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Learners' Expectations towards Virtual Learning and its Effect on Mathematics Performance

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The demands for virtual learning have exponentially increased because of the COVID-19 pandemic. The aim of the research was to explore learners' expectations towards virtual learning and its effect on mathematics achievement. A total of 2,350 students from basic to university levels in Nepal participated in the cross-sectional survey. T-test, ANOVA, and SEM were employed for data analysis. The findings indicate that the expectation of learners towards virtual learning from the government, educational institutions, teachers, and parents found to be significantly high. Parents' level of education, gender, and the types of educational institutions are key predictors of the expectation of learners. Expectations of learners towards virtual learning from government, institutions, and parents have negative and expectations from teachers have a positive effect on mathematics performance.

Keywords: achievement, expectation, mathematics, Nepal, virtual learning

INTRODUCTION

In recent decades virtual learning (VL), also called online or remote learning (Kerimbayev, 2016), has emerged as an alternative to face-to-face learning. In VL, especially in an asynchronous mode, students can learn at their pace, place, and time (Kerimbayev, 2016; Mupinga, 2005), which can contribute significantly to learning performance (Murugaiah & Yen, 2019). Additionally, online learning has some

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shortcomings related to learners or instructors (Kebritchi et al., 2017; Murugaiah & Yen, 2019; Nortvig et al., 2018) however the disparity between online learning and the expectation of students may affect their learning performance (Newlands & Coldwell, 2005). Several factors may affect to students perform in online classes such as parental education, students' geographical locations of schools and their homes (Westbrook, 2014) whereas the lack of infrastructure and resources, diverse teaching strategies (Mupinga et al., 2006), and negligence of concerned stakeholders (Blömer et al., 2020; Uygur et al., 2020) have created barriers to virtual learning. Kunwar et al. (2020) also showed that students' expectations, changing role of tutors, lack of effective communication, and practices of digital pedagogy are issues for the promotion of online education in Nepal. However, collaborative learning activities, access to resources, student-teacher and student-student interactions, academic behavior of teachers, and parental support are crucial for promoting online learning (Kumi–Yeboah et al. 2018). Hence this research was intended to find the effect of learners' expectations towards virtual learnings towards mathematics performance.

Virtual learning: Process and context

Blended and flipped modes of VL are major demands all over the world (UNESCO, 2021) because it is proved to be effective in enhancing learning (Halasa et al., 2020). Due to the emergence of new online platforms, a multitude of learning spaces and resources have become available for learners (Merriänboer & Stoyanov, 2008). While transforming teaching from face-to-face to virtual mode, one of the key concerns that teachers face is constructing knowledge (Luyt, 2013) suitable for online delivery (Maheshwari, 2021). In the virtual learning environment, instructors can create an engaging and immersive learning community so that students can learn through collaboration and sharing (O'Connor & Domingo, 2017; Mupinga, 2005).

Students seek a helpful learning atmosphere, interaction with instructors, and immediate feedback from the teachers in an online learning environment (Conaway et al., 2005; Hunt & Oyarzun, 2020). It is also argued that the more the cultivated motivational beliefs and strategies students possessed, the stronger the engagement they would perceive (Cheng & Tsai, 2020). Learner centered instruction as Khadka et al. (2022) suggested would be beneficial to engage students in virtual environment. The role of administrators is to provide appropriate support and resources essential for the online environment (Roby et al., 2013), which can influence the perception of learners towards online learning.

Learners' expectations, satisfaction, and achievement in virtual learning

Quality of learning outcomes, communication skills, interaction with instructors, and online resources increase students' satisfaction with online learning (Bervell et al., 2020; Palmer & Holt, 2009). Each student has unique learning experiences, needs, and expectations (Powell & Kusuma-Powell, 2011). Muljana and Luo (2019) posit that institutional support, facilitation as well as demographic variables such as home environment, family behavior, and the availability of instructional technologies determine their academic performance. Students' learning goals and teachers' efforts in

helping them to meet those goals are key in online learning (Paechter et al., 2010). Students' aspirations for learning, the instructor's expertise, and the active roles of facilitators are important for the acquisition of knowledge, skills, and competencies in online learning (Dhilla, 2017; Shaikh & Khoja, 2012). Online classes should be enjoyable by which students can be motivated towards self-regulated learners (Artino & Jones, 2012) and positive instructor-learner and learner-learner relationship is vital for motivating learners in online learning environment (Luo et al., 2022). Additionally, the technological skills readiness of students (Wei & Chou, 2020) and ways of using the internet at home are the determinant of achievement in online learning (Broadbent & Poon, 2015; Hart, 2012; Wang et al., 2013) and mathematics achievement of school to university level is poor in Nepal (ERO, 2015, 2020) however instructors also have strategic plan for enhancing student engagement and outcomes (Bolliger & Halupa, 2018).

Virtual learning: Nepali context

School Sector Development Plan (SSDP) 2016–2023 regards that the use of ICT in teaching, and access to learning materials through technology are key factors to improve the education system in Nepal (MoE, 2016). *Digital Nepal Framework (DNF) 2019* is a newly developed framework that contains several indicators such as smart classrooms, open learning exchange, development of online learning platforms, rent-a-Laptop programs, and mobile learning centers in rural areas (MoCIT, 2019). Both SSDP and DNF indicate that the government has adopted a policy to facilitate digital resources in education from K-12 to university education. Additionally, higher education institutions also integrated ICT into their bachelor's in education (B. Ed.) and master's in education (M. Ed.) in Mathematics Education programs. These policies have targeted integrating digital resources in instructional practices for facilitating teachers and students, but it is not clear what their expectations are. Hence this research is intended to know the expectation of learners from the government, teachers, and institutions about virtual learning.

The pandemic situation has created a new demand for VL hence the educational institutions and students of Nepal are demanding more digital resources (Shakya et al., 2018); however, all students are not equally capable of using digital technologies. According to Bhatta et al. (2018), a majority (80.7%) of the higher education medical students of age 19-20 years were habituated to using electronic devices whereas K-12 students are not equally familiar with digital tools. Resources, technical support, and the perception of learners have a significant role in increasing effective online learning (Gautam & Gautam, 2021). Because of the readiness of teachers, students, and administrators, online learning is challenging in the Nepali context (Khati & Bhatta, 2020). Sharma and Bhatta (2018) and Adhikari et al. (2020) suggested that the government should manage the infrastructure and free internet services in educational institutions. Paudel (2021) found that courses and policies should be reformulated for targeting effective online and blended learning.

The literature reviewed presented above primarily focused on challenges and practices of online learning in Nepal and beyond; however, the research studies on the

expectations of learners are either neglected or missing in scholarly literature. For the necessary improvement of newly adopted online learning system, learners' expectation is pivotal (Hwang, 2023; Ong & Quek, 2023). However, the expectations of learners from parents, teachers, academic institutions, and the government towards online learning and their effect on mathematics achievement have not been previously investigated in the context of Nepal. Additionally, many issues highlighted in this study like institution types, study level, and educational level of the parents are unexplored in the literature. In this respect, this research will bring a fresh perspective to contribute to the body by investigating the following research questions:

1. What is the level of learners' expectations towards online learning in school and tertiary education in Nepal?
2. What is the effect of learners' expectations towards virtual learning on mathematics achievement?
3. What is the effect of sample characteristics (gender, study level, parents' education, and types of institutions) on the expectations of learners towards online learning?

Theoretical perspectives

Connectivism could be an appropriate theoretical framework to describe the mechanism of online learning because it appropriately describes learning in the technologically enabled network (Goldie, 2016) whereas expectations of the learners in online learning are significant variable that defines connectivist approach to learning (Kebritchi et al., 2017; Murugaiah & Yen 2019; Nortvig et al., 2018). The foundation of connectivism is based on valuing others' perspectives, connections over interdisciplinary ideas, updated information, and risk bearing mechanisms (Siemens, 2005). Online environments must offer more activities than only the transmission of information (Reese, 2015). For successful online learning, learners should develop expectations that coincide with the mechanism of blended, traditional, and online courses (Reese, 2015). More importantly, teachers' roles may become more complex and time-consuming and the learners' roles may become more flexible and independent (Hoskins, 2011).

Digitally competent teachers can creatively share digital content (Yengin et al., 2010) and use pedagogical skills (Coman et al., 2020) more effectively. Continuous and prompt communication with the instructor, real-time feedback on coursework, deliberate learning strategies from the tutor, a suitable schedule of online classes, and favorable learning tools and techniques are the general expectations of learners in online learning (Bourdeaux & Schoenack, 2016; James, 2020; Mupinga et al., 2006). Student's punctuality, motivation, preferences, nature of content delivery, instructor and family support, and collaboration with the instructor are the determinants of satisfaction and success in VL (Alqurashi, 2019; Bolliger & Halupa, 2012; Hart, 2012; Landrum et al., 2020; Sun & Metros, 2011). Parents' support in managing the digital device and creating a peaceful environment in online learning is also crucial (Ayadat et al., 2021) whereas lack of internet connection and power supply are the barriers to successful VL (Laudari et al., 2021).

Parents are also responsible for the management of appropriate technological resources (Keengwe et al., 2012) and for creating a suitable environment for VL (Rahimy et al., 2021; Ribeiro et al., 2021). Muthuprasad et al. (2021) suggested that institutions should facilitate visual document sharing whereas Turnbull et al. (2021) emphasized training, sharing learning materials, and LMS management under institution roles for effective online learning. Additionally, digital tools management, study materials, cost and access to the internet, motivation, and the role of institutional administrators are determinant factors of technological integration in online learning (Adarkwah, 2021).

METHOD

Study setting

The population of this included all the students from school to university level who participated in online teaching and learning activities during COVID-19. In Flash Report (2019/2020) published by the Centre for Education and Human Resource Development, 7,481,975 students were enrolled in school level from K-12 in the academic year 2019/2020 (Ministry of Education, Science and Technology [MoEST], 2020) and university level, it was 4,41,819 in higher education of Nepal (University Grants Commission [UGC], 2020). However, during COVID-19 pandemic, data were not available about how many schools or universities initiated and run their educational activities online mode. Despite pandemic situation, a cross-sectional survey design was administered to conduct this study. The data were conveniently collected from 45 institutions across the 27 districts out of 77 districts of Nepal however representativeness of the sample in terms of level of school and university, and location was highly considered. For data collection, 40 enumerators (online learners of MPhil students of Nepal Open University) were involved. They were oriented to randomly and proportionately select the respondents across the institutions. However, some institutions did have not a large number of students and colleges were not established in each location hence the sample of basic to university level is not equal. Finally, with the help of enumerators, the questionnaires were collected from 2,350 students from K-12 schools and universities of Nepal where 83.4% of them were from schools and the rest from university level.

Research instrument

A survey questionnaire containing twenty-two items was prepared for collecting the data. The fundamental idea to develop the items was based on the assumption of connectivism, that is, mechanism of online learning environment for continuous and prompt communication with the instructor, real-time feedback on coursework, deliberate learning strategies from the tutor, a suitable schedule of online classes, and favorable learning tools and techniques, and etc. Moreover, findings from different empirical researches were also used in the process of instrument development. The nature of items was in the form of a rating scale as strongly disagree to strongly agree and rated from 1 to 5 respectively. The percentage representation of mathematics achievement was reported by the record of the educational institution for the year 2020 examination.

Validity and reliability of the instrument

The validity and reliability of the research instrument were ensured by using different statistical techniques. The research instrument was verified by piloting among 180 students (60 students each from the Basic, Secondary, and University levels) in the Kathmandu district of Nepal. The consistency of the item was ensured by Cronbach's alpha reliability method based on the data of piloting, which found 0.88 that exceeds the threshold criteria of 0.7 (Cohen et al., 2007). Similarly, the content validity was maintained by sharing the tool with education and computer science stream related four experts and incorporating their suggestions on modification of language of some items in the instrument before data collection. After data collection, the reliability was ensured by composite reliability (CR) and validity was ensured by convergent and discriminant validity methods. The value of CR was found to be >0.70 indicating that the instrument was reliable (Kline, 2016). The convergent validity was ensured by average variance extracted (AVE) and found to be over 0.5 in the case of EFI, EFT, and EFP exceeding cut up criteria of 0.50 (Blunch, 2017); however, the AVE value was 0.46 in case of EFG but it was accepted because it exceeded 0.40 (Fornell & Larcker, 1981; Huang et al., 2013). The discriminant validity was ensured by heterotrait–monotrait (HTMT) ratio correlation technique. All values were found to be less than the threshold value of 0.90 (Henseler et al., 2015); therefore, it was confirmed that the discriminant validity existed in the data (Table 1). The validity and reliability of the mathematics achievement were not calculated because the score was reported from the institutional record. The score is considered valid and reliable because there is a provision for using a specification grid considering Bloom's Taxonomy while making test items from the Basic to University level in Nepal.

Table 1
Reliability and validity

Construct	CR	AVE	HTMT Analysis			
			EFG	EFI	EFT	EFP
EFG	0.81	0.46				
EFI	0.91	0.58	0.75			
EFT	0.90	0.59	0.89	0.77		
EFP	0.85	0.58	0.81	0.63	0.84	

Variable information

The sample characteristics mainly gender, study level, parental education, and the types of institutions were considered independent variables whereas the expectation of learners towards online learning was a dependent variable. Additionally, learners' expectations in terms of EFG, EFI, EFT, and EFP towards online learning are considered independent variables for mathematics achievement. In independent variables, the gender has two categories male (50.8%) and female (49.2%). Study level has three categories: Basic (35.3%) Secondary (48.1%), and University (16.6%) whereas basic represents from classes 1-8 and secondary represents from classes 9-12 in Nepal. The fathers' qualification has three categories as illiterate (12%), school education (64.1%), and university education (23.5%). Similarly, mothers' education has same categories as illiterate (28.9%), school education (59.3%), and university

education (11.8%) whereas illiterate represents not having any educational qualification and unable to read, write and perform basic calculations and school education represents up to Grade 12 in both cases. The types of institutions have two categories: private (31.2%) and public (68.8%) as per the rule of the government of Nepal. The detail of the variable information is presented in Figure 1.

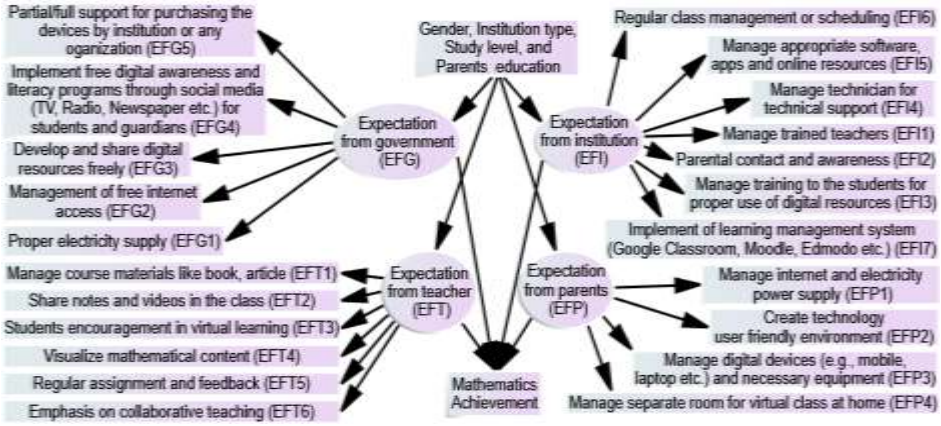

Figure 1
Conceptual framework

Data analysis techniques

Descriptive statistics mainly frequency and percentage were used to show the status of socio-demographic characteristics. Mean and standard deviation (SD) was used to determine the status of students' expectation towards virtual learning whereas a one-sample t-test was employed to test the significant level of expectation by assuming 3 as the population means. Structural equation modeling (SEM) was employed to determine the effect of (1) sample characteristics on the expectation of learners as EFG, EFI, EFT, and EFP towards online learning, and (2) the effects of the expectations of learners on mathematics achievement. The assumptions of SEM were tested before analysis as standardized residuals to evaluate normality, homoscedasticity, linearity, independence of errors, and absence of outliers (Tzagkarakis & Fidell, 2007). The data were analyzed by using Statistical Package for Social Science (SPSS 23) and Analysis of Moment Structure (AMOS 23).

FINDINGS

The items were grouped under four dimensions expectations of students from the government (EFG), expectations from educational institutions (EFI), expectations from teachers (EFT), and expectations from parents (EFP) based on the confirmatory factor analysis (CFA) technique where the factor loading are presented in Table 2. In Table 2, the one-sample t-test result shows that the level of expectation was found to be significantly high in all items including dimensions. Among all, the expectation was found highest in proper electricity supply under EFG, regular class management or scheduling and management trained teacher under EFI, emphasis on collaborative

teaching, sharing notes and videos of the class under EFT, and managing internet and electricity power supply under EFP respectively. But the level of expectation was found lowest in partial/full support for purchasing the devices by the institution or any organization under EFG, implementation of a learning management system under EFI, and managing separate rooms for virtual classes at home under EFP as compared to remaining items. Based on dimension wise analysis the mean score of perception was found to be high on EFG and EFI as compared to EFT and EFP. The achievement score in mathematics was also found to be significantly high by assuming 50 as the population means.

Table 2
Status of expectations and achievement score (n=2350)

Items with categories	Mean	SD	Factor loading	t-value
Expectation from Government (EFG)	3.86	0.97		42.92**
EFG1	4.04	1.28	0.72	38.43**
EFG2	3.79	1.40	0.70	27.32**
EFG3	3.92	1.16	0.70	39.31**
EFG4	3.92	1.21	0.67	21.24**
EFG5	3.61	1.40	0.58	36.81**
Expectation from Institution (EFI)	3.88	1.01		42.05**
EFI1	4.05	1.27	0.80	40.96**
EFI2	3.86	1.23	0.78	40.07**
EFI3	3.83	1.30	0.78	31.00**
EFI4	3.78	1.27	0.76	29.79**
EFI5	3.80	1.25	0.75	34.04**
EFI6	4.03	1.22	0.75	30.84**
EFI7	3.77	1.30	0.71	28.76**
Expectation from Teacher (EFT)	3.84	1.02		40.02**
EFT1	3.84	1.27	0.79	33.96**
EFT2	3.85	1.29	0.79	33.62**
EFT3	3.84	1.21	0.78	32.06**
EFT4	3.84	1.28	0.77	31.98**
EFT5	3.84	1.27	0.75	31.71**
EFT6	3.85	1.21	0.74	32.10**
Expectation from Parents (EFP)	3.85	1.03		40.15**
EFP1	3.94	1.24	0.82	29.19**
EFP2	3.86	1.25	0.78	33.55**
EFP3	3.85	1.23	0.77	36.48**
EFP4	3.76	1.27	0.67	33.38**
Mathematics Achievement	57.33	17.16		20.73**

**$p<0.01$

Model fit indices of SEM

Multi-factor first-order CFA model of SEM (Civelek, 2018) was employed in this research. Model fit indices as the goodness-of-fit statistics (GFI), adjusted goodness-of-fit statistics (AGFI), normed-fit index (NFI), incremental fit index (IFI), Tucker-Lewis index (TLI), comparative fit index (CFI, root means square error of approximation

(RMSEA), standardized root mean square residual (SRMR) were calculated before applying SEM for ensuring good model fit in the research. In the present model, the value of GFI, AGFI, NFI, IFI, TLI, and CFI are 0.95, 0.93, 0.95, 0.96, 0.95, and 0.96 respectively and the value of RMSEA is 0.05. Among these values RMSEA <0.08 and the remaining GFI, AGFI, NFI, IFI, TLI, and CFI are exceeding the threshold criteria of 0.95 indicating that the model is a good fit (Bentler & Bonett, 1980; Fornell & Larcker, 1981; Hooper et al., 2008; Hu & Bentler, 1999; Rigdon & Hoyle, 1997; Xia & Yang, 2019). The relative chi-square measure (CMIN/DF) was found 6.57 after modification of the model which is acceptable for model fit (Maat et al., 2015). Before finalizing the model, the modification indices were employed to improve some indices as GFI, NFI, and TLI which is presented in Table 3.

Table 3
Detail of model fit indices

Indicators	CMIN/DF	DF	GFI	AGFI	NFI	IFI	TLI	CFI	RMSEA
Values	6.57	218	0.95	0.93	0.95	0.96	0.95	0.96	0.05

Effect of learners' expectations towards virtual learning on mathematics achievement

Figure 2 shows that the learners' expectations towards virtual learning explains 5% of the variance on mathematics achievement. All observed variables have significantly affected their corresponding latent variables. Additionally, all expectations such as EFG, EFI, EFT, and EFP have a significant effect on mathematics achievement. However, EFG (beta=-0.37), EFI (beta=-0.11) and EFP (beta=13) have negative, and EFT (beta=0.54) have positive effect on mathematics achievement. The correlation value among the expectations was found to be positively significant from 0.64 to 0.89 which is high (Henseler et al., 2015) in all cases.

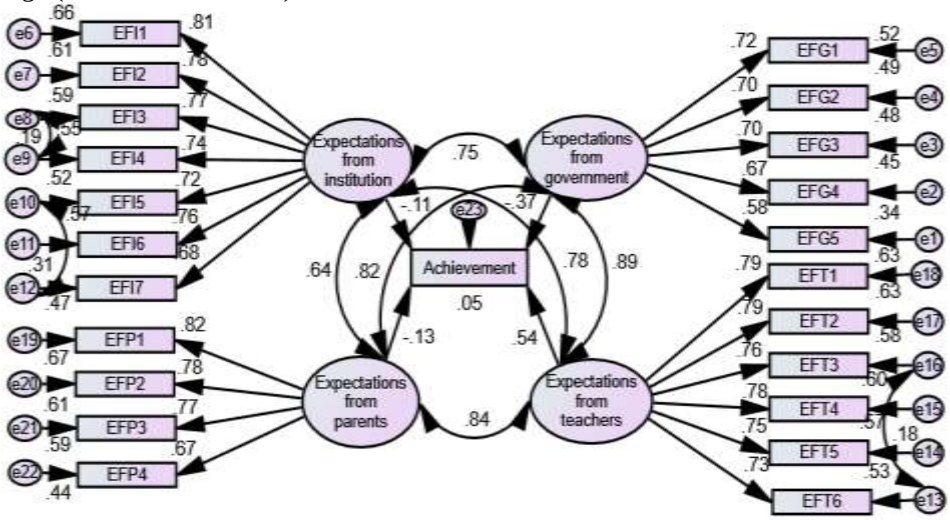

Figure 2
Effect of expectation of the learners towards online learning on mathematics achievement

Effect of sample characteristics on learners' expectations on virtual learning

Figure 3 shows that the model explained 4%, 5%, 7%, and 3% variance in EFG, EFI, EFT, and EFP respectively. Parents' (father and mother) education, gender, and types of institution are significant predictors of EFG, and fathers' education, gender, and types of institution are found to be significant predictors of EFI. Similarly, mothers' education, gender, types of institution, and study level have a significant effect on EFT, and fathers' education, gender, types of institution, and study level have a significant effect on EFP. In all cases, the type of institutions was found as the main predictor with the highest absolute beta value and all significant predictors have negative contributions.

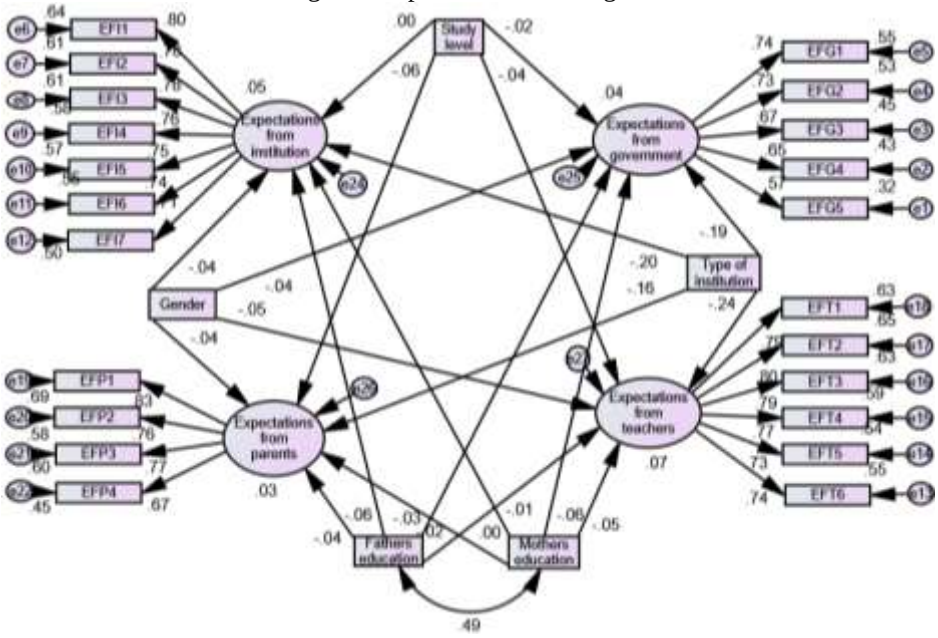

Figure 3
Effect of sample characteristics on learners' expectations on virtual learning

DISCUSSION

This study focused on the expectation of students in a virtual learning environment from the school to university level in Nepal. The expectations of the students towards online learning were found to be significantly high with respect to government, educational institutions, teachers, and parents indicating that the students do not have sufficient support from these stakeholders. Students were highly expecting proper electricity supply where (Khanal et al., 2021) also emphasized the electricity problem for using digital devices in online mathematics learning. The expectation of the learners by the institution was found to be high in regular class management or scheduling for online learning (Muljana & Luo, 2019) indicating that the institution has not sufficient, effective, and regular practice of online learning (Bourdeaux & Schoenack, 2016; James, 2020).

The high level of expectation on managing trained teachers indicated that the teachers of the school to university level should update their digital skills to improve their virtual teaching practices (Broadbent & Poon, 2015; Hart, 2012; Wang et al., 2013). Learners of all levels are expected to have collaborative teaching indicating that mathematics teachers may not have sufficient ideas to develop and share digital resources. As O'Connor and Domingo (2017) showed teachers should share resources and collaborate for effective online learning, hence the government, educational institution and other financial supporters should focus to enhance such skills of teachers (Bourdeaux & Schoenack, 2016; Kumi–Yeboah et al., 2018). The high level of expectation for regular assessment and feedback indicates that formative assessment and constructive feedback were not implemented effectively in online learning (Conaway et al. 2005; Hunt & Oyarzun 2020). Blended and flipped learning are major modes of learning (Halasa et al., 2020; UNESCO, 2021) and it will be only possible when the concerned stakeholders can create a suitable learning environment. The results as low-quality internet connectivity in Nepali educational institutions, public places, and remote areas are barriers to virtual learning as found by previous studies (Khadka et al., 2022; Laudari et al., 2021). The results of this research also corroborate the findings drawn by Adhikari et al. (2020). This finding shows that Nepali students are still struggling for the access to the Internet rather than expecting a more collaborative learning environment, automated support system and flexible online learning environment (Adhikari et al., 2023; Joshi et al., 2022; Pangarso & Setyorini, 2023). Additionally, technical support, digital awareness of parents (Ayadat et al., 2021; Khanal et al., 2021a), and separate rooms at home are also major issues of online learning (Ferri et al., 2020), which are also in favor of the results of our findings.

Study level and institution types have a significant role to determine the expectations of students hence concerned bodies should focus on fulfilling those expectations for effective virtual learning. Learners should have a comfortable environment to use digital resources (Kunwar et al., 2020). Fathers' and mothers' education has a negative effect on EFG, EFI, and EFP indicating that increment in parental education can solve digital technology related problems faced by their children. Gender has a negative effect on all expectations indicating that male students have low expectations than females, which may cause of patriarchal society of Nepal (Gadtaulaa & Chung, 2016). Guardians have more support for their sons (Pun et al., 2016, 2020; Rishal et al., 2018), which affects the level of motivation, expectations, and interests (Virtanen et al., 2015). The expectation of students from private educational institutions was higher than their public-school counterparts. The reason behind it may be due to the financial responsibility of parents from private schools. The public schools of Nepal get all financial and managerial support from the government however prime source of income is student fees in private institutions (Regmi, 2017). Study levels have a negative effect on EFT and EFP indicating that students from the higher level have low expectations than their lower counterparts which may cause the students of that level can engage in financial income related activities, they can manage their problems, and become more competent in using digital resources.

Expectations of learners such as EFG, EFI, and EFP have a negative effect on mathematics achievement indicating that the mathematics achievement and level of expectation have a controversial relationship. For reducing the level of expectation, the educational institutions must manage regular classes (Turnbull et al., 2021), provide teachers with digital training, encourage students to use digital resources, provide technical support and subject related software, apps, and online resources, and effectively implement the available LMS (Adarkwah, 2021). EFP has a negative effect on learning achievement, which indicates that parents can help their children's learning by managing separate rooms for virtual classes, digital devices and resources, internet and electricity power supply, and a technology-friendly environment (Broadbent & Poon, 2015; Hart 2012; Wang et al., 2013).

The EFI has a negative effect on learning achievement which indicate that the virtual learning practices in Nepal were triggered by the COVID-19 pandemic. The abrupt transfer from face-to-face to VL became challenging because of the lack of trained teachers, digital awareness and technical support, digital tools, and the use of LMS. The level of expectation toward electricity supply is high; however, there is a hope that some hydropower projects under construction (ADB, 2017; GoN, 2017; Macekura, 2020; Trace, 2019) might fulfill this expectation. Besides these findings, EFT has a positive significant effect on mathematics achievement indicating that the increment of the level of expectations towards VL from teachers as an emphasis on collaborative teaching, students' encouragement in virtual learning, sharing notes and videos, managing course materials, visualize mathematical content, and regular assignment and feedback support to enhance the mathematics achievement (Dhilla, 2017; Shaikh & Khoja, 2012)

CONCLUSIONS

The findings of the study shows that students' expectation from government are proper electricity supply, digital learning resources and supports in purchasing digital devices to take online class from home. That means, there is the problems of power supply, digital devices and learning resources. The students have similar expectations from parents also. They are expecting internet connectivity at home, technology-friendly environment and digital devices to support in taking online classes. Similarly, students expect trained teachers, regularity in classes and flexible scheduling as well as training for the students to join and participate in the online learning platform. These findings reflect that the institutions do not have trained and competent mathematics teachers who are capable to run mathematics class online by using effective digital resources. Online classes were not regular and scheduled. Also, the expectations of students from the government, institutions and parents were negatively correlated with mathematics achievement. This finding indicates that students seem pessimistic regarding the improvement in connectivity, power supply, teacher's practices and regularity in the classroom. On the other hand, students seem optimistic towards teachers teaching styles and preferences because the achievement of students in mathematics was significantly positively correlated in regards to expectation from teachers. However, students expect more collaborative online lessons with an appropriate use of digital resources including videos.

RECOMMENDATIONS AND LIMITATIONS

The findings of this research provide some evidence to the government, educational institutions, teachers, and parents for the type of support needed for promoting VL in Nepal. The reported results are significant for governments as well as international aid agencies (Regmi, 2021) to provide adequate resources for schools, universities, and students for VL. Given the contextual differences, the findings of this research may not be generalized to all the countries but they are useful for devising digital learning policies and plans for developing countries like Nepal. As noted above, while the findings of this study are drawn through rigorous statistical analysis, we could not perform complete randomization, which is a limitation of this study. The study was based on a survey and limited to the institutions of Nepal hence further study can be carried out to see how the case of Nepal compares with the cases of other developing countries that have to aspire to implement VL.

The higher expectation of students regarding internet connectivity and digital resources management at home indicates that the environment of learning from home is not good for students. So, the government should develop and implement a certain plan for free or cheap internet service to the students. The role of parents in a conducive environment for learning at home is crucial, so, parents should take responsibility for their children's education. The government and other concerned stakeholders should broadcast and telecast digital awareness programs through radio, television, and other social media. Additionally, schools and child-related organizations like junior red cross, children's clubs, houses, and scouts can be used by conducting street drama, disputes, essays, and other dramatic programs to manage the appropriate home environment and parental awareness.

The government and international organizations should support students by avoiding value-added tax (VAT) on digital resources, providing free wi-fi in educational institutions, additional support for marginalized peoples, broadcasting/telecasting digital awareness programs, free online training, and encouragement for the teacher to develop digital learning resources (Sharma & Bhatta, 2018). The high level of expectation demands the support of developed countries in cooperation, coordination, and sharing of their ideas as well as the support of education related organizations such as UNESCO, World Bank, and others for awareness and resource management in developing countries like Nepal otherwise, equality, equity, quality education, and digitally literate society will be limited only to rhetoric.

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