STUDENTS' MEDIA PREFERENCES IN ONLINE LEARNING

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ABSTRACT

This study examined students' preferred media in online learning and its relationship with learner characteristics and online technology self-efficacy. One hundred six college students in a mid-size U.S. university responded to a survey. The frequency analysis showed that students did not necessarily favor rich media over lean media in online learning. They preferred recorded online slide presentations with audio to Internet-based live video lectures in two-way video and audio interactions. Online discussion boards and chat groups were less favored than other types of media. As expected, online technology self-efficacy was correlated with a type of media requiring a relatively higher level of technology skills. The paper presents the results and discusses their implications of the study.

Keywords: Media preferences, online technology self-efficacy, online interaction, higher education.

INTRODUCTION

The current advancements in technology allow us to integrate a variety of media into online courses. However, media can either limit or promote students' interactions (Thoms & Eryilmaz, 2014), and the use of inappropriate or ineffective media impedes the delivery of the course content. Therefore, selecting the right media is key to successful online learning. When instructors design online courses, they should consider students' media usage patterns and preferences.

Past studies have identified media-richness as one of the influential factors for people's media preferences. The theory suggests that people choose specific media according to levels of uncertainty and equivocality of information (Daft & Lengel, 1984, 1986; Daft, Lengel & Trevino, 1987). Uncertainty is related to the quantity of information, which can be reduced by providing additional information, whereas equivocality addresses the complexity or ambiguity of information itself. According to the theory, two types of media exist: rich and lean media. Rich media transmit information through multiple channels, such as audio and visual, and they may be appropriate for discussing complicated or personal matters. On the other hand, lean media deliver information through limited channels, such as text only; therefore, they may be useful for casual conversation or information exchange. The theory suggests that richer media are generally synchronous media that can afford immediate feedback, verbal and nonverbal communication cues, a sense of personalized communication, and natural language (Capsi & Gorsky, 2005).

In the online learning context, students must rely on technology to obtain course materials and communicate with instructors and peers; therefore, their media preferences may be different from those in regular classroom settings. Capsi and Gorsky (2005) maintained that media choice in distance education is not merely determined by the level of media richness. Their study identified individuals' technology skills and social influence (e.g. group norms and peer pressures) as significant factors that affect media preferences. Similarly, Lightfoot (2009) added new dimensions to the media-richness theory and revealed that students' media preferences vary depending on gender, level of technology comfort, and the person with whom they are communicating.

Zhao, Alexander, Perreault, Waldman, and Truell (2009) found that faculty's media preferences in distance education are different from those of students. In their study, both faculty and students preferred online lecture notes and assignments the most. However, in video conferencing formats, significant differences emerged. Faculty preferred TV-based two-way live lectures, whereas students preferred Internet-based two-way live video and audio lectures. Nowadays, the use of online videos is becoming increasingly popular in distance education, and some faculty members also record their lectures and upload them on course websites. In a recent study, Sadik (2015) compared different types of online videos and found that students perceive screencasting recordings to be more useful than lecture capture recordings.

Furthermore, Morris (2013) found that online students prefer to use technology for learner-content interaction more than for learner-learner interaction, and that both faculty and students perceived online discussion forums as the least important media. Consistent with Morris's findings, Kaiser's study (2011) also showed that the younger generation perceived online collaboration with peers as less important than older students. Another research also revealed that age and attitude toward technology are two strong predictors of how students approach studying in distance education. Younger students tend to have positive attitudes towards technology, whereas older students are more likely to use technology for deeper learning (Jelfs & Richardson, 2013). Furthermore, research has demonstrated that although faculty members tend to be reluctant to use social media for teaching (Brown, 2012), prior experience with e-learning or hybrid courses increases their use of social media (Manca & Ranieri, 2016). These findings are consistent with an earlier study showing that prior technology experience influences on media choice in the distance learning context (King & Xia, 1997), suggesting that because distance learners are more likely to use technology to complete their coursework compared to other students, prior distance learning experience may also affect students' media preferences.

Finally, one might expect that if online students use their preferred media, their course satisfaction would increase. According to the media richness theory (Daft & Lengel, 1984, 1986; Daft, Lengel & Trevino, 1987), face-to-face communication is assumed to be the richest medium and expected to be the most favorable communication means. However, Havice, Davis, Foxx, and Havice (2005) argued that although the use of rich media in online courses is more likely to boost student satisfaction, it can also increase the risk of technical problems, which in turn discourages students to use advanced technology. In addition, Cole (2016) revealed that online students tend to prefer face-to-face communication, yet their course satisfaction is independent of their preferences for face-to-face interaction, and is rather related to their communication satisfaction with instructors. These studies support Capsi and Gorsky's claim (2005) that students may not always prefer rich media to lean media in the online learning context.

Bandura (1977) first introduced the theory of self-efficacy, which refers to the level of confidence in one's own ability to perform a particular task or accomplish a goal successfully. Self-efficacy is context dependent and affected by different factors, such as self-esteem, prior experience, task value, interest/motivation, and support by instructors or peers (Alkharusi, 2013; Hsiao, Tu, & Chung, 2012; Jian-Feng, Ze-Wei, & Xue-Ting, 2015). Online technology self-efficacy (OTSE) is one type of self-efficacy related to computer skills and is necessary for online communication or interaction with peers and instructors. As noted earlier, levels of technology skills and comfort influence media choice; therefore, it is assumed that OTES is more likely to affect students' media preferences.

Miltiadou and Yu (2000) developed an online technology self-efficacy scale (OTSES) and demonstrated its validity and reliability in their study. Other researchers also used the OTSES to examine the relationship between learners' characteristics and OTSE. For example, Yukselturk and Top (2013) found that males tend to have a higher level of OTSE compared to females. Moreover, Wang, Shannon, and Ross (2013) also revealed that the number of previous online courses taken influenced OTSE levels. Their finding aligns with research by Eastin and LaRose (2000), which found that students with limited online learning experience have a lower level of OTSE. Lee (2015) also found that OTSE changes over time; as students' use of online technology increases, their OTSE also increases. Furthermore, Wang et al. (2013) reported that OTSE is significantly related to the final grade in the most recent online course. Taken together, these studies suggest that females or students with limited and unsuccessful online learning experiences are less likely to choose rich media or a high level of technology.

Research Questions

In summary, a number of factors appear to be related to online students' media preferences. Learner characteristics such as age, gender, and prior online learning experiences have emerged as influential factors. Based on past research, it is also assumed that OTSE is more likely to affect students' media preferences, and that students with a higher level of OTSE are more likely to favor rich media over lean media. The purpose of the study was to investigate online students' preferred media and its relationship with demographic features and OTSE. The research questions included:

> - What types of media do college students perceive to be useful in online learning?
> - Is there a relationship between students' demographic features and preferred media in online learning?
> - Is there a relationship between OTSE and preferred media in online learning?

METHODOLOGY

Participants in the study were recruited from students majoring in education at a rural, mid-size U.S. university. These participants had taken at least one college-level online course. The study employed a convenient sampling method; the survey was anonymous and distributed online as well as in print. The total number of participants was 106. The survey consisted of three sections: participants' demographics, online technology self-efficacy, and preferred media in online learning. The participants' demographics are described in the results section.

Instruments used for the other two sections are explained as follows.

Online Technology Self-Efficacy Scale

The researcher examined an existing OTSE survey created by Miltiadou and Yu (2000) and added and deleted several items to reflect current technology. The revised survey consisted of 20 items in a four-point Likert scale: strongly agree, agree, disagree, and strongly disagree (see Appendix). The scale is expected to assess a variety of technology skills that are necessarily for online learning. In order to confirm the content validity, the researcher asked an expert in the field to examine each item. A sample college student was also asked to respond to the survey to test the clarity of written instructions and question items. Based on their suggestions, minor revision was made to a few items. Inter-item reliability was tested using SPSS, and Cronbach's alpha was .94. Factor analysis was also conducted to examine underlying components and factor loadings. The Kaiser Meyer-Olkin Measure test was above an acceptable value (.898) and Bartlett's Test of Sphericity also showed a significant level ($p<.001$). Factor loadings were higher than .45 on each item, which was at an acceptable level (Matsunaga, 2010). Therefore, all 20 items were included in the survey, and composite scores were used to assess OTSE.

Preferred Media in Online Learning

In order to assess students' preferred media in online learning, the researcher identified 15 media based on a study by Zhao et al. (2009). In that study, the participants were all graduate students. However, in this study, the majority of participants were undergraduate students, and only a few students were in remote locations. Therefore, several items that did not apply to the current participants were dropped. Students were asked to respond to each item on a four-point Likert scale regarding their perceptions of media technologies: very useful, somewhat useful, not very useful, and not at all useful.

RESULTS

The total number of participants was 106. About 87% of them were senior and junior and 76% were female. The median of the age group was 21 to 23. The number of online courses taken prior to Fall 2015 was sparse and the median was three, while 27% of students had taken more than six online courses. Over 70% of the participants received as in their most recent online courses.

Frequency Analysis for Preferred Media in Online Learning

Table 1 shows the frequency distribution of preferred media in online learning. Email, texting/instant messaging, and lectures notes and assignments posted on LMS were the three most useful media identified by participants; more than 80% of participants selected very useful. Online slide presentations with audio, online collaboration tools, and online videos were also perceived as useful media. Online discussion and chat groups and CDs/DVDs were rated the lowest among all media listed in the survey and only about 20 to 25 % of students found them very useful.

Table 1. Frequency of Preferred Media in Online Learning

	Very useful	Somewhat useful	Not very useful	Not at all useful
1. Online lecture notes and assignments posted on LMS	82 (77.4)	24 (22.6)	0	0
2. Online slide presentations with audio	70 (66.0)	35 (33.0)	1 (.9)	0
3. Online slide presentations with images and text only	62 (58.5)	35 (33.0)	9 (8.5)	0
4. Online discussion groups (Discussion boards)	26 (24.5)	51 (48.1)	23 (21.7)	6 (5.7)
5. Online chat groups	21 (19.8)	54 (50.9)	28 (26.4)	3 (2.8)
6. Online collaboration tools (Wiki, Google Docs etc.)	74 (69.8)	29 (27.4)	2 (1.9)	1 (.9)
7. Email	86 (81.1)	19 (17.9)	1 (.9)	0
8. Telephone/Voicemail	56 (52.8)	39 (36.8)	10 (9.4)	1 (.9)
9. Texting/Instant Message	87 (82.1)	17 (16.0)	2 (1.9)	0
10. Online videos (Youtube, TED etc.)	77 (72.6)	29 (27.4)	0	0
11. CD or DVD	28 (26.4)	51 (48.1)	23 (21.7)	2 (1.9)
12. Social networking systems (Facebook etc.)	37 (34.9)	51 (48.1)	14 (13.2)	2 (1.9)
13. Internet–based live lecture using two-way video and audio	38 (35.8)	50 (47.2)	15 (14.2)	2 (1.9)
14. Internet–based live lecture using one-way video and two-way audio	28 (26.4)	61 (57.5)	15 (14.2)	1 (.9)
15. Internet–based live lecture using two-way audio with presentation slides.	44 (41.5)	47 (44.3)	13 (12.3)	1 (.9)

Note. **Numbers in the parentheses show percentages.**

Kendall's Tau-b Correlation Analysis

The researcher treated the survey items as ordinal scales, and the collected data also failed to meet the normality assumption. Therefore, a Kendall's tau-b correlation analysis was conducted to determine the relationship between preferred media and demographics, and between preferred media and the revised OTES (see Table 2). Gender was significantly correlated with email ($τb = .192$, $p = .048$), telephone/voicemail ($τb = .187$, $p<.046$), and internet-based two-way video and audio ($τb = .213$, $p =.022$). Females perceived these three media more positively than males. GPA and recent online course grades were also negatively correlated with online slide presentations with images and text only ($τb = -.535$, $p = .003$ forGPA; $τb = .535$, $p = .003$ for recent online course grade). That is, students with lower grades felt online slide presentations with images and text to be more useful than those with higher grades. There were strong to moderate positive correlations between OTSE and

several types of media. Three types of media including online collaboration tools (τb = .258, p = .002), Internet based live lecture with two-way video and audio (τb = .277, p = .001), and Internet-based live lecture with one-way video and two-way audio (τb = .219, p = .008) were strongly correlated with OTSE. Online chat groups (τb = .206, p = .012) and social-networking systems (τb = .181, p = .030) were also moderately correlated with OTSE. The results indicate that students with higher level of OTSE perceived those five media more favorably than those with lower OTSE. Lastly, OTSE was not correlated with any of the demographic factors and prior online learning experiences in this study.

Table 2. Results of Kendall's Tau-b Correlation Analysis

	Age	Gender	N of online courses	Recent online grade	OTSE
1. Online lecture notes and assignments posted on LMS	.092	.018	.015	-.048	.129
2. Online slide presentations with audio	.091	.020	-.062	-.181	.072
3. Online slide presentations with images and text only	-.001	.118	-.068	-.199*	.145
4. Online discussion groups (Discussion boards)	.101	.119	-.085	-.076	.086
5. Online chat groups	.099	.018	-.112	-.067	.206*
6. Online collaboration tools (Wiki, Google Doc etc.)	-.015	-.082	-.075	.002	.258**
7. Email	.033	.192*	.105	-.096	.025
8. Telephone/Voicemail	-.136	.187*	-.016	-.005	-.058
9. Texting/Instant Message	-.071	.147	.073	-.035	.037
10. Online videos (Youtube, TED etc.)	.030	-.042	-.106	.023	.140
11. CD or DVD	.116	.006	-.083	-.085	.010
12. Social networking systems (Facebook etc.)	.069	.132	.051	.050	.181*
13. Internet–based live lecture using two-way video and audio	-.067	.213*	.011	-.0.51	.277**
14. Internet–based live lecture using one-way video and two-way audio	-.014	.134	-.064	-.010	.219**
15. Internet–based live lecture using two-way audio with presentation slides.	-.087	.113	-.034	-.131	.157

Note. *p<.05, **p<.01

DISCUSSIONS

What Types of Media Do Students Perceive to be Useful in Online Learning?

As expected, all surveyed students perceived online lecture notes and assignments as useful. The result was consistent with a past study (Zhao et al., 2009). These are traditional methods of delivery for course materials in online learning. Even though a variety of new technologies are available, the study suggests that simple text documents and written instructions are still essential tools. Among email, text, and telephone/voice mail, students perceived telephone/voice mail to be the least useful. Aligning with a study by Frey, Yankelov, & Faul, (2003), online students prefer email and text because of their flexibility. Although social networking is popular among younger generation, the result showed that students perceived it to be less useful compared to other asynchronous media. The result may be linked to faculty's attitude; social media are not perceived as pedagogical tools (Manca & Ranieri, 2016). Also, students rated online videos much higher than CDs/DVDs. The results reflect the current student population; about 70% to 95% of undergraduate students in the U.S. own at least one smartphone or other type of mobile device (Chen & Denoyelles, 2013). Therefore, online videos may be more convenient and easier to access compared to CDs/DVDs.

Online discussion boards, online chat groups, online collaboration tools (e.g. Wiki, Google Docs) are used to promote interaction among peers. Of these three media, online collaboration tools were perceived to be the most useful. In alignment with Morris' study (2013), students did not perceive online discussion boards to be useful. Although both online collaboration tools and online discussion boards are asynchronous media, their purposes of use are different. For example, Google Docs is helpful when constructing a collaborative research paper, while online discussion boards are generally used for exchanging opinions on a topic assigned by the instructor. This indicates that online students prefer individual learning unless the assignment requires collaboration. Also, how discussion boards are used can vary with the instructor. Therefore, students' prior experience with discussion boards may have influenced the results. Students with negative or limited experiences may perceive discussion boards to be less useful than those who have used them for meaningful tasks or discussions. Further research is needed in this area.

In this study, three different types of Internet-based live lectures were compared. Internet-live lectures with two-way audio with slide presentations were rated the highest, followed by two-way video and audio and one-way video and two-way audio. One might expect that two-way video and audio would be the most preferred format because it is considered to be a richer medium than the other two formats. However, live video lectures are often interrupted due to bandwidth issues. Past research also shows that personality traits affect people's media choice (Hertel, Schroer, Batinic, & Naumann, 2008), therefore it is quite possible that shy or introvert students may not feel comfortable with being on live videos, which in fact can limit their participation. Thus, two-way video and audio may not always be necessary or the best option.

Is There a Relationship Between Students' Demographics and Preferred Media?

Gender and recent online course grades were related to some of the media included in the survey. Females rated higher on email and telephone/voice mails than males did. This is consistent with a past study; females tend to use cell phones for social communication more frequently than males (Beaver, Knox, & Zusman, 2010). Therefore, it is expected that females also use these media for academic purposes more frequently. In addition, females perceived two-way video and audio to be useful more than males did. Online communication patterns between males and females are different. Females try to establish a sense of emotional closeness though online communication more often than males (Gougeon, 1998).

This may be why females tend to prefer a two-way video and audio format because it is closer to face-to face communication. Lastly, the results showed that students who received lower grades on the most recent online courses prefer online slide presentations with images and text only. This seems to align with Sweller's cognitive load theory (Blayney, Kalyuga, & Sweller, 2015). Overuse of multimedia including audio, images, and text can be distracting, which in turn slows down students' cognitive processes. Therefore, online instructors should use multimedia, only if that technology helps students better understand the content.

Is There a Relationship Between the Revised OTSE and Preferred Media?

Five types of media were significantly correlated with the revised OTSE. Those media are relatively new technologies, such as social network systems, online collaboration tools, and live video and audio lectures. Students with a higher level of OTSE perceived them more useful than those with a lower level of OTSE. In the survey, three types of Internet-based live lectures were listed. Two-way and one-way videos were negatively correlated with OTSE. This indicates that the use of video gives students with a lower OTSE additional complexity, such as learning how to operate the video feature and handling with technical problems; therefore, they prefer two-way audio with presentation slides. Moreover, there was a strong negative correlation between online collaboration tools and OTSE. Although more than 90% of the students perceived online collaboration tools as useful media, instructors should be aware that students with lower OTSE might need additional support when those tools are integrated into course activities.

CONCLUSION

The study identified several factors that influence students' media preferences and shed light on directions for future research. Consistent with earlier studies, online students did not necessary favor rich media over lean media. As expected, OTSE influenced students' preferences for rich media or a higher level of technology. Although gender differences were found in preferences for several media, they were not related to OTSE. The revised OTSE scale appears to be valid and reliable, yet the majority of participants in this study were education students at the same university; thus, further analysis with different groups of samples is recommended. In addition, this study did not examine students' prior experiences with each type of media in the online learning context. Future researchers may investigate to what extent students' past technology experiences affect their media preferences.

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Revised Online Technology Self-Efficacy Scale

Please rate the level of your confidence in using technologies and choose the one that best describes your feeling. Choose the option "Strongly Disagree," if you didn't know what the statement meant.

1. I feel confident in downloading (saving) files from a website to the desktop.   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**
2. I feel confident in printing a website.   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**
3. I feel confident in copying a block of text from a website and pasting it to a word document.   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**
4. I feel confident in bookmarking a website.   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**
5. I feel confident in taking a screenshot of the computer monitor.   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**
6. I feel confident in inserting a link in a word document or an email message.   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**
7. I feel confident in performing the basic functions of email systems (ex. Sending email to a specific person or multiple people at the same time, forwarding email, and attaching files).   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**
8. I feel confident in texting or using instant messaging systems with my classmates.   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**
9. I feel confident in posting a new comment (creating a new thread) and a reply to others on online discussion boards.   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**
10. I feel confident in using the Internet (ex. Google, Yahoo) to find or gather information for online learning.   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**
11. I feel confident in using library databases to find articles for course assignments.   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**
12. I feel confident in performing the basic functions of online audio and video/slide shows (ex. Play, Stop, Forward/Rewind, Share).   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**
13. I feel confident in subscribing and unsubscribing to a podcast.   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**
14. I feel confident in creating a podcast and publishing it to a website.   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**
15. I feel confident in creating a simple video/slide show and uploading it to a website.   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**
16. I feel confident in creating a simple web page with text, images, and links.   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**
17. I feel confident in using the basic functions of social networking systems (ex. Facebook, Twitters).   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**
18. I feel confident in using online collaboration programs (ex. Wiki, Google Doc) to work on a group project.   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**
19. I feel confident in using audio/video conferencing systems (ex. Skype, Face Time, Adobe Connect) to participate in live group disccussions.   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**
20. I feel confident in using online text chat programs to participate in live group discussions.   **(1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree**