The effects of online syllabus interactivity on students’ perception of the course and instructor

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Received 29 October 2002; accepted 22 November 2002

Abstract

Online educational materials differ widely in the degree to which they feature interactivity between system and users. A three-condition, between participants controlled experiment (n=49) was designed to examine whether the level of interactivity in an online syllabus influences students’ first impressions of the course and instructor. Participants viewed identical syllabi, differing only in the number and relationship of hyperlinks. The independent variable, interactivity, was manipulated to have three ordinal levels: a website with no links (low interactivity), a website with three linearly sequenced links (medium interactivity), and a website with three links, each hierarchically related to three further links (high interactivity). Following exposure, subjects completed a paper and pencil questionnaire to assess their impressions. Participants in the linear sequenced conditions (low and medium interactivity collapsed into the “some” interactivity condition) showed more positive perceptions of the instructor compared to participants in the “high” interactivity condition. Future work and theoretical implications for the operationalization of interactivity as well as practical implications for distance education content design are discussed.

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Keywords: Online educational material; Online syllabus; Interactivity; Hyperlinks

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PII: S1096-7516(02)00163-X
1. Introduction

The claims made for the Internet and online materials have attracted the attention of universities and educators around the world. The Internet, of course, is intimately linked to universities, which have served both as a point of origin and a source of innovation. Yet, the Internet is, in turn, restructuring education to such a degree that magazine surveys utilize “most wired” rankings to guide the prospective selection of schools. The current use of technological enhancements of educational practices includes posting reading materials, posting class lecture notes, bulletin boards, chat rooms, and specialized software such as WebCT, the use of search engines, exam tutorials, email, instructor and course web pages, and course syllabi.

Perhaps, the most striking element of this list is the nature of the content: it is predominantly text-based. This is not surprising to anyone who has studied or considered the question. Not only is most computer and Internet content currently textual, university education is very much about reading texts. Whether or not the textual predisposition is one fostered by traditional instructional practices, or whether the textual medium has inherent advantages in terms of managing cognitive complexity remains an open question. It may be the case that the textual “hegemony” will one day explode into multiple and multimediated intelligence. Yet typographical man, as McLuhan puts it, is not quite dead yet, and one should be wary of sacrificing present student needs for future promises.

On the other hand, are we sacrificing current student potentials out of traditional prejudices? Such might be the argument of those proponents of “dimensional shifts” in literacy, reasoning, and learning, who proclaim a broad transition from broadcast learning to “interactive learning” (Brown, 2000; Tapscott, 1998). In this paper, the authors present first a review of the relevant literature, explore the current research and theory in these fields, and propose a research question and hypotheses. The authors then describe the methods and results of an experiment designed to investigate those questions. Finally, the authors discuss the findings, point out implications, and suggest future avenues of investigation.

2. Literature review

2.1. Interactivity

Interactivity, along with digitization and convergence, is one of the three magic words of the communication revolution. Whereas digitization refers to the computer readable code (1s and 0s), which makes it all possible, and convergence is the coming together of mass media images and texts, computer data, and voice-telephony, interactivity is the undefined potentiality thought to be both inherent to the technology itself and expressive of the general drift of the times. There comes a point, however, at which potentialities are realized or lost, and it is difficult to tell whether the current plethora of definitions for interactivity indicates a wealth of opportunity or the dispersion of possibility.

Even a cursory review of the literature yields a multiplicity of definitions and distinctions. These might be categorized most profitably in the four categories below.
2.1.1. Subjective perception (media users-based) vs. objective determinants (media-based) of interactivity

Following the time-honored distinction in communication research, one can differentiate between the attitudinal or subjective perception of interactivity (Vorderer, 2000) and the objective, technological features of a medium (Brody, 1990; Durlak, 1987; Phillips, 1997). Downes and McMillan (2000), in their review and research into experts’ definitions of interactivity, suggest two continua based on this distinction: for the subjective participant continuum, they suggest dimensions of control, responsiveness and perceived goals; for the message continuum, dimensions of direction, time, and place. According to Downes and McMillan (p. 175), “scales should be developed to measure each dimension and the relationship of each to the global concept of interactivity.”

2.1.2. Medium-specific dimensions

Another method of parsing out the various definitions or applications of interactivity is in accordance with the privileged medium of communication. Although convergence promises to render these indistinguishable as characteristics of distinct media, one can isolate meanings of interactivity biased toward:

- Speech and face-to-face interaction (Williams, Rice, & Rogers, 1988; for a criticism of this, see Jones, 1998; Rafaeli, 1988).
- Visuals and video (Bezjian-Avery, Calder, & Iacobucci, 1998).
- Data/information retrieval (Ha & James, 1998).

2.1.3. User control definitions

Most definitions of interactivity insist on feedback and user control capabilities (Heeter, 1989; Steuer, 1995). Degrees in the capacity for selection and modification of content can serve as the criteria for characterizing interactivity as reactive, coactive, and proactive/responsive (Rafaeli & Sudweeks, 1997; Goertz, 1995, cited in Zillmann & Vorderer, 2000; Rhodes & Azbell, 1985).

2.1.4. Sequencing and navigational definitions of interactivity

Perhaps the most promising conceptualizations concentrate on variations in the sequencing and linking of content. One might note this of Rafaeli’s evolving definition of interactivity, in the conceptual shift in focus from message “transmission” to message “sequencing” and association (Rafaeli, 1988; Rafaeli & Sudweeks, 1997). In this vein, one can concentrate on variations in sequencing: hierarchical sequencing, linear sequencing, and fragmented sequencing. Whereas the first two definitions refer to goal directed navigational activities, fragmented or nonlinear sequencing is nongoal-oriented, or more colloquially, surfing. Mahood, Kalyanaraman, and Sundar (2000) distinguish these as comprehensive and general navigation. The crucial aspect to the distinction between types of sequencing is the specification of the association, or what Rafaeli and Sudweeks (1997) term relatedness, between links (i.e., temporal, partial, order, causal, conditional, equivalent).
2.2. Web technology as an educational tool

Interactivity in learning is a necessary and fundamental mechanism for knowledge acquisition and the development of both cognitive and physical skills (Barker, 1994 as cited in Sims, 1996). Although there are empirical studies on what kinds of items in syllabi students perceive to be important (Becker & Calhoon, 1999), how often they refer to the syllabus, and how much information they can remember from the course syllabus (Smith & Razzouk, 1993), there is little research about how students use an online syllabus and what function an online syllabus might serve as opposed to printed versions. How might the use of an online syllabus enhance the interaction between a teacher and students, or among students outside class? In this context, it is timely and appropriate to study how students perceive differences in the interactive navigational structures of online course syllabi.

Perhaps the most enthusiastic conceptualizations of interactivity, although related purely in anecdotal terms, are those of John Seely Brown, a scientist for Xerox. Brown (2000) relates successes in interactive learning utilizing two-way radios (p. 16), a web-based “tech rep” opinion journal (p. 17), videotaped instructional lectures (p. 17), and the digital enhancement of weekly forums which represent a limit case for the digital convergence of various interactive media (p. 18). In this last case, digital video of weekly meetings is stored on a media server with time-stamps of any interaction cues, such as laughing, clapping, slide changes, etc. Audience members are encouraged to take notes in digital format, which are also time-stamped and cross-indexed into the video stream. In this fashion, the audience quite literally alters the content of a presentation and can provide digital markers not unlike the functioning of hypertext.

The point of an online syllabus is to facilitate navigational abilities and literacy. The unspoken but obvious point of Brown’s examples is that asynchrony and repetition allow for the potential fostering of a more shared and reflective relationship vis-à-vis users and content. Nonetheless, it is equally obvious there is an attendant rise in the complexity of conceptualizing the interactivity of such a process. In many ways, the entire process is one based on the model of hyperlinking navigation; therefore, it may be useful to carry out research in the most simple and basic instance from which this model is drawn: simple text-based hyperlinks.

Although there is a well-established bias to conceptualize new communication technologies on the model of dialogue or conversation (Williams, Rice, & Rogers, 1988) or to privilege a social constructionist or phenomenological paradigm (Downes & McMillan, 2000), the most promising work follows a more structural and text-based operationalization. In fact, if there is a single interactive dimension unique to computer-based communication, it is hyperlinks, for which there is no correlate in dialogue or traditional mass media.

Sundar (Sundar, 2000) and his associates (Sundar, Hesser, Kalyanaraman, & Brown, 1998; Sundar, Kalyanaraman, & Brown, 2003; Mahood et al., 2000) have carried out several experiments investigating the relationship of interactivity in different contexts (political impression formation, online pornographic content, etc.) and enjoyed some success in
pursuing a hyperlink operationalization of interactivity. Their research provides the foundations for our current research question and hypotheses:

- **RQ:** For users of an online syllabus, controlling for content, what is the relationship between the degree of interactivity of the site and students perceptions of syllabus content and the instructor?
- **H1:** Participants in the highest interactive condition (more internal links and hierarchical structure) will rate a higher interactivity score than those in the low and medium interactivity conditions.
- **H2:** Participants in the medium interactive condition will have a more positive perception of the syllabus.
- **H3:** Participants in the medium interactive condition will have a more positive perception of the instructor.

3. Method

A total of 49 participants in a between-subjects experiment read one of three versions of a course syllabus posted on the web. All the three syllabi had the same content, only being at variance in the degree of interactivity appeared on the site. After reading the syllabus, participants filled out a paper-and-pencil questionnaire on which they rated their perception of syllabus content on the site, their first impression of the instructor, and their interest in taking the course either in traditional class format or online.

3.1. Participants

Forty-nine undergraduate students at an East Coast state university participated in the research for extra course credit. The sample was one of convenience, being constituted from three communication courses and one Science, Technology, and Society (STS) course. All participants signed an informed consent form before their participation in the experiment, and then randomly assigned to one of the three experimental conditions. The number of participants for each experimental condition ranged from 14 to 18.

3.2. Stimulus material

The online syllabus used in the experiment was constructed from an existing course syllabus, “Law of Mass Communication.” The experimenters changed the instructor’s name,
telephone number, office hours, office location, and e-mail address to avoid participants’ previous knowledge of the instructor.

Because this study focuses on a text-based operationalization of interactivity, sequencing of the content in different hierarchical structures was the key feature of interactivity in the study. Accordingly, the degree of interactivity on the syllabus was manipulated by increasing the number of navigable internal links.

As can be seen in Fig. 1, for the low interactivity syllabus, all the content was put into one page with a scroll down bar. For medium interactivity, the content was divided into three categories (Introduction, Class Materials and Schedule, and Evaluation and Policy) with the list of internal links for these three categories in the main page.

Each of the three categories was further divided into three subitems (see Fig. 1) to build a high interactivity site. Both medium and high interactivity sites had navigable internal links so that subjects could randomly access the specific parts of the syllabus. No graphics, external links, bulletin board, and e-mail feedback were included in the sites.

### 3.3. Procedure

The participants from four undergraduate classes used in the study were randomly assigned to one of three experimental conditions. The entire experiment for each participant lasted from 25 to 40 min. Upon entering the computer lab, participants were given a brief explanation of the purpose of the research. Participants were told that the researchers were working on the development of a new communication curriculum. In addition, participants were instructed not to browse through any other websites. Before reading the web page, demographical data, and participants’ previous communications, course and online syllabus experiences were collected and measured via a paper-and-pencil prequestionnaire. Researchers collected the prequestionnaire and instructed participants to begin. There was no time limit to read the syllabus. Researchers unobtrusively measured the amount of time spent on reading the material. When the reading ended, the researchers handed out the postquestionnaire.
naire. Address bars on the web browsers were hidden, and monitors turned off as the postquestionnaire was handed out.

3.4. Dependent measures and index construction

Dependent variables were measured using nine-point Likert scales in which 1 represents not at all and 9 represents very much. Variables were grouped according to participants’ impression of the syllabus and instructor. This data was analyzed using principal components factor analysis with varimax rotation yielding two factors in each case. The number of factors was determined by the number of components with eigenvalues greater than or equal to one.

The first factor was deemed to measure perceived quality of syllabus content. “Syllabus quality” comprising perception of interactivity, informativeness, and usefulness accounted for 44% of the variance (eigenvalue=2.64, Cronbach’s $\alpha=.48$). The second factor was deemed to measure syllabus relevance. “Syllabus relevance” comprising interest and importance accounted for 17% of the variance (eigenvalue=1.00, Pearson’s $r=.51$).

The third factor measured participants’ positive impression of the instructor. “Positive impression” comprising fair, lively, likable, intelligent, enjoyable, informative accounted for 38% of the variance (eigenvalue=3.79, Cronbach’s $\alpha=.84$). The fourth factor measured participants’ negative impression of the instructor. “Negative impression” comprising biased and boring accounted for 16% of the variance (eigenvalue=1.63, Pearson’s $r=.38$).

In summary, four indices (syllabus quality, syllabus relevance, positive impression of the instructor, and negative impression of the instructor) were created for use as dependent variables in the research.

3.5. Data analysis

The data analysis of perceived interactivity found no significant difference between the low and medium conditions. However, there were significant differences between the high condition and each of these levels. Therefore, the medium and low conditions were combined into one group labeled “some” interactivity ($n=32$). In sum, the independent variable of interactivity was measured on two ordinal levels, while all seven dependent variables consisting of four indices (syllabus quality, syllabus relevance, positive impression of instructor, and negative impression of instructor), and three items (perception of interactivity, course enrollment interest, and online course enrollment interest) were measured on ratio scales.

Finally, $t$-tests were performed to assess the effects of online syllabus interactivity on participants’ perception of the syllabus, the instructor, and interest in taking the course.

4. Results

The means between high and some interactivity conditions for perceived ratings of interactivity are shown in Table 1. Participants in the high interactivity condition (more internal
links and hierarchical content structure) perceived the syllabus as more interactive than those in the same interactivity condition. Therefore, research hypothesis one is supported which also provided the manipulation check for our stimulus. As can be seen in Table 1, there was a significant difference ($p=.026$) in perceived interactivity between the high interactivity condition and some interactivity condition.

The study also found some interactivity is positively correlated to students’ positive perception of the instructor, whereas high interactivity is positively correlated to students’ positive perception of the syllabus quality. Participants who read the high interactivity syllabus found it of higher quality than those who read the some interactivity syllabus. However, there was no significant relationship between the degree of interactivity and the perception of syllabus relevance. In the positive impression of instructor index, a higher mean indicates subjects perceived the instructor more positively. Consistent with the second hypothesis, which states that lower interactivity will provide a more positive impression of the instructor, participants in the some interactivity condition rated their first impressions of the instructor significantly more positive. The mean scores for the negative impression of instructor index, in which a higher score represents a more negative impression of the instructor, also confirm this finding.

There was no significant difference in time spent across stimulus conditions ($M=6.5$ min). There was no significant difference between participants with previous online syllabus or communication course experience. In addition, there were no significant gender and age differences in ratings of interactivity, perceptions of the content and instructor, and course enrollment interest.

5. Discussion

In this study, the authors investigated the effects of online syllabus interactivity on students’ impression of the course syllabus and instructor. Interactivity was operationalized purely through the presence of hypertext links. As can be seen from Table 2, a significant effect for interactivity was obtained on the “positive impression of instructor” and “negative impression of instructor” indices for the “some” and “high” conditions, respectively. Participants exposed to the higher level of interactivity (increased links and navigational options) formed a negative first impression of the instructor, whereas subjects in the “some” condition (zero or limited links) formed a positive first impression of the instructor. The instrument for memory of syllabus content was deemed ineffective.

<table>
<thead>
<tr>
<th></th>
<th>High ($n=16$)</th>
<th>Some (low+medium) ($n=32$)</th>
<th>$t$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$M$</td>
<td>6.75</td>
<td>5.38</td>
<td>2.293</td>
</tr>
<tr>
<td>S.D.</td>
<td>1.06</td>
<td>2.27</td>
<td></td>
</tr>
</tbody>
</table>

Significance is based on a one-tailed test: $df=46$, $P<.05$. 

![Table 1](image-url)

D. Grigorovici et al. / Internet and Higher Education 6 (2003) 41–52
It may be argued that the relatedness or association of the hyperlinks is an important factor, in addition to concerns about the amount of interactivity. Previous studies suggested that too much interactivity, particularly in the form of multimedia presentations, could lead to diminishing returns or negative responses. Rationales for this often hint at various theories of overtaxed cognitive activity (Eveland & Dunwoody, 2000). Too much interactivity is not necessarily a positive thing, as this is most likely a function of the specific task type that users pursue. However, our operationalization was purely text-based, which is generally acknowledged as the least cognitively straining medium. Sundar et al. (1998), in an operationalization we built upon for this experiment, found nonapathetic subjects had less affinity for candidates in a higher interactive website, which led us to hypothesize for a similar finding. However, it might be argued that all university students could be considered “nonapathetic” about education, since they are engaged with academic institutions in a manner unlike the relationship of apathetic citizens to political institutions.

In the “some” condition of interactivity, not only are there less hyperlinks and navigational options, but it might be argued that the relatedness or association of the included hyperlinks are qualitatively different from those in the “high” condition. Perhaps, in linear or fragmented sequencing, more links simply translate into greater selectivity and choice (which may or may not facilitate cognitive overload), yet in a hierarchical structure, the possible choices (hyperlinks) are constrained by a “logical” (obvious or efficient relation of units) or “partial” (higher level unit is composed of several lower level units) association of links. Such a contradictory message (higher selectivity yet more constrained choice) might help account for students’ negative first impression of the instructor combined with their positive impression of syllabus quality, which was found in the high interactivity condition.

5.1. Implications

As the cliché goes, one never gets another chance to make a first impression. The relevance of student dispositions in forming first impressions upon actually meeting a course instructor exceeds the reach of this study, yet instructors should be aware of these findings in posting

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>Some</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Syllabus</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td>23.3</td>
<td>21.7</td>
<td>1.841*</td>
</tr>
<tr>
<td>Relevance</td>
<td>14.5</td>
<td>14.7</td>
<td>0.347</td>
</tr>
</tbody>
</table>

| **Instructor** |               |              |         |
| Positive impression | 38.0          | 41.6         | 1.958*  |
| Negative impression | 9.25          | 7.68         | 1.714*  |

Significance is based on a one-tailed test: df=46.

* P<.10.
on-line syllabi. Our findings may be particularly applicable to distance learning and courses taken entirely on-line, where impressions about instructors are likely to be much more arbitrary or fickle (or at least not based on interpersonal interaction), given the lack of non-verbal cues associated with computer Mediated Communication.

There is also the first impression of the course as a whole, which may be created by a course syllabus. Behnke and Miller (1989) suggest a well-structured course syllabus helps teachers and students to establish mutually agreed expectations for the rest of the course, to improve instructional effectiveness, and to increase students’ involvement and interest. This once again raises the issue of the function of course syllabi. Are they to facilitate class coordination and educational goals, positive impressions of the instructor, or, as may be the case in a world of distance and online education, the “selling” of courses for enrollment?

An analogous situation to which our findings could be applicable is the online posting of resumes on services such as monster.com. There are obvious differences in the situation and intended audience, yet the structural similarities are suggestive.

5.2. Limitations and suggestions

Obviously, the external validity limitations of a highly controlled lab experiment do not allow the extension of these findings to non-educational contents or college students as a whole. The effects may be content-specific to education and learning endeavors to be distinguished from advertising and campaigning, entertainment, and news, with their respective functions of persuasion, enjoyment, and information. Particular course contents (i.e., materials engineering vs. communication law) might also produce different findings. Further, the syllabus may not be representative of current online course syllabi in terms of formal interactive characteristics (e-mail, external links, bulletin board, etc.); it certainly is not representative of the possibilities of online course syllabi.3

A severe limitation of this research concerns the absence of a highly valid instrument to measure participants’ content recall. We found no significant difference for content recall across conditions and although this is consistent with previous research findings, it is apparent the questions used to measure recall might have been too simplistic.

It may be useful in future research to differentiate participants according to specific cognitive orientations. For example, Bezjian-Avery et al. (1998) distinguish between a visual and verbal orientation to interactivity. This is also relevant to the further conceptualization regarding the association of hyperlinks. Preference for hierarchical, linear, or fragmented sequencing may be related to personality characteristics (i.e., dominant vs. passive) and theories such as “affinity–similarity” theory may be useful.

Future work may want to focus on the differential conceptualization of the association between hyperlinks, in addition to investigating the proper amount of links requisite to useful interactive materials. Although we derived this idea from studies of how knowledge is

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3 The main author is currently pursuing studies using highly interactive 3D syllabus web sites to test for cognitive effects.
structured for instructional purposes (Chen, 1995), a literature review oriented to this problem may turn up previous work. No doubt future research will need to account for extra textual multimedia interactivity, yet if our claim is correct, further advances should conceptualize interactivity on a hypertext model of sequence association.

Acknowledgements

This paper is dedicated to all graduate students in Research Methods as living proof that their methodology endeavors are worth all their effort. The authors wish to acknowledge all their gratitude and many thanks to Prof. S. S. Sundar and S. Kalyanaraman, for their invaluable support during all the stages of this research.

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the annual conference of the Association for Education in Journalism and Mass Communications (AEJMC), August, Phoenix, AZ.


