapt microcomputer technology to World Wide Web page design and development.

Due to the need to teach computer applications in our educational programs and the rate at which technology

advances are developing new uses for computers, it is important for our curriculum planners to have timely information pertaining to the future computer competencies needs of our students. Educators are facing tremendous challenges in identifying, developing, and designing a curriculum that will prepare undergraduates for work in the 21st century (Hunt & Perreault, 1999).

2. PURPOSE OF STUDY

The problem was that, to date, there has been little evidence of research conducted to determine the integration skills needed by web page designers and developers for the future. The purpose of this study, therefore, was to determine objectives in the area of integration skills for the preparation of web page designers and developers for the year 2003 and beyond.

3. BRIEF REVIEW OF LITERATURE

The review of the literature in process for this study examines web page development competencies as related to information systems educational programs.

There is a lag in the process from origination to achievement of curriculum revision in the most disciplines. In terms of computer technology, it is obvious that the amount of time used to make curriculum revisions may encompass an enormous amount of change. Therefore, it is assumed for the purposes of this study that a consensus among future-minded professionals will be more appropriate than techniques that may simply analyze current trends in the field of information systems. Many contemporary research studies in the area of information technology are utilizing the Internet and the World Wide Web as a media to collect consensus data, and methodology used in these similar studies will be cited in the review of the final paper.

Research relating to computer competencies for the preparation of web page developers was reviewed from the perspective of the research question. Over the last decade, previous studies have been found to be relevant to the research question in content and the context of training (Retalis, et. al, 2000). Included with these is the suggestion that there is a lack of specialized training and education in the area of web engineering. Only some literature exists to determine if there has been an adoption of instructional technology by university faculty to meet the needs for training future professionals in the area of web page design and development (Groves & Zemel, 2000).

4. RESEARCH QUESTION

Based upon the past models of competencies that are cited in the literature relating to computer competencies needed by web page designers and developers, the following question guided the research: "For the year 2003, what integration skills do web page designers and developers need to possess in order to effectively create and deploy World Wide Web pages?"

Although there are many other skills which web designers might require beyond integration skills, this study focused on this category. It is planned that the last phase of the study will include a broader research question to identify additional skill sets to include in the curriculum.

5. METHODOLGY

In research, the Delphi technique is an organized research methodology for correlating views and information pertaining to an area of strategy and for allowing respondents with such views an opportunity react to and assess differing viewpoints. The technique was introduced in 1958 through "Project DELPHI" which was sponsored by the United States Air Force and directed by the Rand Corporation to obtain the most reliable consensus of a group of experts concerning predictions of alternate national defense futures (Dalkey & Helmer, 1963, p. 458).

This study is being completed in five phases, the first of which was completed on September 15, 2001. The initial phase involved identifying a national panel of experts. After identifying these experts they were petitioned for a list of statements regarding their respective answer to the research question. The panel of experts contributing to the data includes 24 participants from the Association of Internet Professionals (AIP) and the World Organization of Webmasters (WOW). All panelists were invited to participate in multiple iterations of communication utilizing the Internet and the World Wide Web as a primary media. An additional panel of experts will involve information systems educators who are actively involved in teaching and research in the area of web page development. The identities of the panelists are being kept confidential throughout the study, and each panelist is assigned a unique identity that keeps the panelist anonymous to the other participating panelists.

The first round of communication was followed with two more rounds of communication using a modified Delphi instrument over a period of two months. The second round was completed on December 15, 2001 and the third round was completed on February 10, 2002. These iterations of communications were transmitted through electronic mail and a World Wide Web page interface to all participants on the same days.

To develop the second round instrument, the responses received during the first round included statements made by the panelists to answer the research question. These statements were compared for similarity and collapsed into a web page survey that presented all the statements representing the collective views of the panelists. During the second round of communication, each panelist rated the importance of each competency according to a 5-point scale. A rating of 1 indicates that the panelist felt the item was not important, 2 that the item was some-

what important, 3 that the item was moderately important, 4 that the item was important, and 5 that the competency was very important. The panelists will also be encouraged to make comments to explain their answers.

The third round of the procedure involved a communication of the instrument in revised format, which provided each panelist's previous response along with the median of the collective responses given by the panel. The inclusion of the group and individual responses from the previous round allowed each panelist an opportunity to re-rate each item based upon the group response.

Descriptive statistics including the Pearson product-moment correlation coefficients and the number of responses for each rating given for both the second and third rounds of communications will be used. Stability is defined, in this study, as the point when any two distributions show correlation of greater than .50 in a Pearson Product-Moment test. All positive correlations (greater than .50) will indicate a consensus of the panel for statements about future competencies that may be included in web design and development curriculum.

The fourth round of the procedure will involve a communication of the instrument in revised format, which will include the statements; however, it will not include data from the expert panel responses. Since the final round will use a separate panel involving information systems educators, it will provide an opportunity to include additional statements. It is anticipated that this round will be completed by November 2002.

6.   EXPECTED OUTCOMES

It is expected that when completed, the outcome of this study will determine the skills needed by web page designers and developers for the near future. It is also expected that the study will determine objectives in the area of programming and additional skills for the preparation of web page designers and developers for the year 2003 and beyond.

7.   FINDINGS TO DATE

The panel of practicing web page designers used in this study identified 27 skills that should be considered when developing courses to teach web page architecture. The skills identified include technical programming/coding, front end usability, and those aesthetic skills needed to produce web documents which appeal to the end-user.

All of the skills identified by the panelists were deemed as at least moderately important by the collective panel. The panel considered 12 of the skills to be important and 12 to be moderately important. Collectively the panel rated two skills dealing with Java2 scripting and Scalable Vector Graphics to be somewhat important. The one skill that the panel agreed to be essential to include in curriculum for web page development is the ability to

design user interfaces with usability and interactivity. Table I presents a summary of the findings of the study ranked by composite score.

8.   CONCLUSIONS

This study contributes to the literature in information systems by examining the potential content of web page development courses included in information systems programs. This study could provide guidance to information systems educators who teach such a course as well as practitioners who may hire information systems graduates. In addition, textbook authors may use these data to assess the necessary coverage of specific topics for a web page design and development course. Curriculum designers may use these results to define a course sequence, which could involve multiple web page design or development offerings at the university level.

9.   REFERENCES

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Table I, Skills Identified and Rated by Web Page Designers as Necessary in the Field of Web Page Design.

(Rating Scale: 4.5 to 5 = Essential; 3.5 to 4.4 = Important; 2.5 to 3.4 = Moderately Important; 1.5 to 2.4 = Somewhat Important; ≤1.4= Not Important.)

In order to effectively create and deploy World Wide Web pages for the year 2003, web page designers and developers need to possess the following integration technology skill:	median	mean	Std. Dev.	Composite
Design user interface(s) with usability and interactivity	5.00	4.65	0.99632	79
Envision the end result through the user's (customer's) eyes	5.00	4.41	1.17574	75
Maintain a focus on user needs	5.00	4.41	1.17574	75
Integration of effective and quick-loading multime-dia/graphics	4.00	4.12	1.11144	70
A strong understanding of the perspective target audience including good communication skills and a strong ability to sell and promote your goods or services	4.00	3.94	1.29762	67
The ability to deliver high quality applications with simple front ends and sophisticated back ends. (This includes Java, and database design and implementation skills.)	4.00	3.88	0.92752	66
Use team communication and project management skills	4.00	3.76	1.14725	64
Define, implement, and interpret usability testing	4.00	3.76	0.90342	64
Dynamic Web Page Languages	4.00	3.71	0.98518	63
Use proper language and grammar in writing and editing content	4.00	3.71	1.31171	63
Use backend database support, and data warehousing	3.00	3.65	0.93148	62
Develop information architecture	4.00	3.59	0.71229	61
Demonstrate content expertise, online community devel-opment, backend/IT management, web/IT engineering	4.00	3.59	0.93934	61
Possess knowledge of networking foundations	3.00	3.47	0.94324	59
A balanced synergy of industry best practice with specific customer segment lessons learned	4.00	3.47	0.87447	59
Utilize content management systems	4.00	3.47	0.94324	59
Use authoring languages and graphics	4.00	3.47	1.17886	59
Utilize cross-cultural communication	3.00	3.35	0.78591	57
Code with XHTML (Extensible Hypertext Markup Lan-guage)	3.00	3.18	1.0146	54
Code with JavaScript	3.00	3.18	0.88284	54
Code with ASP/PHP (Active Server Pages/Personal Home Page)	3.00	3.12	1.11144	53
Use Macromedia Dreamweaver	3.00	3.12	1.26897	53
Use Adobe Photoshop	3.00	3.12	1.31731	53
Code with JSP (Java Server Pages)	3.00	2.82	0.95101	48
Use Macromedia Flash	3.00	2.53	0.87447	43
Code with Java2	2.00	2.41	1.12132	41
Code with SVG (Scalable Vector Graphics)	3.00	2.29	1.21268	39