

## **Learning Landscapes in Post-Pandemic Context: A Comprehensive Study on Online Education at University of Jaffna, Sri Lanka**

U. Latha<sup>1</sup> and I.M. Lakshman<sup>2</sup>

### **Abstract**

This study examines the challenges and opportunities of online learning preferences, and the constraints undergraduate students face, emphasizing the need for comprehensive research tailored to the Sri Lankan institutional context of higher education. Employing a dual methodology, this study meticulously examines socio-economic factors underscoring their influence on online learning experiences at the University of Jaffna. The binary outcome analysis exposes significant influences of various explanatory variables. These findings underscore the importance of considering these factors, specifically the academic year and stream, when integrating online learning into alignment with the Sri Lankan higher education framework. The study proposes recommendations for a blended learning approach with varying proportions of online components tailored to academic years, streams, and socio-economic contexts. In conclusion, this research offers a sustainable

---

<sup>1</sup> Senior Assistant Librarian, University of Jaffna, Sri Lanka

Email: [ulathanki@gmail.com](mailto:ulathanki@gmail.com), ID: <https://orcid.org/0000-0002-9364-9014>

<sup>2</sup> Professor, Department of Sociology, University of Colombo, Sri Lanka

Email: [ireshalakshman@soc.cmb.ac.lk](mailto:ireshalakshman@soc.cmb.ac.lk) ID: <https://orcid.org/0000-0001-8709-0958>



Received: 13 December 2023, Accepted revised version: 29 January 2024  
This work is licensed under a Creative Commons Attribution-Share Alike 4.0 International License

solution to the challenges posed by resource scarcity and increasing demand in the unique context of the Sri Lankan higher education landscape.

**Keywords:** Academic Streams, Academic Year, Online Education, Sri Lanka, University of Jaffna

## Introduction

Online learning was introduced as a substitute for conventional classroom learning from 2020 to 2021 since all the academic sessions have reached a standstill due to the COVID-19 outbreak in Sri Lanka. Though online learning has been in practice as a supplementary in education, to a certain extent already, it was never considered a proxy for conventional learning. However, the Coronavirus has turned everything upside down, leading to a paradigm shift in Sri Lanka's education system. Online teaching and learning played a chief role in the contemporary context of higher education during 2020 and early 2021.

In light of the evolving landscape of the Sri Lankan government's national policy proposal on higher education and the escalating demand for advanced education each year, there has been a substantial increase in higher education intake ([National Education Commission, Sri Lanka 2019](#)). Unfortunately, the current infrastructure facilities and available resources are not in sync with this surge. Moreover, the capital allocated to develop the higher education system falls short of the requirements ([British Council, 2021](#)). This predicament is further highlighted by the economic downturn and inflation prevailing in the country. As a developing nation in Southeast Asia, Sri Lanka grapples with its unique challenges and setbacks. Given this scenario, the Sri Lankan higher education system must urgently identify a feasible and practical solution.

Incorporating a structured online teaching and learning platform into the Sri Lankan higher education system could address the infrastructure and resource inadequacies and challenges these institutions face, particularly those that cannot be instantaneously resolved. Therefore, this study has made an effort in scholarly exploration to lighten up the complex dynamics in vogue

and offer insights into undergraduate students' preference for online learning in the post-pandemic in the Sri Lankan context.

### **Review of Literature**

The Coronavirus outbreak has made a drastic change in the lifestyle of the masses. Life in general and education, in particular, experienced a turnaround in teaching and learning in 2020. The standard traditional teaching methods have been replaced by online learning due to the COVID-19 pandemic ([Hayashi et al., 2020](#); [Maheshwari, 2021](#); [Priyadarshana et al., 2022](#); [Subashini et al., 2022](#); [Ramanan & Ravikumar, 2023](#)). After the closure of all educational institutions in March 2020 due to the COVID-19 pandemic, Sri Lanka swiftly transitioned to online tertiary education. [Hayashi et al. \(2020\)](#) mentioned that despite a lack of prior experience and training, nearly 90% of students actively participated in online education during this period. This may be because they did not have other options during the lockdown. On top of it, all internet service providers in Sri Lanka granted complimentary internet access to university servers till August 2020. Mainly, this change has influenced the educational sector in numerous ways.

The government plays a central role in Sri Lanka's higher education landscape, offering state institutions tuition-free bachelor's degree programs. However, this policy poses constraints on widening access to education for many. UNESCO's data reveals a gross enrolment ratio for tertiary education of 19.6% in 2018, which drops significantly when excluding external degree programs from the Sri Lanka Open University. This discrepancy highlights a gap between the growing demand for higher education and the government's capacity to meet it. Notably, [International Labour Organization \(2020\)](#) statistics indicate that 88% of youths in upper-middle-income countries have successfully continued their education through online platforms. Given these

challenges, championing online learning is a promising and sustainable solution for shaping the future of higher education in Sri Lanka.

Technology plays a significant role in enhancing the educational experience for undergraduate students. “Online learning is defined as learning partly or entirely over cyberspace, including online delivery of course materials and instructions, interactive online learning activities, presentations, and assessments” ([Cavanaugh, 2001](#); [Maddux et al., 2010](#)). Various factors influence undergraduate students' preference for online learning over conventional methods ([Chau et al., 2021](#); [Perera & Nalin, 2022](#)). Some of these factors are related to the student's characteristics, such as their readiness for and familiarity with technology. Other factors include the availability of resources, technological experience, learning preferences, study habits, objectives, reasons, lifestyles, and personal attributes ([Ninsiana et al., 2022](#)). Considering all these factors, it becomes evident that students' preference for online learning is influenced by individual attributes, convenience and flexibility, availability of resources and interactive tools, and the ability to meet diverse learning styles. Numerous factors influence students' preference for online learning over conventional learning ([Chau et al., 2021](#); [Ramanan & Ravikumar, 2023](#)). These factors can be categorised into socio-economic, personal, and technology-specific aspects. Socio-economic factors include financial constraints, access to technology and internet connectivity, and the availability of online learning resources. Personal factors include students' preferences and learning styles, motivation, and readiness for online learning ([Wijaya & Khoiriyah, 2021](#)). Technology-specific factors include the ease of use and accessibility of online learning platforms, the availability of technical support, and the overall quality of the technology used for online learning. These factors can influence a student's preference for online learning over

conventional learning ([Xu & Mahenthiran, 2016](#); [Kurdi et al., 2020](#); [Wijaya & Khoiriyah, 2021](#)). Furthermore, the interaction between these factors can vary among undergraduate students, as each individual has unique settings and preferences.

According to present Sri Lankan statistics, students prefer online learning well below 70%, but this was around 90% in conventional learning ([Hayashi et al., 2020](#)). In the present context, generally, most educational institutions have been obliged to continue their education virtually without examining the conditions necessary for effective online learning ([Kaya, S., 2021](#); [Muthuprasad et al., 2021](#) & [Selvaraj et al., 2021](#)). In the meantime, a report released in 2021 by Hootsuite, a leading social media management platform and [Central Bank of Sri Lanka \(2022\)](#) statistics, shows that 7.32 million individuals in Sri Lanka, 34% of the country's population, currently have an internet connection. This indicates that a considerable proportion of the country's population still lacks connectivity, and further, [Ramanan and Ravikumar \(2023\)](#) expressed their concern about the speed of internet connectivity. This could be considered one of the main hurdles faced by online education. In contemporary education, the rapid emergence of innovative technologies has presented a formidable challenge globally. These technologies are making their way into schools and higher education institutions, reshaping the educational paradigm. Concurrently, [Subashini et al. \(2022\)](#) underscore the pressing need for comprehensive investigations to unearth the underlying causes of constraints in E-learning and to craft effective and pragmatic solutions. The confluence of emerging technologies, the quest for student satisfaction, and the imperative to mitigate E-learning constraints form the backdrop for this research endeavour.

Students' participation is a crucial element, especially in higher education. The prime objective of higher education is to produce competent and employable graduates. The current question is, how will this 'new normal' ([Norberg et al., 2011](#) & [Nahed, 2021](#)) mode of education help increase their competency when there is less student engagement with online learning? It was stated that the success of online learning is influenced by many factors, such as available technology, accessible platforms, online activities and assessments ([Shuey, 2002](#); [Wijekumar et al., 2006](#); [Kurian et al., 2021](#) & [Nahed, 2021](#)). Furthermore, [Maheshwari \(2021\)](#) and [Samsudeen et al. \(2019\)](#) aptly observed that academic institutions must discern the factors influencing students' satisfaction and intention to engage in online learning. Therefore, finding a credible solution to this inadequacy is critical to accomplishing the prime aim of higher education in Sri Lanka.

### **Research Gap**

Despite the growing emphasis on online pedagogy within Sri Lanka's higher education setting, a pronounced research gap persists, underscoring a critical need for a comprehensive understanding and resolution of challenges associated with implementing online education as a component. Recent studies ([Hayashi et al., 2020](#)) outline a conspicuous decline in student engagement in online learning compared to traditional methodologies, prompting inquiries into online education's constraints, efficacy, and acceptance. This noticeable gap is particularly pertinent in the context of higher education's predominant goal to nurture competent and employable graduates of Sri Lanka.

Moreover, the research gap addresses the inadequate examination of the settings requisite for effective online learning in the Sri Lankan context.

The report of DATAREPORTEL 2022 unveils that a mere 34% of Sri Lanka's population possesses internet connectivity, indicating a crucial obstacle to online education despite the advancements in an array of technology, including AI, smart classrooms, and digital libraries. The noticeable connectivity challenges raise concerns regarding the feasibility and inclusivity of the online learning component in Sri Lanka's higher education system.

Furthermore, the study identifies a void in the existing literature addressing the factors influencing students' participation probability and the key elements underlying the students' engagement in online learning. While the literature acknowledges the theoretical importance of blended learning, a research gap inadequately addresses the pivotal factors to be considered when integrating online education within the framework of blended learning in the Sri Lankan higher education context.

### **Objective**

This research aims to comprehensively investigate Sri Lanka's higher education landscape by evaluating the effectiveness, constraints and conditions necessary for undergraduates to engage in online learning, specifically focusing on the University of Jaffna.

### **Specific Objectives**

- To assess the preferences and constraints of online education
- Investigating necessary conditions for effective online learning
- Propose recommendations for seamless integration of online learning into the curriculum



## **Research Methods**

This study centred around the University of Jaffna, explicitly targeting students across various academic disciplines, from agriculture to arts, engineering to management, and science and technology. The primary data collection phase unfolded between April and May 2022, utilizing an online questionnaire to gather information. In anticipation of a projected non-responsive rate of 75%, a rigorous stratified random sampling approach was employed to ensure the selection of a robust sample of a minimum of 15% undergraduates. This sample represents diverse degree programs, including Arts, Agriculture, Engineering, Management and Commerce, Technology and Science. According to the University of Jaffna administration statistics, these streams collectively encompass 7,858 undergraduates from 2017/2018 to 2020/2021, constituting 78.2% of the total undergraduate student population at the University of Jaffna, currently 10,048 students. The selection process prioritised a balanced representation from six disciplines across academic years. Invitations to partake in the survey were sent to 3000 randomly chosen students via email, accompanied by a detailed explanation of the survey's objectives and a request for written consent. A cumulative response of 1270 was obtained, which represented 16% of the total student population.

To mitigate random noise and enhance the accuracy of the analysis, 18 samples were excluded from the dataset due to missing values and measurement errors. The final sample consisted of 1,252 observations. Data underwent scrutiny using descriptive statistics and the binary probit regression model. The binary response model was instrumental in analysing students' decisions regarding participation in online learning. The dichotomous nature

of the dependent variable suggests the suitability of either a probit or a logit model for the data analysis ([Gujarati, 2003](#) & [Liao, 1994](#)).

The binary response model (BRM) is represented as,  
 $Y_i = \{1 \text{ if } Y_i > \tau, 0 \text{ if } Y_i \leq \tau\}$ . Where  $\tau$  = a threshold generally assumed to be 0. As derived from the linear probability model, the probit model estimates the probability of observing an event  $y$  given  $x$ . This can be illustrated as follows

$$\Pr(y = 1|x) = \Pr(y^* > 0|x)$$

$$\Pr(y = 1|x) = \Pr(x\beta + \varepsilon > 0|x)$$

$$\Pr(y = 1|x) = \Pr(\varepsilon > -x\beta|x)$$

$$\Pr(y = 1|x) = \Pr(\varepsilon \leq x\beta|x)$$

$$\Pr(y = 1|x) = F(x\beta)$$

$$\Pr(y = 1|x) = F(\alpha + x\beta)$$

Here,  $F$  represents the normal cumulative density function (CDF) illustrated as  $\Phi$  in the equation, and  $\alpha$  is the dispersion parameter in the nonlinear BRM. The BRM can predict

$\Pr(y = 1|x)$  values larger than one or smaller than 0. To remove this issue of  $y > 1$  or  $y < 0$ ,  $\Pr(y = 1|x)$  must be transformed into a function that ranges from negative to positive infinity ( $-\infty$  to  $\infty$ ).

The first step of the transformation is to change the probability into two odds in the equation. The explanation for transforming this into odds is that the odds illustrate how frequently a positive response ( $y = 1$ ) occurs relative to a negative response ( $y = 0$ ). This happens within the range from 0 when  $\Pr(y = 1|x) = 0$  to 1 when  $\Pr(y = 1|x) = 1$ . The probit model can then be constructed by choosing functions of  $\beta x$  that range from 0 to 1 and finally look like

$$\Pr(y = 1|x) = \int_{-\infty}^{x\beta} \frac{1}{\sqrt{2\pi}} \exp\left[-\frac{t^2}{2}\right] dt = \Phi(x\beta)$$

Scientific literature, especially within econometrics, commonly illustrates the probit model in the following form.  $\Pr(y = 1|X) = \beta_0 + \beta_n X + \varepsilon$ . Here, P is the probability that the  $i^{\text{th}}$  student's decision to participate in the online learning at time t, 1 and 0 otherwise.

X vector of the explanatory variables and  $\beta$  vector of the coefficients to be estimated.  $\beta_0$  is the Y-intercept, and  $\varepsilon_{it}$  is the stochastic component of the model at a particular time t. This research considers including 'different streams' as one of the explanatory variables in the model. This can be expressed as,

$$\frac{\Pr(y = 1|X)}{\Pr(y = 0|X)} = \frac{\Pr(y = 1|X)}{1 - \Pr(y = 1|X)}$$

$$Y_{it} = \beta_0 + \beta_1.\text{stream} + \beta_2.\text{gender} + \beta_3.\text{acyear} + \beta_4.\text{province} + \beta_5.\text{location} + \beta_6.\text{familymem} + \beta_7.\text{familystud} + \beta_8.\text{incomearner} + \beta_9.\text{expense} + \beta_{10}.\text{totaldata} + \varepsilon_{it}$$

In this model,  $Y_{it}$  is a categorical dependent variable, defined as if the undergraduate student's decision to participate in online learning then = 1 and 0; otherwise,  $\beta_0$  is the intercept, under the explanatory variables, the stream is a dummy variable coded as if Science stream=1 and 0 otherwise, the gender is a dummy variable treated as if female =1 and 0 otherwise, the academic year is categorical variable coded as first year=1, second year=2, third year=3 and fourth year=4 again the province of the undergraduate from is a string variable corded from 1 to 9, the location was coded as rural=1, suburban=2 and urban=3, number of students in the family, and number of income earners in the family were measured in numerical value, average monthly expense for

data for the student was measured in monetary units, average monthly data usage by the student measured in MB and  $\epsilon_{it}$  is the stochastic component of the model. The data were analysed using the software STATA 15.

## **Results and Discussion**

The findings are systematically interpreted through a dual lens of descriptive statistics and the qualitative response regression model analysis. This comprehensive approach provides a quantitative snapshot of the data and investigates the qualitative shades that underlie and enrich the numerical outcomes.

### **Descriptive Statistics**

Regarding the descriptive statistics derived from the analysis of the online survey data, it is noteworthy that the distribution of respondents across gender and geographical locations comprehensively reveals the constraints and preferences of the students. Mainly, the survey sample demonstrates a gender disparity, with male undergraduates comprising only 33% of the total respondents, leaving the majority to their female counterparts. Undergraduate students from the University of Jaffna were represented from all nine provinces of Sri Lanka and reflected a more diverse and inclusive sample. Notably, the greater number of students, comprising approximately 36%, came from the Northern province, and the remaining 64% represented the other eight provinces of Sri Lanka. This geographic distribution underscores the university's capacity to attract students from various corners of the country, nurturing rich perspectives and experiences within its academic community. Examining the location of the students further revealed that a mere 20.9% of the participants represented urban residency, while another 28.4% resided in suburban areas, and a substantial 50.7% hail from the rural areas of Sri Lanka.

Furthermore, categorization based on the academic streams revealed a heterogeneity in representation. The survey gathered the most substantial response from the agriculture stream, with an impressive 37.4% representation. Science followed closely behind, contributing significantly with a response rate of 19.7%. In contrast, the technology stream exhibited the lowest response, comprising 10.25% of participants. Engineering, arts, management, and commerce streams demonstrated comparable response rates, accounting for approximately 18%, 14%, and 13% of the survey participants.

The academic streams, including arts, management, and commerce, were collectively categorized under the "Non-Science streams." Conversely, all other academic disciplines found their classification within the encompassing category labelled as the "Science stream." This streamlined classification system facilitates a more apparent distinction between the two primary academic distinctions, simplifying the analytical process and enhancing the interpretability of data related to academic streams. Of the 1252 respondents, 46.6% (583) belong to the non-science stream, showcasing a substantial presence. In contrast, the remaining 53.4% (669) fall under the science stream category, indicating a noteworthy representation from this academic domain.

The mean income earners within student households were 1.3, ranging from a minimum of 0 to a maximum of 5. Exceptionally, 1% of the students revealed a scenario of no income earners in their families, while a predominant 74% had a single-member income earner. Finally, 22% of the families reported having two income earners. This socio-economic insight manifests

the diverse financial contexts within which students navigate their academic pursuits.

For payment preferences, 54% of students opt for the prepaid plans, while 17% endorse the post-payment alternatives. Meantime, 29% of respondents preferred both options, reflecting a flexible approach to managing their digital expenses. Recognising the significance of these choices, particularly in the context of device preferences and payment methods, family income becomes the most crucial factor in crafting the online learning environment of the students. Notably, the influential role of income in shaping internet access and online learning participation probabilities is affirmed by [Hayashi et al. \(2020\)](#) and [Subashini et al. \(2022\)](#), emphasising the broader contextual relevance of these findings.

### **Qualitative Response Regression Analysis**

In the binary response Probit regression, the chi-square probability value associated with the model, less than 0.01 ( $\text{Prob} > \chi^2 = 0.0012$ ), indicated that all coefficients of the explanatory variables in the model collectively deviate significantly from zero. The pseudo- $R^2$  value of 0.2920 reveals that this model outperforms 29% over the baseline model by suggesting the efficacy of the chosen binary model. The Link test in STATA, exhibiting the test statistics of  $\_hat$  ( $P > |z| = 0.006$ ) and  $\_hatsq$  ( $P > |z| = 0.859$ ), indicated the correct specification of the model. The statistics imply that the Link test failed to reject the null hypothesis, affirming the correct specification of the model. Interpretation of Probit model outcomes commonly relies on predicted probabilities. Table 1 concisely presents these probabilities, standard errors and corresponding significance levels for the variables.

**Table 1***Probit regression - Average marginal effects*

Average marginal effects			Number of obs		=		1,252
Model VCE		: OIM					
		Delta-method					
	dy/dx	Std. Err.	z	P> z	[95% Conf. Interval]		
dstream	-.0075072	.0277856	-0.27	0.787	-.0619659	.0469515	
dgender	-.0552181	.0280913	-1.97	0.049**	-.1102759	-.0001602	
dacyear							
First year	dropped						
Second Year	.0414595	.0382702	1.08	0.279	-.0335487	.1164676	
Third Year	.0911283	.0328388	2.78	0.006***	.0267653	.1554912	
Fourth Year	-.0364081	.0460614	-0.79	0.429	-.1266868	.0538705	
dprovince							
Northern	dropped						
North Central	.0655835	.0480715	1.36	0.172	-.0286349	.1598018	
North Western	.0085096	.0433186	0.20	0.844	-.0763933	.0934125	
Eastern	.0434719	.0445345	0.98	0.329	-.043814	.1307578	
Central	.0281562	.0466846	0.60	0.546	-.063344	.1196563	
Sabaragamuwa	.0412281	.0765498	0.54	0.590	-.1088068	.191263	
Uva	.0067059	.0652879	0.10	0.918	-.1212561	.1346679	
Western	.0124249	.0501961	0.25	0.804	-.0859576	.1108074	
Southern	-.0992662	.0974334	-1.02	0.308	-.2902322	.0916997	
dlocation							
Rural	dropped						
Suburban	-.0423432	.0329187	-1.29	0.198	-.1068626	.0221762	
Urban	-.077126	.0348205	-2.21	0.027**	-.1453729	-.008879	
familymem	.0009268	.0246479	0.04	0.970	-.0473823	.0492359	
familystud	-.0323182	.0169746	-1.90	0.057*	-.0655878	.0009514	
incomearner	.0295976	.0135282	2.19	0.029**	.0030827	.0561124	
expense	5.45e-06	.0000185	0.29	0.769	-.0000309	.0000418	
totaldata	-.0005099	.000507	-1.01	0.314	-.0015036	.0004837	

Note: dy/dx for factor levels is the discrete change from the base level.  
 (\*-significant at 10%, \*\*-significant at 5%, \*\*\*-significant at 1%  $\alpha$  levels)

Examining the predicted marginal values from the Probit model in Table 1 reveals statistically significant positive contributions to undergraduates' decisions to engage in online learning depending on the academic year (Prob > chi2 = 0.006) and the number of income earners in the family (Prob > chi2 = 0.029) of the student. Conversely, gender (Prob > chi2 = 0.049), students' living location (Prob > chi2 = 0.027), and the number of undergraduate students in the family (Prob > chi2 = 0.057) were found to have negative impacts on the probability of online learning participation. Notably,

the academic stream, provinces of origin, household size, monthly data expenses, and total monthly data consumption did not exhibit statistical significance in the model, indicating no discernible influence on the online learning participation probability among undergraduates at the University of Jaffna. It is worth mentioning that some variables were excluded from the analysis due to collinearity concerns.

### **Preference, Constraints and Adequate Conditions for a Sustainable Online Education**

A compelling narrative unfolds in the technological preferences for online learning among undergraduates, transcending gender boundaries. Astonishingly, 63% of the student body exhibited an apparent inclination towards utilizing laptops as their primary tool for academic engagement, underscoring the centrality of this device in the contemporary educational landscape. Intriguingly, a mere 20% reported possession of personal computers, emphasizing a digital divide within the student community. This resonates with the findings of Hayashi et al. (2020), suggesting a consistent trend in prioritising laptops for optimal online learning experiences. In a notable disparity between preference and possession, a nominal 24.7% expressed a predilection for smartphones in online learning endeavours, yet a substantial 64% found themselves actively utilizing smartphones for educational pursuits. The remainder of the cohort expressed preferences for tablets and desktops, with a noteworthy subset opting for the versatility of multiple devices.

This elucidates the challenges students face in acquiring a preferred and convenient device for online learning. The discernible disparity in access



underscores the potential enhancement of online learning participation through pragmatic and sustainable measures to bridge this gap. Moreover, the acquisition of a device is inherently contingent upon the individual's financial capacity. Neglecting to address this aspect with due consideration may engender a substantial educational divide, impeding a noteworthy proportion of the student populace from accessing future educational opportunities due to economic disparities.

**Table 2**

*Undergraduates' preference for different modes of learning*

Preference	1 <sup>st</sup> Choice	2 <sup>nd</sup> Choice	3 <sup>rd</sup> Choice
Blended	219	785	248
Conventional	885	205	162
Online	148	262	842

Table 2 delineates the preferences of undergraduate students regarding various modes of learning. Most of the sample, comprising over 70% (885 individuals), prefer conventional learning over online and blended learning modalities. Approximately 11% of respondents express a primary inclination toward online learning. Concurrently, following conventional learning as the primary preference, blended learning emerges as the foremost choice for students in both their first and second preferences. This prominence underscores a proclivity towards technological modalities, indicating an acceptance of online learning as an adjunctive mode. Considerations of accessibility and resource availability for educational endeavours inherently guide the articulation of preferences by students. Many researchers, [Garrison and Kanuka, 2004](#); [Masalela, 2009](#); [Qiang, 2016](#); [Kintu et al., 2017](#); [Dziuban et al., 2018](#); [Kara, 2021](#); & [Subashini et al., 2022](#), advocate the blended

learning approach as a viable solution to address the resource scarcity crisis, aiming to meet the escalating demand for higher education within the specific context of Sri Lanka. Therefore, fostering online learning in the blended learning environment is imperative.

**Table 3**

*A gender perspective on online learning*

Online Learning	Male 0	Female 1	Total
No (0)	263	579	842
Percentage	63.22	69.26	67.25
Yes (1)	153	257	410
Percentage	36.78	30.74	32.75
Total	416	836	1,252

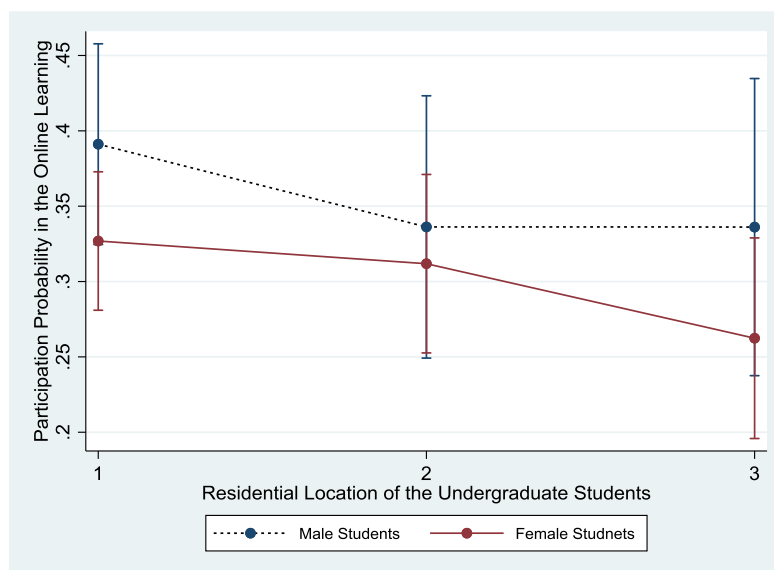
Table 3 presents a comprehensive examination of gender-related influences on the preference for online learning. The sample composition aligns precisely with university demographics, with approximately 67% comprised of female students and the remaining represented by males. Notably, the preference distribution reveals that while a significant percentage of both male (63.2%) and female (69.2%) students exhibit a reluctance toward online learning, male students (36.8%) express a relatively higher inclination compared to their female counterparts (30.7%).

In the probit regression analysis, the average marginal effect of gender on online learning participation (Prob > chi2 = 0.049) in Table 1 indicates a statistically significant lower participation probability for female students compared to their male counterparts at a 5% significance level. Figure 1 further elucidates the gender influence on the probability of online learning participation, revealing a notable preference for male students across locations. Irrespective of the location type, female students exhibit a notably

lower probability of participation. This could probably be due to the female students' preference for the conventional mode of education rather than the virtual means. The overall participation rate of the students from rural areas appears to be higher than that of individuals residing in suburban and urban areas, albeit with a maximum participation probability of just below 0.4.

### Figure 1

*Undergraduates' online learning participation probability with respect to gender and location (1: Rural, 2: Sub-urban, 3: Urban)*



The study's sample, consistent with the [Economics and Social Statistics of Sri Lanka annual report \(2020\)](#), mirrors the national trend, with nearly 70% of the student population originating from rural areas. Our sample also corroborates this trend, illustrating that approximately 79% of the participants hail from rural and suburban areas. This underscores the potential to augment student participation in online learning by providing facilities and resources tailored to the unique challenges faced by students in rural areas.

Further, it is noteworthy that the average marginal effect (Table 1) of the number of income earners in the student's family ( $\text{Prob} > \chi^2 = 0.029$ ) significantly elevates the probability of online participation. The selection of the number of income earners in the probit regression model as a proxy explanatory variable encapsulates the family's capacity and financial capability to support the procurement of necessary gadgets and data for online learning. This aspect is particularly salient in rural settings, where a prevalent pattern involves a singular breadwinner within families grappling with a higher dependency ratio.

Hence, the observed higher probability of online learning participation among rural students is attributed mainly to gender, limited logistical access, constrained household income, and reduced diversions in these regions. These findings underscore the need for targeted interventions to bridge the existing gaps in online learning participation, mainly based on constraints faced by the students concerning their location and gender in Sri Lankan rural contexts.

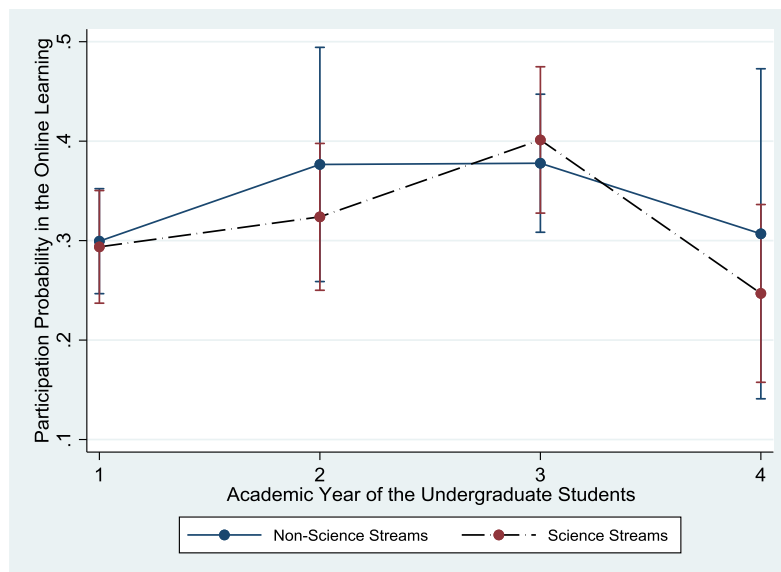
**Table 4**

*Effect of undergraduates' stream on online learning*

Online Learning	Science 0	Non-Science 1	Total
No (0)	385	457	842
Percentage	66.04	68.31	67.25
Yes (1)	198	212	410
Percentage	33.96	31.69	32.75
Total	583	669	1,252

**Figure 2**

*Undergraduates' online learning participation probability with respect to their stream and academic year*



The analysis derived from both Table 1 and Table 4 reveals that the academic stream of undergraduates does not significantly influence the probability of online learning participation. Irrespective of whether students are enrolled in science or non-science streams, their expressed participation probabilities exhibit a comparable pattern. However, a notable divergence in participation probabilities surfaces upon scrutinizing the student academic year data. The average predicted marginal value for the academic year, particularly for the third academic year, emerges as highly significant ( $\text{Prob} > \chi^2 = 0.006$ ) at a 1% significance level. Figure 2 visually illustrates the discernible variations in online participation probabilities across different academic years. At the outset of the academic year, the participation probability for both streams is uniform at 0.3. Subsequently, distinct phases of probability elevation transpire for each stream, with the non-science stream exhibiting a more accelerated increase than their science stream counterparts.

The disparity in participation becomes particularly pronounced during the second academic year, possibly attributable to non-science students finding online participation more amenable due to a diminished emphasis on hands-on practical training components in their curriculum. Conversely, this trend undergoes a rapid transformation for science stream students in the third academic year, whose probability peaks at 0.4, surpassing that of the non-science stream. However, the fourth academic year witnessed a substantial decline in online participation probability for science stream students, reaching a minimum probability of nearly 0.25. A parallel trend is observed among non-science stream students, albeit at a slower rate. This analysis underscores how undergraduate students' preferences for online learning and participation probabilities exhibit slight variations across streams but are predominantly contingent on academic years.

**Table 5**

*Mode of learning preference based on academic year*

Mode of Learning	Academic Year of the undergraduates				Total
	1	2	3	4	
Online	55	26	56	10	147
Percentage	10.15	11.76	15.38	8.00	11.74
Conventional	395	147	252	92	886
Percentage	72.88	66.52	69.23	73.60	70.77
Blended	92	48	56	23	219
Percentage	16.97	21.72	15.38	18.40	17.49
Total	542	221	364	125	1,252

Table 5 systematically outlines the preferences of University of Jaffna undergraduate students for online learning, categorized according to their respective academic years, disregarding their specific academic streams. These percentages offer a preliminary framework for crafting a customized

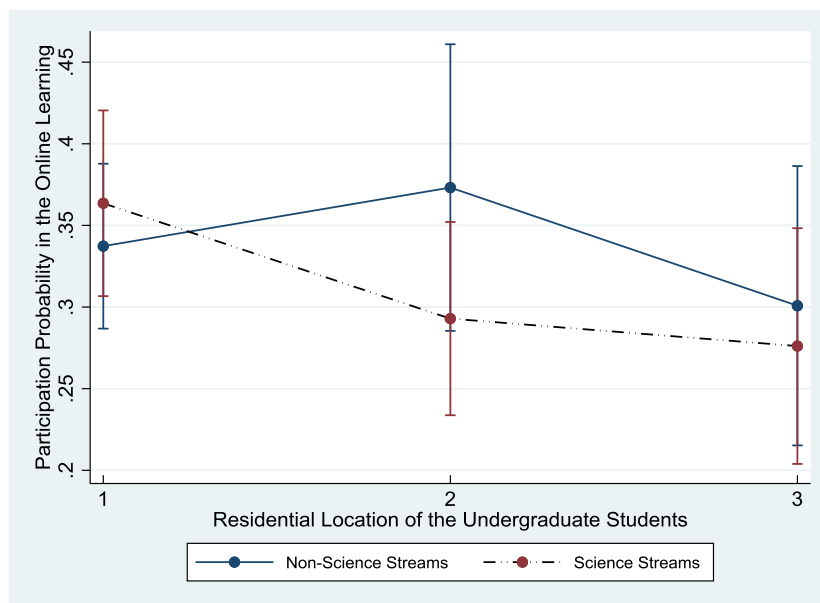
curriculum aligned with the academic year of undergraduates, acknowledging the substantial variations in their learning preferences and requirements.

Consequently, integrating online learning into higher education curricula, particularly adhering to blended learning principles advocated by numerous researchers and academics, necessitates meticulous consideration of the academic stream and, more critically, the student's academic year. The study underscores the imperative of precisely planning the inclusion of online learning components, suggesting that a substantial proportion must be blended with conventional education for sustained viability. It becomes evident that the blending percentage warrants careful consideration, varying considerably across disciplines and academic years in accordance with the weightage of hands-on practical components and other academic commitments, differing significantly based on the students' stream and academic year. Therefore, a flexible approach in determining the percentage of the online learning component is indispensable for achieving sustainable academic progress and ensuring the delivery of quality tertiary education in Sri Lanka.

Figure 3 outlines the impact of location on the probability of online learning among University of Jaffna undergraduates belonging to distinct academic streams. Mainly, students in the science stream exhibit a notably higher probability of online learning participation than their non-science counterparts. Suburban areas demonstrate considerable variability in online participation probabilities across the major stream categories. Conversely, in urban settings, the disparity in participation probabilities between both streams diminishes compared to suburban locations.

**Figure 3**

*Undergraduates' online learning participation probability with respect to stream and location (1: Rural, 2: Sub-urban, 3: Urban)*



The negative relationship between location and online participation is substantiated by Table 1, indicating 5% statistical significance ( $\text{Prob} > \chi^2 = 0.027$ ). This suggests a diminished enthusiasm for online learning among urban students. Typically, science stream students, who are mandated to incorporate hands-on practical components in their curriculum, exhibit a reluctance towards the online modality.

Furthermore, probit regression discloses a significant hindrance to online learning participation with an increased number of students in the family ( $\text{Prob} > \chi^2 = 0.057$ ). This is rationalized by the economic constraints most Sri Lankan families face, making it impractical to furnish the requisite gadgets and data individually as the family size expands. In consonance with



[Hayashi et al. \(2020\)](#) and [Priyadarshana et al. \(2022\)](#), who emphasized the disproportionate impact on students from low-income households, it can be inferred that access gaps to tertiary education widen under such circumstances.

Consequently, contemplating a transformation in Sri Lankan higher education in the backdrop of resource scarcity to meet escalating demands necessitates the incorporation of blended learning as prescribed by [Aragon et al., 2002](#); [Wallace, 2003](#); [Pawan et al., 2003](#); [Eom et al., 2006](#); [Hayashi et al., 2020](#) & [Subashini et al., 2022](#). On top of it, our study recommends that having the online learning component blended at a desirable right proportion into the curriculum is mandatory. More specifically, a customized approach regarding the proportion of the online learning component in the blended learning domain based on the students' academic years and streams is essential, rather than employing a uniform approach. The authors consider this to be more crucial and a prerequisite for ensuring the success and sustainability of higher education in the evolving academic landscape of Sri Lanka.

In a nutshell, this study emphasises integrating online learning components into the curriculum and finding the optimal proportion for this integration.

## **Conclusions**

This study focused on the University of Jaffna and shed light on online education's challenges and dynamics, particularly in a post-pandemic context. The findings underscore the critical factors that constrain undergraduate learning online. The intersection of gender, location, academic stream, and economic status unveils the intricate patterns influencing the likelihood of online learning participation among undergraduates. Notably, the digital

divide, evident based on the device preferences of students, poses challenges that require pragmatic, sustainable solutions to ensure the inclusivity of students from all economic strata.

In contemplating transforming the Sri Lankan higher education landscape, incorporating online learning components into the regular undergraduate curriculum appropriately emerges as a plausible solution to address resource constraints and meet the escalating demand for higher education in Sri Lanka. Further, this study emphasizes that integration must be advocated with precision, considering the characteristics of students, such as academic year, stream, location, gender, and economic status of the family. Integrating online learning components based on these variables is crucial for higher education's sustained viability and success in Sri Lanka. The analysis across academic years and streams of undergraduates reveals a need for a flexible approach in determining the percentage of the online learning component under the blended learning domain.

In conclusion, this study contributes valuable insights for policymakers, educators, and researchers endeavouring to shape the future of higher education in Sri Lanka by acknowledging students' diverse requirements and preferences and aligning that with higher educational strategies, especially concerning the evolving digital landscape.

### **Limitations and Further Research**

Building upon the foundations laid by this study, future research endeavours could extend their purview to encompass all seventeen universities in Sri Lanka. The current study centred on the University of Jaffna and its six

faculties. However, a comprehensive understanding of higher education policy frameworks necessitates a more inclusive examination.

The precision of future research can be significantly enhanced by shifting from a broader binary classification of undergraduates as science and non-science streams to a more specific approach based on individual disciplines. This tailored approach promises to provide more insightful information, allowing for a more refined comprehension of each academic discipline's diverse needs and preferences.

Further, more attention should be directed towards determining the optimal proportion of online education within the curriculum, aligning with each academic discipline's unique demands and capacities. In essence, future research endeavours should aspire to transcend the limitations of this study by embracing a discipline-specific nationwide approach.

## References

- Aragon, S. R., Johnson, S. D. & Shaik, N. (2002). The influence of learning style preferences on student success in online versus face to a face environment. *The American Journal of distance education*, 16(4), 227 – 244.
- British Council (2021). *Proposal required: industry placement for higher education system in Sri Lanka*. <https://opportunities-insight.britishcouncil.org/news/opportunities/proposals-required-industry-placements-higher-education-system-sri-lanka>
- Cavanaugh, C. (2001). The effectiveness of interactive distance education technologies in K -12 learning: A meta-analysis. *International Journal of Educational Telecommunications*, 7(1), 73–78.
- Central Bank of Sri Lanka (2022). Annual report 2022.

Chau, K Y., Law, K M Y., & Tang, Y M. (2021). Impact of self-directed learning and educational technology readiness on synchronous e-learning. *Journal of organizational and end-user computing*, 33(6). DOI:[10.4018/JOEUC.20211101.0a26](https://doi.org/10.4018/JOEUC.20211101.0a26)

DATAAREPORTEL (2022). 2022 Report.  
<https://dataareportal.com/reports/digital-2022-sri-lanka>

Dziuban, C., Graham, C. R., Moskal, P.D., Norberg, A. & Sicilia, N. (2018). Blended learning: The new normal and emergency technologies. *International Journal of Educational Technology in Higher Education* 15(3).

Economics and Social Statistics of Sri Lanka (2020). Annual report 2020.

Eom, S., Wen, J. & Ashill, N. J. (2006). The determinants of students' perceived learning outcomes and satisfaction in university online education: An empirical investigation. *Decision sciences Journal of innovative education* 4(2), 215 – 235. <https://doi.org/10.1111/j.1540-4609.2006.00114.x>

Garrison, D. R. & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, 2004, pp. 95 – 105.

Gujarati, D.N. (2003). Basic Econometrics, 4<sup>th</sup> ed. McGraw Hill.

Hayashi, R., Garcia, M., Maddawin, A., & Hewagamage, K. P. (2020). Online learning in Sri Lanka's high education institutions during the COVID-19 pandemic. *ADB Briefs*, 151. DOI: <http://dx.doi.org/10.22617/BRF200260-2>

Hootsuite (2021). Impact report 2020.

International Labour Organization (2020). Statistics 2020.

<https://ilostat.ilo.org/education-pays-off-but-you-have-to-be-patient/>

Kara, A. (2021). COVID-19 pandemic and possible trends for the future of higher education: A review. *Journal of Education and Educational Development*, 8(1). DOI: <http://dx.doi.org/10.22555/joeed.v8i1.183>

- Kaya, S. (2021). The factors predicting students' participation in online learning English courses. *Eurasian Journal of Educational Research*, 20(91), 301–320. DOI: 10.14689/ejer.2021.91.14
- Kintu, M.J., Zhu, C., & Kagambe, E. (2017). Blended learning effectiveness: the relationships between student characteristics, design features and outcomes. *International Journal of Educational Technology in Higher Education*, 17.
- Kurdi, B. A., Alshurideh, M., Salloum, S. A., Obeidat, Z. M. & Al – dweeri, R. M. (2020). An empirical investigation into examination of factors influencing university students' behaviour towards e-learning acceptance using SEM approach. *International journal of interactive mobile technologies*, 14(2). DOI: <https://doi.org/10.3991/ijim.v14i02.11115>
- Kurian, S., Ramanathan, H.N. & Alwis, C.D. (2021). E-learning India and Sri Lanka: A cross-cultural study, *Asia Pacific Journal of Information Systems*, 31(1). <https://doi.org/10.14329/apjis.202.31.1.102>.
- Liao, T. F. (1994). Interpreting probability models: Logit, probit and other generalized linear models.-Sage Publication Inc.
- Maddux, C., Liu, L., & Cumming, R. (2010). A totally online university class in statistics for teachers: Aids and cautions. In I C. Crawford et al. (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference*, 699–704. Chesapeake, VA: AACE.
- Maheshwari, G. (2021). Factors affecting students' intention to undertake online learning: An empirical study in Vietnam. *Education and Information Technologies*. <https://doi.org/10.1007/s10639-21-10465-8>
- Masalela, R. K. (2009). Potential benefits and complexities of blended learning in higher education: The case of the University of Botswana. *Turkish Online Journal of Distance Education* 10(1).
- Muthuprasad, T., Aiswarya, S., Aditya, K. S. & Jha, G.K.(2021). Students' perception and preference for online education in India during COVID - 19 pandemic. *Social Science and Humanities Open*, 3 (2021) 100101.

Nahed, H. (2021). E-learning in the Higher education sector under the COVID – 19 pademic – Japan and Sri Lanka. *Journal of Financial Accounting & Management Studies*, 8(3), 869.

National Education Commission, Sri Lanka (2019). National policy proposals on higher education - 2019. *National Education Commission*, Sri Lanka.

Ninsiana, W., Gabidullina, F.I., Widodo, M., Paaatra, I., Pallathadka, H., Alkhateeb, D.A.A.M., Zainal, A.G. & Gheisari, A. (2022). High school students' attitudes towards e-learning and impacts of online instruction on their general English learning: challenges and issues. *Education Research International*. DOI:[10.1155/2022/9103862](https://doi.org/10.1155/2022/9103862)

Norberg, A., Dziuban, C.D., & Moskal, P.D. (2011). A time-based blended learning model. *On the Horizon*, 19(3), 207-216. <https://doi.org/10.1108/10748121111163913>

Pawan, F., Paulus, T. M., Yalcin, S. & Chang, C. F. (2003). Online learning: patterns of engagement and interaction among in – service teachers. *Language learning & technology*, 7(3), 119 – 140.

Perera R. H.A.T. & Nalin, A. (2022). Factors affecting e- learning perception during the COVID – 19 pandemic. *Asian Association of Open Universities Journal*, 17(1), 84-100.

Priyadarshana, A.J.M., Abeyrathna, G. & Ediringhe, E.A.N.J. (2022). Tertiary level students' perception of online learning during the COVID -19) pandemics (evidence from students residing in Kegalle District, Sri Lanka). *Journal of Academic Session – Advance Tech*, 15.

Qiang, H. (2016). Learners' perceptions of blended learning and the roles and interaction of f2f and online. *ORTESOL Journal*, 33.

Ramanan, T. & Ravikumar, M.N. (2023). Significance of school libraries in online teaching learning activities during the COVID – 19 pandemics in select National schools of Batticaloa district, Sri Lanka. *Journal of University Librarians Association of Sri Lanka*, 26(2), 72- 96. Doi: 10.4038/ Jula.v26i2.8069.

Samsudeen, S. N. & Mohamed, R.(2019). University student's intention to use e-learning system: A study of higher educational institutions in Sri

Lanka. *Interactive Technology and Smart Education*, 16(3), 219- 238.  
<https://doi.org/10.1108/ITSE-11 - 2018 - 0092>.

Selvaraj, A., Vishnu, R., KA, N., Benso, N. & Mathew, A.J. (2021). Effect of pandemic-based online education on teaching and learning systems. *International Journal of Educational Development*, 85.  
<https://doi.org/10.1066/j.ijedudev.2021.102444>

Shuey, S. (2002). Assessing online learning in higher education. *Journal of Instruction Delivery Systems*, 16(2), 13-18.

Subashini, N., Udayanga, L., De Silva, L.H.N., Edirisinghe, J. C. & Nafla, M. N. (2022). Undergraduate perception on transitioning into E-learning for the continuation of higher education during the COVID pandemic in a developing country: A cross-sectional study from Sri Lanka. *BMC Medical Education*, 22:521 <https://doi.org/10.1186/s12909-022-03586>

UNESCO (2020). UNESCO Global education monitoring report, 2020: inclusion and education: all means all. UNESCO.

Wallace, R. M. (2003). Online learning in higher education: a review of research on interactions among teachers and students. *Education, communication & Information*. 3(2), 241 – 280.  
<https://doi.org/10.1080/14636310303143>

Wijaya, D P., & Khoiriyah, U. (2021). The relationship between preferences for online large-classroom learning methods and self-directed learning readiness. *Proceedings of the International conference on medical education (ICME 2021)*. DOI:[10.2991/assehr.k.210930.016](https://doi.org/10.2991/assehr.k.210930.016)

Wijekumar, K., Ferguson, L., & Wagoner, D. (2006). Problems with assessment validity and reliability in web-based distance learning environments and solutions. *Journal of Educational Multimedia and Hypermedia*, 15(2), 199-215.

Xu, H., & Mahenthiran, S. (2016). Factors that influence online learning assessment and satisfaction: Using Moodle as a learning management system. *International Business Research*, 9(2). DOI:[10.5539/ibr.v9n2p1](https://doi.org/10.5539/ibr.v9n2p1)