Title of the Project

International English negotiation skill Instruction through online RPG simulation & Instruction

Research motivation and purpose

Teachers confront significant concerns when adopting technology that potentially leaves some students behind. The current research asks if an instructor moves a class totally online, do differences in learners' technology readiness have a detrimental effect on their confidence (or self-efficacy), engagement, and so achievement? Millennials' are undoubtedly immersed in digital media, assumed to be digital natives (Prensky, 2010), yet are challenged by technology-based problems (Change the Equation, 2015). The notion of digital natives unravels as millennials confine themselves to a limited range of technologies (Kirschner & De Bruyckere, 2017; Margaryan et al., 2011).

Literature

Technology readiness refers to the "propensity to embrace and use new technologies for accomplishing goals in home life and at work" (Parasuraman, 2000, p. 308). Technology readiness consists of enablers, (optimism and innovativeness) that encourage use, and inhibitors, (discomfort and insecurity) that that discourage engagement.

Interest in computer anxiety began after the introduction of personal computers into the classroom (Alothman et al., 2017). The overall concern is that students who are anxious over engaging with technology-mediated education will be placed at a disadvantage (Saadé & Kira, 2009) that impairs learner self-efficacy. Educational technology acceptance antecedents include emotion (Saadé & Kira, 2006) and anxiety (Powell, 2013). Perceived ease of use and perceived usefulness predict continuing use of e-learning (Lee, 2010) as well as being a critical influence on self-efficacy (Straub, 2009).

Engagement captures a state of mind (Schaufeli et al., 2002) that is an effective predictor of learning and development (Hu & Hui, 2012) combined with learning and practice (Pellas, 2014). A technology ready learner will find engagement easier in a technology-mediated class setting. Howard et al. (2016) argue students more positively engaged with technology complete more complex tasks. Learner engagement is highly related to interest in learning (Reyes et al., 2012).

Research questions

Computer self-concept and performance outcomes have been explored by Christoph, Goldhammer, Zylka, and Hartig (2015). Higher levels of computer engagement correlates with performance outcome. Rau, Gao, and Wu (2008) find that mobile technology increases learner intrinsic motivation towards learning. Based on this review, the current study tests these hypotheses.

H1: Learners who are less comfortable with technology exhibit lower online self-efficacy in asynchronous online classes.

H2: Learners who are less comfortable with technology exhibit lower engagement in asynchronous online classes.

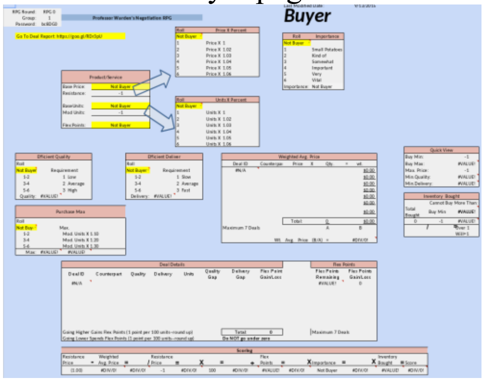
H3: Learners who are less comfortable with technology exhibit lower achievement in asynchronous online classes.

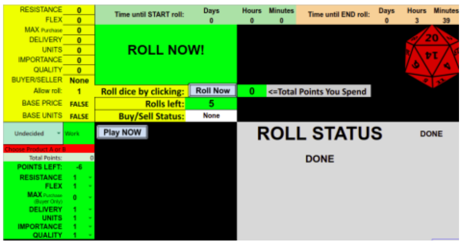
Research design and methods

Course content includes video lectures, online quizzes, business writing practice, and negotiation simulations, all delivered asynchronously online over 18 weeks with no physical meeting times. Participants in the class total 156, who are given an online informed consent form to participate in the study, as approved by the university research ethics procedure. Video course content is delivered with English with Mandarin Chinese closed captioning. Most participants (84%) report no previous experience taking any online classes. Only 13% have experience with two to three online classes while 3% have taken four or more, while they find video content engaging (Watson et al., 2016). The video content is designed following edX guidelines (Guo et al., 2014). This is followed by online quizzes.

A negotiation role-playing game (RPG) is delivered in which learners, in groups, act as companies with negotiation positions and goals. The RPG is turn-based, simulating markets and showing group/company interaction and progress. Groups negotiate deals over days and communicate however they choose—normally through social media.

Example negotiation RPG buyer page and the starting game page of the sim

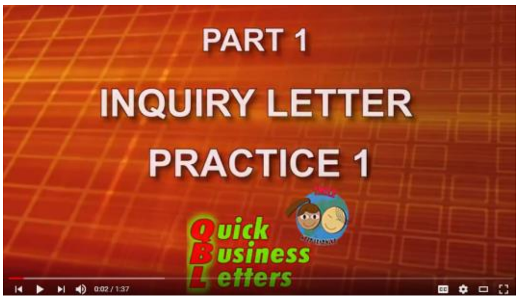


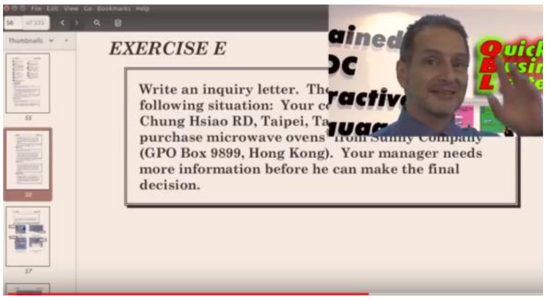


We draw on the well-established technology readiness index (TRI) (Parasuraman, 2000; Parasuraman & Colby, 2015). Shen, Cho, Tsai, and Marra's (2013) inductively developed survey specifically measures online learning self-efficacy. That resulting factor structure includes five self-efficacy factors: 1) completing an online course (complete), 2) interacting socially with classmates (social), 3) handling online course management tools (CMS), 4) interacting with instructors (instructor), and 5) interacting with classmates for academic purposes (classmates). We use the thirty questions, representing these five latent variables.

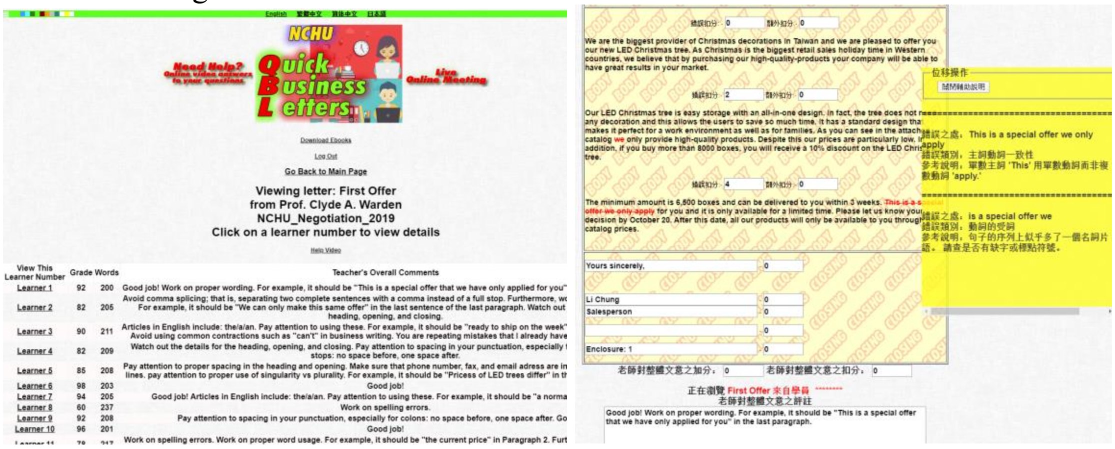
Engagement in an online class is often measured by completion of tasks (Xiong et al., 2015) or viewing of course videos and accompanying quizzes (Barba et al., 2016; Guo et al., 2014). We quantify learner engagement with a combination of video viewing time and quiz questions relating to video content. Our measure of individual effort is through online business writing assignments (Quick Business Letters) that includes online guidance and instructional videos.

Example cloud instruction videos





Example cloud writing exercises



Teaching and research results

We perform all CFI analyses with the R package Lavaan, version 0.6-1, and other statistics with the R package Psych, version 1.8.4 (Revelle, 2017). We first test TRI results with a confirmatory factor analysis to check the data's fit to the four latent variables. This results in seven questions representing TRI's two basic orientations of being drawn towards (labeled as Comfortable) or pushed away (labeled as Uncomfortable) from new technology.

The model has a CFI of .98, an RMSEA of .065 (χ^2 (2) =.13, p = .31), thereby supporting a good fit. These two factors of (un)comfortable clearly describe differences in values among respondents. Comfortable responses in this sample represent a social leadership element. Uncomfortable responses, in contrast, tends to reflect concerns around online purchases and information sent over the Internet. Reliability of the latent variables, using Cronbach's alpha, is .83 for Comfortable and .76 for Uncomfortable. McDonald's omega (Dunn et al., 2014), a better reliability measure as it takes into account indicator relationships, is .89 for Comfort and .77 for Uncomfortable. Standardizing predicted scores, from the resulting CFI model, supply Z-scores (M = 0, SD = 1) that we use for further analysis. We use the TRI measure next to split the sample into two groups: more/less comfortable with new technology. Predicted scores for the factors, deriving from the CFI model, determine group membership. Respondents are placed in the group corresponding to the factor they score higher on, i.e., each respondent's Uncomfortable factor score is subtracted from his/her Comfortable factor score with positive results placed in the Comfortable group and negative results in the Uncomfortable group. The Comfortable/Uncomfortable factor scores are statistically significantly different between the groups (t (102) = 11.09, p < .005), with 56 people belonging to the Comfortable group and 46 to the Uncomfortable group. Furthermore, each of the eight TRI indicator survey questions is statistically significantly different between the Comfortable/Uncomfortable groups (using their unstandardized responses), thereby supporting the validity of this grouping measure (see Table 1). A chi-squared test of previous online experience between the Comfortable/Uncomfortable groups shows no significant difference (χ^2 (2) = 2.74, p < = .43), thereby eliminating previous experience as an influence on group membership.

Table 1. Technology readiness comfortable versus uncomfortable groups

Technology readiness index questions	Comfortable (n = 46) M(SD)	Uncomfortable (n = 56) M(SD)	t	d	p
Other people come to me for advice on new technologies	2.93 (1.27)	4.07 (1.20)	-4.6	0.92	.001
In general, I am among the first in my circle of friends to acquire new technology when it appears	2.33 (1.16)	3.43 (1.22)	-4.68	0.92	.001
I can usually figure out new high-tech products and services without help from others	3.54 (1.17)	4.27 (1.26)	-3.01	0.6	.003
I find I have fewer problems than other people in making technology work for me	3.59 (1.09)	4.29 (1.14)	-3.16	0.63	.002
I do not feel confident doing business with a place that can only be reached online	4.24 (1.08)	2.91 (1.16)	5.97	1.19	.001
Any business transaction I do electronically should be confirmed later with something in writing	1.11 (4.00)	2.52 (1.36)	6.67	0.47	.001
If I provide information to a machine or over the Internet, I can never be sure it really gets to the right place	3.76 (1.12)	2.43 (1.14)	5.93	1.18	.001
Omega (alpha)	.89 (.83)	.77 (.77)			

Note. d = Cohen's d.

We adapt measures from Shen et al.'s (2013) study of self-efficacy in online learning environments. Of the thirty indicators from the original scale, confirmatory factor analysis leads to removal of lower loading indicators (under .6), resulting in 20 indicators loading on five latent variables. The data fits the model with a CFI of .85 (χ^2 (2) = 352.15, p < .01) and an RMSEA of .12 (90% CI [0.11, 0.14], p = .01). McDonald's omega reliability results show .88 for Complete, .82 for Social. .93 for CMS, .96 for Instructor, and .88 for Classmates. Latent constructs exhibit discriminant validity, with average variance explained all over .5 and larger than inter-construct squared correlations (see Table 2).

Table 2. Self-efficacy factors correlation matrix and AVE

	Complete	Social	CMS	Instructor	Classmates
Complete	1				
Social	.45**	1			
CMS	.53**	.53**	1		
Instructor	.31**	.33**	.53**	1	
Classmates	.35**	.49**	.49**	.48**	1
AVE	.72	.59	.56	.73	.71

Note. Complete = Completing an online course; Social = Interacting socially with classmates; CMS = Handling online course management tools; Instructor = Interacting with instructors; Classmates = Interacting with classmates for academic purposes. *Correlation significant at the 0.01 level

Using Z scores for the self-efficacy factors, a MANOVA test shows statistically significant differences (F (5, 79) = 2.43, p < .05) across the five factors. A detailed ANOVA test (see Table 3) shows the self-efficacy factors of complete (Confidence I can socially interact with my classmates in any online course) and social (Confidence I can do the following academic tasks with my classmates in any online course) are statistically significantly different between the two TRI comfort levels. Results partially support H1, with learners less comfortable with technology report lower self-efficacy in social interactions with classmates and academic-specific social interactions. Interaction with the instructor and/or TAs, while not statistically significant, is weaker for the lower comfort level group. Self-efficacy, relating to 1) completing an online course and 2) handling an online course's content management system, exhibits no difference between the two groups.

Table 3. Self-efficacy by TRI comfort ANOVA results

Self-efficacy factor	F	SS	df	Mean Square	F	p
Complete	Between Groups	.25	1	.25	.26	.61
	Within Groups	75.08	79	.950		
Social[a]	Between Groups	5.07	1	5.07	6.14	.015
	Within Groups	65.26	79	.83		
CMS	Between Groups	1.33	1	1.33	1.45	.232
	Within Groups	72.43	79	.92		
Instructor	Between Groups	2.19	1	2.19	2.34	.13
	Within Groups	73.92	79	.94		
Classmates[b]	Between Groups	5.05	1	5.05	5.87	.018
	Within Groups	68.03	79	.86		

Note. *Correlation significant at the 0.01 level. [a]General social relationships. [b]Education specific relationships.

The t-tests show both engagement (t (99) = 0.07, p = .47) and achievement (t (99) = -1.3, p = .2) levels do not differ between the technology comfort groups (see Table 4).

We test H2 and H3 with a nonparametric test—Mann-Whitney-Wilcoxon (see Table 4). Results, using the transformed data, again show engagement does not differ between the technology Comfortable (Mdn = 6.62×10^{13}) and Uncomfortable (Mdn = 6.28×10^{13}) levels (U = 1259, p = 0.97, r = 0.98). The same non-significant result is obtained for the achievement measure technology Comfortable (Mdn = 344.4×10^{7}) comparing to Uncomfortable (Mdn = 398.9×10^{7}) levels (U = 1060, p = 0.16, r = 0.19). We thus reject H2 (Learners who are less comfortable with technology exhibit lower engagement in asynchronous online classes) and H3 (Learners who are less comfortable with technology exhibit lower achievement in asynchronous online classes).

Table 4. t-test and Mann-Whitney test differences in engagement and achievement

	Comfortable		Uncomfortable		
	M	SD	M	SD	t
Engagement[a]	5.73	2.54	5.7	2.75	t(99) =0.07, p = .95, d =.013
Achievement[b]	311.31	159.07	359.88	207.2	t(99) = -1.3, p = .2, d =.263
	Mdn	Range	Mdn	Range	Mann-Whitney test
Engagement[a]	6.62	9.03	6.28	9.51	U = 1259, p = 0.97, r = 0.1
Achievement[b]	344.4	5.78	393.9	7.26	U = 1060, p = 0.16, r = 0.19

Note. [a]$\times10^{13}$. [b]$\times10^{7}$

Suggestions and reflections

Students with lower levels of technology readiness exhibit reduced levels of self-efficacy. Specifically, our millennial learners show lower confidence in social interaction with classmates generally, and specifically regarding coursework. Although not statistically significant, interaction with the instructor is also a concern for these learners, while confidence to complete the online course and handle the class technology is equal across all levels of technology readiness.

Learners do not have an issue with the mainstream of MOOC-like technology delivery systems (e.g., online video, quizzes, and web-based writing assignments). Millennials are generally considered able to handle simple technical tasks (Kirschner & De Bruyckere, 2017) in a way that aligns with this online class, where technical competence falls within a narrow range of digital skills (Warden et al., 2013). Although millennials are self-confident, late adopters are already at the limit of their capabilities, as current results show. The technical demands of moving fully online may result in low participation if ignored.

Learner discomfort in engaging with technology for social interactions is a new finding. Although social network usage is widespread, learners lower in technology readiness are concerned over how to execute social interactions within formal class settings—similar to the findings of Toliver (2011) showing Facebook savvy students find digital classroom tools difficult. Social interaction is key to retaining participation (Zheng et al., 2015), meaning any millennials who are technological late adopters may avoid selecting an online class out of concern surrounding social interactions.

Social media in education can be motivating (Hortigüela-Alcalá et al., 2019), but how they can be integrated into education is unclear (Gebre et al., 2014; Tang & Hew, 2017). Those with little experience and lower technology readiness may expect digital teaching technologies to echo the established tools of conventional pedagogies. Our findings reinforce Kennedy and Fox's (2013, p. 76) assertion that, while millennials use a large variety of communication technologies to stay connected with their friends, they are using such tools primarily for, ". . . personal empowerment and entertainment, but are not always digitally literate in using technology to support their learning."

Instructors across disciplines and institutions face a heavy investment in instructional material development, quite aside from the technical challenges, to move classes online (Giuntini & Venturini, 2015; Stanton & Harkness, 2014). Special attention is required to reassure learners that social interaction among classmates is doable. However, not all millennials are early adopters or able to adapt to fully online class-based technologies.

Moving a class online can be accompanied with communication channels to reassure these less technology ready students that the online class resembles the physical class in that patterns of social interaction are supported. While it is tempting to increase technology-based solutions, such as posting boards and/or chatrooms, this may not address concerns. These concerns are subjective in nature—reflecting the lower technology readiness. Rather than a real issue of behaviour, this social aspect is more an expression of concern, leading to the limitations of this study.

Self-efficacy reflects learners' subjective beliefs at the start of the semester. This study does not report on actual social network use throughout the semester, which is a potential topic for future research. Another limitation is the research frame which focuses on an elective class, meaning participants are self-selecting. Students with a much lower technology readiness likely self-select out from the class and may perform quite differently if required to take an online class.

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