

Digitally Literate Introverts Have More Fun: Zoom eLearning in Israel during the Coronavirus Pandemic

Tal Samuel-Azran

IDC Herzliya
azrant7@gmail.com

Tsahi Hayat

IDC Herzliya
tsahi.hayat@gmail.com

Yair Amichi-Hamburger

IDC Herzliya
yairah@idc.ac.il

אינטרוברטים בעלי אוריינות דיגיטלית נהנים יותר: למידת זום מקוונת בישראל במהלך מגפת הקורונה

יאיר עמיחי-המבורגר

המרכז הבינתחומי הרצליה
yairah@idc.ac.il

צחי חייט

המרכז הבינתחומי הרצליה
tsahi.hayat@gmail.com

טל סמואל-עזרון

המרכז הבינתחומי הרצליה
azrant7@gmail.com

Abstract

The 2020 Coronavirus pandemic forced universities to hastily move to an eLearning format on a mass scale, necessitating analyses of demographics that are more challenged by the move. This study specifically aims at identifying how introversion/extraversion level and digital literacy come to play in students' satisfaction with the eLearning environment. The analysis examined 272 Israeli students (N=272) who moved from a physical to Zoom environment between March-July 2020 following the eruption of the pandemic. The analysis identified that, against our hypothesis, introverts expressed more satisfaction from the move to study on the video-conference Zoom platform. For highly introverted people, high digital literacy significantly increased course satisfaction. We discuss these findings, which strengthen the notion that online "the poor are getting richer", in line with relevant literature.

Keywords: introversion, extraversion, Zoom eLearning, digital literacy.

Introduction

In March 2020, the coronavirus pandemic caused universities and schools worldwide to abruptly move from face-to-face to an online studies format at an unprecedented global scale, most commonly using the Zoom video communications software platform (Demuyakor, 2020). The new incarnation of the education world, also titled emergency eLearning, forced students who had never experienced eLearning to study a full academic curriculum online. Accordingly, universities realized the need to identify satisfaction from the move to online courses in general and amongst different demographics in particular (Murphy, 2020). This is particularly true in light of strong indications that the eLearning format will continue in the near future in light of the continued spread of the pandemic (Wijaya et al., 2020).

*Proceedings of the 16th Chais Conference for the Study of Innovation and Learning Technologies:
Learning in the Digital Era*

I. Blau, A. Caspi, Y. Eshet-Alkalai, N. Geri, Y. Kalman, T. Lauterman (Eds.), Ra'anana, Israel: The Open University of Israel

To contribute to current literature, this study aims at identifying how personality traits and technical skills come to play in students' satisfaction with the eLearning environment. Thus, we examined the interplay between students' digital literacy skills and their level of introversion/extraversion, two aspects which past studies have identified as crucial for satisfaction with eLearning experience (Muhammadi, 2015; Hamburger and Ber-Artzi, 2015). The analysis will identify how these aspects interplay with students' satisfaction at the beginning, middle and end of an eLearning course studied on the Zoom platform during the Spring semester (March-July) 2020 in Israel taking place following the eruption of the pandemic in the country.

The fact that the study was conducted on Zoom, which became the most common platform for eLearning, makes it a unique case study as Zoom was almost never studied as an eLearning platform before the pandemic. The fact that Zoom was not used for eLearning by the participants means that, theoretically, it should give some advantage to extraverts, since studies identified that extraverts are more likely to try new web-based services and technologies (Svensden et al., 2013). Further, the Zoom platform is essentially a video conference platform, thus potentially giving an advantage to extraverts, since studies have identified that whereas introverts prefer asynchronous platforms such as discussion boards and blogs (Kramer et al., 2008), extraverts flourish on video-based interactions (Fraj-Andres et al., 2013). Conversely, because Zoom replaced face-to-face learning and because it allows its users to turn their camera off and also contains features such as chat to ask questions privately without "talking" in the online class, it also provides potential advantages to introverts. All this makes our study a timely and important addition to current literature.

Introversion and student satisfaction in eLearning studies

The study of the importance of personality of the learner in online learning is a sub-category within the wider field of eLearning studies. It aims to identify, amongst other things, whether the move from face-to-face to online platforms serves students with specific personality types while challenging others. One of the most commonly used personality types models in education (and beyond) is the big five personality traits model (Costa et al., 1992; Amichai-Hamburger et al., 2020) This model is also considered one of the most validated methods to understand the relationship between personality and internet behaviors (Amichai-Hamburger et al., 2002) as well as personality and academic performance (Poropat, 2009). Of the five main personality traits suggested by the model, the *Extravert-Introvert* distinction, is widely considered the most dominant distinction affecting many online behaviors (Amichai-Hamburger et al., 2002) and in particular learners of all types (Kim, 2012). Notably, Carl Jung (1921) defined extraverts as individuals who feel energized in the company of a large crowd and introverts as those who prefer solitude or very few friends, aspects that prove crucial in determining whether students prefer group projects or working alone, class participation or quiet reflection etc. (Poropat, 2009).

The study of introverts versus extraverts' satisfaction from moving to the Zoom platform will add a new layer to the long tradition of studies of introverts and extraverts in the classroom. Studies conducted in the traditional classroom often identified that although extraverts have an advantage in class participation in the physical classroom, introverts are at an advantage in all other aspects of grading system. This happens as exams and assignments tend to give an advantage to those who prefer to spend long hours by themselves going over the course material (Geen et al., 1985). With the advent of the commercial web in the 1990s, studies claimed that introverts gained even more benefits in class with the integration of asynchronous discussion boards online in lectures, allowing them to express their thoughts in the quiet of their homes or offices (Belcher,

1999). The advent of online social networks and their integration in academic studies assignments, however, dramatically reversed notions regarding introverts' advantage in the classroom. A 2013 study conducted in Taiwan linked extraversion and satisfaction with online courses using web 2.0 applications (Shih et al., 2013). A later study further identified a significant association between extroversion and use of web-based courses (Barnett et al., 2015). Other studies highlighted that extraverts flourish particularly in visual-based online social networks such as Instagram (Samuel-Azran and Ravid, 2016). As Zoom is defined as a video conferencing platform, by definition highly visual, and the lectures take place with the students opening their web-camera (although, as noted, they can decide not to), we hypothesize that extraverts will express higher satisfaction from the move to eLearning via the Zoom platform.

The role of digital literacy in online learning behavior

The issue of digital literacy relates to the proficiency in finding, using, and evaluating information skills that require both technical and cognitive abilities (Eshet-Alkali and Amichai-Hamburger, 2004). Importantly, although our study was conducted on a group of students of which the great majority falls within the definition of "digital natives", thus born after 1996, studies identified that even within this group there are dramatic differences in digital literacy. Analyses shows that both lecturers and the students who belong to the "digital natives" generation largely overestimate their digital skills (Magrino and Sorrell, 2014), and that many of this generation lack the required skills to manage eLearning tools successfully (Messineo and Delleos, 2005). In addition, studies note that even within digital natives there are gaps, as some are exposed to technologies as toddlers while others are introduced to technological devices as late as elementary school (Livingstone and Helpser, 2007).

Indeed, empirical studies further highlight that even within digitally literate participants in an eLearning environment, the differing level of literacy can make a dramatic difference on the performance of participants. A study in New Zealand found that participants in a professional development for accountants eLearning course with higher digital literacy performed better and enjoyed the course more (Mohammadyari and Singh, 2015). Follow-up studies on digital natives in Saudi Arabia (Alhabeeb and Rowley, 2018) and Asia (Tang and Chaw, 2016) further confirmed a very strong correlation between digital literacy constructs and effective learning online. These analyses further strengthen the need to include the digital literacy aspect in studies examining students' evaluations of eLearning experiences.

Thus, we ask the following research question:

RQ1: to what extent does digital literacy mediate the interplay between extroversion, and satisfaction with eLearning?

Methodology

Sample

Participants in this study were Israeli and international undergraduate, and graduate students in a private college in the center of Israel (N=272), all of whom were enrolled to Zoom based classes during the 2019-2020 academic year. Data collection was conducted between March and July 2020.

Procedure

Each participant was invited to participate in our survey by e-mail, signed an informed consent form and followed a link to a 'Qualtrics' online self-report survey. **Introversion**, our independent variable was derived from the Big Five personality traits scale (Gosling et al., 2003). The participants were presented with ten items, assessing their personality traits. The participants were asked to write a number next to each statement to indicate the extent to which you agree or disagree with that statement (ranging from 1-"Disagree strongly" to 7-"Agree strongly" ($\alpha = .77$; Median = 3.6; SD = 1.26).

Our moderating variable, **digital literacy** scale (adapted from Hargittai, 2009), assessed the extent to which the participants are familiar with 21 different computer and Internet-related items (e.g., Phishing, Hashtag, etc.). For each of these items the participants were asked to indicate their familiarity with the item between 1 "no understanding" and 5 "full understanding" of the item ($\alpha = .71$; Median = 3.72; SD = 2.71).

The dependent variable, course satisfaction (adapted from Chemers, Hu, & Garcia, 2001; Lee & Lee, 2008) was measured using 7 items. For each of these items the participants were asked to indicate their satisfaction on a six-point scale ranging from 1 "very low satisfaction" to 6 "very high satisfaction" ($\alpha = .77$; Median = 4.73; SD = .92). Additionally, sex and age data were gathered from our participants, and used as control variables in our study.

Results

We employed linear regression models to study the interplay between introversion and digital literacy on course satisfaction. The regression model, a three-step hierarchical multiple regression model, assessed the interaction effect introversion and digital literacy on course satisfaction. The Durbin-Watson statistic was used to investigate the assumption of independence. Normal probability plots were used to investigate the normality of error terms and homoscedasticity was tested by observing the scatterplot of the residuals and the predicted value. These checks identified no violations of multiple regression assumptions. All statistical tests were one-tailed and a significance level of $P < .001$ was set for all analyses.

To facilitate the interpretation of the interactions, all continuous variables used in our model were standardized. To calculate the statistical power of this study to reject false null hypotheses, we conducted a post hoc statistical power test (Faul et al., 2009; Cohen, 1992). With 11 predictors in the regression analysis, an observed R^2 of .88, a sample size of 487, and $\alpha = .05$, the test results indicated an observed power of 1.0.

As can be seen in Table 1, age, gender, were entered in the first step. introversion and digital literacy were entered in the second step and their interaction term in the third step. The overall model was significant (step 3: $\Delta R^2 = .009$; $F(7,270) = 352.22$, $P < .05$). To test the appropriateness of our steps, we assessed the R^2 increase in step 2 relative to step 1, as well as for step 3 relative to step 2, with an F test. The results of the F test show that the respective F changes of step 2 and step 3 were 1042.56 ($P < .05$) and 27.81 ($P < .05$), respectively. Regression coefficients and significance values are presented in Table 1. As indicated by our findings, there was a significant main effect for introversion ($\beta = .68$, $SE = 0.31$; $t_{267} = 46.29$, $P < .05$), a significant main

effect for digital literacy ($\beta = 0.29$, $SE = 0.30$; $t_{267} = 3.17$, $P < .01$), and a significant interaction ($\beta = 0.28$, $SE = 0.51$; $t_{267} = -5.27$, $P < .05$). The interaction plot, depicted in Figure 1, suggests that for less introverted people, digital literacy plays a significant role in course satisfaction, while for

highly introverted people, high digital literacy significantly increased course satisfaction. Simple slopes tests, following Cohen et al, (2013) were conducted at one standard deviation above and below the mean of help availability. Both slopes were significant ($P < .001$).

Table 1. Standardized Variables Included in the Hierarchical Regression Model Predicting Course Satisfaction

	<i>Step 1</i> (<i>n</i> =272)		<i>Step 2</i> (<i>n</i> =269)		<i>Step 3</i> (<i>n</i> =269)	
	β	<i>t</i>	β	<i>t</i>	β	<i>t</i>
<i>Age</i>	-2.59	-3.69*	.02	.07	.12	.39
<i>Gender</i>	.64	.95	-.28	-.95	-.30	-1.03
<i>Introversion</i>			.72	44.81*	.68	46.29*
<i>Digital literacy</i>			.31	3.52**	.29	3.17*
<i>Introversion × Digital Literacy</i>					.28	5.27*
<i>Adjusted R²</i>	.07		.82		.84	
<i>F change</i>	10.51*		1042.56*		27.81*	

Note. Since all continuous variables were standardized, β s for continuous predictors correspond to standardized regression coefficients. * $p < .05$, ** $p < .01$

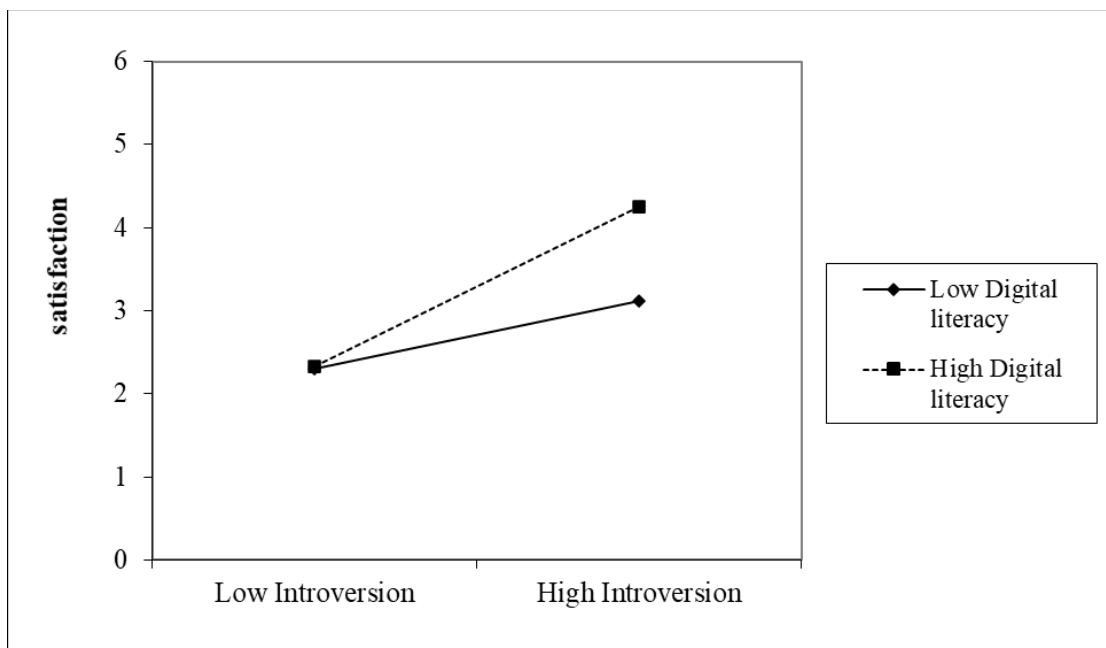


Figure 1. Interaction effect of introversion and digital literacy course satisfaction (n=272).

Conclusions

The analysis examined the role of introversion/extraversion level and digital literacy in students' satisfaction from a Zoom platform eLearning experience during the 2020 Coronavirus pandemic period. The study highlighted that, contrary to our hypothesis, introverts expressed higher satisfaction than extraverts from learning on the Zoom platform. One of the interesting conclusions that can be drawn from our results is that digital literacy can help introverts enjoy and benefit from the online environment. Over twenty years ago, Hamburger and Ben-Artzi (2000) pointed out that introverts may well be empowered by the internet. They may use the anonymous online environment to compensate themselves and even reinvent themselves, to the extent that they become extroverts. This idea was paraphrased as "the poor gets richer" (Amichai-Hamburger and Hayat, 2011), namely that socially shy and withdrawn individuals may undergo a transformation online and become highly interactive, social beings with a large network of online connections. This phenomenon was found to occur mainly in online anonymous environments. Interestingly, Amichai-Hamburger and Vinitzky (2010) found that while introverts' social network size was smaller than that of extroverts, introverts do invest more effort into building and designing their personal profile on Facebook. This may be explained by the fact that introverts tend to feel anxious in real life interactions and may experience exposure on Facebook as something similar. It seems that our results may demonstrate that introverts can enhance their satisfaction from an online experience if they learn and acquire digital literacy skills. Digital literacy can be perceived as a compensation for introverts who may feel a greater challenge than extroverts in the typical Face to Face learning experience.

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