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The motivational quality of nutrition-related websites for children

Heidi Maria Stimmel

To the Graduate Council:

I am submitting herewith a thesis written by Heidi Maria Stimmel entitled "The motivational quality of nutrition-related websites for children." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Nutrition.

Paula Zemel, Major Professor

We have read this thesis and recommend its acceptance:

Betsy Haughton, June Gorski

Accepted for the Council:
Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

To the Graduate Council:

I am submitting herewith a thesis written by Heidi Maria Stimmel entitled "The Motivational Quality of Nutrition-Related Websites for Children." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Nutrition.

Paula Zemel PhD, RD, LDN
Major Professor

We have read this thesis
and recommend its acceptance:

Betsy Haughton, EdD, RD, LDN

June Gorski, DrPH, CHES

Accepted for the Council:

Vice Provost and
Dean of Graduate Studies

THE MOTIVATIONAL QUALITY OF NUTRITION-RELATED WEBSITES FOR CHILDREN

A Thesis
Presented for the
Master of Science Degree
The University of Tennessee, Knoxville

Heidi Maria Stimmel
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DEDICATION

This thesis is dedicated to:

My parents,
Paul H. and Helen Stimmel

and

Bradford M. Anderson

for providing me with
encouragement and support
throughout my educational career.

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ABSTRACT

Included among the issues of using computer technology with children are the concerns with website content and gender inequality. Many tools have been developed to evaluate the content of websites, however even a website validated with accurate content can create an unpleasant experience for the user if it does not possess qualities that motivate the user to engage in it. Also, based on previous data that demonstrates variations between males and females with various aspects of computer usage, gender differences in ratings of websites for their motivational quality could potentially exist. Thus, the purpose of this study was three-fold: 1) to determine the level of utility and interest of nutrition-related websites for children; 2) to evaluate gender differences with the way that the motivational qualities of websites are rated; and 3) to determine those factors that are associated with utility and interest of nutrition-related websites for children.

Using the *WebMAC Junior- 2000* evaluation tool, 38 fourth- and fifth-grade students in a local magnet school for technology rated the motivational quality of one science-related website that was rated "awesome" from previous use with the WebMAC tool and ten nutrition-related websites. First, the students interacted with the website and then, based on a Likert-type scale, assigned numerical ratings to each question in the *WebMAC Junior- 2000* tool for the website being evaluated.

Our results indicate that 1) there were differences in the utility and interest scores for the websites evaluated; 2) only two websites demonstrated a significant difference in scores when compared by gender, thus male and female students tended to rate the websites similarly; and 3) predicting factors for the levels of utility and interest of the

websites emerged from the data and can be used to guide the design of nutrition-related websites.

PREFACE

This thesis is divided into two parts. Each part is a separate unit with its own list of references and appendices. The first part of the thesis is the literature review covering the background and significance of the research for this project. The second part of this thesis is written as an expanded journal article covering the methodology, results, discussion, and implications for research and practice for this research project.

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PART I

INTRODUCTION, BACKGROUND AND SIGNIFICANCE OF RESEARCH

INTRODUCTION

The Internet is recognized as a powerful tool for providing nutrition education.[1,2] Nutrition-related websites are just one component of the Internet that engage users and allow them to become actively involved in the learning process. Although there are many benefits to this method of learning, caution must be given to the accuracy of website content. Therefore, proper website evaluation is essential.[2-6]

Whereas content validity should be given top priority when evaluating websites, the general purpose of the website is only served if the user engages in it. Once the content has been deemed valid, the next step is to determine if the user enjoys the website. To do this, the user should ask, "Would I visit, stay, and return to this site?" In other words, "Is this site motivating?" To determine the answers to these questions, one must evaluate the motivational quality of the website.[7]

The Website Motivational Analysis Checklist (WebMAC) is a set of tools designed to determine the motivational quality of websites.[8] WebMAC is unique in that it allows children, rather than adults, to perform the evaluation. In addition, it is theory-based and has been tested for content validity and reliability.[9] When using the tool, the evaluator first selects and interacts with the website and then, based on a Likert-type scale, assigns a numerical rating to each question in the tool. Resulting are the scores for two motivational qualities, utility and interest, of the website for that particular user.

Thus far, the motivational quality of nutrition-related websites for children has not been determined. Identifying which qualities of websites children like or dislike can disclose those that are effective as well as those that need to be modified in order for

them to reach their full potential. The goal of this research was to use the *WebMAC Junior-2000* evaluation tool to allow children to determine the motivational quality of selected nutrition-related websites. Therefore, the purpose of this study was to address the following specific aims:

1. To determine the utility (i.e. how well the site works) of nutrition-related websites for children as perceived by students in fourth- and fifth-grade.
2. To measure the level of interest of nutrition-related websites as perceived by students in fourth- and fifth-grade.
3. To investigate the differences in which male and female students in fourth- and fifth-grade rate the motivational quality of websites.
4. To determine those factors that are associated with utility and interest of nutrition-related websites for children.

BACKGROUND AND SIGNIFICANCE

The background and significance relating to these specific aims are addressed in the following literature review. Relevant topics were reviewed pertaining to nutrition and website evaluation including:

- conveying nutrition messages through the mass media;
- using computers for nutrition education in schools;
- using the Internet for nutrition education;
- the importance of website evaluation; and
- determining the motivational quality of nutrition-related websites.

Conveying Nutrition Messages Through The Mass Media

Dietary choices are often influenced by the nutritional messages conveyed through the mass media. These messages can either encourage proper nutrition or promote unhealthful food choices. Food advertisements on television often target children as the intended audience because of the recognized influence on their subsequent dietary behavior and food preferences. Approximately 50 percent of the advertisements aired during children's Saturday morning television programs are for foods, namely products that are high in fat and sugar.[10,11] When studied, children who view these advertisements are more likely choose the advertised foods over more healthful, non-advertised selections.[12,13]

Realizing this impact, various channels within the mass media are also being utilized to educate audiences about proper nutrition. Identified resources for communicating nutrition information to the public include print resources, such as magazines, fact sheets, newspaper articles, and newsletters in addition to radio and television programs and advertisements, videos, public service announcements (PSAs), compact disks (CDs), computer software and, more recently, online technology.[2, 14-27] Although evaluations of some of these mediums have revealed various levels of effectiveness,[15-17, 20-27] the use of computers and online technology for teaching and learning about nutrition has emerged as a valuable and versatile means of providing nutrition education in a variety of different environments.[1,2,28,29]

Using Computers For Nutrition Education in Schools

Schools are an environment where computers can play a key role in teaching nutrition. In 1999, a nationwide survey of elementary and secondary schools revealed that 95% of public schools were equipped with Internet access, a 271% increase since 1994.[31] Also in 1999, 66% of public school teachers reported utilizing computers or the Internet for classroom instruction and 41% used these approaches to some extent for teaching nutrition.[31,32]

Computers can provide assistance to teachers who, for many years, have expressed a need to access nutrition teaching materials.[32-36] Considering over half (61%) of the schools offering nutrition education do not have a coordinated nutrition program,[37] many teachers are responsible for developing and teaching their own lessons.[35,37,38] A majority (90%) of teachers reported that they develop their own materials,[37] thus demonstrating a need for quality learning materials that can be easily accessed.

With computer and Internet availability, teachers have access to many nutrition-related websites that can offer lesson ideas or allow teachers to learn about materials available from agencies or private organizations that provide instructional resources. Furthermore, many computer software packages have been created that can be used during class time to aid with nutrition education.[40-43] When surveyed, 43% of the teachers agreed that access to more nutrition-related software would be useful.[32]

Computer software is often utilized to provide nutrition education through Computer-Assisted Instruction (CAI). CAI has been used to teach nutrition at all levels of education and is advantageous because of the potential for interactivity and feedback.

In addition, use of nutrition software in the classroom has been confirmed to teach new skills, enhance learning outcomes, result in higher test scores, and lead to positive dietary modifictions.[28, 44-46]

Carew et al.[46] examined the effects of using a CAI program in a college-level nutrition course. Students enrolled in the class had the option of using a CAI program that complemented the course material. A pretest and post-test based on lesson content was given to all students in the course to measure the effects of the CAI on cognitive test scores. Students who used the CAI program were also administered an instrument that used a Likert-type scale to determine their opinions towards the CAI both at the beginning and ending of the course. Additionally, demographic information, such as the usefulness of the program, the students' attitudes towards using the program, and the perceived advantages and disadvantages, was also collected. Results showed that students who used the program had a higher improvement in their pretest–post-test scores over non-users. Also, all of the students thought that the CAI program was useful to some degree and, overall, their attitudes toward using the program improved throughout the duration of the course.

One issue that has risen from the use of computer software and computer usage in general is that of gender bias. Over the years, gender differences in attitudes, level of interest, and performance outcomes with computer usage have become evident. To explore these differences, a survey of fourth- and fifth-grade students showed that the males had a more positive attitude toward using computers than females.[45] In another survey of students, both males and females perceived males' interest with computers to

be greater than females and with regard to format, females reported disliking video game-style activities on the computer.[48]

Joiner et al.[49] studied gender differences of children ages 10 and 11. Each child interacted with two computer software games, one with a male-stereotyped design and another identical game, but with a female-stereotyped design. Results showed that boys performed better on both designs of the games than the female students. Another finding was that, of the two formats, girls preferred the female stereotyped design better and subsequently performed significantly better with this design compared to the male stereotyped design. However, there was no relationship between boys' design preference and their performance.

The gaps in gender differences with computer usage have been attributed to: 1) attitude and performance factors, such as time spent using a computer and grade level; 2) family factors, like having the father as the primary user of the household computer and purchasing more computer software programs for male children than female children; 3) software factors, such as male-stereotyped computer games and storylines of computer software programs; and 4) educational factors, like lack of teacher training and transmission of negative attitudes of female teachers to female students.[50]

Using The Internet For Nutrition Education

For years, software was virtually the only means available to employ the use of computers for educational purposes. However, recent advances with online technology have expanded the possibilities for providing nutrition instruction via computers.[2] Although many resources such as listservs and bulletin boards are available to collect and

transmit information on the Internet, electronic mail (e-mail) and the World Wide Web (WWW) are two online features that have been reported frequently within the nutrition literature.[51-62]

E-mail has been used with nutrition in many instances as a means of communication. Sending messages via e-mail is more economical than other routes and the convenience allows messages to be sent to one or more receivers in a timely manner. In schools, e-mail can be used to facilitate the instruction of nutrition courses as well as to communicate messages between students and nutrition professionals.[56-60] Positive outcomes associated with receiving information by e-mail include improved communication skills, increased level of competence with online technology, enhanced knowledge, high assignment and test scores, and professional networking.[56-60]

The World Wide Web (WWW) contains information regarding virtually any nutrition-related topic. The availability of this information provides many opportunities for teaching and learning with the Web. Moreover, skills, such as web design and posting information on websites, can be developed in conjunction with learning about nutrition.[52,53] Lessons involving the Web can offer hands-on experience and interactivity, which involve the users and help make learning fun. The importance of these characteristics has been recognized, especially when teaching nutrition to children.[1, 2,62-65]

Many nutrition-related websites have been designed specifically for children. Websites for younger audiences can offer some of the same attention-gaining features of television programs, such as cartoon characters and animation. Or, for children who enjoy video games, websites can offer fun and exciting games with a nutrition focus. Cullen et al.[66] conducted focus groups with third- through fifth-graders to obtain their

opinions on the format design of computer games. Students reported that immediate gratification, including being fun and challenging, was the primary reason for playing computer games, whereas some stated the opportunity to learn as an added benefit. The students also preferred cartoon characters and pictures more than realistic pictures and a mystery game was favored over other various formats.[66]

The Importance Of Website Evaluation

Although there are many advantages, the concern with using the web for educational purposes is the excessive amount of misinformation that is found on some websites. In particular, sites offering health information have been found providing information that is inconsistent with national recommendations.[67] More specifically, nutrition-related sites must be used with caution due to the excessive amount of incorrect and/or misleading dietary information that must be identified through proper evaluation.[2-6]

A plethora of tools have been developed to evaluate the content of websites. While some instruments provide an in-depth analysis of sites, others have been designed for quick assessments. Criteria lists, such as the Checklist for Evaluating Web Resources[66] and the Critical Evaluation Surveys,[69] allow the user to perform a short, simple evaluation, whereas a tool such as Evaluating Web-Based Resources: A Practical Perspective[70] provides a more lengthy, complex assessment. One popular reference for teachers and students, Kathy Schrock's Guide for Educators,[71] identifies features such as navigation and usability, authorship, and content validity as the three basic foci for website evaluation.

Evaluation tools have been specifically designed to identify inaccurate information on health-related sites. The Office of Health Promotion at Emory University has created the Health-Related Web Site Evaluation Form,[72] developed for use by health educators and clinicians to assess health information found on websites for their clients. Various other resources also provide guidelines for evaluating health information on websites, however, for many, descriptions of these tools do not indicate their basis for development, what criteria are used to develop the tool, or if the tools are valid and reliable.[73]

Specifically for nutrition-related sites, the School of Nutrition Science and Policy at Tufts University provides an online reference, the *Tufts University Nutrition Navigator.*[74] The purpose of the site is to help users quickly find accurate nutrition information from nutrition-related websites. Sites are selected and evaluated by a panel of nutrition experts according to their content and usability. Content evaluation includes nutrition accuracy, depth of nutrition information, and when the site was last updated. Usability looks at the overall experience of the user including the site's navigation tools, accessibility of information, download time, and timeliness of information. After they are evaluated, the websites are listed in rank-order from "Among the Best" to "Not Recommended" and then posted on the *Tuft's University Nutrition Navigator* site for public access.

Determining The Motivational Quality Of Nutrition-Related Websites

Whereas content should be the first priority with website evaluation, regardless of how accurate the site is, it can only be effective if the user engages in it. Therefore, after

assessing the content of the website, the next step is to ask, "Why would someone visit, stay, and return to this site?" In other words, "Is this site motivating?" To determine the answers to these questions, the motivational quality of the website must be evaluated.[7]

Motivation can be placed into two classifications: external and internal. External rewards, such as positive feedback, an award, or an allowance, lead to external motivation, whereas internal motivation comes from within and can result from engaging in a fun or enjoyable activity. The motivational aspects of websites also can either be external, such as giving positive feedback, or internal in the instance of using games and other activities that engage the user. If the qualities of a website are appealing, the user will likely be motivated to engage in the site, as opposed to another site that provides an unpleasant experience. Subsequently, if the user has a pleasurable experience when using the website, the likelihood that he or she will learn and benefit from the site is enhanced. Various qualities that exist within websites can be evaluated to determine the site's overall motivational effectiveness.

The Website Motivational Analysis Checklist (WebMAC) is a set of tools that has been developed to determine the motivational quality of websites.[8] The motivational quality is determined by comparing the level of utility, or how well the site works, with the level of interest of websites. When evaluating a website, the user first explores and interacts with the site and then, based on a four-point Likert-type scale (0 = strongly disagree to 3 = strongly agree), assigns a rating to each question. For the evaluation tools that are targeted toward younger children, each number in the rating scale is matched to a complementary hedonic scale. Upon completion, the ratings for the even-numbered questions are totaled for the utility score and the odd-numbered questions are totaled for

the interest score. The website can have individual utility and interest scores ranging from "poor" (score of 0 to 5) to "excellent" (score of 20 to 24). When the two scores of a website with "excellent" utility and interest are combined (total score of 40 to 48 points), then the site is considered "awesome".

After the utility and interest of the websites are rated, the tool includes two Yes/No questions that ask the users if they would like to visit the website again and if friends their age would also like to visit the website. The survey ends with two open-ended questions that inquire about what the user liked best about the website and how the website could be improved. Thus, the final result from the evaluation is both a qualitative and quantitative measure of the site's motivational quality for that particular user.

Five tools have been created for use by students within the WebMAC series; *Web Site Investigator, WebMAC Junior- 2000,* and *WebMAC Junior Long Form* target first- through fourth-graders, whereas *WebMAC Middle* targets fifth- through eighth-grade, and *WebMAC Senior* targets ninth- through twelfth-grade. The difference between the three tools that target first through fourth-graders is based on the number of Likert-type questions within each tool. *Web Site Investigator* contains 12 Likert-type questions, *WebMAC Junior- 2000* has 16, and *WebMAC Junior Long Form* asks 24. All of the tools within the WebMAC series are aimed beyond content analysis and, instead, target motivational qualities such as functionality and appeal.[9] WebMAC is unique in that it allows students, rather than adults, to perform the evaluation, it is theory-based, and it has been tested for content validity and reliability.

The WebMAC tool is based on the theoretical framework of the Expectancy-Value (E-V) Theory.[75] The E-V Theory describes two prerequisites that are necessary for an individual to become motivated to engage in a given activity. First, the individual must perceive value in involving him or herself in the activity and secondly, the individual must expect that he or she can be successful upon completing the activity.[75] These two criteria must be met in order for an individual to become and remain motivated.

The E-V Theory has served as the basis for many other well-known theories and learning models including John Keller's ARCS Model.[76] The ARCS Model expands on the E-V theory and identifies Attention, Relevance, Confidence, and Satisfaction as the four essential components necessary for motivation.[76] A motivating activity must be able to gain and sustain a learner's *attention* and provide activities and/or information that is *relevant* to the learner's personal goals and motives. Furthermore, a motivating activity must provide the learner with the *confidence* that he or she can be successful with engaging in and completing the activity as well as the *satisfaction* of knowing that the time and effort expended on the activity was worthwhile.

Through the ARCS model, motivational theory has been integrated into computer-assisted instruction (CAI) in the classroom. Yang and Chin studied the effects of two types of instructional control, program and learner, on students' motivation to learn from CAI.[77] The type of control is determined by whether the learner makes the decisions regarding the pathway and quantity of information received from the CAI (learner control) or whether the program dictates where the learner goes and the amount of information that is provided (program control). Forty-eight sixth-grade students

evaluated CAI lessons using an evaluation instrument based on the four motivational factors of the ARCS Model (attention, relevance, confidence, and satisfaction). Students responded to the statements on the instrument by ranking their answers using a Likert-type scale. The study found no significant differences between program and learner control on the students' motivation to learn from CAI.[77]

Also based on Keller's ARCS Model is the SCARCS Model,[78] which addresses the issue of gender equity with computer usage, as discussed previously in this review of the literature. Added to the ARCS model are the categories of staff development and curriculum, which serve to educate the staff on gender issues regarding computer usage and ways to prevent gender bias when implementing computer activities into the curriculum. This model was developed to determine if males are more motivated by computers than females, which could contribute to the explanation of the differences in attitudes, level of interest, and performance factors between males and females.[47-49] Implementation or evaluation of this tool have not been reported in the literature.

Although the E-V Theory has been used in a variety of contexts, the WebMAC tool relates it specifically to website evaluation. A question from the *WebMAC Junior-2000* tool that corresponds to "expectancy" is: "Was it easy to find what you needed at this website?".[8] Another example from the same tool that addresses "value" is: "Was what you found at this website useful to you?".[8] These questions from the WebMAC tools help to identify qualities that relate to the utility and level of interest of websites. These two qualities combine to enhance the perceived value and expectation for success when engaging in the site, thus modeling the E-V Theory.

The WebMAC tools have tested for both content validity and reliability. Testing originally began when more than 70 educators and library professionals reviewed and critiqued tools from the WebMAC series. Revisions to the language, format, and length were made based on the feedback given from the testing; resulting was the original 24-question form. This form was used in a large pilot study of more than 500 students in second- through fourth-grade to further test the tool. Based on the results, a shorter, 16-question version of the form, *WebMAC Junior-2000* evolved. The original *WebMAC Junior* tool was renamed *WebMAC Junior Long Form.*[9] Although use of the tool has been documented,[74] outcome research has not yet been reported in the literature.

Although the WebMAC tool has been used nationwide, thus far the motivational quality of nutrition-related websites for children has not been determined. Using the WebMAC tool to determine the motivational quality of websites with validated content would be beneficial to students and teachers as well as nutrition educators and website designers. Students can learn the importance of website evaluation as well as the ability to critically evaluate websites for utility and interest, although not content. By allowing students to evaluate the websites, teachers, in turn, can use the highly-rated websites to supplement their classroom instruction. Likewise, nutrition educators can integrate these sites into their nutrition lessons. The likes and dislikes of the websites revealed from the evaluations can help website designers create high-quality websites.

Determining the motivational quality of nutrition-related websites can disclose those that are effective as well as those that need modification. Therefore, the main purpose of this study was to determine the motivational quality of selected nutrition-related websites for children. This study also looked at gender differences regarding the

frequency and reasons for Internet usage as well as students' attitudes toward using the Internet.

REFERENCES

REFERENCES

1. Lytle L, Achterberg C. Changing the diet of America's children: what works and why? J Nutr Educ 1995;27:250-60.

2. Kolasa KM, Miller MG. New developments in nutrition education using computer technology. J Nutr Educ 1996;28:7-14.

3. Hertzler A, Young VE, Baum CM, Lawson M, Marshall-Penn M. Nutrition and exercise information for children on the Internet. J Fam Consumer Sci 1999;91:100-3.

4. Davidson K. Finding nutrition information on the Net. J Am Diet Assoc 1996;96:749-50.

5. Vozenilek G. The wheat from the chaff: sorting out nutrition information on the Internet. J Am Diet Assoc 1998;98:1270-2.

6. Contento I, Balch GI, Bronner YI, et al. The effectiveness of nutrition education and implications for nutrition education policy, programs, and research: a review of research. Chapter 4: Nutrition education for school-aged children. J Nutr Educ 1995;27:298-311.

7. Arnone MP, Small RV. Evaluating the Motivational Effectiveness of Children's Websites. Educ Technol 1999;39:51-5.

8. Arnone MP, Small RV. WWW motivation mining: finding treasures for teaching evaluation skills (Grades 1-6). Worthington, OH:Linworth, 1999.

9. Small RV, Arnone MP. Evaluating web sites: a critical information skill. In: unleash the power! Knowledge-technology-diversity. Presented at the Third International Forum on Research in School Librarianship, Annual Conference of the International Association of School Librarianship (IASL), Birmingham, AL, 1999.

10. Taras HL, Gage M. Advertised foods on children's television. Arch Pediatr Adolesc Med 1995;149:649-52.

11. Kotz K, Story M. Food advertisements during children's Saturday morning television programming: are they consistent with the dietary recommendations? J Am Diet Assoc 1994;94:1296-1300.

12. Signorielli N, Lears M. Television and children's conceptions of nutrition: unhealthy messages. Health Commun 1992;4:245-57.

13. Borzekowski DLG, Robinson TN. The 30-second effect: an experiment revealing the impact of television commercials on food preferences of preschoolers. J Am Diet Assoc 2001;101:42-6.

14. Korninis M, Korslund MK, Belli G, Donohue JM, Johnson JM. Comparison of calcium and weight loss information in teen-focused versus women's magazines over two 4-year periods (1986-1989 and 1991-1994). J Nutr Educ 1998;30:149-54.

15. Chipman H, Kendall P, Slater M, Auld G. Audience responses to a risk communication message in four media formats. J Nutr Educ 1996;28:133-9.

16. Kolasa KM, Jobe AC, Clay M, Daugherty J. Evaluating the use of a multimedia approach to teaching nutrition in medical school. J Nutr Educ 1997;29:351-5.

17. Shannon B, Thurman G, Schiff W. Foodene: a pilot TV show on nutrition issues. J Nutr Educ 1979;11:15-8.

18. Breault JL, Gould R. Formative evaluation of a video and training manual on feeding children with special needs. J Nutr Educ 1998;30:58-61.

19. James DCS, Rienzo BA, Frazee C. Using focus groups to develop a nutrition education video for high school students. J Sch Health 1997;67:376-9.

20. Steinberg-Nichols LA, Schmidt MK. The impact of video tapes in educating grocery store shoppers about fat and cholesterol. J Nutr Educ 1995;27:5-10.

21. Steeples MW, Millison M. The "Healthy Traditions" cooking show videos: a unique product for communicating nutrition information and skills. J Nutr Educ 1999;31:119C.

22. Lancaster KJ, Smiciklas-Wright H, Ahern F, Achterberg C, Taylor-Davis S. Evaluation of a nutrition newsletter by older adults. J Nutr Educ 1997;29:145-51.

23. Struempler BJ, Marshall AC. Using low-literacy newsletters to provide nutrition education for limited-resource individuals. J Nutr Educ 1999;31:60C.

24. Hosig K, Rodibaugh R. Parent newsletters to strengthen a school-based community nutrition education program in the rural Arkansas delta. J Nutr Educ, 1998;30:340B.

25. Gans KM, Lovell HJ, Fortunet R, Lasater TM. Low-literacy audio intervention for lowering fat intake. J Nutr Educ 1998;30:410B.

26. Contract CH, Goffi J, Dwyer JT. Teens create public service announcement (PSA): high blood pressure prevention. J Nutr Educ 1998;30:232C.

27. Dooley DA, Soll L. Scripting public service announcements for radio. J Nutr Educ 1999;31:235C.

28. Beerman KA. Computer-based multimedia: new directions in teaching and learning. J Nutr Educ 1996;28:15-8.

29. Carroll JM, Stein C, Byron M, Dutram K. Using interactive multimedia to deliver nutrition education to Maine's WIC clients. J Nutr Educ 1996;28:19-25.

30. Williams C. Internet access in public schools and classrooms: 1994-99 (NCES 2000-086) U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office, 2000.

31. Rowand C. Teacher use of computers and the Internet in public schools (NCES 2000-090). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office, 2000.

32. Celebuski C, Farris, E. Nutrition education in public elementary school classrooms (NCES 2000-40). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office, 2000.

33. Stang J, Story M, Kalina B. Nutrition education in Minnesota public schools: perceptions and practices of teachers. J Nutr Educ 1998;30:396-404.

34. Auld GW, Romaniello C, Heimendinger J, Hambidge C, Hambidge M. Outcomes from a school-based nutrition education program alternating special resource teachers and classroom teachers. J Sch Health 1999;69:403-8.

35. Zemel PC, Brokaw S, Huntsinger D. What do teachers use and what do they need to teach healthful eating in schools? Sch Food Serv Res Rev 1993;76:41-5.

36. Norton PA, Falciglia GA, Wagner M. Status of nutrition education in Ohio elementary schools. J Nutr Educ 1997;29:92-7.

37. Celebuski C, Farris, E. Nutrition education in public elementary school and secondary schools (NCES 96-852). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office, 1996.

38. Zemel P, Huntsinger D. Nutrition education resources used by elementary school teachers. Tennessee Educational Leadership 1992;19:20-6.

39. Connell DB, Turner RR, Manson EF. Summary of findings of the School Health Education Evaluation: health promotion effectiveness, implementation, and costs. J Sch Health 1985;55:316-21.

40. Achterberg C, Getty V. *From Land to Landfill: A Systems Perspective.* Use of an organizing theme in an interdisciplinary multimedia curriculum. J Nutr Educ 1998;30:178C.

41. Youatt JP, Andrews SL, Hammerschmidt P, Sawyer CA, Murphy AS. RISK Raiders: a food safety hypermedia software game for students (grades 3-5). J Nutr Educ 1996;28:181A.

42. Mathewson K, Achterberg C, Peck K, Augustine C. Ship to Shore. Nutrition Media Alliance. University Park, PA: The Pennsylvania State University, 1992.

43. Dole Food Company and the Society for Nutrition Education. 5 A Day adventures [CD-ROM] San Mateo, CA: Dole Food Company, 1993.

44. Riles CP, Granell J, Zemel P. Authoring a CAI lesson in nutrition education. J Nutr Educ 1984;16:51-52.

45. Burnett KF, Magel PE, Harrington S. Computer-assisted behavioral health counseling for high school students. J Counseling Psychol 1989;36:63-7.

46. Carew LB, Chamberlain VM, Alster FA. Evaluation of a computer-assisted instructional component in a college-level nutrition course. J Nutr Educ 1997;29:327-34.

47. Griffin BL, Gillis MK, Brown M. The counselor as a computer consultant: understanding children's attitudes toward computers. Elementary School Guidance & Counseling 1986;20:246-249.

48. Johnson CS, Swoope KF. Boys' and girls' interest in using computers: implications for the classroom. Arithmetic Teacher 1987;35:14-16.

49. Joiner R, Messer D, Littleton K, Light P. Gender, computer experience and computer-based problem solving. Computers Educ 1996;26:179-87.

50. Nelson CS, Watson JA. The computer gender gap: children's attitudes, performance and socialization. J Educ Tech Syst 1990-91;19:345-53.

51. Fang CS. Virtual Snack Shop: an Internet project with emphasis on food sources of vitamins and minerals. J Nutr Educ 2000;32:119C.

52. Kipp DE. Reflections on teaching graduate students how to use and publish nutrition information on the World Wide Web. J Nutr Educ 1996;28:308-12.

53. Rodriguez JC. Web page and online response activities in an undergraduate nutrition education course. J Nutr Educ 2000;32:119B.

54. Olson RB, Cohen N, Atallah E. NIBBLE for adult basic education: website and lessons for low-literate learners. J Nutr Educ 2000;32:285A.

55. Cotugna N, Vickery CI, Barrar C. The INK project: Internet nutrition for kids. J Nutr Educ 1999;31:175C.

56. Merkel JM, Dittus KL. CyberNutrition on-line: educating nutrition students and the public in CyberSpace. J Nutr Educ 1998;30:66-7.

57. McDonnell E, Achterberg C. Development and delivery of a nutrition education course with an electronic mail component. J Nutr Educ 1997;29:210-4.

58. Knous BL. Outcomes associated with e-mail delivery of a general nutrition course. J Nutr Educ 2000;32:169-76.

59. Rodriguez JC, Brown G. Online mentoring in an undergraduate nutrition education course. J Nutr Educ 2000;36:60B.

60. Evers WD. Enlarging your professional community through electronic communication. J Nutr Educ 1996;28:47B.

61. Achterberg C. Tips for teaching a course by e-mail. J Nutr Educ 1996;28:303-7.

62. Gray AS, Raab CA. "On-Line to Healthy Weights": employed women's responses to electronic messages on weight management. J Nutr Educ 1999;31:56-9.

63. U.S. Department of Health and Human Services. Public Health Service. Centers for Disease Control and Prevention. Guidelines for school health programs to promote lifelong healthy eating. Morb Mortal Wkly Rep 1996;45(RR-9):11-12.

64. Rickard KA, Gallahue DL, Gruen GE, Tridle M, Bewley N, Steele K. The play approach to learning in the context of families and schools: an alternative paradigm for nutrition and fitness education in the 21st century. J Am Diet Assoc 1995;95:1121-6.

65. Plum J, Hertzler AA, Brochetti D, Stewart D. Game to assess nutrition concepts of preschool children. J Am Diet Assoc 1998;98:1168-71.

66. Cullen KW, Baranowski T, Baranowski J. Computer software design for children's recording of food intake. J Nutr Educ 1998;30:405-9.

67. McClung HJ, Murray RD, Heitlinger LA. The Internet as a source for current patient information. Pediatrics 1998;101:E2.

68. University of Southern Maine Library. Checklist for Evaluating Web Resources. Accessed on: October 22, 2000. Accessed from: http://library.usm.maine.edu/guides/webeval.html.

69. Schrock, K. Critical Evaluation Surveys. Accessed on: October 22, 2000. Accessed from: http://school.discovery.com/schrockguide/eval.html.

70. Elkordy A. Evaluating web-based resources: a practical perspective. Accessed on: March 20, 2001. Accessed from: http://www.thelearningsite.net/cyberlibrarian/elibraries/eval.html.

71. Schrock K. Separating the wheat from the chaff: how to tell the good sites from the bad. Internet Trend Watch for Libraries, 1998. Accessed on: October 22, 2000. Accessed from: http://school.discovery.com/schrockguide/chaff.html.

72. The Office of Health Promotion, Emory University. Health-related web site evaluation form. Accessed on: August 27, 1998. Accessed from: http://www.sph.emory.edu/WELLNESS/instrument.htm.

73. Jadad AR, Gagliardi A. Rating health information on the Internet: navigating to knowledge or to Babel? J Am Med Assoc 1998;279:611-614.

74. School of Nutrition Science and Policy, Tufts University. Nutrition Navigator: a guide to nutrition websites. Accessed on: October 11, 2000. Accessed from: http://navigator.tufts.edu/kids.html.

75. Vroom VH. Work and Motivation. New York:Wiley, 1964.

76. Keller JM. Strategies for stimulating the motivation to learn. Performance & Instruction 1987;26:1-7.

77. Yang Y-C. Motivational analyses on the effects of type of instructional control on learning from computer-based instruction. J Educ Technol Syst 1996;25:25-35.

78. Bohin RM. Computers and gender differences: achieving equity. Computers in the Schools 1993;9:155-167.

APPENDIX: ABBREVIATIONS

ABBREVIATIONS

ARCS	Attention, Relevance, Confidence, Satisfaction
CAI	computer-assisted instruction
CD	compact disk
E-Mail	electronic mail
E-V	Expectancy-Value Theory
PSA	public service announcement
SARCS	Staff development, Curriculum, Attention, Relevance, Confidence, Satisfaction
WebMAC	Website Motivational Analysis Checklist
WWW	World Wide Web

PART II

THE MOTIVATIONAL QUALITY OF NUTRITION-RELATED WEBSITES FOR CHILDREN

INTRODUCTION

Over the years, nutrition education has been provided through a variety of communication channels.[1-15] More recently, the use of online technology has become a popular method of relaying important nutrition information to the public.[1] One component of online technology, the World Wide Web (WWW), offers numerous possibilities to educate the public about nutrition.[16,17] However, because the content of websites is not regulated, there is a great need to critically evaluate the accuracy of the information contained on these sites.[1, 18-21]

Although content deserves precedence with website evaluation, even if the information is accurate, this does not guarantee that users will enjoy engaging in the site. Many factors, including content organization, ease of navigation, the level of readability, and pictures or backgrounds, lend to a site's degree of utility and interest. These features help to create an enjoyable experience, thus enhancing the likelihood that the user will be motivated to visit, stay, and return to the site.[22]

Another concern with using computer technology relates to gender bias. Differences in gender with computer usage have been found regarding the attitudes, level of interest, and performance outcomes of boys and girls. Males are more likely to have a more positive attitude and a greater interest, and are more likely to perform better with certain software applications than females when using a computer.[23-25]

Many tools have been developed to measure the concerns of motivational and gender differences with computer usage. One such tool is the SCARCS Model,[26] based on John Keller's ARCS Model for motivational design.[27] The tool addresses both of the

aforementioned concerns by measuring the motivational differences of computer interaction between males and females. Another tool based on motivational theory is the Website Motivational Analysis Checklist (WebMAC).[22] This tool was designed to allow children to measure the motivational quality of websites by determining if a website contains features that are enjoyable and, thus motivates them to visit, stay, and return to the site.[22] Unlike other website evaluation tools, WebMAC goes beyond content analysis and, instead, focuses on a site's level of utility and interest.

The motivational quality of nutrition-related websites has yet to be determined. Also, it is unknown if there are any gender differences in the way that the motivational aspects of nutrition-related websites are evaluated. Thus, the purpose of this study was three-fold: 1) to determine the level of utility and interest of nutrition-related websites for children; 2) to evaluate gender differences in the way that the motivational qualities of websites are rated; and 3) to determine those factors that are associated with utility and interest of nutrition-related websites for children.

METHODS

Subjects and Research Design

This study used an analytic design to identify the motivational quality of nutrition-related websites for children. Both fourth- and fifth-grade students enrolled in a magnet program at a local elementary school completed evaluations of six websites. One of the selected websites was a science-related website rated "awesome" from previous use with a WebMAC tool and five were nutrition-related websites that had not been rated. This school was selected as the data collection setting for the project because each

student could have his or her own computer to evaluate the websites due to the ample availability of computers and because the students enrolled in the magnet program had previous experience with using the Internet.

Project Organization

Eleven websites were selected for the evaluation. One science-related site that had been rated "awesome" from previous testing with *Web Site Investigator*, the short, 12-question evaluation tool within the WebMAC series, was chosen to test the tool's reliability. The website was rated by fifth- grade students, nominated, and subsequently chosen to be posted in the "AWArds" section of the WebMAC website.[28] The remaining ten sites used for the evaluation were selected from the *Tufts University Nutrition Navigator* website, an online reference from the Tufts University School of Nutrition Science and Policy.[29] Websites are evaluated by the *Tufts University Nutrition Navigator* Advisory Board, a panel comprised of nutrition experts, according to their content and usability. Websites are grouped into rating categories ranging from "Not Recommended" (fewer than 13 points) to "Among the Best" (22-25 points). The results and other descriptive information about the reviewed websites are posted on the *Tufts University Nutrition Navigator* website.[29] For this study, only sites that had a rating of at least 17 ("Better than Most") on or by May 8, 2001 and also had "kids" listed as the intended audience were considered. From the sites fitting these criteria, the technology consultant at the data collection setting for this project selected the 11 most age-appropriate sites for the evaluation, 10 to use for the evaluation and 1 as an alternate site.

The evaluation form chosen for the project was the *WebMAC Junior- 2000* (Appendix A), a tool within the Website Motivational Analysis Checklist (WebMAC) series.[30] The tool contains 16 questions based on a four-point Likert-type scale (0 = strongly disagree to 3 = strongly agree) with each number matched to a complementary hedonic scale. The eight even-numbered questions within the tool relate to utility, or how well the website works, whereas the eight odd-numbered questions relate to the level of interest of the website. The website can have individual utility and interest scores ranging from "poor" (score of 0 to 5) to "excellent" (score of 20 to 24). When the two scores of a website with "excellent" utility and interest are combined (total score of 40 to 48), then the site is considered "awesome."

The tool also includes two Yes/No questions that ask the users if they would like to revisit the website and if friends their age would like to visit the website. The survey ends with two open-ended questions that inquire what the user liked best about the website and how the website could be improved.

Packets were assembled containing six WebMAC evaluation forms. One form was for the "awesome" site and the remaining five were different websites from the ten nutrition-related websites selected for the research project. All of the evaluations in the packets were given a randomized assignment so that no packet contained the same order of evaluations. Each packet was also assigned a numbered according to its randomized order, which also served as the students' identification number. In order to obtain background information, each packet also contained an "All About You" (Appendix A) questionnaire that inquired about the demographics and computer and Internet use for each child. The questionnaire contained 13 questions: five multiple-choice, four Yes/No,

and four open-ended. According to the Flesch-Kincaid Grade Level test, the questionnaire was written at the fourth-grade reading level.[31]

Website Evaluation

Prior to data collection, all procedures were approved by the Institutional Review Board at The University of Tennessee Office of Research. Data were collected from one fourth- and two fifth-grade classes in the elementary school whose parents had provided written consent. After students had voluntarily given their verbal assent to participate in the project, each student was assigned a packet of six *WebMAC Junior- 2000* evaluation forms. Students who did not give verbal assent were given an assignment by the classroom teacher unrelated to the research project. The students' names were recorded on a sheet along with the identification number listed on the packet. Each student was then assigned to his or her own computer.

Before beginning the evaluation, the students were asked to complete their "All About You" information sheet. When finished, students were then given permission to begin their evaluation. The students were allotted two hours to complete all six evaluation forms and were allowed to work at their own pace. However, the first evaluation in each class was timed for 20 minutes in order to provide a reference of the amount of time that it should take to explore and interact with one website and complete the corresponding evaluation form. The students were allowed to answer the questions to the evaluation as they wished, either while exploring and interacting with the website or afterward. The evaluation for the current website had to be completed before the student

was allowed to move on to the next. The teachers gave the students an assignment unrelated to the research project once they had completed all of their evaluation forms.

Statistical Analysis

Data were entered into a computed database and a statistical analysis was performed using SPSS-PC Base 10.0.[32] All data were evaluated for normality of distribution and equality of variance prior to analysis.

Measures of validity and reliability were computer for the data set prior to hypothesis testing. A Principal Component Analysis with varimax rotation with Kaiser Normalization was performed on the 225 completed WebMAC evaluations to determine the degree to which items completed by the students loaded on the constructs of utility and interest proposed by Arnone and Small, authors of the WebMAC series. Cronbach's alpha was calculated to estimate internal consistency and split half reliability was calculated also.

Mean and standard deviation were calculated for the total, utility, and interest scores for all students and by gender. An independent t-test was performed on interest, utility and total scores of male and female students ($\alpha = .05$).

A dummy variable multiple regression analysis was performed with the overall level of utility and interest scores as the dependent variables (interval or ratio data) and the scores for each question as the independent variables (ordinal data) to determine which items were the most predictive of the utility and interest scores ($\alpha = .05$).

RESULTS

Demographic Characteristics

Characteristics of the students who evaluated the websites in this study are listed in Table 1. Parental consent was received for 78% of the students, of which 97% agreed to participate (n=38). There were fewer fourth- (32%) than fifth-grade students (68%) and approximately the same proportion of males (55%) and females (45%). Students ranged from nine to twelve years of age. The majority of the students were African American (74%) and the remaining (26%) were Caucasian.

The majority of the students had both a computer at home (76%) and Internet access (66%). Approximately half of the students (53%) reported using the Internet sometimes (1-3 times a week) at home and school. When asked for all of the reasons for using the Internet, the students reported to play games (76%), to surf (47%), to complete homework (26%), to use electronic mail (e-mail) (34%), to chat (24%) and for "other" reasons such as web design and in-class assignments (4%). While most of the students stated that they like using the Internet (97%), only a few (8%) believe everything that is found on the Internet is true. When asked what they like *most* about using the Internet, the two main reasons were for fun (including playing games) (46%) and to learn (35%). Students primarily reported disliking using the Internet when it is slow (42%) or when experiencing technical problems (21%). Out of the total 228 evaluations distributed to the students, 225 (99%) were usable.

Table 1. Characteristics of subjects

Characteristic	*N*	*%*[a]	*Characteristic*	*N*	*%*[a]
Grade			Reason for using Internet[b]		
4th	12	32	Games	29	76
5th	26	68	Surf	18	47
Gender			E-mail	13	34
Male	21	55	Homework	10	26
Female	17	45	Chat	9	24
Age			"Other" (web design, in-class assignments)	4	11
9	3	8			
10	12	32	Like using Internet		
11	21	55	Yes	37	97
12	2	5	No	1	3
Race			Believe everything on Internet		
African American	28	74	Yes	3	8
Caucasian	10	26	No	35	92
Have computer at home			Like *most* about Internet		
Yes	29	76	Fun (including playing games)	17	46
No	9	24	Learning	13	35
Have Internet access at home			Surfing	4	11
Yes	25	66	Chatting	2	5
No	13	34	E-mail	1	3
Frequency of Internet use			Like *least* about Internet		
Never or Seldom (less than once/week)	4	11	Slowness	10	42
			Technical problems	5	21
Sometimes (1-3 times/week)	20	53	Poor content quality (uninteresting, misinformation)	4	17
Often (4-6 times/week)	7	18			
Always (every day)	7	18	Lack of navigation	3	13
			Content inappropriate for children	2	8

[a] Rounded to the nearest whole number
[b] Students could select more than one answer

Website Characteristics

Characteristics of the websites reviewed for this study are shown in Table 2. Reeko's Mad Scientist Lab was the science-related website selected that was rated as "awesome" from previous use of the WebMAC tool. Of the websites, 36% were supported by commercial sponsors that make the products promoted on the website, 27% by industrial sponsors, which promote a particular food regardless of which company products that food, and the remaining 37% were sponsored by private, government, university, health and non-profit agencies and organizations. Although all of the sites had "kids" listed as an intended audience, for the sites with more than one audience, students were directed to the specific section targeted to children.

Validity of WebMAC Tool

Results of the factor analysis are shown in Table 3. The Scree plot indicated that 2 components were extracted and the rotation converged in 3 iterations. The Rotated Component Matrix is shown in Table 3 and confirms the original factors proposed by Arnone and Small. Cronbach's alpha was 0.8381 for interest and 0.8431 for utility ($p < .05$) further indicating that the items were measuring the same underlying constructs. A split half reliability of 0.745 for utility and 0.6891 for interest ($p<.05$) was also calculated, indicating the items were internally consistent and homogenous.[32]

Table 2. Characteristics of websites evaluated.[a]

Website Name	*URL*	*Sponsor*	*Intended Audience*
Eat 5 A Day	www.5aday.com/kids/index.html	American Frozen Food Institute	Kids, Consumers
Food 4 Kids	food4kids.missouri.edu	University of Missouri and USDA	Kids, Teachers
Fresh Starts	www.freshstarts.com	BASF	Kids, Teachers, Parents
Kellogg's Nutrition Camp	nutritioncamp.com	Kellogg's	Kids, Parents
Kids Food Cyber Club	www.kidsfood.org	The Connecticut Association for Human Services	Kids, Teachers, Parents
Nutrition Café	www.exhibits.pacsci.org/nutrition	Pacific Science Center and Washington State Dairy Council	Kids
Nutrition Explorations	www.nutritionexplorations.org/kids_zone.html	National Dairy Council	Kids, Teachers, Parents, Health Professionals
Tooned-In School Menu	www.schoolmenu.com	School Marketing Partners	Kids
Vita-Men	www.vita-men.com/meetmen/meet.htm	Roche Vitamins, Inc.	Kids, Consumers
Wegmans	www.wegmans.com/kids/index.asp	Wegmans Food Markets, Inc.	Kids, Consumers
Reeko's Mad Scientist Lab[b]	www.spartechsoftware.com/reeko/	Private	Kids

[a] Information for nutrition-related sites gathered from the Tufts Nutrition Navigator website at http://navigator.tufts.edu on 05/08/2001.

[b] Science-related site previously rated as "awesome" with use of WebMAC tool.

Table 3. Rotated component matrix for all questions in WebMAC tool.

	Factor Loadings[a]	
Question	*Utility*	*Interest*
1	.36	.72
2	.68	.21
3	.18	.64
4	.64	.26
5	.19	.75
6	.50	.39
7	.19	.59
8	.79	.17
9	.16	.75
10	.72	.21
11	.40	.51
12	.53	.26
13	.18	.65
14	.54	.40
15	.40	.64
16	.60	.30

[a]Factor loadings of 0.05 were accepted.

Website Ratings

As shown in Table 4, total scores for all students ranged from 29.62 to 39.52 with the Kellogg's Nutrition Camp website having the highest score and the Eat 5 A Day website having the lowest. Utility scores ranged from 15.29 to 20.09 again, with Kellogg's Nutrition Camp working the best and Eat 5 A Day and Tooned-In School Menu websites both working the poorest of the evaluated websites. Scores for interest ranged from 14.33 to 19.78 with Nutrition Café being the most interesting and the Eat 5 A Day website being the least interesting. Reeko's Mad Scientist received a total score of 35.74, the fourth highest score of all the rated websites.

Table 4. Mean scores and standard deviations for total score, utility, and interest of websites rank-ordered based on total score by all students.

	All Students		*Males*		*Females*	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*
Kellogg's Nutrition Camp (N=23)						
Total score[a]	39.52[g]	8.59	39.36	10.14	39.78[g]	5.95
Utility[b]	20.09	4.29	19.93	5.36	20.33	2.00
Interestc[c]	19.43	6.03	19.43	5.18	19.44	5.08
Nutrition Café (N=23)						
Total score	39.22	7.40	38.31	6.66	40.40[g]	8.47
Utility	19.43	4.14	18.77	3.90	20.30	4.50
Interest	19.78	3.58	19.54	3.04	20.10	4.33
Fresh Starts (N=17)						
Total score	36.47	6.21	34.33	5.24	37.64	6.61
Utility	17.65	4.53	18.00	2.19	19.24	2.94
Interest	18.82	2.70	16.33	4.59	18.36	4.54
Reeko's Mad Scientist Lab[d] (N=38)						
Total score	35.74	6.99	36.57	5.87	34.71	.823
Utility	18.50	3.47	18.57	3.33	18.41	3.74
Interest	17.24	4.53	18.00	2.95	16.29	5.90
Vita-Men						
Total score	35.28	9.75	34.40	9.05	36.38	11.11
Utility	18.06	4.89	17.60	5.02	18.63	5.01
Interest	17.22	5.46	16.80	4.76	17.75	6.54
Nutrition Explorations (N=22)						
Total score	34.86	13.29	30.08[e]	15.57	41.78[f,g]	3.03
Utility	17.50	6.84	15.08[e]	8.02	21.00[f]	1.80
Interest	17.36	6.67	15.00[e]	7.80	20.78[f]	1.86
Wegmans (N=16)						
Total score	33.50	9.98	33.00	9.35	34.00	11.20
Utility	17.75	4.88	17.88	4.64	17.63	5.42
Interest	15.75	5.64	15.13	5.08	16.38	6.44
Tooned-In School Menu (N=7)						
Total score	32.57	6.48	29.80	5.40	39.50[g]	.71
Utility	15.29	3.04	14.60	3.36	17.00	1.41
Interest	17.29	4.68	15.20[e]	3.56	22.50[f]	2.12
Food 4 Kids (N=19)						
Total score	32.05	12.70	27.64	14.81	38.13	5.30
Utility	17.47	6.70	15.18	8.04	20.63	1.92
Interest	14.58	6.83	12.45	7.78	17.50	4.11
Kids Food Cyber Club (N=21)						
Total score	31.14	12.18	31.08	9.86	31.22	15.41
Utility	15.76	6.74	16.50	5.47	14.78	8.41
Interest	15.38	5.84	14.58	4.76	16.44	7.21

Table 4. (continued)

	All Students		*Males*		*Females*	
Website	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Eat 5 A Day (N=21)						
Total score	29.62	13.15	26.55	15.72	33.00	9.23
Utility	15.29	6.82	12.73	7.89	18.10	4.18
Interest	14.33	6.93	13.82	8.36	14.90	5.32

[a] Out of a possible 48 points
[b,c] Out of a possible 24 points using 4-point Likert-type scale (0 = strongly disagree to 3 = strongly agree)
[d] Science-related site previously rated as "awesome" with use of WebMAC tool
[e,f] Different letters indicate differences significant at $p < .05$
[g] When rounded to the nearest whole number, websites met criterion for being "awesome"

Gender Comparisons

Opinions of male and female students for the total score, utility, and interest of the websites are shown in Table 4. There were scoring variations between male and female students for the websites that were least and most favored for the three categories. Total scores for the websites rated by the male students ranged from 26.55 to 39.36, with Eat 5 A Day as the site that the males favored least and the Kellogg's Nutrition Camp being the preferred site of the male students. The total scores for the female students ranged from 31.22 to 41.78 with Kids Food Cyber Club being the least desired site and Nutrition Explorations being the favorite site.

For the utility of the sites, scores ranged from 12.73 to 19.93 for the male students and 14.78 to 21.00 for the female students (see Table 4). The male students thought that the Kellogg's Nutrition Camp website functioned the best and the Eat 5 A Day site functioned the poorest. Female students, however, felt that the Nutrition Explorations site functioned the best and that Kids Food Cyber Club functioned the poorest. Scores for the interest of the sites ranged from 12.45 to 19.54 for male students and 14.90 to 22.50 for female students. Nutrition Café was the most interesting site for the male

students, whereas they were least interested in the Food 4 Kids website. The female students were most interested in the Tooned-In School Menu site and least interested in the Eat 5 A Day website.

Although there were variations in the scoring of the websites between the male and female students, only two websites demonstrated any significant difference ($p < .05$). For the Nutrition Explorations website, the utility and interest scores, and hence the total score, were significantly higher as rated by the female students than the males. The female students were also significantly more interested in the Tooned-In School Menu site than the male students.

Score Classification

As previously mentioned, to be considered "awesome," a website was required to have a total score of 40 to 48. When the total scores in Table 4 are rounded to the nearest whole number, some of the evaluated websites met this criterion. For all students, only Kellogg's Nutrition Camp (40) was considered "awesome." For the male students, none of the scores reached a total of 40, thus, overall, the male students did not feel that any of the websites were "awesome." Four of the websites could be considered "awesome" as rated by the female students including: Nutrition Explorations (42), Nutrition Café (40), Kellogg's Nutrition Camp (40), and Tooned-In School Menu (40). The ratings for Reeko's Mad Scientist Lab, the website previously rated as "awesome" by other fifth-grade students, did not meet the criterion when rated by the students in this study.

Website Visitation

After the students completed the Likert-type questions regarding the utility and interest of the websites, they were asked if they would like to visit the website again and if the website was one that friends their age would like to visit. The website that the student's would most like to visit again was Nutrition Café (91.3%) and they were least interested in visiting the Kids Food Cyber Club (38.1%) website again (see Table 5). The website the students thought that others their age would most like to visit was Tooned-In School Menu (83.3%), whereas only 33.3% of the students thought that Eat 5 A Day was a website that friends their age would enjoy. A majority of the students (73.7%) also agreed that they as well as friends their age would like to visit the control site, Reeko's Mad Scientist Lab, again.

Predictors of Utility and Interest

Items from the questions in the WebMAC tool that predicted the scores for the utility and interest of the websites evaluated are listed in Table 6. For the utility score, four factors explained a total of 90.3% of the variation. These items include: having "enough desired information," ensuring that all of the "parts work the way that they should," having "clear and simple directions," and "ease of navigation." Four items that predicted 89.5% of the variation for the interest score included: being "interesting or fun," including "enough activities," "colors and backgrounds," and updating the website with "new things to read and do."

Table 5. Students' opinions on site visitation rank-ordered by "Would Visit Site Again."

Website	*Would Visit Site Again (%)*	*Friends Their Age Would Like to Visit (%)*
Nutrition Café (N=23)	91.3	78.3
Kellogg's Nutrition Camp (N=23)	82.6	65.2
Reeko's Mad Scientist Lab[a] (N=38)	73.7	73.7
Nutrition Explorations (N=22)	71.4	66.7
Wegmans (N=16)	68.8	62.5
Tooned-In School Menu (N=7)	66.7	83.3
Vita-Men (N=18)	61.1	50.0
Fresh Starts (N=17)	58.8	47.1
Food 4 Kids (N=19)	57.9	57.9
Eat 5 A Day (N=21)	47.6	33.3
Kids Food Cyber Club (N=21)	38.1	57.1

[a] Science-related site previously rated "awesome" with the use of WebMAC tool.

Table 6. Items predicting levels of utility and interest of websites.

*Dependent Variable**	*Cum R^2*	*R^2 Change*	*B*
Regression Equation 1			
Utility (N=225)			
Enough desired information	.562	--	.308
Parts work the way they should	.754	.192	.353
Clear and simple directions	.848	.094	.303
Ease of navigation	.903	.055	.280
Regression Equation 2			
Interest (N=225)			
Interesting or fun	.621	--	.375
Enough activities	.764	.143	.317
Colors and backgrounds	.842	.078	.278
New things to read and do	.895	.053	.271

*Variables entered at $p<.05$.
Analyzed by stepwise multiple regression

DISCUSSION

The World Wide Web can offer many opportunities for teaching and learning about nutrition.[16,17] However, due to the lack of content regulation, before websites are utilized they need to be properly evaluated. Content evaluation should always be given precedence when evaluating websites, but assessing whether the users are motivated to engage in the websites cannot be ignored. Using the WebMAC tool, levels of utility and interest can be measured to determine the motivational quality of websites.

The results of this study show that there were variations within the total, utility, and interest scores of the websites. The Kellogg's Nutrition Camp site received the highest rating for the total and utility scores, but Nutrition Café was rated the highest for the level of interest. This reveals the importance of attending to both of these factors when either designing a website or when selecting a website to integrate into a lesson plan.

Another finding was that some of the websites met the criterion for being considered "awesome," meaning these sites were "excellent" for both utility and interest. However, the website previously rated as "awesome" by other fifth-grade students, Reeko's Mad Scientist Lab, was not among the "awesome" sites that resulted from this study. One possible explanation for this discrepancy is demographics, although this could not be confirmed because only the school's name, location, and grade level of the students were available for the Reeko's Mad Scientist Lab site. Alternatively, the difference could be attributed to maturity bias. Another potential explanation is that the Reeko's site contains many science experiments which, if carried out, could make the website more fun and exciting. Receiving an "awesome" rating is very important because websites that are motivationally effective will more likely motivate the students to want to visit, stay, and return to the site. This will ultimately optimize the potential for learning with the website.[22]

Other findings from this study revealed that the websites received different total, utility, and interest scores when the data were separated by gender. Two websites were rated significantly higher by females than males. One potential explanation for these differences in gender comes from the results of a focus group session conducted with girls to determine what qualities and characteristics they prefer with computer games.[33] The study showed that girls prefer games that are non-competitive, do not involve earning points, and are not timed.[33] The focus group participants also agreed that they desire games that are challenging and involve problem solving, but do not require "winning" to be successful.[33] The two websites that the female students in this study rated significantly higher, Nutrition Explorations and Tooned-In School Menu, both

contain non-competitive games and activities, such as mazes, word scrambles, matching, and word finds. As for the remaining nine websites evaluated in this study, there were no significant differences in the scores between the male and female students. This finding indicates that both male and female students tended to have the same opinions about the websites and, thus, rated the websites similarly. This finding does not support the research on gender differences with computers that has found significant variations between male and female students' attitudes, level of interest, and performance outcomes with computer usage.[23-25]

Two unusual findings resulted from the question asking the students if they would like to visit the website again. The Tooned-In School Menu website had the highest percentage of students (83.3%) who stated that they would recommend the website to friends their age. However, only 66.7% stated that they would like to return to the website again themselves. Likewise, the Fresh Starts website was ranked third for highest total score by all students. However, only 58.8% of the students reported that they would like to visit the site again. The reason for these differences could be attributed to the primary predicting item for utility resulting from this study, which was having "enough desired information." It is evident that the students who visited these websites enjoyed them because they would either recommend it to their friends or they gave the site a high overall rating. However, it is possible that the websites had some information that the students enjoyed, but not enough information for them to want to return, resulting in low return visit percentages.

Emerging from the data were items that predicted the utility and interest levels and, thus, the motivational quality, of websites. These items can be used when selecting

websites for web-based learning or for aiding with website design. Once the predictors are known, it is important to consider ways in which they can be carried out. Suggested design elements for websites for children along with ideas for implementation are summarized in Table 7.

Items that predict the motivational qualities, utility and interest, of websites can be used when selecting websites for web-based learning or for aiding with website design. For the websites used in this study, the primary item that emerged as a predictor for how well the sites worked, or their utility, was if the sites had enough desired information. This finding can be related to a model developed by Hackbarth, which guides instructors through a five-step process for developing a web-based lesson.[34] During the first phase the educator diagnoses what the students need or "desire" to know and already know. Throughout phase two, the lesson is designed by planning and gathering information. During this critical step, the instructor should ensure that the information gathered is congruent with the findings of the first step and that the amount of information is sufficient to meet the desires of the students. The third and fourth phases include procuring and producing finalized versions of the materials. Finally, the web-based lesson is implemented, evaluated, and revised during the fifth phase. From the evaluation, in the final step the instructor can receive feedback from the students on their level of satisfaction or dissatisfaction with the information received.

Other major contributing factors to the sites' overall utility were having the parts work the way that they should, having clear and simple directions, and the ease of navigation. When using websites, it is important to frequently check all of the

Table 7. Suggested design elements for websites for children and ideas for implementation.

Suggested design elements	*How to implement*
Utility	
Enough desired information	Conduct needs assessment/focus groups to obtain input about type and quantity of information desired.
Parts work the way they should	Review all parts of the website before utilization to ensure that all of the parts are working properly and that all requirements for accessing information from the website are available.
Clear and simple directions	Select or create websites with directions that have succinct and precise wording, short paragraphs and sentences, and minimal verbiage. Bulleted or numbered lists should be used for step-by-step directions.[a]
Ease of navigation	Use or design websites with an overall organized structure, orderly menu design, indexes, table of contents, search functions, and online "help".[b]
Interest	
Interesting or fun	Choose or develop websites that use pictures, graphics, sounds, games, videos, and animation that enhance the quality of the site.[c]
Enough activities	Assess activities to be completed both online and offline to ensure that there are enough age-appropriate activities to sustain the interest of those who frequent the same website or for those who engage in the site for an extended period of time.
Colors and backgrounds	Select or create websites that use basic colors and backgrounds that enhance the aesthetic appearance of the website.
New things to read and do	Use or design websites that are updated with new information and activities at least every four months or as needed.[d]

[a] Kilian C. Writing for the Web. North Vancouver, BC:Self-Counsel Press Inc., 1999.
[b] Wilkinson GL, Bennett LT, Oliver KM. Evaluation criteria and indicators of quality for Internet resources. Educ Technol 1997;37:52-58.
[c] Starr RM. Delivering Instruction on the World Wide Web: overview of and basic design principles. Educ Technol 1997:37;7-14.
[d] School of Nutrition Science and Policy, Tufts University. Nutrition Navigator: a guide to nutrition websites. Accessed on: October 11, 2000. Accessed from: http://navigator.tufts.edu/kids.html.

components, such as games or other activities as well as links, to ensure that they work properly. Also, some websites have some additional requirements, such as frame-capable browsers, special plug-ins, or software such as Adobe Acrobat Reader® to access information from the site. These features should be accessible from the website in which they are required. Before using websites that require these features, it is important to ensure that the programs are installed on the computer(s) that will be used to access the sites.

Directions that are clear and simple will decrease user confusion and frustration and make the website interaction a more pleasant experience. This holds true especially when children are the targeted audience. In his book *Writing for the Web*, Kilian recommends that text, including the directions, should be succinct and precise, paragraphs and sentences should be kept short, and verbiage should be cut to a minimum.[35] Another tip that Kilian suggests is dividing long paragraphs into bullet lists in order to make it easier and quicker for the reader to read the information.[35]

Navigation through the website should be virtually effortless for the user. Websites should contain a path that leads the user to what he or she is searching for quickly and easily. Without clear navigation, users can become lost and frustrated and ultimately leave the website. Elements that can aid with navigation include organizational structure, menu design, indexes, table of contents, search functions, and online "help."[36]

The level of interest of the websites evaluated in this study was namely predicted by how interesting or fun the sites were. This is consistent with the main reason the students stated for using the Internet in the "All About You" qualitative information sheet

used in this study as well as the findings of Cullen et al.[37] If used properly, pictures, graphics, sounds, games, videos, and animation can be integrated into websites to add interaction, fun and excitement.[38]

Enough activities, color and backgrounds, and new things to read and do were additional key predicting factors that determined how interesting or fun the sites were. Both online activities such as games or puzzles and activities that can be completed offline such as recipes and pictures to print and color should be assessed to ensure that there are enough age-appropriate activities to sustain the interest of those who frequent the same website or for those who engage in the site for an extended period of time. However, when assessing the quantity of activities, it is equally important to evaluate the quality and the variety of the activities, as well.

Both colors and backgrounds should be simplistic and should enhance, rather than distract from, the overall aesthetic appearance of the website. Specific preferences for colors and backgrounds can be obtained from the target audience. Cullen et al.,[37] most of the students preferred having a selection of colors and backgrounds from which to choose with the option of changing colors of the screen.

The final factor, having new things to read and do is important for those who frequently visit the same website. If a website is continuously updated to offer new information and activities, the likelihood that the user will want to return is enhanced. Monthly updating of website information is recommended, although updating every four months is acceptable.[29]

IMPLICATIONS FOR RESEARCH AND PRACTICE

Nutrition educators should include motivational qualities when using or designing websites for school-aged children. Results of this study suggest design rules that can assure that motivational qualities are considered. The findings of this study suggest that including enough desired information, ensuring that parts work the way they should, having clear and simple directions, and the ease of navigation are contributors to the utility of websites. The degree of interest of websites can be enhanced by making the website interesting or fun, including enough activities, focusing on the colors and backgrounds, and adding new things to read and do. Teachers, nutrition educators, and web designers should consider these factors when using or designing websites. Incorporating these design rules into the needs assessment, website planning, formative and summative evaluation processes enable incorporation of factors school-aged children find motivating. Websites found to have valid content and a high motivational quality can ultimately be used as powerful tools for providing "awesome" nutrition education on the World Wide Web.

REFERENCES

REFERENCES

1. Kolasa KM, Miller MG. New developments in nutrition education using computer technology. J Nutr Educ, 1996;28:7-14.

2. Korninis M, Korslund MK, Belli G, Donohue JM, Johnson JM. Comparison of calcium and weight loss information in teen-focused versus women's magazines over two 4-year periods (1986-1989 and 1991-1994). J Nutr Educ 1998;30:149-54.

3. Chipman H, Kendall P, Slater M, Auld G. Audience responses to a risk communication message in four media formats. J Nutr Educ 1996;28:133-9.

4. Kolasa KM, Jobe AC, Clay M, Daugherty J. Evaluating the use of a multimedia approach to teaching nutrition in medical school. J Nutr Educ 1997;29:351-5.

5. Shannon B, Thurman G, Schiff W. Foodene: a pilot TV show on nutrition issues. J Nutr Educ 1979;11:15-8.

6. Breault JL, Gould R. Formative evaluation of a video and training manual on feeding children with special needs. J Nutr Educ 1998;30:58-61.

7. James DCS, Rienzo BA, Frazee C. Using focus groups to develop a nutrition education video for high school students. J Sch Health 1997;67:376-9.

8. Steinberg-Nichols LA, Schmidt MK. The impact of video tapes in educating grocery store shoppers about fat and cholesterol. J Nutr Educ 1995;27:5-10.

9. Steeples MW, Millison M. The "Healthy Traditions" cooking show videos: a unique product for communicating nutrition information and skills. J Nutr Educ 1999;31:119C.

10. Lancaster KJ, Smiciklas-Wright H, Ahern F, Achterberg C, Taylor-Davis S. Evaluation of a nutrition newsletter by older adults. J Nutr Educ 1997;29:145-51.

11. Struempler BJ, Marshall AC. Using low-literacy newsletters to provide nutrition education for limited-resource individuals. J Nutr Educ 1999;31:60C.

12. Hosig K, Rodibaugh R. Parent newsletters to strengthen a school-based community nutrition education program in the rural Arkansas delta. J Nutr Educ, 1998;30:340B.

13. Gans KM, Lovell HJ, Fortunet R, Lasater TM. Low-literacy audio intervention for lowering fat intake. J Nutr Educ 1998;30:410B.

14. Contract CH, Goffi J, Dwyer JT. Teens create public service announcement (PSA): high blood pressure prevention. J Nutr Educ 1998;30:232C.

15. Dooley DA, Soll L. Scripting public service announcements for radio. J Nutr Educ 1999;31:235C.

16. Kipp DE. Reflections on teaching graduate students how to use and publish nutrition information on the World Wide Web. J Nutr Educ 1996;28:308-12.

17. Rodriguez JC. Web page and online response activities in an undergraduate nutrition education course. J Nutr Educ 2000;32:119B.

18. Hertzler A, Young VE, Baum CM, Lawson M, Marshall-Penn M. Nutrition and exercise information for children on the Internet. J Fam Consumer Sci 1999;91:100-3.

19. Davidson K. Finding nutrition information on the Net. J Am Diet Assoc 1996;96:749-50.

20. Vozenilek G. The wheat from the chaff: sorting out nutrition information on the Internet. J Am Diet Assoc 1998;98:1270-2.

21. Contento I, Balch GI, Bronner YI, et al. The effectiveness of nutrition education and implications for nutrition education policy, programs, and research: a review of research. Chapter 4: Nutrition education for school-aged children. J Nutr Educ 1995;27:298-311.

22. Arnone MP, Small RV. Evaluating the Motivational Effectiveness of Children's Websites. Educ Technol 1999;39:51-5.

23. Griffin BL, Gillis MK, Brown M. The counselor as a computer consultant: understanding children's attitudes toward computers. Elementary School Guidance & Counseling 1986;20:246-249.

24. Johnson CS, Swoope KF. Boys' and girls' interest in using computers: implications for the classroom. Arithmetic Teacher 1987;35:14-16.

25. Joiner R, Messer D, Littleton K, Light P. Gender, computer experience and computer-based problem solving. Computers Educ 1996;26:179-87.

26. Bohin RM. Computers and gender differences: achieving equity. Computers in the Schools 1993;9:155-167.

27. Keller JM. Strategies for stimulating the motivation to learn. Performance & Instruction 1987;26:1-7.

28. Small RV, Arnone MP. The motivation mining company. Accessed on: March 20, 2001. Accessed from: http://www.motivationmining.com

29. School of Nutrition Science and Policy, Tufts University. Nutrition Navigator: a guide to nutrition websites. Accessed on: October 11, 2000. Accessed from: http://navigator.tufts.edu/kids.html.

30. Arnone MP, Small RV. WWW motivation mining: finding treasures for teaching evaluation skills (Grades 1-6). Worthington, OH:Linworth, 1999.

31. Flesch RD. A new readability yardstick. J Appl Psychol 1948;32:221-33.

32. SPSS/PC+ V 10.0 Base Manual. Chicago, IL: SPSS Inc., 1999.

33. Miller L, Chaika M, Groppe L. Girls' preferences in software design: insights from a focus group. Interpersonal Computing and Technol 1996;4:27-36.

34. Hackbarth S. Integrating web-based learning activities into school curriculums. Educ Technol 1997;37:59-71.

35. Kilian C. Writing for the Web. North Vancouver, BC:Self-Counsel Press Inc., 1999.

36. Wilkinson GL, Bennett LT, Oliver KM. Evaluation criteria and indicators of quality for Internet resources. Educ Technol 1997;37:52-58.

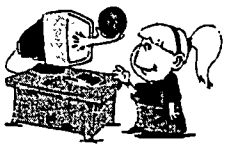
37. Cullen KW, Baranowski T, Baranowski J. Computer software design for children's recording of food intake. J Nutr Educ 1998;30:405-9.

38. Starr RM. Delivering instruction on the World Wide Web: overview of and basic design principles. Educ Technol 1997:37;7-14.

APPENDICES

APPENDIX A: WEBMAC AND "ALL ABOUT YOU" SURVEYS

ORDER____



WebMAC Junior- 2000

(©1999 , Marilyn P. Arnone, PhD & Ruth V. Small, PhD)

Website Address: http://_____

Instructions

Just like the judges who decide the winners in an art or science contest, you are one of the judges for this Web site. After reading each question, circle the face that best describes how you would rate this Web site. Remember that there are no right or wrong answers. First, try the example below.

Example

Did this Web site contain things that you are interested in?

If you circle the sad face ☹, it means that this Web site is really poor in this category. In other words, there is nothing in this Web site that is of interest to you. You give it the lowest score, which is 0 points. If you circle the face with no expression 😐 (just a straight line for the mouth), it means that this Web site is OK, but there's nothing special that interests you. If you circle the face with a small smile ☺, it means that this Web site is not the best, but it is good. If you circle the face with a big smile ☺, it means that this Web site is excellent—definitely one of the best Web sites you have seen when it comes to things that interest you. You give it 3 points, the highest score!

WebMAC Junior—2000

1. Was this an interesting or fun Web site to explore?

0 1 2 3

2. Could you read and understand most of the words that were used?

0 1 2 3

3. Was the information at this Web site believable? (Did it seem to be true?)

0 1 2 3

4. Was it easy to find your way around without getting lost?

0 1 2 3

5. Did the pictures, sounds, or videos make this Web site more interesting?

0 1 2 3

6. Was it easy to find what you needed at this Web site?

0 1 2 3

7. Did this Web site have links to other interesting or useful Web sites?

0 1 2 3

8. Did all the parts of this Web site work the way they should?

0 1 2 3

9. Were there lots of activities to do at this Web site?

0 1 2 3

10. Were the directions for using this Web site simple and clear?

0 1 2 3

11. Do you think this Web site sometimes adds new things to read about and do?

0 1 2 3

12. Did things like pictures, games, or videos *quickly* come up on the screen?

0 1 2 3

13. Did you like the colors and backgrounds used at this Web site?

0 1 2 3

14. Did you find enough of what you were looking for at this Web site?

0 1 2 3

15. Was what you found at this Web site useful to you?

0 1 2 3

16. Were there ways of getting help if you needed it at this Web site?

0 1 2 3

Would you like to visit this Web site again sometime? (✔) YES NO

Is this a Web site that friends your age would like to visit? YES NO

What did you like best about this Web site? Write in the space below.

_____

_____

What would make this Web site better? Write your ideas below.

_____

_____

All About You!

Please fill in the circle next to your answer

Grade
- o 4th
- o 5th

Gender
- o Male
- o Female

Age (years old)
- o 8
- o 9
- o 10
- o 11
- o 12

Race
- o African American
- o American Indian
- o Asian
- o Caucasian
- o Hispanic

Do you have a computer at home?
- o Yes
- o No

Do you have the Internet on your computer at home?
- o Yes
- o No

How often do you use the Internet?
- o Never or Seldom (less than 1 time a week)
- o Sometimes (1-3 times a week)
- o Often (at least 4-6 days a week)
- o Always (every day)

Why do you use the Internet?
- o Homework
- o Play games
- o E-mail
- o Chat
- o Surf
- o Other_____

Do you like using the Internet?
- o Yes
- o No

Do you believe that everything that you find on the Internet is true?
- o Yes
- o No

What is your favorite website?

_____

Why is this your favorite website?

_____

_____

What do you like ***most*** about using the Internet?

_____

_____

What do you like the ***least*** about using the Internet?

_____

_____

THANK YOU!

APPENDIX B: PARENTAL CONSENT FORM

INFORMED CONSENT STATEMENT
The Motivational Quality of Nutrition-Related Websites for Children

INTRODUCTION

Select students who attend Sarah Moore Greene Technology Academy are invited to participate in a research study. The purpose of this research is to determine the motivational quality of nutrition-related websites for children.

INFORMATION ABOUT PARTICIPANTS' INVOLVEMENT IN THE STUDY

For two days during the month of May, approximately 40 participants will complete evaluations of websites to see if they enjoy using the sites. The sites will be nutrition-related and will be approved for appropriateness by the school's filtering system. The process involves the participants viewing the sites and then critiquing each with a written evaluation form. Each participants will be involved in the sessions for approximately two to three hours each day, or a total of four to six hours for the duration of the study. The students will be supervised at all times throughout the study.

RISKS

This study involves no greater than minimal risk to the participants. The research involves normal educational practices.

BENEFITS

The results of this study will teach the participants the skill of website evaluation and will also help the researchers to understand qualities and characteristics that are liked/disliked about nutrition websites designed for children.

CONFIDENTIALITY

Participants' names will <u>not</u> be used on the evaluation form and all information will be confidential and stored in a locked filing cabinet in Dr. Paula Zemel's office in 369 HPER Building at The University of Tennessee. No one other than the researchers will have access to any information. No reference will be made in oral or written reports that could link participants to the study.

CONTCT INFORMATION

If you have any questions at any time about the study or the procedures, you may contact the researcher, Heidi Stimmel, at 229 Jessie Harris Building, (865) 974-5445. If you have questions about your or your child's rights as a participant, contact the Research Compliance Services Section of the Office of Research at (865) 974-3466.

PARTICIPATION

Your consent as well as your child's decision to participate is voluntary, and you may decline to participate without penalty. If your child participates in the study, he/she may withdraw at anytime without penalty. If your child is withdrawn from the study before data collection is completed, the data will be returned to him/her or destroyed.

CONSENT

I have read the above information. I have received a copy of this form. I agree to allow my child to participate in this study.

Child's Name (First, MI, Last) (please print) _____

Parent or Guardian Signature_____Date_____

Investigator Signature _____Date_____

APPENDIX C: DIALOGUE GUIDE AND VERBAL ASSENT FORM

Verbal Assent Dialogue Guide

(To be read by the researcher or research assistant to each student whose parent has consented to his/her participation in the study)

Today we will be doing a research project with your class and tomorrow with two other classes. The project will take about three hours.

We are working on a project to see what students think about different nutrition-related websites. To do this, we will need students to "judge" some websites that we have chosen.

If you decide to participate, you will be given a packet of forms that will ask questions about websites. You will look at an assigned website and judge the site using the form. Your name will not be on the form, so no one will know that it is your form.

After everyone is done judging the websites, we will use them to see what was liked/disliked about each site.

Do you understand everything I have said so far? (If yes, proceed; if not, explain again and ask the child for any questions).

If you do not want to be a part of this project, you do not have to. This project has nothing to do with your grade in Mrs./Ms. (Padgett, Odom, Pelton) class, and if you decide not to participate, it is okay.

Do you understand that you do not have to participate, and that it is your choice? (If yes, proceed; if no, explain again and ask the child for any questions.)

Do you have any questions?

I will now ask you to tell me whether or not you want to participate in the study. (Note child's answer on child's verbal assent form)

Verbal Assent Form

(To be completed ONLY after parent has completed parental consent form)

Child's Name: _____

Was verbal assent freely given? Yes_____ No_____

Investigator Signature_____Date_____

Witness Signature _____Date_____

APPENDIX D: ABBREVIATIONS

ABBREVIATIONS

ARCS	Attention, Relevance, Confidence, Satisfaction
E-Mail	electronic mail
SARCS	Staff development, Curriculum, Attention, Relevance, Confidence, Satisfaction
WebMAC	Website Motivational Analysis Checklist
WWW	World Wide Web

APPENDIX E: EXPANDED METHODOLOGY

EXPANDED METHODOLOGY

Subjects and Research Design

This study used an analytic design to identify the motivational quality of nutrition-related websites for children. Both fourth- and fifth-grade students enrolled in a magnet program at a local elementary school were selected to participate in the study. The selected elementary school is an inner-city school with a magnet program for technology. The school attracts students from throughout the city to participate in its advanced technological opportunities. This school was selected as the site for the project because each student could have his or her own computer due to the ample availability of computers for the students and because the students enrolled in the magnet program had previous experience with using the Internet.

The total duration of the project was two days. On the first day, the fourth-grade students completed their evaluations and on the second day, the fifth-graders evaluated their sites. Ideally, the evaluations would have been divided over the two-day period for all three classes, with each class evaluating three sites on the first day and three on the next. However, due to other schedule conflicts, each class had one day to complete its evaluations.

Project Organization

Eleven sites were selected for the evaluation. One science-related site that had been rated "awesome" from previous testing with the Web Site Investigator, the short, 12-question evaluation tool within the WebMAC series, was chosen to test the tool's

reliability. The website was rated by fifth-grade students, nominated, and subsequently chosen to be posted in the "AWArds" section on the WebMAC website.[1] The remaining ten sites were selected from the *Tufts University Nutrition Navigator,* an online reference from the Tufts University School of Nutrition Science and Policy.[2] Websites are evaluated by the Tufts University Nutrition Navigator Advisory Board, a panel comprised of nutrition experts, according to their content and usability. Websites are grouped into rating categories ranging from "Not Recommended" (fewer than 13 points) to "Among the Best" (22-25 points). The results and other descriptive information about the reviewed sites are posted on the *Tufts University Nutrition Navigator* website.[2] For this study, only sites that had a rating of at least 17 ("Better than Most") on or by May 8, 2001 and also had "kids" listed as the intended aucience were considered. From the sites fitting these criteria, the technology consultant at the data collection setting for this project selected the eleven most age-appropriate sites for the evaluation, ten to used for the evaluation and one as an alternate site.

The evaluation form chosen for the project was the *WebMAC Junior- 2000,* a tool within the Website Motivational Analysis Checklist (WebMAC) series.[2] The tool contains 16 questions based on a four-point Likert-type scale (0 = strongly disagree to 3 = strongly agree) with each number matched to a complementary hedonic scale. The eight even-numbered questions within the tool relate to the utility, or how well the website works, whereas the eight odd-numbered questions relate to the level of interest of the website. The website can have individual utility and interest scores ranging from "poor" (score of 0 to 5) to "excellent" (score of 20 to 24). When the two scores of a website with "excellent" utility and interest are combined (total score of 40 to 48), then the site is

considered "awesome". The more comprehensive WebMAC Junior- Long Form was previously suggested for use. However, due to the length of the tool and the time constraints of the project, it was subsequently substituted with the abbreviated version.

Packets were assembled containing six WebMAC evaluation forms, five for the different nutrition-related websites and the one for the "awesome" site. On the cover of each of the evaluation forms was a sticker with the name of the website as well as the website address. For websites with multiple sections, the web address on the packet directed the student to the specific section of the website that was to be reviewed. All of the evaluations in the packets were given a randomized assignment so that no packet contained the same order of evaluations. Each packet was also assigned a numbered according to its randomized order, which also served as the student identification number. In order to obtain background information, each packet also contained an "All About You" (Appendix A) sheet that inquired about the demographics and computer and Internet use for each child. The questionnaire contained 13 questions: five multiple-choice, four Yes/No, and four open-ended. According to the Flesch-Kincaid Grade Level test, the questionnaire was written at the fourth-grade reading level.

Website Evaluation

Prior to data collection, all procedures were approved by the Institutional Review Board at The University of Tennessee Office of Research. Data were collected from three classes of fourth- and fifth-grade students in the elementary school whose parents had provided written consent. The principal investigator gave an introduction to the students by providing a brief overview of the project and then read the verbal assent

form. After all students had voluntarily given their verbal assent to participate in the project, each student was assigned a packet of six WebMAC evaluation forms. The students' names were recorded on a sheet along with the identification number listed on the packet. Each student was then assigned to his or her own computer. Students who did not give verbal assent were given an assignment by the classroom teacher unrelated to the research project.

Before beginning with the evaluation, the students were asked to complete their "All About You" information sheet. When completed, students were then given permission to begin their evaluation. The students were allotted two hours to complete all six evaluation forms. Students were allowed to work at their own pace, however the first evaluation in each class was timed for 20 minutes in order to provide a reference for how much time it should take to interact and explore one website and complete the evaluation form. First, the students connected to the Internet, typed in the website address and then verified the title of the website with the title on the evaluation form. Technical assistance was available to students who had problems connecting to the Internet or accessing a site. One of the original sites was not accessible from the computers because it was sorted out by the school's Internet filtering system. This site was replaced with an alternate site, which was also approved by the technology consultant. Most of the students assigned this site were given an alternate site to evaluate. Next, the students interacted with the site and then, based on a Likert-type scale, assigned numerical ratings to each question listed on the WebMAC tool for that particular website. The students were allowed to answer the questions to the evaluation as they wished, either while exploring and interacting with the website or afterward. The

teachers gave the students an assignment to complete once they had completed all of their evaluation forms.

REFERENCES

1. Small RV, Arnone MP. The motivation mining company. Accessed on: March 20, 2001. Accessed from: http://www.motivationmining.com

2. School of Nutrition Science and Policy, Tufts University. Nutrition Navigator: a guide to nutrition websites. Accessed on: October 11, 2000. Accessed from: http://navigator.tufts.edu/kids.html.

3. Arnone MP, Small RV. WWW motivation mining: finding treasures for teaching evaluation skills (Grades 1-6). Worthington, OH:Linworth, 1999.

VITA

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