Investigating Online Learning Readiness of Indian Undergraduate Students

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Abstract: Online teaching and learning has alternated from being ancillary to primary and back through the course of the last few years. From discussion on the use of technology and online learning being a secondary fall back mechanism before COVID 19 to being the only means of education during the pandemic, the importance and impact of online modes of learning has seen many deliberations. Post pandemic, the status changed with the need for online teaching and learning methodology being established pragmatically. This pragmatic acceptance needs to be further investigated to understand the factors influencing learning and teaching. The current study was conducted to develop an instrument to measure online learning readiness of students with specific focus on learning motivation, computer/internet self-efficacy and self-directed learning variables. 18 items focusing on three competencies, namely motivation for learning, self-directed learning, and computer/internet self-efficacy were included in the initial instrument. EFA (exploratory factor analysis) shows that the instrument has three factor structures of online learning readiness with 63.75% variance in relationship among the items. All factors had high reliability as Cronbach's $\alpha > .823$. The final instrument had 16 items as two items which cross loaded on multiple items were not considered for the study. Motivation for learning, self-directed learning and computer/internet self-efficacy had 8 items, 5 items and 3 items respectively. Three of the factor structures of the Online Learning Readiness Scale (OLRS) instrument have been conformed through the current study. Academicians and researchers can employ Online Learning Readiness instrument to get better insight about t learning motivation, computer/internet self-efficacy and self-directed learning competencies of students pursuing undergraduate education.

Keywords: online learning, motivation, self-directed learning, computer self-efficacy, autonomy.

1. Introduction

Online learning has oscillated between positions of being secondary and primary mode of learning resulting from the pandemic's impact globally. If pre-covid era was marked with technology being a scaffold to face to face teaching, the pandemic brought online teaching to the forefront of teaching-learning milieu. However, post the pandemic's effect waned off online teaching is being considered as an option, but still grapples with questions about effectiveness in imparting education. Research in this domain has shown that a possible positive environment can be created for online learning and teaching, despite numerous challenges that are present in this domain not only from mainstream students but also for students who need special assistance(Fitzgerald, Miller, Higgins, Pierce, & Tandy, 2012; Morgan, Higgins, Miller, Pierce, Boone, & Tandy, 2016; Straub & Vasquez, 2015; Sublett & Chang, 2019). Online learning brings with it many challenges, ranging from those faced by students, teachers to those faced by administrators who struggled with infrastructural issues. In totality online learning and teaching

are still being debated as either being an effect support to face to face teaching or as a standalone approach to teaching. In either situation, an investigation into the preference of students and their readiness to learn online would be prudent to champion the cause of online teaching or to identify the lacunas, if any.

Online learning has been aided by revolutionary developmental work in information technology and the ability to share content, both synchronously and asynchronously. This was boosted by the pandemic (Bozkurt, 2019)that cornered the academic fraternity into employing technology for teaching. Online learning had gained momentum as a preferred mode of learning and teaching, even before the pandemic, as many studies have shown it to be the preferred mode of learning for learners and higher educational institutes (Allen & Seaman, 2013; Hung 2016). Online learning models also facilitate convenience, flexibility and is also known to improve collaboration (Poole, 2000; Chizmar & Walbert, 1999; Hung, Chou, Chen, & Own, 2010). However, there are also studies that show that online learning readiness needs to be ascertained before implementing any such course or program as the results may not always be encouraging. Readiness, in this situation, refers to the psychological, physical competence and availability of tools for primary learning needs (Holmes & Gardner, 2006).

Additionally in the Indian sub-context online learning can be a challenge owing to the load on the infrastructure. Although India is endowed with a digital transformation, with economically priced internet services and low-cost digital learning devices such as phones, tablets, computers and laptops the overall readiness for successful implementation of online learning and teaching approach needs to be ascertained due to the heterogeneous student composition, the burdened administrative machinery and probably the nascent educators in terms of technology.

The present research explores both validity and reliability of the developed instrument, selection of set items to be included in the final instrument in order to measure learning motivation, computer/internet self-efficacy and self-directed learning, the key factors that affect online learning readiness and finally the effect of gender on learning readiness.

2. Literature Review

Online learning readiness can be defined by including students' preference between online and face-to-face interaction, their competence in using electronic communication for learning with focus on internet use and computer-mediated communication and lastly by considering their competence to learn autonomously (Warner, Christie, & Choy, 1998). This idea was extended as the "cognitive awareness and maturity that a student develops for successful learning in a web-based environment" and also considers self-directed learning strategies, technological competence, digital etiquettes awareness and readiness to seek help as being pivotal to the readiness of learning online (Liu & Roberts-Kaye, 2016). The idea of online learning readiness was extended to incorporate notions of benefits derived and increase in quality of learning(Lopes, 2007; Kaur & Abas, 2004)along with student preferences on delivery, their competence and confidence in online communication and their ability to engage in online learning(Warner, Christie, & Choy, 1998).

This was furthered using a 13 item instrument for measuring readiness by Maggie McVay Lynch (2000, 2001) which focused on two key aspects related to online learning namely comfort with e-learning and self-management. Collaborative learning processes on online platforms have proven to be beneficial in elevating learning environment, meaning creation and objective achievement(Harasim, Hiltz, Teles, & Turoff, 1995; McKavanagh, Kanes, Beven, Cunningham, & Choy, 2002; Stacey, 1996). Self-management has been evident in most concurrent researches which is necessary for effective resource-based learning in distance education and flexible delivery(Boote, 1998; Evans, 1999; Warner, Christie, & Choy, 1998). Similar results were resonated in research carried out by Smith et al (2003) here "comfort with e-learning"

Earlier research defined the concept of self-directed learning as the process in which students formulated learning needs, identified goals, computed needed human and material resources required to select and implement learning strategies. This was described at Self-directed learning(Knowles, 1975) and has proven to be a keen driver in identifying their learning needs based on their personalities and also a component that powers student autonomy (Guglielmino, 1997). Motivation for learning is also directly impacted by online learning readiness as this aligns with their own desire(s) which would influence learning, retention and retrieval. Both intrinsic and extrinsic motivation plays a crucial role in the way students learn as intrinsic motivation led to lower drop out ratios and better learning strategies

which resulted in higher-quality learning and better enjoyment in educational institutes (Czubaj, 2004; Deci & Ryan, 1985). Extrinsic motivation can include higher grades on exams, getting awards and prizes and can be considered as a behaviour to achieve a specific reward (Deci & Ryan, 1985).

Traditional learning environment may tend to be restrictive for students when it comes to control. Textbooks or other instructional material tend to follow a linear sequence, which is not the most organic way to learn. However, in online teaching and learning more flexibility and freedom is permitted as students can choose the type of material and the pace with which they want to study. Synchronous and asynchronous learning allows students to be in control of their learning experience and process (Shyu & Brown, 1992) and online learning environments try to maximize this freedom, if delivered appropriately(Hannafin, 1984; Reeves, 1993). Internet and communication self-efficacy also influence online learning readiness. Computer and internet self-efficacy is not merely related to the ability in using a computer for simple tasks, it transcends into application of higher-level skills and cognitively challenging tasks such as troubleshooting and using software to analyze data (Eastin & LaRose, 2000). These in turn assist cognitive, motivation, affective and decisional processes (Bandura, 1977, 1986, 1997). Computer mediated communication becomes a corner stone concern in online learning environment due to it being the only two way communication channel present for the feedback. Research has shown that online environments are more conducive to elicit shy students' participation (Palloff & Pratt, 1999) which emphasizes the need for creating a platform for richer discussion amongst the students and the instructor (McVay, 2000; Roper, 2007).

Given the importance of these factors in creating a conducive learning environment these need to be investigated especially when the change is happening not by choice but was forced due to the pandemic. Online learning readiness is an excellent tool to understand how adaptable students are to this new learning environment and how it will affect their performance. Additionally, it also clearly results shows how students can be in control of their own learning which results in better learning and retention.

The McVay questionnaire was used for the present study because of the mounting evidence in its support (Sadler-Smith & Riding, 1999). The clear focus of this tool makes it one of the most detailed, yet comprehensive ways of gathering insight about online readiness of students.

3. Research Methodology

A detailed survey was designed and conducted by sharing survey links with students pursuing undergraduate degree. Unengaged responses were identified and removed from the total responses after data cleaning.

3.1 Data Sources

Responses were collected from 400 students pursuing undergraduate education in India. A careful data cleansing was conducted for missing values, errors and normality before data analysis was attempted. Final data size, post cleansing, was 370 out of which 180 (44.3%) were females and 226 (55.7%) were male respondents. The age group of the respondents varied between 17 to 22.

3.2 Instrument

The study used a five-point Likert scale ranging between strongly agreed to strongly disagreed to measure online learning readiness of students. A total of 18 items were included in the questionnaire which were rated by the respondents.

3.3 Sampling

The instrument developed was the main tool for collecting primary data from students. Random sampling technique was applied, through printed questionnaires as well as online. The data were analyzed by using a statistical software programme SPSS.

4. Data Analysis

370 responses were considered for the research out of which 53.8% respondents were males while 46.2% were females. In terms of the categorization of age, for ages 17 to 22 with an interval of 1 year between each the number of respondents were 12, 134, 120, 64, 27 and 13 respectively. The respondents were also asked about their preferred tool for studying online where a majority (62.7%) , 232 of 370 preferred to use a smart phone for studying online while 122 respondents (33%) used laptops for their educational needs. Personal computers (desktops) and tablets were preferred by only 10 (2.7%) and 6 (1.6%) of the total respondents selected for the survey.

Exploratory Factor Analysis

For the purpose of this study Exploratory factor analysis was performed on 18 variables. For various statistical analysis statistical software SPSS was used. Exploratory Factor Analysis increases the reliability of the scale through inappropriate items identification, which can be removed. The dimensionality of constructs can also be ascertained using exploratory factor analysis, by investigating the relationships, that may exists between items and factors, especially when limited information relation to dimensionality may be present (Netemeyer, Bearden, & Sharma, 2003).

The Kaiser-Meyer-Olkin Measure was employed to validate sampling adequacy. It yielded KMO=.926 which is above 0.6 (Kaiser, 1974). Bartlett's test of sphericity, $\chi 2 = 3340.625$, p value of .000 indicates that inter correlation matrix is not identity matrix and correlations between items were sufficiently large for exploratory factor analysis.

Table 1 Factor Variance Explained

Component		Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
		Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
dimension0	1	7.731	48.316	48.316	7.731	48.316	48.316	3.848	24.050	24.050
	2	1.449	9.054	57.370	1.449	9.054	57.370	3.542	22.137	46.187
	3	1.021	6.381	63.750	1.021	6.381	63.750	2.810	17.563	63.750
	4	.872	5.448	69.198						
	5	.766	4.789	73.987						
	6	.561	3.508	77.495						
	7	.535	3.346	80.840						
	8	.511	3.197	84.037						
	9	.446	2.786	86.823						
	10	.403	2.518	89.341						
	11	.368	2.302	91.643						
	12	.330	2.062	93.705						
	13	.290	1.813	95.518						
	14	.266	1.661	97.179						
	15	.236	1.474	98.652						
	16	.216	1.348	100.000						

Table 1 Extraction Method: Principal Component Analysis.

Firstly, the eigenvalues for each factor was calculated. The study found that it is a three-factor solution, as three factors had eigenvalues greater than one. Table 1 illustrates 16 item explained 63.75% of variance. The variance displayed by each of the factors were 48.316% (Motivation for learning), 9.054% (Self-Directed Learning) and 6.381% (Computer/Internet Self Efficacy) respectively. It shows motivation for learning has highest impact on online learning readiness of students followed by Self direct learning and Computer/Internet Self Efficacy. EFA was carried out on 18 items with a rotated component matrix using SPSS, focusing on three factors namely Motivation for Learning, Self-Directed Learning and Computer/Internet Efficacy to understand students' online learning readiness pattern. Two of these items, 'I am not distracted by other online activities when learning online (instant message, internet surfing) had a factor loading of 0.388 and 'I seek assistance while facing learning problems had a factor loading of 0.359 were deleted resulting in final three factors structure for the study consisting of 16 items only.

Table 2 Descriptive Statistics of Online Learning Readiness Instrument

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
Motivation for learning	370	1	5	3.63	1.136	-0.722	-0.039
Self Direct Learning	370	1	5	3.53	1.077	-0.597	-0.101
Computer/Internet Self Efficacy	370	1	5	3.69	1.133	-0.840	0.229

Table 2 shows minimum, maximum, mean, standard deviation, skewness, and kurtosis of three factors. It is clearly evident from the data analyzed that respondents have higher levels of computer/internet self-efficacy with a mean of 3.69 while motivation for learning and self-directed learning were at a mean of 3.63 and 3.53. The minimum and maximum values are the same, at one and five respectively, for all three competencies. Additionally, the skewness and kurtosis were less than one, which shows variables are normally distributed.

Table 3: Factor Values of Variables

	Factor		
	1	2	3
Factor 1: Motivation for learning			
1. ML1	.697		
2. ML2	.687		
3. ML3	.650		
4. ML4	.649		
5. ML5	.615		
6. ML6	.614		
7. ML7	.603		
8. ML8	.570		
Factor 2: Self Directed Learning			
9. SDL1		.837	
10. SDL2		.834	
11. SDL3		.633	
12. SDL4		.608	
13. SDL5		.548	
Factor 3: Computer/Internet Self-Efficacy			
14. ISE1			.716
15. ISE2			.716
16. ISE3			.714

The above table shows final three-factor structure and variables under each factor. Variables that have factor loading of more than 0.5 were included in the construct. Factor 1 Motivation for learning has the highest number of variables, i.e 8 variables. Factor 2 Self Direct Learning has 5 variables. Factor 3 Computer/Internet Self Efficacy has 3 variables.

Cronbach Alpha was ascertained for each factor, as a test of factor reliability, wherein a satisfactory internal consistency range is set between 0.7 to 0.9 (Blunch, 2008). All three factors of this study had high reliability as Cronbach's α were .895, .859 and .824 for Motivation for Learning, Self-Directed Learning and Computer/Internet Self-Efficacy respectively.

Table 4: Group Statistics of Gender

Group Statistics					
Gender		N	Mean	Std. Deviation	Std. Error Mean
Motivation for Learning	Male	199	3.5609	0.87769	0.06222
	Female	171	3.6265	0.81405	0.06225
Self-Direct Learning	Male	199	3.5266	0.89174	0.06321
	Female	171	3.5392	0.82835	0.06335
Computer Efficacy	Male	199	3.6767	1.02817	0.07289
	Female	171	3.7018	0.91112	0.06967

Above table shows the mean average and std. deviation of Online Learning Readiness of Male and Female. There are a total 199 Male and 171 Female respondents. Mean average of Motivation for Learning in female (3.63) which is almost equal in male (3.56). Mean average of Self Direct learning in female is 3.54 and in male 3.53, which is almost equal in both the genders. Mean average of Computer efficacy in female is 3.70 and in male 3.68, which is also almost equal in both the genders.

Table 5: Independent Samples Test

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Motivation for Learning	Equal variances assumed	3.154	0.077	-0.740	368	0.460	-0.06553	0.08852	-0.23959	0.10853
	Equal variances not assumed			-0.745	365.839	0.457	-0.06553	0.08801	-0.23861	0.10754
Self Direct Learning	Equal variances assumed	1.481	0.224	-0.139	368	0.889	-0.01255	0.08999	-0.18951	0.16441
	Equal variances not assumed			-0.140	365.752	0.889	-0.01255	0.08949	-0.18853	0.16343
Computer Efficacy	Equal variances assumed	1.233	0.268	-0.246	368	0.806	-0.02504	0.10176	-0.22513	0.17506
	Equal variances not assumed			-0.248	367.643	0.804	-0.02504	0.10083	-0.22331	0.17324

Independent Sample T Test is used to analyse mean difference in Online Learning Readiness of both genders.

Ho: There is no significance difference between Online Learning Readiness of Male and Female
H1: There is significant difference between Online Learning Readiness of Male and Female
Independent Sample T Test states that p value for Motivation for Learning is 0.460, Self Direct Learning 0.889 and Computer Efficacy is 0.806. Here p value is more than 0.05 which means we fail to reject the Ho i.e. there is no significance difference between Online Learning Readiness of Male and Female respondents.

5. Discussion:

Research in the domain online learning has brought forth various factors that impact, both positively and negatively. The present research also strengthens some of these important aspects and extends it through the detailed analysis conducted here. The methodological approach carried out as part of this research shows that motivation for learning has the most significant impact on online learning readiness while there is no difference between the two genders when it comes to learning readiness through the online mode. The research focused on first developing a data collection tool, i.e. a questionnaire, which had 18 items. Analysis showed that two of the variables had a loading of less than 0.5 and thus these two variables were removed. Two items that were deleted are 'I am not distracted by other online activities when learning online (instant message, internet surfing) that had a factor loading of 0.388 and 'I seek assistance while facing learning problems which had a factor loading of 0.359. The final three factor structure that emerged after the analysis consisted of total 16 items. Motivation for learning has 8 items, Self Directed-Learning had 5 items and Computer/Self Efficacy has 3 items respectively. The systematic analysis carried out gives a data collection tool that is comprehensive for use by future researchers also.
Further, the three factor structure was analysed to measure the variance. Motivation for learning, Self-Directed Learning and Computer Self-Efficacy depicts 63.75 variance. The variance explained by Motivation for learning is highest i.e. 48.32%, followed by Self Direct Learning 9.05% and Computer/ Internet Self Efficacy 6.38%. It means Motivation for Learning has highest effect on Online Learning Readiness of respondents followed by Self Direct Learning and Computer/Internet Self Efficacy. This insight can help important stake-holders such as policy makers, teachers, parents and even online educational institutes should focus on this factor to make online learning more productive. Students have not been found hesitant when it comes to interacting with other members during online learning, be it peers of educators. They are confident in using online learning as a means of gaining knowledge as it allows them some level of freedom to use materials and also be open to new ideas. This understanding is crucial to all stakeholders who are still using online learning as a parallel means of education.

Sampling adequacy was measured using The Kaiser-Meyer-Olkin, KMO=.926 which is above Kaiser's recommended threshold of 0.6 (Kaiser, 1974). Bartlett's test of sphericity, $\chi 2 = 3340.625$, p value of .000, shows that correlations between items were sufficiently large for EFA. All the three factors have high reliability as the Cronbach's α are .895, .859 and .824 for Motivation for Learning, Self-Directed Learning and Computer/Internet Self-Efficacy respectively.

The research has deeply examined the collected data and found that gender has no impact on online learning readiness. Online Learning Readiness of both genders is analysed using Independent Sample T Test. P value for Motivation for learning, Self Direct Learning and Computer Self Efficacy is 0.460, 0.889 and 0.806 respectively. The values clearly prove that gender does not become a hindrance in online learning situations. This understanding is key as some established notions related to gender and use of technology has always favoured male gender. The age-old notion of males being better at use of technology is refuted through this research giving rise to a more equal and equity-based opportunity for everyone to learn using online methods. Further research in this aspect could focus on empowering women through education in the online mode as they too are competent to use online modes and are also motivated to do so.

6. Conclusions

The exploratory study examined the factors that impact online learning readiness by developing a questionnaire consisting of 18 items. Using Exploratory Factor Analysis two of the variables with a loading of less than 0.5 were deleted, resulting in 16 strong items that were further analysed to result in 3 factor loading namely motivation for learning, self-directed learning and internet/computer-efficacy. Motivation for learning has the most impact on students' online learning readiness while gender has no role to play. Online learning may have started as a compulsion or mandate during the pandemic, however having acclimatized with the nuances, key stakeholders are using online learning as a medium of instruction in all levels of education. In a such a situation it is important to investigate the factors that affect online learning readiness as students may not be willing to still continue with the same. However the present study has revealed important findings that can be looked into by policy makers, educators, parents and organizations that primarily function in the online education milieu. The significance of the study transcends the basic notions of online learning by engaging with the students who are the key stakeholders.

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