UNDERSTANDING ONLINE LEARNING BASED ON DIFFERENT AGE CATEGORIES

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ABSTRACT

Aim/Purpose	To understand readiness of students for learning in online environments across different age groups.
Background	Online learners today are diverse in age due to increasing adult/mature students who continue their higher education while they are working. Understanding the influence of the learners' age on their online learning experience is limited.
Methodology	A survey methodology approach was followed. A sample of one thousand nine hundred and twenty surveys were used. Correlation analysis was performed.
Contribution	The study contributes by adding to the limited body of knowledge in this area and adds to the dimensions of the Online Learning Readiness Survey additional dimensions such as usefulness, tendency, anxiety, and attitudes.
Findings	Older students have more confidence than younger ones in computer proficiency and learning skills. They are more motivated, show better attitudes and are less anxious.
Recommendations for Practitioners	Practitioners should consider preferences that allow students to configure the learning approach to their age. These preferences should be tied to the dimensions of the online learning readiness survey (OLRS).
Recommendations for Researchers	More empirical research is required using OLRS for online learning environments. OLRS factors are strong and can predict student readiness and performance. These are opportunities for artificial intelligence in the support of technology-mediated tools for learning.

INTRODUCTION

Online learners today are increasingly more diverse in age. This includes learners at the undergraduate level who are adults coming back to school while working full time. The most important opportunity for these adults is the fact that online courses allow them to continue their education and get credits towards acknowledged degrees while at the same time remain employed. This phenomenon caused by the increased use of the web for education has stretched the scope of the learner population from a homogenous profile of 'out of high school' students around the age of 18 years to one that is increasingly more intergenerational (Ke & Kwak, 2013).

It is progressively more evident that the diversity of age groups in online higher education is increasing. The online learning student population is becoming more heterogeneous in terms of age, and it is now also composed of adults who are mostly employed, goal-oriented, and self-directed. This was already observed a decade ago (Dabbagh, 2007), and this phenomenon continues to expand today. Although studies are scarce, some have reported that learner's age is a potential predictor of student online learning success (Knowles, 1989; Wojciechowski & Palmer, 2005). Some of the findings are:

- Older students are more likely to get higher grades than their counter part young ones;
- Older learners seem to be more intrinsically motivated to learn the subject matter;
- The older the student, the more self-directed they are – a critical characteristics for a better online learning experience;
- However, when it comes to knowledge test, younger students perform better and are more satisfied with their online environment (Lim, Morris, & Yoon, 2006);
- Since 1998, some researchers supported the assumption of the cognitive aging perspectives that older adults tend to lack skills or epistemological beliefs to perform technology-mediated learning (Jones & Bayer, 1998);
- Others found that the level of education influences learners' perceptions. The higher the education level the more likely the students will report that they experienced positive learning outcomes (Ke & Kwak, 2013; Makoe, Richardson, & Price, 2008; Shin & Chan, 2004)

There is some indication and dispersed literature to the effect that students' dispositions associated with their age can influence their thoughts and learning actions, as discussed in Kennan, Bigatel, Stockdale, and Hoewe (2018). In their research, students were asked to rate thirty-five teaching behaviors as facilitators to their online learning. The relationship between the ratings and age of students were studied in two samples. Only four of the thirty-five behaviors have shown significant consistent relationship in both samples. They are about the instructor's abilities to give feedback, to provide a respectful environment, to provide understandable content, and to leave evidence of their presence and engagement in the course by participating in the discussions. Butaray and Yukselturk (2015) have also studied if students' demographics, such as age, gender, and computer literacy, could have an impact on performance in an online course. They found that none of those factors have a significant impact on their achievement. Simonds and Brock (2014) found that students' age has an impact on their preference for some specific pedagogical activities in the course. Kuo and Belland (2016) conducted a study on 167 students and found that those in 26 to 35 age bracket are most satisfied with online learning.

A review of the body of knowledge shows that there are many studies in online learning and its various dimensions but very few have studied the influence of age on learning in online courses. In this article, we present the results of age differences in online learning by examining over 1900 students' responses to the online learning readiness questionnaire.

The online learning readiness questionnaire (OLRS) (Hung, Chou, Chen, & Own, 2010) was used in this study. The OLRS measures five dimensions of learning, namely, self-directed learning, motiva-

tion for learning, computer and internet self-efficacy, learner control, and online communication self-efficacy. Over the past couple of decades, some researchers have also focused on developing a readiness survey for online learning (Peng, Tsai, & Wu, 2006; Roper, 2007; Saadé, He, & Kira, 2007; Smith, Murphy, & Mahoney, 2003; Tsai & Lin, 2004).

THE STUDY

CONTEXT

Students from a Canadian Business School enrolled in an introductory online undergraduate course, "Fundamentals of Information Technology and Business Productivity," were asked to complete a survey at the start of the semester. The survey included demographic information and questions from the OLRS. The survey was made available for only 10 days at the beginning of the semester to capture students' responses without the influence of the course activities. Students were assured that the information they provide was strictly confidential and used only for statistical purposes; and only the results of the statistical analysis would be used for academic and research purposes. They were also informed that the aim of the analysis is to help the online course developers to refine the course elements regularly and every semester.

One thousand nine hundred and twenty usable surveys were collected from students enrolled in the course during the fall and winter semesters. The course is mandatory for approximately one third (32%) of the respondents who must take this course as part of their business program admission requirements. It is for them a high-stakes course and very important for their academic success. On the other hand, about two-third (68%) of the respondents select the course as an elective and about 40% of them are from programs outside the school of business.

LEARNING ENVIRONMENT

This online course uses a web-based learning management system called Learning Lab, designed as a project management tool for the sequencing of the tasks and activities associated with the course (Saadé, & Kira, 2009). Learning Lab allows the course tasks/activities to be mapped to the learning goals. The tasks are sequenced from top to bottom similar to that of a Gantt chart, indicating the visits that the student had made for each task, the weight of the task, the deadline for completing the task, the status of the task (coming, open, expired), and the score obtained. At the bottom of the student's dashboard there is a real time progress performance bar providing the cumulative score as the semester progresses and the student completes the tasks/activities and another bar showing that of the class average. At the top right hand side of the student's dashboard, the student has the option to view his/her performance from a learning goal perspective.

Learning Lab also provides the professor and teaching assistants with dashboards to monitor the students' activities and performance. A question center is also integrated to eliminate emails and allow students to browse others' questions and answers. Communication with the students is done through an integrated communication module which can be automated or made adhoc. All communications are sent to the student's emails and also remain in the student's dashboard for proper storage and future reference. The system indicates which messages were read by the student and which were not.

PEDAGOGICAL CONSIDERATIONS

The pedagogical design of the course is in-line with the dimensions of the OLRS and includes the following: skill-based activities to learn spreadsheet and databases using Microsoft Excel and Access respectively; small quizzes to ensure students do the assigned chapter readings; a problem-based mini case to solve (such that the tool in Learning Lab provides a guided approach to solve it); a pre- and post-knowledge test to measure impact of pedagogy on student's learning of course material; and a

summative exam that covers all subject matter. The elements of learning management system Learning Lab facilitate the management of communication between students, the professor, and the teaching assistants, and supports self-directed learning in terms of sequencing events and of automated reminders.

THE ONLINE LEARNING READINESS QUESTIONNAIRE

The questionnaire has four parts:

1. Demographics
2. Skills and Abilities
   a. Computer proficiency
   b. Learning skills
   c. Self-efficacy
   d. Communications
3. Personality and Perceptions
   e. Motivation
   f. Attitudes
   g. Anxiety
4. Values
   h. Usefulness
   i. Tendency

Respondents were asked to indicate their level of agreement with different statements, where 1 stands for Strongly disagree, 2: Disagree, 3: Neither agree nor disagree, 4: Agree and 5: Strongly agree.

CONSIDERATIONS FOR OLRS DIMENSIONS INTEGRATION

The course under study was created in 2008. Since then, students, in general, have shown openness to use different methods to help them learn the course content. They were motivated to do extra work to enhance their chances for a better grade. This is especially true due the nature/context of our university in Canada where our student population is very international and diverse culturally and in age. The course offered in English always includes a large student body:

- With different mother tongues such as English, French, Chinese, Arabic, Spanish, and others, which presents a more complex environment due to variation of English proficiency,

- With many students working either part-time and even full-time; where in general, students who work are older students, due to the time flexibility offered by online courses,

- A significant number of students have to commute from urban areas to the campus downtown for face to face classes, and with online classes, they can manage to reduce that commute time and utilize the time for work,

- With a large number of students taking the course under study who have not made up their mind on what to major in.

For the last ten years, we continue to see students' behavior with regards to communication, neediness, learning environment efficacy, integration of course into life, motivation, and confidence differ between younger and older learners. We have been observing this phenomenon over the years and only now started to capture some data and analyze them to better understand how to enhance online learning.

It is important to note that Learning Lab was used in a mandatory setting where the student activities and associated scores counted towards the course final grade. Learning Lab was also used to proctor the final exam worth 60% of the grade.

DISCUSSION AND ANALYSIS OF RESULTS

The survey data of 1920 participants was analyzed using SPSS, with 49.1% Female and 50.9% Male respondents from different age levels. Table 1 presents the distribution of age and gender. The average age of Female respondents is 21.0 and 20.9 for Male respondents. The spread of the age distribution is similar for both gender, but we note that among Female students the percentage with less than 20 years of age is superior to that of group of Male students by 4.5%. While the frequency of the 20 to less than 25 categories, is 4.5% superior in the Male category. This observation could be attributed to the fact that, in general, female students do better than male students in pre-university programs and therefore can start their university program younger.

Table 1. Demographics

Age	N	%	Female	Male
Less than 20	730	38.0%	40.3%	35.8%
20 to less than 25	952	49.6%	49.6%	55.0%
25 to less than 30	172	9.0%	6.2%	6.2%
30 and more	66	3.4%	3.9%	3.0%
Total	1920	100%	49.1%	50.9%

SKILLS AND ABILITIES

Tables 2, 3 and 4 present the questions and scores obtained for the different age groups and are organized by the dimensions. Table 2 can be divided into four sections, such as: "Computer proficiency", "Learning skills", "Self-efficacy" and, "Communication" which are the Skills and Abilities for online learning. Respondents are to indicate their level of agreement with several statements, where 1 corresponds to "Strongly disagree" and 5 to "Strongly agree". The average level of agreement for each statement is presented according to the age category. The second to last column of the table contains *sparklines*. A sparkline is a tiny chart in a worksheet cell that provides a visual representation of data. In Table 2, it shows the trend in the average level of agreement according to age categories.

Age is an influencer factor on the perception of ability level required for online learning. An analysis of variance is performed to see if the average level of agreement across age categories are significantly different. Significant differences at 5% level are identified by **, while 10% level is by *.

The first part of Table 2 concerns Computer Proficiency. We can see that for 8 out of 9 statements, the older groups, that is 25 to 30 and those above 30 years of age give the highest level of agreement. As also indicated by the sparklines, the level of agreement increases with age, for most statements. The only exception is for statement *A8: My files are well organized* where we observe that the level of agreement decreases with age. This could possibly be explained by the fact that with time the number of files managed by respondents increases and makes it more difficult to be well organized. Several analysis of variance have identified significant differences at 5% level for statement *A2: Securing it from viruses*, where the older group of respondents seem to master this issue, *A6: Knowledgeable at managing my software* and *A9: Overall, I think my computer skills will help to learn in an online course.* Overall, older respondents have higher level of confidence in their ability to take online courses.

The second part of Table 2 is about Learning Skills. We observe that for 7 out of 9 statements, the highest level of agreement is given by the group of respondents of 30 years of age or more. Significant difference in means exist at 5% level for statement *B3: I am self-disciplined in studying* and *B6: I am able to complete my assignments on time.* It is interesting to note that in the case of B3, younger respondents strongly believe in the statement and that support starts to go down, until the 30 and plus give their highest support. Perhaps as younger students ideally believe they can be self-disciplined in stud-

ying, they soon realized that it is not that easy, but with experience, the confidence comes back. Similar analysis can be made for statement B6. Significant difference in means exist at 10% level for statement *B5: I am able to successfully manage my study time* where confidence starts high for the younger group and declines to raise with the 30+ group.

The third part of Table 2 is about Self-efficacy. All three statements exhibit significant differences in means and the older group always scores higher, showing highest confidence in themselves. Interestingly, self-efficacy ratio is significantly higher for older than younger students and the trend is upward in all elements as shown by the sparklines.

Table 2: Skills and Abilities by Age Categories						
Proficiency	**Age**					**Grand Average**
	<20	**20-24**	**25-30**	**>30**		
A1. Overall usage	4.09	4.13	4.18	4.23		4.12
A2. Securing it from viruses**	**3.28**	3.36	3.46	**3.65**		3.35
A3. Store and retrieve information	4.02	4.04	4.09	4.23		4.04
A4. Find information on Internet efficiently (fast)	4.44	4.37	4.46	4.39		4.40
A5. Find information on internet effectively (right information)	4.19	4.14	4.23	4.24		4.17
A6. Knowledgeable in managing my software**	3.35	3.48	3.61	3.71		3.45
A7. Able to manage my emails without problems	4.41	4.39	4.50	4.41		4.41
A8. My files are well organized	4.16	4.11	4.08	3.95		4.12
A9. Overall, I think my computer skills will help me to learn in an online course.**	3.93	4.07	4.09	4.17		4.02
Learning Skills						
B1. I have control over my own learning.	4.25	4.24	4.26	4.30		4.25
B2. I effectively take responsibility for my own learning.	4.29	4.28	4.38	4.33		4.29
B3. I am self-disciplined in studying. **	4.01	3.92	3.89	4.18		3.96
B4. I seek help when facing learning problems.	3.93	3.85	3.92	4.05		3.89
B5. I am able to successfully manage my study time. *	3.77	3.73	3.72	4.02		3.75
B6. I am able to complete my assignments on time. **	4.44	4.37	4.21	4.41		4.39
B7. I am able to set my own learning goals.	4.15	4.09	4.09	4.26		4.12
B8. I am autonomous.	4.13	4.17	4.18	4.29		4.16
B9. Overall, I am organized.	4.07	4.06	3.98	4.20		4.06
Self-efficacy						
C1. I could complete my studies using an online learning system, even if there was no one around to tell me what to do as I go.**	3.56	3.65	3.73	4.06		3.64
C2. I could complete my studies using an online learning system, if I could call someone for help if I got stuck. *	3.97	3.90	3.85	4.11		3.93
C3. Overall, I am confident I have the abilities to complete my studies online. **	4.04	4.07	4.14	4.29		4.07
Communication						
D1. I feel confident in using online tools (email, discussion or SMS) to effectively communicate with others.	4.37	4.33	4.39	4.36		4.35
D2. I feel confident in posting questions in online discussions.	3.92	3.88	3.91	4.12		3.90
D3. Overall, I am able to interact with others via social network services like Facebook, Twitter or MySpace. **	4.44	4.32	4.21	4.21		4.36
** indicates that the difference in means is significant at 0.05						
* indicates that the difference in means is significant at 0.10						

The fourth part of Table 2 is about Communication. The only significant difference in means exist for statement *D3: Overall, I am able to interact with others via social network services like Facebook, Twitter or MySpace.* This confidence is the highest among the youngest group, and it decreases as the age increases. Younger students might be more informed about social media than the other groups. Also as indicated by the strong support of statement *D2: I feel confident in posting questions in online discussions*, older students feel more confident about this learning tool.

Overall, students in all age categories seem to have a same fundamental skills readiness to start online learning with small differences in some elements but they have a significant difference in self-efficacy area that is an important required character of successful online learning. Age is an influencer factor on the perception of ability level required for online learning.

PERSONALITY AND PERCEPTIONS

Table 3, is divided into three parts: Motivation, Attitudes, and Anxiety.

Table 3: Personality and Perceptions toward Online Learning by Age Categories						
	Age					Grand Average
Motivation	<20	20-24	25-30	>30		
E1. I am able to remain motivated even though the instructor is not online at all times.**	3.88	3.94	3.98	4.17		3.93
E2. I am able to complete my work even when there are distractions in my home (television, children, and such).**	3.72	3.71	3.53	3.98		3.71
E3. I am able to complete my work even when there are online distractions (friends sending emails or websites to surf).**	3.72	3.79	3.77	4.15		3.78
E4. Even in the face of technical difficulties, I can learn from material presented in online learning environment.**	3.80	3.92	3.90	3.98		3.88
E5. I am confident I can learn without the physical presence of a teacher to assist me.**	3.84	3.94	4.02	4.20		3.92
E6. Overall, I am motivated to learn in the online environment.	3.98	4.00	4.03	4.20		4.00
Attitudes						
F1. Using an online learning system is beneficial for me.**	3.50	3.66	3.90	4.14		3.63
F2. Online learning provides me attractive learning environment.**	3.42	3.53	3.66	3.88		3.51
F3. Using an online learning system is convenient.**	3.70	3.90	4.03	4.26		3.84
F4. Overall, I like using an online learning system.**	3.43	3.59	3.69	3.85		3.54
Anxiety						
G1. Computers in general stress me when I use them for online learning.**	2.55	2.37	2.16	2.02		2.41
G2. I am usually scared when using computers for online assessments such as quizzes and exams.**	2.70	2.57	2.37	1.85		2.58
G3. I feel generally anxious when I submit assignments online.**	2.69	2.63	2.39	1.97		2.61
G4. I feel comfortable using tablets and phones for my online learning.	3.37	3.47	3.47	3.47		3.43
G5. Overall, I can overcome any anxieties I may when using a new technology.**	3.84	3.87	4.06	4.11		3.88
** indicates that the difference in means is significant at 0.05						
* indicates that the difference in means is significant at 0.10						

Results presented in the first part of Table 3 about Motivation reveal that the older category of respondents is more motivated than those in the younger categories. This is also illustrated by the sparklines. They can remain motivated even if the instructor is not online, when there are distractions at home or online, in front of technical difficulties, and overall they are more convinced that

they can learn in an online environment. The analysis of variance performed on the data revealed that the differences in means are highly significant at 5% except for E6.

The second part of Table 3, about Attitudes, reveals the same pattern, as illustrated by the sparklines. The four statements F1, F2, F3 and F4 gain increasing support as the age categories increase. The differences in means are all significant at the 5% level. Therefore, older students consider online learning as more beneficial, more attractive, more convenient, and overall more likeable as compared to the younger groups.

The third part of Table 3 is about Anxiety. The first three statements *G1: Computers in general stress me when I use them for online learning*, *G2: I am usually scared when using computers for online assessments such as quizzes and exams*, and *G3: I feel generally anxious when I submit assignments online* follow the same pattern that can be visualized with the sparklines which indicate that the levels of stress and anxiety decrease when the age increases. The differences in means are also significant at the 5% level. Overall, the confidence in overcoming any anxieties when using a new technology increases with age.

VALUE

Table 4 presents the level of agreement for statements concerning Usefulness and Tendency. The four statements *H1, H2, H3* and *H4* follow the same pattern, where the levels of agreement increase with age as illustrated by the sparklines. The differences in mean levels of support are significant at the 5% level. Therefore, older respondents more strongly believe that the online learning system is useful, increases their productivity and performance, and enhances learning. Similarly, results on statements *I1, I2* and *I3* indicate that older respondents more strongly consider online learning as important and needed, and overall are more interested in online learning.

Table 4: Value of Online Learning by Age Categories						
	Age					Grand
Usefulness	**<20**	**20-24**	**25-30**	**>30**		**Average**
H1. Online environments enhance my learning experience.**	3.28	3.39	3.55	3.85		3.37
H2. Online learning increases my productivity.**	3.18	3.34	3.45	3.73		3.30
H3. Online learning improves my performance in my studies.**	3.19	3.31	3.43	3.64		3.28
H4. Overall, I find the online learning system will be useful in my studies.**	3.48	3.60	3.86	3.94		3.58
Tendency						
I1. I consider that online learning is important for me.**	3.57	3.63	3.71	4.00		3.62
I2. I consider that online learning is needed for me.**	3.30	3.42	3.60	3.97		3.40
I3. Overall, I have an interest for online learning.**	3.68	3.74	3.87	4.08		3.73
** indicates that the difference in means is significant at 0.05						
* indicates that the difference in means is significant at 0.10						

CONCLUSIONS

Overall we can conclude that age is certainly an important factor to consider when designing online courses. In this study, participants of different age groups have reacted differently to the questions in the survey, and they behave differently in the way they study and manage the online course. This research has brought to light the fact that students in the older category (more than 30 years of age) are more enthusiastic about participating in online learning as they feel that they have stronger self-efficacy and better mental readiness. Participants also felt they were more prepared and ready to engage in the online activities. This is an indication towards self-confidence, which seem natural with increasing age. With that regards, confidence can be an important dimension to be studied in future research and in this context. Moreover, perhaps because of their work experience and/or maturity,

they believe they are more knowledgeable in managing software, and that skill will help them to learn better online. While we might have thought that the younger generation of students would be more prepared for online learning, maturity and experience may play a very important role.

This study using the online learning readiness questionnaire contributes to the understanding of a diversified clientele of online courses, where age category plays an important role. It would be interesting in online courses to encourage group projects where members would be from different age categories.

Although the sample in this study is very large, the questionnaire should also be used in different types of online courses. More specifically we can provide recommendation to the following aspects: (1) students who are taking the course, (2) faculty who are ready to teach online, (3) the administration that needs to provide the resources to help the students, and (4) course designers who would need to consider age differences and include content and mechanisms for assistance to students. Recommendations to the different stakeholders are interrelated. For example, when it comes to students, we see that confidence is very important. Students need to have some level of trust in their abilities to complete the tasks using the online tools. But at the same time professors have to provide support in terms of documentation and instruction on how to succeed in the course and make the case for the usefulness of the course. At the same time, administration should provide the resources, such as teaching assistants, computer labs and rooms, to allow students to meet teaching assistants face to face, especially since many students still are very anxious on not having anyone to meet face-to-face. When it comes to course designers, the most important part is the ease of use and guided pedagogy implemented in the online learning website with dynamic and interactive activities that connect students to students to teachers to content. The integration of these tools and processes are the key to success, and the OLRS provides the factors that need to be managed, namely, anxiety, motivation, attitudes, usefulness, and tendency. Tools and processes can be devised to reduce anxiety, enhance attitudes, improve motivation, demonstrate the usefulness of content and process, and change learning tendencies of students to increasing levels.

It would be interesting to study in future research how perceived skills and abilities relate to performance in online learning and how the level of prior exposure to online learning could affect performance, attitudes, and anxiety. The reasons why students are taking the course could also reveal other elements that could contribute to motivation, attitude, and anxiety.

REFERENCES

Baturay, M. H., & Yukselturk, E. (2015). The role of online education preferences on student's achievement. *Turkish Online Journal of Distance Education–TOJDE*, *16*(3), 3-13. https://doi.org/10.17718/tojde.47810

Dabbagh, N. (2007). The online learner: Characteristics and pedagogical implications. *Contemporary Issues in Technology and Teacher Education*, *7*(3), 217-226.

Hung, M. L., Chou, C., Chen, C. H., & Own, Z. Y. (2010). Learner readiness for online learning: Scale development and student perceptions. *Computers & Education*, *55*(3), 1080-1090. https://doi.org/10.1016/j.compedu.2010.05.004

Jones, B. D., & Bayen, U. J. (1998). Teaching older adults to use computers: Recommendations based on cognitive aging research. *Educational Gerontology: An International Quarterly*, *24*(7), 675-689. https://doi.org/10.1080/0360127980240705

Ke, F., & Kwak, D. (2013). Online learning across ethnicity and age: A study on learning interaction participation, perception, and learning satisfaction. *Computers & Education*, *61*, 43-51. https://doi.org/10.1016/j.compedu.2012.09.003

Kennan, S., Bigatel, P., Stockdale, S., & Hoewe, J. (2018). The (lack of) influence of age and class standing on preferred teaching behaviors for online students. *Online Learning*, *22*(1). https://doi.org/10.24059/olj.v22i1.1086

Knowles, M. S. (1989). *The making of an adult educator: An autobiographical journey*. Jossey-Bass.

Kuo, Y-C. & Belland, B. R. (2016). An exploratory study of adult learners' perceptions of online learning: Minority students in continuing education. *Educational Technology Research and Development, 64*(4)*,* 661-680. https://doi.org/10.1007/s11423-016-9442-9

Lim, D. H., Morris, M. L., & Yoon, S. W. (2006). Combined effect of instructional and learner variables on course outcomes within an online learning environment. *Journal of Interactive Online Learning*, *5*(3), 255-269.

Makoe, M., Richardson, J. T., & Price, L. (2008). Conceptions of learning in adult students embarking on distance education. *Higher Education*, *55*(3), 303. https://doi.org/10.1007/s10734-007-9056-6

Peng, H., Tsai, C. C., & Wu, Y. T. (2006). University students' self-efficacy and their attitudes toward the Internet: The role of students' perceptions of the Internet. *Educational Studies*, *32*(1), 73-86. https://doi.org/10.1080/03055690500416025

Roper, A. R. (2007). How students develop online learning skills. *Educause Quarterly*, *30*(1), 62.

Saadé, R. G., He, X., & Kira, D. (2007). Exploring dimensions to online learning. *Computers in Human Behavior*, *23*(4), 1721-1739. https://doi.org/10.1016/j.chb.2005.10.002

Saadé, R. G., & Kira, D. (2009). Computer anxiety in e-learning: The effect of computer self-efficacy. *Journal of Information Technology Education: Research*, *8*, 177-191. https://doi.org/10.28945/166

Shin, N., & Chan, J. K. (2004). Direct and indirect effects of online learning on distance education. *British Journal of Educational Technology*, *35*(3), 275-288. https://doi.org/10.1111/j.0007-1013.2004.00389.x

Simonds, T. A. & Brock, B. L. (2014). Relationship between age, experience, and student preference for types of learning activities in online courses. *Journal of Educators Online*, *11*(1), 1-19. https://doi.org/10.9743/jeo.2014.1.3

Smith, P. J., Murphy, K. L., & Mahoney, S. E. (2003). Towards identifying factors underlying readiness for online learning: An exploratory study. *Distance Education*, *24*(1), 57-67. https://doi.org/10.1080/01587910303043

Tsai, C. C., & Lin, C. C. (2004). Taiwanese adolescents' perceptions and attitudes regarding the Internet: Exploring gender differences. *Adolescence*, *39*(156), 725-734.

Wojciechowski, A., & Palmer, L. B. (2005). Individual student characteristics: Can any be predictors of success in online classes. *Online Journal of Distance Learning Administration*, *8*(2), 13.

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