Knowledge Management & E-Learning, Vol.15, No.2. Jun 2023

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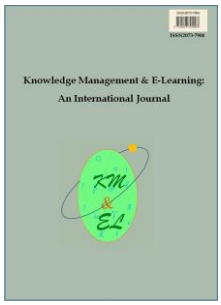

Knowledge Management & E-Learning: An International Journal (KM&EL)
ISSN 2073-7904

Recommended citation:
Zulfiqar, N., Ajmal, R., & Bano, A. (2023). MIMIC model of teachers and students attitudes towards online learning during Covid-19: A gender perspective. *Knowledge Management & E-Learning*, *15*(2), 174–191. https://doi.org/10.34105/j.kmel.2023.15.010

Knowledge Management & E-Learning, 15(2), 174–191

MIMIC model of teachers and students attitudes towards online learning during Covid-19: A gender perspective

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Abstract: Academic institutions around the globe have shifted to online learning because of the unpredictable spread of COVID-19. The present study aimed to compare teachers' and students' attitudes towards online learning during the pandemic and to examine the effects of gender differences on their attitudes. In study 1, we adapted the Test of eLearning Related Attitudes for Pakistani students in three steps: expert review, piloting, and validation. The individual and collective expert review was performed to adapt the teacher version into the student version using the Technique for Research of Information by the Animation of a Group of Experts (TRIAGE). We tested three sets of measurement invariance models for participants' status and gender in study 2. Data were collected from 289 university teachers (men = 158, women = 131) and 444 undergraduate students (boys = 156, girls = 287). The results demonstrated that both groups had highly positive yet different attitudes towards online learning. Teachers were more satisfied than students. Model fit was poor, and the overall factor structure, factor loadings, and intercepts varied across groups. Intergroup gender invariance illustrated heterogeneity in attitudes towards online learning favoring men teachers and boy students. Study strengths and implications for the promotion of a positive experience of online learning are discussed.

Keywords: Covid-19; Student-teacher comparison; Structural equational model; Pakistan; Online learning environment

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1. Introduction

COVID-19 has affected approximately 94% or 1.6 billion students worldwide and has affected up to 99 low- and lower-middle-income countries (De Giusti, 2020; Hussein et al., 2020). This rapid change caused various issues for the teachers and students. Regardless, a smooth transition from formal face-to-face education to distance learning is impossible overnight (Crawford et al., 2020). Teachers and students face challenges in adapting learning in a way that most of them were unfamiliar with before, i.e., learning online and outside of the educational institution (Gelles et al., 2020). The technology acceptance model (TAM) suggests perceived usefulness and perceived ease of use as two basic features to regulate whether technology will be accepted or not. Previous literature shows that this model has been used extensively by different researchers (Davis et al., 1989).

Some students had experienced distance learning before the pandemic to complement traditional learning (Hussein et al., 2020). Most students are unfamiliar with learning online and outside an educational institution (Ananga, 2020). A study mentioned that this urgent online learning experience, on the one hand, is low cost, convenient, reliable, and properly scheduled. However, distraction, technical problems, reduced workload, and inadequate support from teachers and colleagues diminish its beneficial power (Hussein et al., 2020). Social, economic, and cultural factors make online learning unsuccessful, and not all teachers and students like to read online (Febrianto et al., 2020). Some challenges regarding online learning were the lack of interaction and motivation, technical issues, data privacy, and security (Almahasees et al., 2021).

Scholars interchangeably use the terms distance learning, e-learning, and online learning without careful attention to differences in instructional objectives and alternate environments. Distance learning occurs when physical distance separates the teacher and students, and participants use technology to communicate with one other (Angelova, 2020). However, e-learning is the delivery of learning, training, or education programs by electronic means (Li et al., 2009). Online learning is a comprehensive term that provides a complete overview of various forms of online learning to use modern information and communication technologies (ICT) to promote education (Nichols, 2003). Online learning is an updated form of distance learning and is homogenous to e-learning in terms of the learning environment and access to technological tools (Moore et al., 2011). Based on these two reasons, we adopted the term "online learning" in this paper.

1.1. The present study

This study aims to examine the difference between teachers' and students' attitudes simultaneously. To do this, in study I, we adapted Kisanga and Ireson's (2016) Test of eLearning-Related Attitude Measure (TeLRA) for Pakistani students, which was previously used for teachers in Tanzania. Its language is easy to comprehend, and none of the TeLRA items contradict the cultural values of the Pakistani population. It is the best practice to use an identical measure for reliable comparison between teachers and students instead of administering a different scale to measure students' attitudes towards online learning. It is also intriguing to measure gender differences in attitudes towards online learning so that we can seek information about their choice of teaching and learning methods and the positive or negative effects of the virtual environment. In study II, we made status-based and gender-based comparisons of teachers' and students' attitudes towards online learning during the pandemic. This knowledge will facilitate informed decision-making among educators, policymakers, and administrators.

Our study addressed two areas that have not been adequately examined in earlier studies on the relationship between achievement goals and help-seeking (e.g., Arbreton, 1998; Linnenbrink, 2005; Newman, 1998, 2008; Ryan & Pintrich, 1997, 1998; Ryan, Pintrich, & Midgley, 2001). First, we tested the relationship with the online population based on the earlier studies which were mostly focused on traditional face-to-face class population. As e-learning and traditional face to face learning vary greatly in various facets including help-seeking, it's important to investigate whether the relationships found in face-to-face classes from previous results hold true in e-learning (Aleven et al., 2003). Second, we explored the relationship of both the old 2 × 2 and new 3 × 2 models and help-seeking to advance earlier studies which merely focused on the old model (Elliot & McGregor, 2001, Elliot, Murayama, & Pekrun, 2011). As Elliot and his colleagues proposed the new model and argued the conceptual difference between the earlier and newer constructs from the two models, it is important to cross examine the new model with the online population and explore the potential relationship between the new constructs of achievement goals and help-seeking.

2. Literature review

Researchers in different countries examined teachers' and students' experiences of online learning during the pandemic. Malaysians readily accepted the online platform. However, they reported massive mental effort, less enjoyment, and a high likelihood of making mistakes during the online delivery of instructions (Rameli et al., 2020). Jordanians agreed on the usefulness of online education during COVID but reported that it is less effective than traditional teaching and learning (Almahasees et al., 2021). Indonesian teachers and students (Wijaya et al., 2020) felt challenged and benefited less from online learning during COVID due to network issues and lack of technical skills, while Chinese teachers reported high satisfaction towards online learning during COVID (Wang et al., 2020). Indonesian teachers and students experienced e-learning unfamiliarity, slow internet connection, and poor physical conditions as barriers to online learning (Octaberlina & Muslimin, 2020). Developing countries such as Pakistan could not adopt the process prosperously because of the lack of resources and technical faults (Adnan, 2020). This scenario offers grounds to plan an empirical study on online learning.

2.1. Teachers' and students' attitudes towards online learning

Certain benefits and barriers experienced during school closure determine attitudes towards online learning. People develop positive or negative attitudes towards a technology based on their perceptions. Some students preferred traditional learning over online learning (Mahfouz & Salam, 2021). They showed low academic interest and considered online learning ineffective (Wijaya et al., 2020). A survey of 643 schoolteachers found a lack of acceptance for online teaching because of undefined performance expectations and effort (Sangeeta & Tandon, 2021). Teachers reported that online learning may lead to different emotional problems, such as being inhuman and disloyal towards studies (Moralista & Oducado, 2020). Other students accepted online teaching and learning with a high level of satisfaction (Nuankaew & Nuankaew, 2021). A researcher reported that students were satisfied with their online classes, with an average score of 4.54 on a 5-point Likert scale (Tuaycharoen, 2021). Likewise, Chinese teachers reported high satisfaction with responsibly fulfilling basic teaching and management tasks via online platforms (Wang et al., 2020). According to Bayrak (2022), university students favoring online learning method had high level of satisfaction than those who preferred traditional learning. Some other students equally preferred online learning and traditional learning but reported having better focus during online learning (Angelova, 2020). In a study with 312 students, 70.5% of students had a positive attitude towards the online mode of learning in making and submitting assignments and using e-learning resources (Maison et al., 2021). Nigerian nursing students also showed a positive attitude towards online learning during pandemic (Oladele et al., 2022).

2.2. Gender differences in attitudes towards online learning

A scarcity of empirical studies on gender differences in teachers' and students' attitudes towards online learning is seen in the previous literature. However, most of the studies report nonsignificant gender differences in students' online learning outcomes, readiness, and motivation (Mondal & Das, 2021; Yu, 2021). Austrian girls reported having more teachers' support and learning engagement than boys, but overall gender differences in the digital competence of 19 thousand students were nonsignificant (Korlat et al., 2021). In a meta-analysis, girls had a more positive attitude towards online learning on average than boys in Spain, Austria, and India. However, boys and girls had similar attitudes towards online learning in the USA, Jordan, China, and the Netherlands (Yu, 2021). Pakistani boys had higher motivation and confidence to use computers and the Internet for academic purposes compared to girls during COVID-19 (Rafique et al., 2021). Graduate students' experiences of online learning show that men felt challenged by having poor Internet access and nonavailability of technology, whereas women felt difficulty because of having multiple roles and lack of support (Venable, 2021).

3. Materials and methods

3.1. Study 1

This study aims to adapt Test of eLearning-Related Attitude Measure (TeLRA) for students and assess its psychometric properties.

3.1.1. Measure

3.1.1.1. Test of e-learning related attitudes (TeLRA)

Kisanga and Ireson (2016) constructed this self-report scale with 36 items across four subscales. These subscales are challenges of e-learning (12 items), benefits from e-learning (9 items), leisure interest in e-learning (6 items) and using computer systems (9 items). We adapted the TeLRA for students, which was initially developed to measure teachers' attitudes towards e-learning. This scale contained 17 positively worded items and 19 negatively worded items which were reverse scored. It is a 4-point Likert scale ranging from strongly agree (4) to strongly disagree (1) with a score range of 36 – 144. A score of more than 90 shows a highly positive attitude, a score of more than 60 shows a moderate attitude, and a score from 36 – 59 shows a negative attitude towards e-learning (see Appendix II).

3.1.2. Adaptation of the TeLRA-student version

We adapted TeLRA in three major steps: expert review, pilot testing, and validation.

3.1.2.1. Step 1: expert review

We used the original version of TeLRA for an expert review using the technique for research of information by the animation of a group of experts (TRIAGE). It is an inducible and organized procedure to obtain group consensus on certain data promptly and professionally (Gervais & Pépin, 2002). Four faculty members were shortlisted as expert reviewers from different departments of the University of Haripur, KPK, Pakistan. The selection criteria for experts were having a doctoral degree, successful completion of at least one research project, and experience in instrument development and validation.

Expert review was performed in two phases: individual and collective expert review. Each expert individually reviewed TeLRA and shared feedback with the research team. The terms "teaching and teachers" in the original version were replaced with "learning and students" in the adapted version. Item numbers 8, 17, and 23 are instances of this modification. Altogether, nine items were rephrased for relevance to the students. During a face-to-face meeting of the collective expert panel, the members developed a consensus to rephrase seven items based on individual suggestions. Two items were discarded (see Appendix I).

3.1.2.2. Step 2: pilot testing

We evaluated the psychometric properties of the TeLRA student version before its large-scale administration. Eighty undergraduate students from the University of Haripur, KPK, Pakistan responded to Google forms during Spring 2021. Their ages ranged from 19–23 years. Participants did not report any ambiguity about items' clarity and relevance.

3.1.2.3. Step 3: validation

Experts provided feedback on the face validity and content validity of the student version. Both the experts' and students' opinions about items' readability, adequacy, complexity, and representative coverage of the domain were incorporated. The adapted measure appeared to have a slightly higher Cronbach's alpha (α = .89) than Kisanga and Ireson's

(2016) pilot study (α = .87) and the main study (α = .85). The strong positive correlation coefficients of the newly adapted measure and its subscales with Kisanga and Ireson's Test of eLearning-related attitudes provide evidence for high convergent validity. Kisanga and Ireson's measure with 22 items had average inter-item correlations lower than our adapted measure. The reported mean inter-item correlations for challenges, benefits, leisure, and computer use were .35, .30, .32, and .42 respectively (Kisanga & Ireson, 2016). Whereas the adapted measure with 36 items had higher mean interitem correlations such as challenges (r = .45), benefits (r = .53), leisure (r = .65), and computer use (r = .64). However, they measure the same construct.

3.1.3. Findings

We used Kisanga and Ireson's (2016) scoring key for interpreting findings and considered average scores of > 90 to be highly positive. Table 1 presents a statistical analysis of the scale.

Table 1
Descriptive statistics, skewness, kurtosis, Cronbach's alpha and correlations among the subscales of TeLRA-student version

Scales	*K*	α	*M*	*SD*	Skew	Kurtosis	Benefits	Leisure	Computer	Total
Challenges	12	.74	27.14	5.93	.24	.07	.16	.27*	.70**	.68**
Benefits	9	.84	26.18	5.96	-.46	-.54		.78**	.37**	.77**
Leisure	9	.77	24.66	5.29	-.08	-.27			.55**	.85**
Computer	6	.74	15.65	3.97	.23	-.72				.81**
Total	36	.89	93.63	16.28	-.03	-.06				-

Note. *** p < .001. ** p < .01. * p < .05 (2-tailed)

Skewness and kurtosis were within an acceptable range with no missing data. The findings showed that participants' overall scores were highly positive towards online learning (M = 93.63, SD = 16.28). The subscale intercorrelations were significantly positive at α levels of .05 and .01, except for the intercorrelations between challenges and benefits.

3.2. Study 2

This study aims to compare teachers' and students' attitudes and examine gender differences in online learning during the pandemic. To do this, we use the MIMIC model, as a technique of structural equation modelling that stands for multiple indicators, a multiple cause model. The MI part of the MIMIC model includes its multiple indicators of the latent factors, and the multiple causes are observed predictors of the latent factors. Attitude towards online learning cannot be directly observed, therefore we treated it as a latent variable measured by its four indicators. These indicators are challenges, benefits, leisure, and computer use. We estimated MIMIC models for teacher versus students and boys versus girls which assess the simultaneous inter-correlations between latent factors and among indicators. Comparatively, if we had chosen to perform independent sample *t*-tests for status-based and gender -based comparison, it would have only informed about the presence or absence of the group differences not providing any information about where this difference lies.

3.2.1. Hypotheses

H₀ 1: There will be no significant difference between teachers' and students' attitudes towards online learning.

H₁ 1: Teachers, on average, will have a more positive attitude towards online learning than students.

H₀ 2: There will be no significant gender difference between teachers' and students' attitudes towards online learning.

H₁ 2: Girls, on average, will have a more positive attitude towards online learning than boys.

3.2.2. Participants

We collected data from undergraduate students and their respective teachers from the University of Haripur, KPK, Pakistan, and its affiliated colleges. Purposive sampling was used so that a minimum of five students of each teacher took part. In 733 total sample, 289 participants were teachers (men = 158, women = 131), and 444 participants were students (boys = 157, girls = 287) across different academic disciplines. The students' ages ranged from 19–23 years.

3.2.3. Measure

Kisanga and Ireson (2016) developed TeLRA to measure teachers' attitudes towards e-learning. Its alpha reliability was .84. The details regarding this measure are already mentioned in study 1.

3.2.4. Procedure

After prior institutional approval and ensuring participants' willingness, data were collected on Google forms during the third wave of COVID-19 in June and July 2021. We contacted university teachers via official email addresses and informed them to seek feedback from at least five students. The purpose of the study and instructions to respond to TeLRA were shared. We ensured participants about data confidentiality, its use for research only, and the right to withdraw from the survey at any time.

3.2.5. Findings

The descriptive statistics, skewness, and kurtosis scores for the student and teacher versions of TeLRA are presented in Table 2.

Table 2
Descriptive statistics, alpha reliability, skewness and kurtosis for subscales of TeLRA

Scales	Teachers (n = 289)			Students (n = 444)			Overall (n = 733)		Skew	Kurtosis
	M	*SD*	*α*	*M*	*SD*	*α*	*M*	*SD*		
Challenges	28.96	5.61	.79	27.04	6.17	.78	27.36	6.12	-.28	.21
Benefits	25.69	5.03	.83	24.76	5.84	.84	24.91	5.72	-.22	-.25
Leisure	24.28	3.55	.58	23.85	4.33	.63	23.92	4.22	-.005	.04
Computer	16.66	3.25	.70	14.74	3.39	.65	15.06	3.44	.22	-.26
Total	95.58	13.71	.88	90.39	13.00	.83	91.26	13.25	.18	.80

The overall scale scores showed that both teachers (M = 95.58, SD = 13.71) and students (M = 90.39, SD = 13.00) had highly positive attitudes towards online learning. Teachers' higher mean scores on the overall scale that show teachers had a more satisfactory attitude towards online learning than students. Higher subscale scores of teachers than students also supported the same finding. The indices of skewness and kurtosis were acceptable. Thus, the data were treated to be normally distributed.

Table 3
Descriptive statistics for gender groups of teachers and students

Scales	Teachers (n = 289)				Students (n = 444)			
	Men (n = 158)		Women (n = 131)		Boys (n = 157)		Girls (n = 287)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Challenges	29.29	5.50	28.34	5.77	27.90	6.40	26.57	6.02
Benefits	25.86	4.58	25.13	5.91	24.25	5.44	25.06	6.05
Leisure	24.50	3.00	23.97	4.40	23.64	4.10	23.95	4.47
Computer	16.72	3.09	16.41	3.63	14.72	3.19	14.76	3.50
Total	96.38	12.25	93.84	16.03	90.51	11.09	90.34	13.96

Next, four gender-based groups of teachers and students were separately examined to measure variations in their attitudes towards online learning. Table 3 shows men teachers (M = 96.38, SD = 12.25) surpassed women teachers (M = 93.84, SD = 16.03) for the higher subscale mean scores and total scale mean scores, which showed their more positive attitude towards online learning. Likewise, boys, on average, also had a slightly higher mean score on the total scale than girls. Girls benefited more from their online learning experiences and reported having fewer challenges than their counterparts. Among students, there were a few decimal points of gender difference in subscale scores of leisure and computer use.

Table 4
Correlations among the TeLRA Versions Subscales (n = 733)

Scales	Challenges	Benefits	Leisure	Computer	Total
Challenges		.46*	.51**	.76**	.82**
Benefits	-.11*		.68**	.46*	.71**
Leisure	.01	.68**		.52**	.84**
Computer	.58**	.15**	.47**		.78**
Total	.58**	.67**	.73**	.70**	

Note. ** p < .01. The upper half diagonal represents the inter-correlations for the TeLRA teacher version. The lower half diagonal represents the inter-correlations for the TeLRA student version.

Table 4 presents the relationship among the subscales of the TeLRA of both teacher and student. The subscales were significantly positively correlated with each other and with the total scale at α < .01. However, the intercorrelations of challenges with leisure was nonsignificant for students' version (r = .01). Teachers felt more challenged and experienced fewer benefits of online learning, however, the correlation coefficient was small (r = -.11). Likewise, a correlation between computer uses and benefits subscales was small (r = -.15) as compared to other moderate coefficients.

3.2.5.1. Status-based comparison

We used MIMIC models to compare teachers' and students' attitudes towards online learning during COVID-19. The word status is used to refer to being a teacher or a student. Initially, a baseline model was tested, and then the configural model was tested to examine whether the overall factor structure of TeLRA was the same for both groups of participants. All factor loadings and intercepts were allowed to vary freely across both groups. The fit indices showed that although the chi-square value was significant and CFI was high, the model fit was poor ($\chi^2(4) = 28.14$, $p = .00$, CFI = 0.97, RMSEA = .10, SRMR = .10). This implies that teachers and students had heterogeneous attitudes towards online learning favoring teachers for a more positive attitude on four subscales and the total scale. The factor loadings of the challenges and computer use were low. Therefore, both factors were correlated with further analysis. Because no modification indices above the minimum value were used in the analysis, we can infer that challenges, benefits, leisure, and computer use are equally good indicators of the TeLRA and that the overall structure also differs across groups of teachers and students. A noteworthy observation is higher factor loadings of subscales in the teachers' model as compared to the students' model.

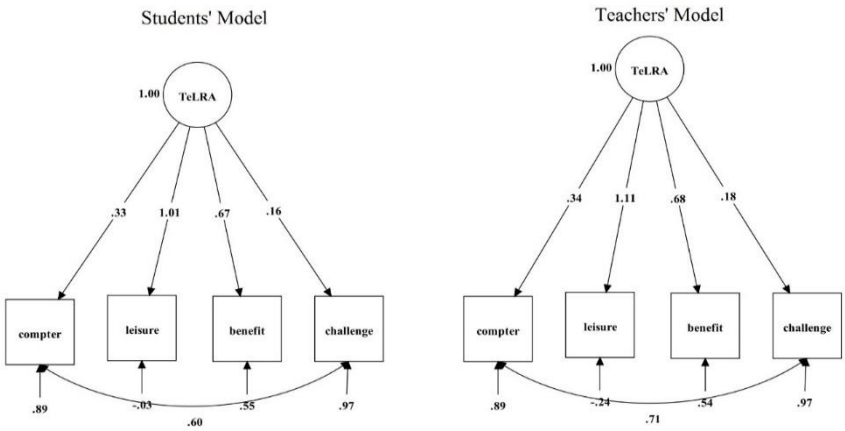

Fig. 1. Measurement invariance in students and teachers attitudes towards online learning

Next, the metric model was constrained to be equivalent across groups of teachers and students while allowing the intercepts to vary freely, as before. The findings showed a significant chi-square value ($\chi^2(6) = 39.81$) and a high comparative fit index (CFI = .95). However, the root means square error of approximation (RMSEA = .10) and standardized root mean square residual (SRMR = .12) were not in the acceptable range. The chi-square difference between the configural model and metric model was significant ($\Delta\chi^2(2) = 11.67$, $p = .00$). Thus, the model fit was interpreted to be poor, showing a difference in factor loadings on TeLRA and teachers had higher scores than students.

Finally, the scalar model was estimated, and intercepts were constrained to be equal across both groups of participants. Fit indices were not in the acceptable range ($\chi^2(9) = 69.49$, $p = .00$, CFI = 0.91, RMSEA = .12, SRMR = .13). The chi-square difference between the configural model and scalar model was also significant ($\Delta\chi^2(5) = 41.34$, $p = .00$). This meant that the intercepts were varied in both groups. The configural

model had a greater number of parameters, and it was chosen as the best-fitting model than the metric model and scalar model (see Fig. 1). This finding supports the hypothesis of status-based differences that teachers have a more positive attitude towards online learning than students.

3.2.5.2. Gender-based comparison

The secondary aim of the research was to examine gender differences in teachers' and students' attitudes during the pandemic. We tested two sets of MIMIC models to meet this objective. The configural model was tested to examine whether the overall factor structure of TeLRA is the same for teachers and students across gender groups. All factor loadings and intercepts were allowed to vary freely across gender groups. The model fit was not as desired, and fit indices were below the acceptable range ($\chi^2(12) = 308.12$, CFI = .59, RMSEA = .39, SRMR = .18).

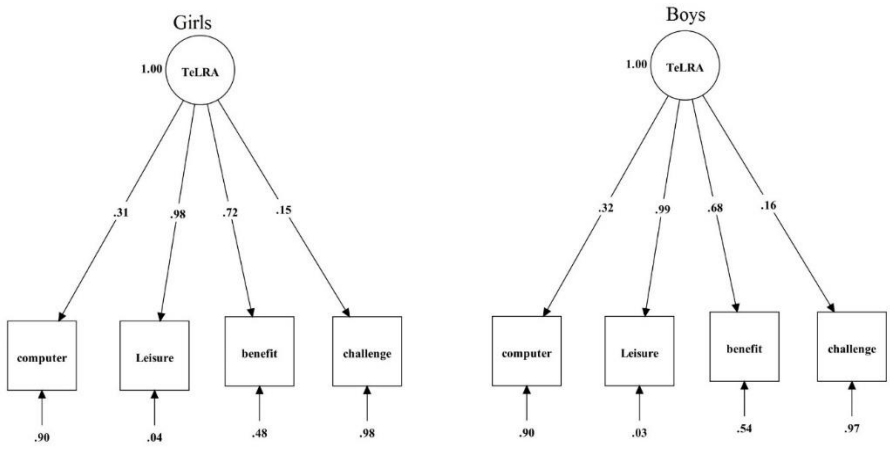

Fig. 2. Gender invariance in students' attitudes towards online learning

Next, the metric model was constrained to be equivalent across gender groups of teachers and students while allowing the intercepts to vary freely as before. The model fit was poor, and fit indices were not in the acceptable range ($\chi^2(18) = 333.53$, CFI = .56, RMSEA = .32, SRMR = .22). The chi-square difference between the configural model and metric model for gender invariance was significant ($\Delta\chi^2(6) = 25.41$, $p = .00$) (see Fig. 2).

Then, the scalar model was estimated, and intercepts were constrained to be equal across gender groups of teachers and students. All factor loadings and intercepts were allowed to vary freely across four groups. The model fit was not as desired, and fit indices were below the acceptable range ($\chi^2(27) = 375.31$, CFI = .51, RMSEA = .28, SRMR = .24). The chi-square difference between the scalar model and configural model was also significant ($\Delta\chi^2(15) = 7.19$, $p = .00$). The poor model fit of all three models for gender invariance showed a different attitude of men versus women teachers, and boys versus girl students towards online learning. Overall, men teachers and boy students outscored their counterparts. The factor loadings of subscales also confirm the results, however, do not provide empirical support for our formulated hypothesis that women will have a more positive attitude towards online learning (see Fig. 3).

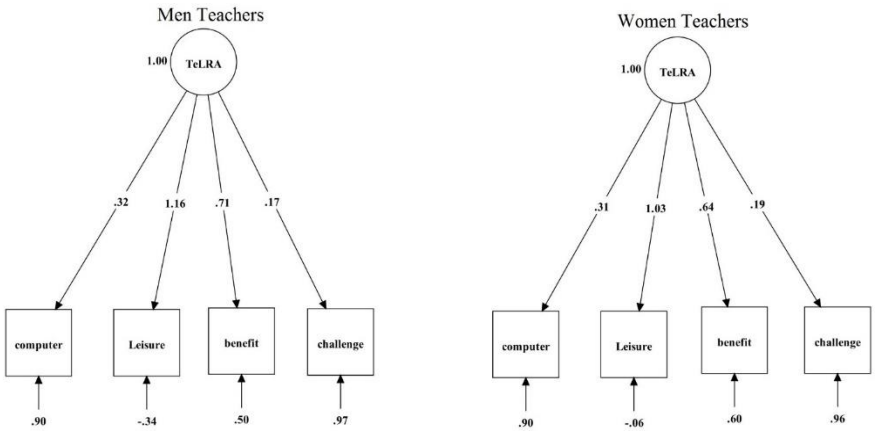

Fig. 3. Gender invariance in teachers' attitudes towards online learning

4. Discussion

We adapted and validated a student version of TeLRA as an alternative to its teacher version because we did not find any indigenous test in our literature search. The findings showed that the TeLRA is a reliable measure with high face, content, and construct validity. Its language is easy to comprehend for the Pakistani population. None of the TeLRA items contradicted the cultural values of the respective population. Study 2 examined the status-based and gender-based differences in online learning during COVID-19. Data were paired and coded for each teacher-student group. The findings show non-invariance in teachers' and students' attitudes and a more positive attitude of teachers towards online learning than students. The sample of teachers was 289, compared to 444 students. We could not make a pairwise comparison for the unmatched group size.

Developing countries such as Pakistan do not have sufficient technological or technical resources for online learning. As we virtually collected peri- and post-third waves of the COVID-19 pandemic, participants might have developed confidence in using online learning platforms. The similar number of cases in the comparison groups is another reason for the chi-square test of model fit. Model fit was poor; hence, the chi-square value was statistically significant, as it usually has a sample size of > 400 cases. Another interesting observation was acceptably high CFI values in configural, metric, and scalar models for status-based comparison. However, the poor values of RSMEA and SRMR led us to decide about the heterogeneity in teachers' and students' attitudes towards online learning. Neither the subscale intercorrelations (≥ .17) nor the factor loadings (≥ .15) across all models were large. This finding can lead to an inference of partial invariance for status-based comparison.

The participants reported having a positive attitude towards online learning. Students are satisfied with online learning in an average score of 4.54 on a 5-point Likert scale (Tuaycharoen, 2021). Chinese teachers showed satisfaction with online platforms for teaching and management tasks (Wang et al., 2020). This was particularly true for the leisure interest and benefits of e-learning. Computer is an essential tool in today's teaching-learning process. Earlier exposure and the level of comfort in technology use

might have facilitated the online learning experiences of the participants. It is plausible that participants were online not only for academic purposes but also for leisure interests and fun during the lockdown. The factor loading for leisure across all models was the highest among others. Information from the item-level analysis revealed that participants reported having highly positive attitudes towards new e-learning innovations, computer games, and social media communication. They found online learning effective, fun, cost-saving, and efficient. That is the reason, the benefit subscale had the second-highest factor loading. In contrast, some participants preferred a traditional learning environment over an online learning environment and were frustrated with the distance learning environment. Others were displeased with the technological issues and lack of technical support. Therefore, computer use and challenges had the least factor loadings, respectively.

Analysis of status-based and gender-based comparisons unveiled the location of differences in online learning. Students positively rated their online experiences and used technology for leisure and to reap benefits. Previous studies have suggested that students' positive attitudes towards online learning are aligned with this finding. Literature showed that students reported having better focus during online learning (Angelova, 2020), while a study reveals that 70.5% of 312 students reported a positive attitude towards online learning (Maison et al., 2021). Another study on Nigerian nursing students during pandemic concluded a positive attitude towards online learning (Oladele et al., 2022). Students accepted the online mode of learning with a high satisfaction (Bayrak, 2022; Nuankaew & Nuankaew, 2021). But teachers were slightly more satisfied than students. Perhaps teachers seek more support from digital devices during the teaching-learning process and are sometimes provided with training for the use of technological tools. Their convenience and comfort in technology use might be responsible for their positive ratings of online learning. When we examined four gender groups of teachers and students, they had different attitudes towards online learning. Male teachers and students reported having higher scores than female teachers and students. Men teachers reported seeking more benefits and facing fewer challenges in online teaching than women teachers. The reason may be the difficulty for women to work from home side by side, balancing the conflicting roles of house chores and child care. These findings are consistent with a previous study that concludes that graduate women students' felt difficulty because of having multiple roles and lack of support during online learning (Venable, 2021). A small gender difference was found in the standardized factor loadings on computer use. This finding is consistent with a study of Rameli et al. 2020 on Malaysian teachers.

The sample characteristics also affect the measurement invariance. Undergraduate students and their teachers were chosen from one university and its affiliated colleges. Their access to technology and technical resources was more or essentially identical. However, the findings showed that the overall structure of the TeLRA and its four indicators were different across groups of teachers and students. Similarly, the standardized factor loadings and intercepts varied in both groups. Gender invariance models for teachers and students also showed a lack of model fit. The significance values of all model comparisons were less than .05, which provided a rationale to choose the configural model as the best fitting with data for having a larger number of parameters than the metric and scalar models.

5. Strengths, limitations, and recommendations

This study adapted and validated a student version of the TeLRA that can be used in future studies in Pakistan and similar cultures. It is further suggested that future studies

investigate the reliability of the newly adapted TeLRA student version. Measurement invariance, as a technique of structural equation modeling, was used to compare the attitudes of participants towards online learning. The advantage of using MIMIC modeling is the simultaneous comparison of groups of participants on one construct. Previous studies have examined the attitudes of either teachers or students at a given time. Using the rigorous methodology, concurrent data collection, and pairing the students with their respective teachers are potential study strengths.

The highly positive attitude of participants alludes to the significance of e-learning as a flexible, convenient, and effective mode of the teaching-learning process. Educational leaders and governments should promote an online learning environment or integrate it with traditional learning approaches. The provision of technical and technological support, training, and incentives for the effective use of online learning can overcome the challenges of making it more user-friendly. As pairing teacher-student groups could have enabled a more profound comparison and examination of congruence or discrepancy in their reports about experiences of online learning, future studies can address this limitation by choosing teacher-student dyads. Furthermore, the sample size of teachers (n = 289) was relatively small to run structural equation modeling or make their comparison against 444 students. Expanding the participant pool and their geographical and demographic backgrounds can enhance the richness of the research evidence.

6. Conclusion

Access to and use of online learning forums safeguarded teachers and students from the perils of academic loss during the pandemic. Findings showed that both teachers and students had a highly satisfactory attitude towards online learning. More teachers and particularly, men benefitted more when teaching in a digital environment. Women teachers and students faced more challenges in computer use. Overall participants were online for leisure purposes during COVID-19 besides teaching and learning.

Author Statement

The authors declare that there is no conflict of interest.

Acknowledgements

The corresponding author certifies having NO affiliations with or involvement in any organization or entity that could have contributed to the writing or publishing of this research paper. We did not seek any course, expert advice, funding, or editing/formatting services from anywhere for the subject matter discussed in this manuscript.

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Appendix I

Test of e-learning Relation Attitude Scale (TeLRA) Revised

	Original Statements	Revised Statements
8	I enjoy teaching using computers.	I enjoy learning using computers.
9	Delivering a lecture through electronic technologies is very difficult.	Listening to a lecture through electronic technologies is very difficult.
14	I believe using e-learning technologies will improve my job performance.	I believe using e-learning technologies will improve my academic performance.
17	Teaching through e-learning is tiresome.	Learning through e-learning is tiresome.
23	e-Learning will increase teachers' efficiency.	e-Learning will increase students' efficiency.
26	Supporting learners in an e-learning environment is very difficult.	Learning in an e-learning environment is very difficult.
33	e-Learning is a threat to teachers' employment.	e-Learning is a threat to student's success.

Appendix II

Test of e-learning Relation Attitude Scale (TeLRA) Original

	Statements	1	2	3	4
1.	e-Learning is very economical for educational institutions to adopt.				
2.	I believe using e-learning will improve the quality of my work.				
3.	Computers make work more interesting.				
4.	I prefer reading articles in e-learning.				
5.	It is easier to revise electronic educational materials than printed material				
6.	I prefer using a computer to prepare my lessons.				
7.	I feel uncomfortable reading on computer screen than a physical textbook.				
8.	I enjoy teaching using computers.				
9.	Delivering a lecture through electronic technologies is very difficult.				
10.	e-Learning requires expensive technical support.				
11.	e-Learning reduces quality of knowledge attained.				
12.	Interacting with the computer system is often frustrating.				
13.	A face-to-face method is more learner-centered than e-learning methods.				
14.	I believe using e-learning technologies will improve my job performance.				
15.	Communicating through social networks is fun.				
16.	I like reading magazines on new technology innovations.				
17.	Teaching through e-learning is tiresome.				
18.	e-Learning increases learners' social isolation.				
19.	e-Learning technologies are difficult to use.				
20.	Using computer systems requires a lot of mental effort.				
21.	Discussions on e-learning technologies are uninteresting.				
22.	My institution has enough teaching-learning resources for e-learning.				
23.	e-Learning will increase teachers' efficiency.				

24. Working with computers is exciting.
25. I like discussing about new e-learning innovations.
26. Supporting learners in an e-learning environment is very difficult.
27. e-Learning infrastructure is very expensive for the government to afford.
28. It will be difficult for me to become skillful in the use of e-learning tools.
29. I make errors frequently when using a Computer.
30. Using a computer at home is very frustrating.
31. Using e-learning technologies will allow me to accomplish more work than would otherwise be possible.
32. I enjoy computer games very much.
33. e-Learning is a threat to teachers' employment.
34. e-Learning will provide me with better learning opportunities than traditional means of learning.
35. I find computer online interaction unexciting.
36. Communicating through electronic mails is annoying.