

# What's in a Web Site? Student Perceptions

Christian Sebastian Loh

*University of Georgia*

Michael D. Williams

*National Institute of Education, Singapore*

## Abstract

*Although motivation is an important aspect in instructional design, few studies have examined the effect of motivation in Web site design. Most of the existing Web site evaluation checklists evaluate for content accuracy but not the motivational quality of Web sites. For this study, we developed the Motivation Analysis Rating Kit (M@RK) to address motivational design elements and to assess children's perception of Web design elements and the Web features they most prefer in "cool" Web sites. The research employed a repeated measures design on a single sample (N = 71) with two within-subjects factors (Web sites and motivational elements). Paired-sample t-tests were used to compare student ratings among the various motivational elements. Findings show that children are able to and do select Web sites critically. They seem to be most motivated by Web sites that are rated high for both content and design elements. (Keywords: checklist, classroom teaching, evaluation, motivation, Web sites.)*

Web sites for educational purposes are becoming increasingly prevalent as "online learning" and "Web-based training" become buzzwords in education. There are plenty of Web design books for anyone who aspires to create a Web site. In this new Internet world of education, a teacher's responsibilities now include sourcing for, evaluating, creating, and maintaining a list of educational Web sites suitable for learning purposes in the classroom.

The advent of technology and the Internet put power in the hands of the consumers and learners. Students who have access to the Internet may find many online courses and learning opportunities. Shrivastava (1999) reported that more than 50% of universities in the United States offer some kind of online courses. Thousands of new courses are being posted on the Web every month, with various kinds of implementation strategies that include e-mail, chat, forum, and online assignments.

However, through all this flurry of activity, the motivational aspect of online learning seems to have eluded the mind of many educators. Small (1999) found that most research and evaluation on Web instruction has focused primarily on content or student outcomes with "little or no attention ... paid to presentation methods that motivate student learning" (p. 1).

---

*The authors wish to thank Dr. Ruth Small, Syracuse University, for granting permission to consult the WebMAC (version 2.0) for this study, and Michael Keesey for his readiness to share the reasons behind the reconstruction of his Dinosauricon Web site. This article was originally presented at the Fourth Global Chinese Conference on Computers in Education 2000: Teaching and Learning in the New Millennium, May 2000 in Singapore.*

A look at the abundant Web evaluation checklists prepared by information scientists and librarians over recent years (see bibliography by Auer, 1999) shows that, although many of them evaluate for content accuracy (e.g., Liven-good, 1997; Wittman, 1998), and some also evaluate multimedia content and aesthetic value (e.g., McLachlan, 1996; Wilkinson, Bennett, & Oliver, 1997), almost none of them evaluate for the motivation of users. There were others who believe that children should be taught Web evaluation skills as well; for example, Payton (1998) proposed three different Web evaluation rubrics for elementary, middle, and high school students, respectively.

Thus far, only one instrument (the Web site Motivational Analysis Checklist, or WebMAC, Small, 1997) evaluates for the motivational aspect of Web sites. As of this writing, a modified WebMAC was also available for use by very young (ages 4–6) children (Arnone & Small, 1999). Web sites need further examination to determine their reliability and their motivational factors. The purpose of this study was to examine children's ranking of educational Web sites by their motivational content so as to better understand what children look for in terms of educational content when browsing a Web site. The results would better inform educational Web site providers about motivating children and creating Web sites suitable for learning purposes.

## **LITERATURE REVIEW**

Although excessive graphical elements should be avoided in Web design because they may become distracting (e.g., Maddux & Johnson, 1997), the use of appropriate graphic design strategies—such as size and color of the text, use of sound, and amount of white space—help enhance instructional motivation (e.g., Boyle, 1997; Tillman, 1997). Additionally, the use of organizational design strategies—such as frames, image maps, tables, and metaphors—is very effective (e.g., El-Tigi & Branch, 1997; Ohl & Cates, 1997). Conversely, a great number of successful commercial Web sites devoted to children are highly effective in vying for the attention of the users.

In a classroom setting, students who encounter an educational Web site with lots of accurate information (that scrolls on and on, Web page after Web page) may find the materials overwhelming or boring, unless the Web site incorporates motivational strategies. Student interest in the subject, and in learning about the subject, may soon wane. In a worse scenario, teachers attempting to incorporate such (motivationally lacking) Web sites into their lessons may find their students disinterested with the process. Without knowing more about the importance of the motivational aspect of educational Web sites, these teachers may arrive at the conclusion that the Internet is not suitable for learning. How then can Web sites be crafted in such a way so as to both attract visitors *and* present the content in ways that will facilitate learning?

## **PURPOSE OF THE STUDY**

There is a need for educators to understand how Web sites can be designed to attract learners, to hold their interest long enough to explore the site, and to motivate them to return. Because motivational analysis of Web sites is virtually nonexistent,

Small (1997) set out to develop WebMAC, hoping to address the issue by offering a tool for diagnosing the motivational quality of educational Web sites.

WebMAC (Small, 1997) was developed based on a number of theories of motivation and models related to the expectancy-value theory—in particular, Keller's ARCS model (1983, 1987) and Taylor's value-added model (1986). It contains 60 items (5-point Likert-type scale) and specifies four categories of motivational quality of Web sites: Engaging, Meaningful, Organized, and Enjoyable.

WebMAC is designed specifically for adult evaluators and serves well as a benchmarking tool for anyone wanting to evaluate a Web site for its motivational index/quotient. However, the Enjoyable category may be confusing, as it evaluates for enjoyment (fun) as well as factors such as continuing motivation (Maehr, 1976). Furthermore, because the motivational qualities are compartmentalized into four distinct and different categories, it is somewhat difficult to appraise the Web sites in a holistic manner.

Thus, this study proposed to extend the current body of knowledge through the following research question.

In terms of children's perception:

- which motivational Web design elements most strongly relate to the motivational quality of educational Web sites?
- which Web design feature is most important?
- which factor is more important in a "cool" Web site: content or presentation?

## **METHODS**

### **Sample**

The sample for this study was drawn from two classes of average ability sixth graders in Singapore. Students in the two classes ( $n = 72$ ) were chosen primarily for their proficiency in Internet browsing. The school was chosen from the handful of Singapore schools with Internet connections. The teachers in charge volunteered their classes because they were intrigued with the possible response of the students. The two classes were considered to have adequate exposure to using Internet in the classroom because lessons using the Internet were conducted from time to time. Students were divided into six groups, to cover all six combinations of sequences-of-visit to the three Web sites. This was to eliminate any influence from a prior site, in the case where a reviewer's decision may become heavily influenced after visiting a particularly well or poorly designed site.

### **Instrumentation**

We developed the Motivational Analysis Rating Kit (M@RK) for this study, based largely on the structure presented in WebMAC (Small, 1997). M@RK contained the original four categories of motivational elements from WebMAC (i.e., Engaging, Meaningful, Organized, and Enjoyable) plus one addition (Overall Perceptions). The 15 items in M@RK use 4-point Likert-type scales for assessment. Table 1 shows a summary of the different categories incorporated in the new instrument.

**Table 1. The Five Categories of Motivational Analysis Rating Kit (M@RK)**

Category	Descriptors
Engaging	Attracts users' attention with eye-catching visuals and intuitive screen layout; impresses users at first sight and novelty; the "Wow!" factor
Meaningful	Establishes credibility and relevance by providing a meaningful context to users; contains accurate, purposive, and updated information; value-added content for right audience
Organized	Provides user-friendly interface and organizational structures (i.e., good "browsability"); users feel confident navigating the site for information
Enjoyable	Users find the experience pleasurable and satisfactory; good hygiene features (Keller & Suzuki, 1988): quick loading speed, appropriate illustrations, active and updated links
Overall perceptions	Evaluates the extent of continuing motivation in the users; users attach high value to sites after browsing; they will return for more and be willing to recommend the site to others

Each student was to complete one rating instrument (Part I) for each Web site visited. This section of the instrument contains five categories (15 items) of motivational elements: Engaging (4 items), Meaningful (3 items), Organized (3 items), Enjoyable (2 items), and Overall Perception (3 items). Part II of M@RK contains 12 Web features that students are to rate for their importance for a cool Web site.

### Materials Selection

After a process of evaluation and elimination, three dinosaur-themed Web sites were selected based on the production quality in having balanced content versus presentation.

1. The Children's Museum of Indianapolis had a Web site created specifically for children. It contained fact sheets about dinosaurs, pronunciation guides, and even line-art illustrations of dinosaurs for coloring activities. The Children's Museum Web site is available at [www.childrensmuseum.org](http://www.childrensmuseum.org), but the Dinosaur section no longer exists.
2. The Dinosauria ([www.ucmp.berkeley.edu/diapsids/dinosaur.html](http://www.ucmp.berkeley.edu/diapsids/dinosaur.html)) is an adult-level Web site catering to anyone who wants to know more about dinosaurs. It has interesting background information, archeological finds, and other scientific facts about the dinosaurs.
3. Mike Keesey's Web Pages on Dinosaurs (now renamed The Dinosauricon, <http://dinosauricon.com>) is T. Michael Keesey's personal Web site. It hosts a huge collection of dinosaur art and drawings. It even has MPEG movies of

beautifully rendered 3-D dinosaurs. It is very impressive, but the original version placed all graphics on one single long page that took a long time to load. The original version was used in our study.

### **Procedure**

The first author held a 30-minute prestudy briefing in which each student received a copy of the instrument and the explanation for filling in the questionnaire. To keep up the excitement level, students were not told what kind of Web sites they were going to access. The students were divided into two equal groups to make use of the two available computer labs simultaneously. Only the URLs of the Web sites were copied on the blackboard for reference; the name and the nature of Web sites were withheld from the students.

A classroom-learning situation was re-created/simulated; students were instructed to visit the three Web sites according to a predetermined randomization table. After visiting one Web site for 15 minutes, the students were required to answer the 15-item survey (Part I of M@RK). When all the students had submitted the survey for that Web site, they were then allowed another 15 minutes to visit a second Web site, followed by a second survey, and so on. Finally, the students were asked to fill out a 12-item general survey (Part II of M@RK).

At the end of the study, students were asked to rate their overall motivation toward the Web sites chosen through a simple show of hands. All the students agreed that the Web sites presented to them were cool and interesting. No one reported feeling bored during the study. In fact, many students felt the time given to visit the Web sites was too short, and they took note of the URLs to continue exploring the sites at home.

### **Data Analysis**

A repeated-measures design was employed to analyze the motivational elements of Web design. The study was conducted on a single sample, with two within-subjects factors ("Web site" with three levels, and "motivational element" with five levels). There is no between-subjects factor in this study. A paired-sample *t*-test was used to analyze and compare the correlation between the various pairs of contrasts among the motivational elements. The data for one student were unuseable, so the final student sample ( $N = 71$ ) consists of 39 boys and 32 girls.

### **PART I: MOTIVATIONAL ANALYSIS OF WEB SITES**

The coefficient (alpha) reliabilities of the instrument (Part I of M@RK) ranged from 0.78 to 0.84 across the three Web sites. The grand means for each of the five categories of motivational elements were plotted against the Web sites (Figure 1).

Notice that the graphs for all three Web sites have a fairly consistent shape: relatively high values for the Engaging, Meaningful, and Organized subscales, but low values for the Enjoyable subscale and midrange values for the Overall

Perceptions subscale. The Meaningful subscale for the Children's Museum site breaks from the overall pattern and is significantly higher (2.45) than the rest of the values.

**Comparisons among Within-Subjects Factors**

Because there were five categories of motivational elements, 10 pairs of contrasts were possible for each Web site. A total of 30 pairs of contrasts would, therefore, be available for the three Web sites used in the study.

To control Type I error rate for each contrast, the alpha had to be adjusted accordingly (Kirk, 1982)—by dividing the nominal value of 0.05 by the number of pair of contrasts (30); in this case:  $0.05 \div 30 = 0.00167$ . For convenience, the adjusted alpha (Type-I error) rate was rounded down to 0.0015.

Tables 2–6 show the  $t(70)$  values among the different pairs of contrasts for all three Web sites ( $N = 71$ ;  $df = 70$ ). Those with  $p < 0.0015$  are indicated with an asterisk (\*).

**Table 2. Within-Subject Factors: Engaging against the Other Four Categories**

Engaging	Overall			
	Meaningful	Organized	Enjoyment	Perception
The Children's Museum	-4.89*	-0.65	6.49*	4.32*
The Dinosauria	-0.10	-1.68	6.84*	3.38*
Mike Keeseey's Web pages	-0.69	-0.65	7.03*	4.48*

**Table 3. Within-Subject Factors: Meaningful against the Other Four Categories**

Meaningful	Overall			
	Meaningful	Organized	Enjoyment	Perception
The Children's Museum	-4.89*	3.87*	9.53*	7.10*
The Dinosauria	-0.10	-1.44	6.19*	3.21
Mike Keeseey's Web pages	-0.69	0.05	6.22*	4.82*

**Table 4. Within-Subject Factors: Organized against the Other Four Categories**

Organized	Overall			
	Meaningful	Organized	Enjoyment	Perception
The Children's Museum	-0.65	3.87*	6.35*	3.62*
The Dinosauria	-1.68	-1.44	6.96*	-4.51*
Mike Keeseey's Web pages	-0.65	0.05	7.10*	4.68*

There are significant differences between the Engaging subscale and both the Enjoyment and Overall Perception subscales for all Web sites. Only the Meaningful subscale of the Children's Museum site is significantly different from the Engaging subscale.

There are significant differences between the Enjoyment and Meaningful subscales for all Web sites. Only the Children's Museum site and Mike Keeseey's Web Pages show significant differences between the Overall Perception and Meaningful subscales. Note that all factors for the Children's Museum site are significantly different from each other. (Ranking of Web sites showed that the Children's Museum site is the most highly rated Web site of the three, followed by The Dinosauria and Mike Keeseey's Web Pages).

There are significant differences between the Organized and Enjoyment subscales and between the Organized and Overall Perception subscale for all Web sites. Other than that, only the Meaningful subscale of the Children's Museum site differs significantly from the Organized subscale.

There are significant differences between the Enjoyment subscale and all other factors for all Web sites, except between the Enjoyment and Overall Perception subscales for the Children's Museum site and Mike Keeseey's Web Pages. The graph in Figure 1 shows that Enjoyment had been ranked consistently lower than the rest of the motivational elements (especially the Engaging, Meaningful, and Organized subscales).

There are significant differences between Overall Perception and almost all other motivational elements for all Web sites, with these exceptions: between Overall Perception and Meaningful for The Dinosauria, and between Overall Perception and Enjoyment for the Children's Museum site and Mike Keeseey's

**Table 5. Within-Subject Factors—Enjoyment against the Other Four Categories**

Enjoyable		Meaningful	Organized	Enjoyment	Overall Perception
	The Children's Museum	6.49*	9.53*	6.35*	-3.20
	The Dinosauria	6.84*	6.19*	6.96*	-3.87*
	Mike Keeseey's Web pages	7.03*	6.22*	7.10*	-2.86

**Table 6. Within-Subject Factors—Overall Perception against the Other Four Categories**

Overall Perception		Meaningful	Organized	Enjoyment	Overall Perception
	The Children's Museum	4.32*	7.10*	3.62*	-3.20
	The Dinosauria	3.38*	3.21	4.51*	-3.87*
	Mike Keeseey's Web pages	4.48*	4.82*	4.68*	-2.86

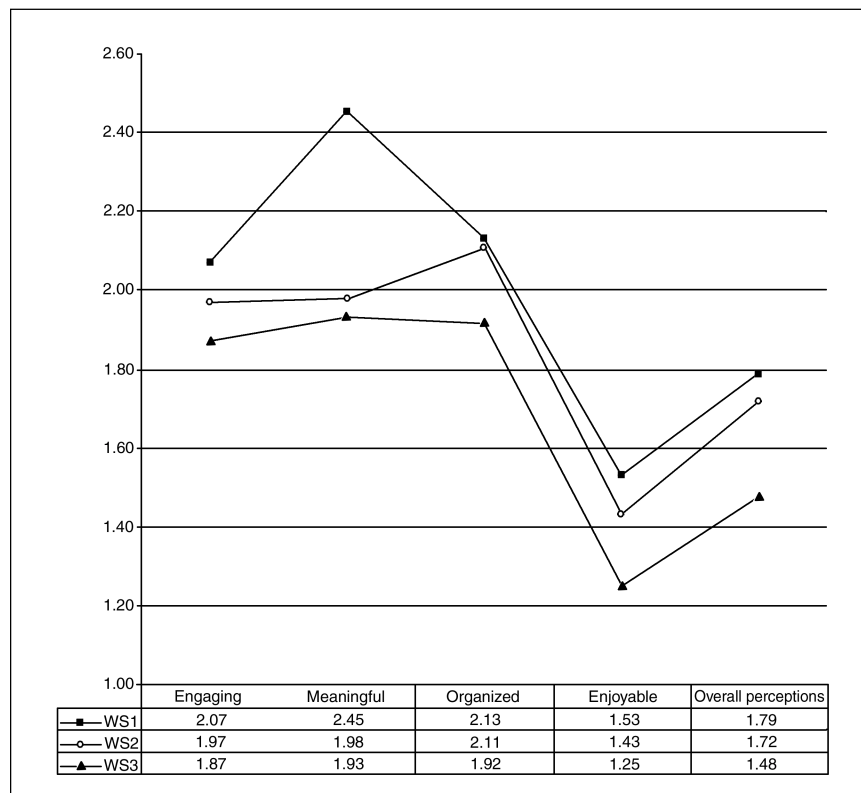
Web Pages. The graph in Figure 1 also shows that Overall Perception was generally ranked lower than Engaging, Meaningful, and Organized, but higher than Enjoyment.

In summary, there seemed to be no significant difference between the rankings of Engaging and Organized, ranging from 1.87 to 2.11. The ranking for Meaningful for the Children's Museum site is significantly higher than all other elements. The ranking for Overall Perception is also found to be significantly lower than Engaging, Meaningful, and Organized, but higher than Enjoyment. The ranking of Enjoyment was significantly lower than all the other motivational elements.

## PART II: COMMON WEB FEATURES

Part II of M@RK presented a list of common Web design features commonly found in Web sites. The mean and standard deviation on students' perception of these Web features essential for cool Web sites are presented in Table 7, sorted from the most essential to the least.

In summary, children identified fast loading time as the most important feature for a cool Web site, whereas the next most essential feature is content (lots



**Figure 1.** Grand means of motivational elements by Web sites. *WS1: The Children's Museum. WS2: The Dinosauria. WS3: Mike Keese's Web pages.*

**Table 7. Ranking of Common Web Features, Sorted by Means**

Ranking of Web Features (* indicates ties)	<i>M</i>	<i>SD</i>
1. Quick loading (less wait time)	2.79	0.65
2.* Lots of information	2.55	0.53
Link back to the home page	2.55	0.60
4. A search button	2.51	0.71
5.* Picture-based navigational guide	2.41	0.67
A forum/bulletin board where I can put up my questions and get some answers	2.41	0.73
7. "Games"	2.30	0.90
8.* A "related link" page	2.21	0.75
Animation, such as animated GIFs	2.21	0.81
10. Sound and background music	2.14	0.98
11. Text-based navigational guide	2.01	0.87
12. Able to e-mail the author/Webmaster	1.83	0.89
Which is more important: content or presentation?	1.94 vs. 1.06	1.44

of information). Following these are the three navigational features. The children wanted a forum or discussion board (chat room) where they could interact with and get feedback from the rest of the Web community. Note, however, they did not want to talk to the author of the Web site, which ranked last on the list. Multimedia features, such as games, graphics and animation, and sound and music, are perceived as less essential (ranked in the bottom 50%).

#### SUPPLEMENTARY FINDINGS

An informal interview was carried out with the two teachers in charge of the classes. They indicated that the Web sites chosen were appropriate for the students. They also confirmed that the students appeared to be highly motivated by these Web sites. Observations during the study found that students seemed enthusiastic and motivated about the Web sites. Many of them took note of the URLs to surf the Web sites at home. (This manifestation seemed typical of continuing motivation. It would be interesting for other researchers to verify if students exhibiting this characteristic are truly continuously motivated.)

Approximately 65% of the students (22 girls, 24 boys) believed that content is more important than presentation for a cool Web site, whereas the other 35% (10 girls, 15 boys) preferred presentation to content.

Students generally liked Mike Keeseey's Web Page for Dinosaurs for the "overwhelming" collection of pictures, graphics, and movies, but they abhorred the long wait time. Interestingly, two months after the study, Keeseey revised his Web site with a more interesting name, The Dinosauricon, and restructured content to make it load faster. Keeseey indicated that he had "wanted a better look and faster loading time" (personal communication, 1999). It would be interesting for other researchers to replicate the current study with the newly improved Dinosauricon Web site. This confirmed Keller and Suzuki's (1988)

opinion about the importance of hygiene features: such features are not necessarily motivating when done well, but definitely contribute to adverse motivation if not done well.

## DISCUSSION

We asked, “Which motivational Web design elements most strongly relate to the motivational quality of educational Web sites?”

We found that the ranking of the five categories of motivational elements (Engaging, Meaningful, Organized, Enjoyment, and Overall Perception) showed a strikingly similar pattern (high for the Engaging, Meaningful, and Organized subscales; moderate for Overall Perception; and low for the Enjoyment subscale). It seemed that children attached higher value to Meaningful content, followed by Engaging, Organized, Overall Perception, and Enjoyment. Thus, content providers could design educational Web sites accordingly: they should have a lot of content, be aesthetically presented, and have good organizational and navigational properties.

As stated earlier, many commercial Web sites for children (e.g., Disney, <http://disney.go.com/>; Nickelodeon, [www.nick.com](http://www.nick.com); Sesame Street, [www.sesameworkshop.com](http://www.sesameworkshop.com)) are investing heavily into making their Web sites more enjoyable, more fun, and more colorful, complete with multimedia, interactivity, and games. These Web sites for young children were often stereotyped to contain jokes, games, music, and coloring pages; whereas Web sites for teenagers often have pictures of teen idols, chat rooms, loud colors, music video clips, and the latest happenings thrown in as part of the potpourri. Some companies even go so far as to hire teenagers as consultants to help design the Web sites to suit the tastes of the target generation.

Yet, the findings of this study seem to contradict that marketing belief. These children did not react as commonly predicted—that is, attaching high value to the Enjoyable element as a requirement for Web sites to be “cool.” On the contrary, they seemed to attach greater value to all other elements. These children identified the most important motivational elements of a cool Web site as meaningful and relevant content, followed by an engaging presentation and ease of navigation (or good organizational structure). Even the overall perception of a Web site is considered more important than Enjoyment, which is supposedly provided by multimedia galore.

For classroom learning, educators could consider searching for Web sites that are rated high in the meaningful, engaging, and organized categories. Web sites that are not as highly rated could perhaps be redesigned for classroom use based on the guidelines as follows:

- The Web site should be targeted to the level of the children (e.g., using vocabulary appropriate to their level, seeing things through their perception). Irrelevant or confusing materials should be removed, and information should be presented in a well-organized manner.

- Existing Web sites that are high in content but boring should be spruced up using appropriate images, color schemes, and metaphoric presentation to increase their motivational quality.
- Learning materials should be further simplified or condensed to cater to the students' level of understanding. Proper chunking of information should make reading and comprehension easier for the children.
- Careful attention should be paid to ensure good "browsability" of the Web site. This would encompass regular placement of navigational features, such as a Home button, advance organizers, summary of content, and perhaps an overall map of the Web site.

We then asked, "Which Web design feature is most important?"

Children in the study identified quick loading speed as the top feature of a cool Web site. Navigational features (e.g., organizational structure of the site) and interactive features (e.g., chat rooms, bulletin boards) were rated more important than multimedia features (e.g., games, sound, music, animations).

Not many classrooms or educators have access to broadband connections. To make matter worse, as more people connect to the Internet, local Internet backbones will become congested. Thus, using the Internet in classroom may be a frustrating experience to many users. Long wait times coupled with unmotivating Web design will further discourage the use of Internet in education.

Furthermore, in an effort to spruce up their Web sites, Webmasters often make use of animated graphics, video, audio, streaming materials, and Java programs, which all contribute to further congesting the Internet connection. Webmasters need to be critically aware of the overall file size of their Web pages and use multimedia prudently. It is also wise to be aware of the latest compression technology to "squeeze down" the file size of movies, sounds, and graphics used. The addition of a bigger Internet backbone (e.g., Internet2) and faster Internet connections (e.g., digital subscriber line, cable modem) may soon help ease congestion and make the Web a more accessible place.

Finally, we asked, "Which factor is more important in a 'cool' Web site: content or presentation?"

It appears that content is more important to children, after all. Despite the flurry of Internet presentations and interactivities, children are becoming more critical and careful in their selection of Web sites. They want a Web site filled with meaningful information, not just one that is eye-catching. Could this perhaps be another instance where the novelty effect of IT is wearing off and users are beginning to focus on content again? Uninteresting Web sites with gray backgrounds likely do not stand a chance in wooing audiences, but it seems that competition for user attention has now moved from design alone to design plus content. Knowledge management would seem to be increasingly important in the future.

## CONCLUSIONS

This study explored the need to incorporate motivation strategies into the evaluation and creation of Web sites as a vehicle in online learning. It examined the motivational design aspect of educational Web sites, using children as evaluators. By knowing the needs of the target audience (students), content providers and educators will be better able to implement successful lesson plans.

Our study showed that children looked for content in educational Web sites and seemed most motivated by good content, instead of the common belief that children are motivated by color, sound, and animation. Undoubtedly, color, sound, and animation are the novelty artifacts that draw children initially to a Web site. However, once past the novelty effect, it takes interesting and captivating content to “motivate” children to return to the Web site for further exploration, very much like a good book with a captivating plot that draws its reader into the depth of the story. Further study will better inform educators and educational Web site providers about creating sites that motivate children to learn. ■

## Contributors

Christian Sebastian Loh began his PhD study at the University of Georgia in August 2000. Before this, he received his MEd from the School of Education of the National Institute of Education in Singapore, where he taught for two years as a teaching fellow. Michael D. Williams is an associate professor at the School of Education of the National Institute of Education in Singapore, where he has been teaching computer-based educational technologies for the last eight years. (Address: Christian S. Loh, Dept. of Instructional Technology, 604 Aderhold Hall, University of Georgia, Athens, GA 30602; csloh@coe.uga.edu.)

## References

- Arnone, M. P., & Small, R. V. (1999). Evaluating the motivational effectiveness of children's Web sites. *Educational Technology, 39*(2), 51–55.
- Auer, N. J. (1999). *Bibliography on evaluating Internet resources* [Online document]. Available: [www.lib.vt.edu/research/libinst/evalbiblio.html](http://www.lib.vt.edu/research/libinst/evalbiblio.html).
- Boyle, T. (1997). *Design for multimedia learning*. London: Prentice Hall.
- El-Tigi, M., & Branch, R. M. (1997). Designing for interaction, learner control, and feedback during Web-based learning. *Educational Technology, 37*(3), 23–29.
- Keller, J. M. (1983). Motivational design of instruction. In C. M. Reigeluth (Ed.), *Instructional design theories and models: An overview of their current status* (pp. 383–434). Hillsdale, NJ: Erlbaum.
- Keller, J. M. (1987). Development and use of the ARCS model of instructional design. *Journal of Instructional Development, 10*(3), 2–10.
- Keller, J. M., & Suzuki, K. (1988). Application of the ARCS model in software design. In D. H. Jonassen (Ed.), *Instructional designs for microcomputer courseware* (pp. 401–434). Hillsdale, NJ: Erlbaum.

- Kirk, R. E. (1982). *Experimental design: Procedures for the behavioral sciences*. Monterey, CA: Brooks/Cole Pub. Co.
- Livengood, S. P. (1997). *An evaluation instrument for Internet Web sites*. Unpublished master's research paper, Kent State University. (ERIC No. ED 413 899)
- Maddux, C. D., & Johnson, D. L. (1997). The World Wide Web: History, culture, context and a manual for developers of educational information-based Web sites. *Educational Technology*, 37(5), 5–12.
- Maehr, M. L. (1976). Continuing motivation: An analysis of a seldom considered educational outcome. *Review of Educational Research*, 46(3), 443.
- McLachlan, K. (1996). *WWW CyberGuides* [Online document]. Available: [www.cyberbee.com/guides.html](http://www.cyberbee.com/guides.html).
- Ohl, T. M., & Cates, W. M. (1997). Applying metaphorical interface design principles to the World Wide Web. *Educational Technology*, 37(6), 25–38.
- Payton, T. (1998). *Evaluation rubrics for Web sites* [Online document]. Available: [www.siec.k12.in.us/~west/online/eval.htm](http://www.siec.k12.in.us/~west/online/eval.htm).
- Shrivastava, P. (1999, January). Online learning trends and the online learning paradox. [Letter to the editor]. *The Technology Source* [Online serial]. Available: <http://ts.mivu.org/default.asp?show=article&id=58>.
- Small, R. V. (1997). *Assessing the motivational quality of World Wide Web sites*. (ERIC No. ED 407 930)
- Small, R. V. (1999). An exploration of motivational strategies used by library media specialists during library and information skills instruction. *School Library Media Research* [Online serial]. Available: [www.ala.org/aasl/SLMR/vol2/motive.html](http://www.ala.org/aasl/SLMR/vol2/motive.html).
- Taylor, R. S. (1986). *Value-added processes in information systems*. Norwood, NJ: Ablex.
- Tillman, M. L. (1997). *World Wide Web homepage design*. (ERIC No. ED 405 840)
- Wilkinson, G. L., Bennett, L. T., & Oliver, K. M. (1997). Evaluation criteria and indicators of quality for Internet resources. *Educational Technology*, 37(3), 52–59.
- Wittman, S. M. (1998). *Evaluating Web sites* [Online document]. Available: <http://servercc.oakton.edu/~wittman/find/eval.htm>.