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RESEARCH ARTICLE

Reliability and Validity of An Instrument Modified Based on The TAM for Piano Learning

Wenjun Huang[1], Poon Chiew Hwa[2], I Ta Wang[3*]

[1]Department of Music, Faculty of Creative Arts, University of Malaya (UM), 50603, Kuala Lumpur, Malaysia.
Email: 598730810@qq.com
[2]Department of Music, Faculty of Creative Arts, University of Malaya (UM), 50603, Kuala Lumpur, Malaysia.
Email: chiewhwa.poon@um.edu.my
[3]Department of Music, Faculty of Creative Arts, University of Malaya (UM), 50603, Kuala Lumpur, Malaysia.
Email: wangita@um.edu.my

CORRESPONDING AUTHOR (*):
I Ta Wang
(wangita@um.edu.my)

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ABSTRACT

This study aims to modify and assess the validity and reliability of an instrument designed to measure middle school students' perceptions of using a short video platform as an aid in piano learning. The Technology Acceptance Model (TAM) was chosen as the theoretical framework because it is a well-established model for assessing user acceptance of technology. The absence of instruments for assessing TAM-based attitudes limits a comprehensive understanding of students' acceptance and the effectiveness of these platforms. The instrument of the current study is based on the modified model by Lee et al. (2009) following the Learners' Acceptance of E-learning framework. Models of self-directed learning and perceived satisfaction are incorporated into the original framework (service quality constructs, perceived usefulness, perceived ease of use, and behavioral intent to use). The instrument was distributed to 100 students and 95 valid responses were returned. Instrument content was modified from the four established instruments from past studies and exploratory factor analysis was used to determine the construct validity. The reliability of each construct was evaluated using Cronbach's alpha, and the internal consistency of individual items within each construct was assessed using Corrected Item-Total Correlation (CITC). The findings indicate that the Cronbach's alpha values for all constructs were between 0.812 and 0.9, which ensures their internal reliability. Ultimately, 33 out of 36 items are retained. The results indicate that the instrument is valid and reliable.

Contribution/Originality: This study contributes to the existing literature by developing a modified Technology Acceptance Model (TAM) instrument tailored for piano learning through short video platforms. It is one of very few studies investigating middle school students' acceptance of these platforms, providing insights

into factors influencing their perceived usefulness, ease of use, and satisfaction.

1. Introduction

In recent years, short video platforms such as TikTok and Kwai have profoundly influenced individuals' lifestyles and approaches to learning. These platforms, characterized by their brevity, ease of use, and rapid diffusion, have garnered attention from educators attempting to utilize them for teaching purposes (Rozaq & Nugrahani, 2023; Yu, 2023). Evidence suggests that these platforms facilitate students' self-directed learning, spark interest, and improve learning efficiency (He, 2020; Rangarajan et al., 2019).

Particularly in music education, short video platforms provide hobbyists with a free and open learning environment where they can choose preferred content, set autonomous learning schedules, and draw inspiration from high-level performance videos (Kruse & Veblen, 2012). However, the decision to adopt these platforms is influenced by multiple personal and contextual factors (McFarland & Ployhart, 2015). Current research in piano education often focuses on the technological merits and limitations, with little emphasis on the comprehensive exploration of how such platforms impact middle school students' learning experiences and satisfaction (Ma & Ma, 2023).

The Technology Acceptance Model (TAM) offers a well-established framework for assessing learners' acceptance of and intentions to use technology. By integrating variables such as perceived usefulness, perceived ease of use, and behavioral intention, TAM has been widely applied to study educational technologies (Lee et al., 2009; Pal & Triyason, 2018). However, in music education, the original TAM model may not fully capture the nuanced experiences of learners, necessitating optimization and validation for this specific context (Liaw, 2008).

1.1. Research Objectives

This study aims to develop a modified Technology Acceptance Model (TAM) instrument tailored to assess the acceptance of short video platforms for piano learning among middle school students. And to evaluate the reliability and validity of the modified instrument for measuring students' perceptions of short video platforms in piano education.

1.2. Research Questions

i. What are the modified TAM instrument's psychometric properties (reliability and validity) in the context of piano learning using short video platforms?
ii. Does the reliability and validity of this instrument statistically significant?

2. Literature Review

2.1. Short Video Platforms in Education

Short video platforms have emerged as powerful tools in education due to their ability to present engaging and concise content. Their application in informal music learning offers learners flexibility, autonomy, and inspiration (Kruse & Veblen, 2012; Rozaq &

Nugrahani, 2023; Yu, 2023). However, their effectiveness is mediated by user-specific and contextual factors, including age, digital literacy, and the learning environment (McFarland & Ployhart, 2015).

2.2. Technology Acceptance Model (TAM)

TAM provides a robust framework for understanding technology acceptance. The model posits that perceived usefulness and ease of use significantly influence behavioural intention (Davis, 1989; Lee et al., 2009). However, recent adaptations highlight the importance of incorporating additional variables such as perceived satisfaction and self-directed learning to capture the full spectrum of user experiences (Liaw, 2008; Pal & Triyason, 2018).

2.3. Adapting TAM for Music Education

The integration of TAM into music education requires careful consideration of the unique characteristics of music learners. Existing instruments, while robust in general educational contexts, often lack sensitivity to the motivational and contextual dynamics of music learning. Studies suggest that perceived satisfaction, alongside traditional TAM variables, plays a critical role in influencing learners' willingness to adopt digital tools in this field (Chou, 2014; Liaw, 2008).

2.4. Research Gaps

Despite the growing interest in digital tools for music education, comprehensive studies exploring the acceptance of short video platforms for piano learning remain scarce. Middle school students, a key demographic with unique learning characteristics, have been largely overlooked in existing research.

To address this gap, this study develops a modified TAM-based instrument specifically tailored for piano learning in the context of short video platforms. Building on the e-learning TAM model by Lee et al. (2009), the instrument incorporates elements from established frameworks, including those by Chou (2014), Liaw (2008), Khan et al. (2020), and others. The aim is to improve the instrument's comprehensibility and validity, enabling a detailed investigation of students' acceptance and the factors influencing their perceptions and intentions to use short video platforms. This study contributes to the theoretical framework of TAM and provides practical insights into music education technology.

3. Research Methods

This pilot study is conducted in a public middle school in a developing city Zaozhuang in southern Shandong Province. It is the only province in the country with a permanent population and a registered population of over 100 million. It is speculated that Zaozhuang can represent for China's fourth-tier city with a large population and the low population mobility. There is growing trend in the expenditure on education, culture and entertainment. On the other hand, the studies on piano learning done in this province have focused on first-tier cities, such as: Jinan, Qingdao, Yantai, etc. This is a quantitative study and data was collected through paper-based instruments.

The sample size of 95 respondents was determined using purposive sampling, selecting middle school students learning piano and using short video platforms for piano learning. This approach ensured the sample met the research criteria. Additionally, a sample size of 95 is sufficient for Exploratory Factor Analysis (EFA), as supported by prior recommendations (de Winter et al., 2009; Tabachnick et al., 2013).

An information sheet explaining the subject matter and goals of the study was provided before the survey began. The survey participants were duly informed that their participation in the survey constituted informed consent. All of the respondents are under the age of 18, so their parents are requested to sign an informed permission form that is attached to the instrument as confirmation of their informed consent to participate in the study.

This study was approved by the research ethic committee from University of Malaya. The data collection process took place in May 2023. Data was collected from three randomly selected public middle schools with similar locations, faculty, and student and parent profiles. Participants are selected using purposive sampling, resulting in 95 valid data. Purposive sampling is a non-probability sampling method where researchers deliberately select samples based on specific criteria and research objectives (Etikan et al., 2016). In this study, the clear objective is to recruit middle school students who play the piano and have used short video platforms for piano learning. The sample selection is not solely based on convenience but also on whether students meet the specific criteria. This sampling approach ensures that the selected sample represents the target population of interest. The sample characteristics are shown in Table 1.

Table 1: Main Demographic Information of the Participants in the Pilot Study (N = 95)

Characteristics	Value	Frequency	Percentage (%)
Age	12	28	29.47
	13	24	25.26
	14	26	27.37
	15	17	17.89
Gender	Male	34	35.79
	Female	61	64.21
Grade in School	1	22	23.16
	2	36	37.89
	3	37	38.95
Years of Playing the Piano	Less than 1 years	14	14.74
	2-3 years	15	15.79
	4-5 years	23	24.21
	6-7 years	31	32.63
	8-9 years	11	11.58
	more than 10 years	1	1.05
Age of First Use of Short Video	5-6 years	1	1.05
Platform to Assist Piano	7-8 years	9	9.47
Learning	9-10 years	55	57.89
	11-12years	28	29.47
	13-14 years	1	1.05
	15-16 years	1	1.05
Average Weekly Time Spent	Less than 1 hour	8	8.42
Learning Piano on Short Video	2-3 hours	83	87.37
Platforms	4-5 hours	1	1.05
	6-7 hours	1	1.05

	8-9 hours	2	2.11

It is a closed item instrument. All items assessing the dimensions range from complete disagreement to complete agreement on a 5-point Likert scale. In modifying the instrument, the author first selected the Technology Acceptance Model (TAM) model extended by Lee et al. (2009) which was to examine the acceptance of using e-learning among Korean university students. The TAM was first developed by Davis (1989) to provide a basis for tracking the influence of external factors on internal beliefs, attitudes and intentions. In conjunction with the studies of Estriegana et al. (2019) and Alomair (2021), it was determined that when measuring the students' acceptance in using short video platforms for piano learning, it needs to include the three quality of service: namely instructor characteristics (IC), teaching materials (TM), design of learning contents (DLC); students' self-directed learning (SDL), their perceived usefulness (PU), perceived ease of use (PeU), perceived satisfaction (PS), and behavioural intention to use (BI). There are two sections in the instrument: six demographic information items and thirty-six items for students' acceptance of each variable which is the main section.

In modifying the instrument items, the author selects instruments with proven validity and reliability from the studies of Chou (2014), Liaw (2008) and Lee et al. (2009), and Pal and Triyason (2018), which were all based on TAM model, and modified to the factors involved in the topic of this study. Firstly, six subscales from Learners' Acceptance of E-learning (Lee et al., 2009) are selected, i.e., IC (5items), TM (3 items), DLC (6 items), PU (4 items), PeU (2 items) and BI (4 items). The survey instrument utilized in this study involved modifications to the original items, with adjustments made to the wording to align them more appropriately with the specific focus of the study and the constraints posed by the targeted student population. For example: the original item 'The instructor motivates me to use e-learning' to was modified to 'The instructor motivates me to use digital resources'. Secondly, the Students' Attitudes towards E-learning instrument adapted by Chou (2014) is changed from a 7-point Likert scale to a 5-point Likert scale format to be consistent with the modification made in other instruments, combining items and variables similar to those in Lee et al.'s (2009) instrument. Furthermore, the subscales of the current study *Students' Perceived Satisfaction Using Short Video Platforms in Piano Learning* was modified based on the e-learning system satisfaction variable (Chou, 2014). In addition to referencing Chou (2014), the author also included three additional items modified from the Students' Perceptions of E-learning scale (Khan et al., 2020) under the students' PS factor. Afterwards, irrelevant variables and items were deleted, making a total of six items included in the construct of PS. Finally, after modifying Alomair's (2021) adapted subscales for measuring student characteristics of SDL with wording changes tailored to participants, five items related to the SDL are added in this section.

The content validity of the modified instrument is qualified by default since the original scales all passed the rigorous reliability and validity tests of the original authors. Valid data collected in this pilot study are analyzed using SPSS version 26. The reliability of the instrument is measured using internal consistency reliability (Cronbach's Alpha). According to Taber (2018), when a survey measures attitudes and other affective dimensions, Cronbach's Alpha is frequently used. Furthermore, this coefficient complements exploratory factor analysis, enabling a comprehensive evaluation of both the internal consistency and underlying factorial structure of the measurement instrument. Its widespread adoption in social research attests to its efficacy in ensuring data reliability and enhancing the overall quality of questionnaire-based studies

(Cronbach, 1951; Deng et al., 2020). Meanwhile, to assess the correlation strength between individual items and their respective dimensions, corrected item-scale correlations (CITC) were computed. It enables a meticulous examination of the item-dimension relationship, facilitating a comprehensive evaluation of the measurement instrument's psychometric properties and its ability to accurately capture the intended dimensions (Griep et al., 2009; McHorney et al., 1994). To avoid the problem of multicollinearity, a threshold criterion of greater than 0.40 and less than 0.8 is adopted to evaluate the adequacy of each item in representing its corresponding dimension.

Next, after adjusting items for Cronbach's alpha and CITC, construct validity was tested using exploratory factor analysis (EFA). It is crucial for understanding the fundamental structure of a collection of measured variables because it enables researchers to assess the suitability of the proposed measurement model, spot potential problems with item choice or wording, and detect potential issues with item wording (Suhr, 2006).

4. Results

A total of 100 participants were recruited and 95 valid data were obtained. Nearly 90% of respondents first used short video platforms as an aid in piano learning between the ages of 9-12, with girls accounting for nearly two-thirds of the total. More than 80% of the respondents use them for 2-3 hours per week, and nearly 1/3 of the respondents have 6-7 years of learning experience in piano. Next, the reliability and validity of the modified instrument are tested according to the assessment dimensions implemented based on Learners' acceptance of e-learning (Lee et al., 2009).

4.1. Reliability Estimation

In measuring students' acceptance of using short video platforms in piano learning, this instrument includes a total of eight variables -IC, TM, DLC, students' SDL, and their PU, PeU, PS, and BI. The assessment of the strength of correlations between individual items and their respective dimensions is performed using corrected item-scale correlations. As shown in Table 2, the following adjustments were made:

i. For the 'IC construct', all five items maintained a Cronbach's alpha of 0.881, with CITC values ranging from 0.676 to 0.747. Similarly, the 'TM construct' demonstrated a Cronbach's alpha of 0.814, with CITC values between 0.627 and 0.721 for the three items in B1-B3 and 0.647-0.771 for the six items in C1-C6. The 'SDL construct' exhibited a Cronbach's alpha of 0.862, and its four items (D1-D4) had CITC values ranging from 0.708 to 0.713.
ii. The 'PU construct' maintained a Cronbach's alpha of 0.877, with CITC values ranging from 0.698 to 0.78 for its four items (E1-E4). The 'PeU construct', comprising two items (F1 and F2), exhibited a Cronbach's alpha of 0.812, with a CITC value of 0.694.
iii. The 'PS construct' initially contained more items, but after eliminating 28H and 30H due to low CITC values (<0.4), the construct retained only four items (H1-H4) and saw an increase in Cronbach's alpha from 0.591 to 0.867. Details can be found in Table 3 of the study. The CITC values for items H1-H4 all exceed 0.4, indicating a strong positive correlation among these items.
iv. The 'BI construct' underwent adjustments to maintain internal consistency. Item 21K with a low CITC value was removed. Therefore, the construct retained four items (K1-K4) thus showed an improved Cronbach's alpha of 0.838, compared to the initial value of 0.657, all of which had CITC values

greater than 0.4. The application of these reliability measures strengthens the robustness and validity of the instrument for assessing the targeted constructs in the research context.

Finally, Table 4 displays the results of reliability and validity analyses for all items. Out of 36 items, 33 were retained after the assessment.

Table 2: Values of Cronbach's Alpha if item deleted and Overall Cronbach's Alpha for the Input Evaluation

Input Evaluation Constructs	Item	Corrected item-total correlation	Cronbach's Alpha if item deleted	Overall Cronbach's Alpha Value
Instructor characteristics	A1	0.723	0.854	0.881
	A2	0.676	0.865	
	A3	0.734	0.851	
	A4	0.696	0.86	
	A5	0.747	0.848	
Teaching materials	B1	0.721	0.687	0.814
	B2	0.627	0.783	
	B3	0.648	0.761	
Design of learning contents	C1	0.647	0.894	0.9
	C2	0.705	0.886	
	C3	0.743	0.88	
	C4	0.749	0.879	
	C5	0.759	0.878	
	C6	0.771	0.876	
Self-directed leaning	D1	0.708	0.825	0.862
	D2	0.713	0.823	
	D3	0.709	0.825	
	D4	0.709	0.825	
Perceived usefulness	E1	0.758	0.834	0.877
	E2	0.698	0.857	
	E3	0.71	0.853	
	E4	0.78	0.825	
Perceived ease of use	F1	0.694	-	0.812
	F2	0.694	-	
Perceived satisfaction	H1	0.478	0.491	0.591
	H2	0.68	0.405	
	H3	0.532	0.478	
	H4	0.63	0.443	
	28H	0.12	0.666	
	30H	-0.057	0.727	
Behavioural intention to use	K1	0.546	0.547	0.657
	K2	0.654	0.484	
	K3	0.613	0.519	

	K4	0.52	0.56
	21K	-0.014	0.838

Table 3: Items and internal consistency reliability of the Perceived Satisfaction of students with the use of short video platforms as an aid in their piano learning

Perceived Satisfaction	Corrected item-total correlation	Cronbach's Alpha if item deleted	Overall Cronbach's Alpha Value
H1	0.708	0.835	0.867
H2	0.734	0.824	
H3	0.71	0.834	
H4	0.725	0.829	

Table 4: Changes of items before and after the validity and reliability process

Input Evaluation Constructs	Items before the validity and reliability process	Items after the validity and reliability process
Instructor characteristics	A1,A2,A3,A4,A5a	A1,A2,A3,A4,A5
Teaching materials	B1,B2,B3a	B1,B2,B3
Design of learning contents	C1,C2a,C3a,C4,C5,C6	C1,C2,C3,C4,C5,C6
Self-directed leaning	D1,D2,D3,D4	D1,D2,D3,D4
Perceived usefulness	E1,E2,E3,E4	E1,E2,E3,E4
Perceived ease of use	F1,F2	F1,F2
Perceived satisfaction	H1,H2,H3,H4,28H,30H	H1,H2,H3,H4
Behavioural intention to use	K1,K2,K3,K4,21K	K1,K2,K3,K4
TOTAL ITEMS	36 items	33 items

4.2. Exploratory factor analysis (EFA)

The respondents of the valid returned data (N=95) met the general recommended sample size for Exploratory Factor Analysis (EFA) (de Winter et al., 2009; Tabachnick et al., 2013; Sapnas & Zeller, 2002). EFA was performed using SPSS version 26 in the pilot study. To evaluate the relationships among latent factors, the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity were utilized. This study uses the most common criterion, i.e. when the KMO is larger than 0.6 and the significance probability of the Bartlett sphere test is less than 0.001 Sig, exploratory factor analysis is appropriate (Deng et al., 2020).

Based on Table 5, we conducted KMO and Bartlett's sphericity tests on the 33 modified and censored items. The KMO value of 0.834 was used for factor analysis and indicates good data quality. The probability of significance of the X^2 statistic was less than 1%, indicating that the data were relevant and met the criteria.

Table 5: Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity

KMO and Bartlett test		
KMO		0.834
Bartlett's test of sphericity	Approximate chi-square	1924.768
	df	528
	Significance probability	0

In further EFA the Principal Axis Factoring (PAF) and oblique rotation have been used for the analyses. Principal axis factoring (PAF) does not require the assumption of multivariate normality for the data (De Winter & Dodou, 2012; Tinsley & Brown, 2000). Moreover, compared to other methods, PAF typically yields more accurate results (Howard, 2016). Table 6 summarizes the Variance Explained information such as Initial Eigenvalues, Cumulative Percentage of Variance (CPV), etc. for all variables. The decision to retain all factors with eigenvalues greater than 1 was based on the Kaiser-Guttman criterion (Kaiser, 1960). The results indicate the presence of 8 factors with eigenvalues greater than 1, which aligns with the predetermined factors based on the modified original instrument in this study. Additionally, from the table, it is evident that the cumulative percentage of variance (CPV) can reach 73.32%. This is consistent with Hinkin's (1998) suggestion that for factors that have practical significance, CPV should ideally not exceed 75% or 80%.

Table 6: Total Variance Explained

Factor	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings[a]**
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**
1	10.37	31.425	31.425	10.028	30.387	30.387	6.706
2	3.34	10.121	41.546	2.987	9.051	39.438	5.345
3	2.54	7.696	49.242	2.179	6.603	46.041	6.592
4	2.261	6.853	56.095	1.922	5.824	51.865	5.765
5	1.759	5.332	61.427	1.413	4.281	56.146	3.924
6	1.471	4.459	65.886	1.137	3.446	59.592	6.183
7	1.298	3.932	69.818	1.012	3.066	62.657	4.417
8	1.155	3.5	73.318	0.828	2.51	65.167	4.183
9	0.751	2.276	75.594	-	-	-	-
10	0.655	1.985	77.579	-	-	-	-
11	0.619	1.876	79.455	-	-	-	-
12	0.596	1.807	81.262	-	-	-	-
13	0.582	1.764	83.026	-	-	-	-
14	0.503	1.524	84.55	-	-	-	-
15	0.483	1.465	86.014	-	-	-	-
16	0.467	1.416	87.431	-	-	-	-
17	0.425	1.288	88.718	-	-	-	-

18	0.414	1.255	89.973	-	-	-	-
19	0.38	1.151	91.124	-	-	-	-
20	0.358	1.086	92.21	-	-	-	-
21	0.323	0.98	93.191	-	-	-	-
22	0.291	0.881	94.072	-	-	-	-
23	0.26	0.787	94.859	-	-	-	-
24	0.251	0.761	95.62	-	-	-	-
25	0.23	0.698	96.318	-	-	-	-
26	0.212	0.643	96.961	-	-	-	-
27	0.204	0.619	97.579	-	-	-	-
28	0.167	0.507	98.087	-	-	-	-
29	0.158	0.479	98.566	-	-	-	-
30	0.142	0.43	98.996	-	-	-	-
31	0.127	0.386	99.381	-	-	-	-
32	0.112	0.339	99.72	-	-	-	-
33	0.092	0.28	100	-	-	-	-

Table 7 shows the pattern matrix after factor rotation and the commonality information for each variable. The factor loadings of each question item at the belonging factor the commonality information for each variable here is no excessive cross-loading, and the factor explanation structure is clear and in line with Howard's (2016) suggested values. Moreover, each independent variable in this study has a commonalities value greater than 0.52, which aligns with a well-fitted EFA model, ensuring that each variable's common variance exceeds 0.5 (Yong & Pearce, 2013).

Table7: Pattern Matrix

	Factor load factor								**Communality**
Item	**Factor 1**	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Factor 6**	**Factor 7**	**Factor 8**	
A1	-0.02	**0.703**	0.061	0.065	-0.03	0.04	0.104	0.004	0.637
A2	-0.008	**0.709**	-0.123	-0.105	0.053	0.2	0.011	-0.003	0.575
A3	0.016	**0.792**	-0.053	-0.016	0.083	0.024	-0.083	0.026	0.632
A4	0.157	**0.791**	0.082	0.146	-0.061	-0.219	-0.095	-0.07	0.65
A5	-0.107	**0.806**	0.013	-0.038	-0.1	0.09	0.039	0.054	0.679
B1	0.105	-0.042	-0.099	-0.037	0.046	-0.055	**0.846**	0.026	0.7
B2	0.036	-0.111	0.123	0.004	-0.191	0.143	**0.761**	-0.057	0.642
B3	-0.096	0.115	-0.03	0.108	0.138	-0.156	**0.746**	0.002	0.632
C1	**0.657**	-0.019	0.02	-0.085	-0.014	-0.033	0.078	0.145	0.493
C2	**0.756**	0.001	-0.129	-0.013	0.069	0.024	-0.009	0.082	0.557
C3	**0.762**	0.103	0.088	0.072	-0.047	-0.124	0.055	-0.06	0.669
C4	**0.789**	-0.075	-0.017	0.03	0.083	0.05	0.075	-0.092	0.662
C5	**0.83**	-0.067	0.043	0.008	-0.018	0.031	-0.097	0.01	0.668
C6	**0.816**	0.098	-0.054	-0.101	0.024	0.077	-0.017	0.036	0.701
D1	0.046	-0.142	**0.824**	0.029	0.093	-0.009	-0.039	-0.073	0.7
D2	0.033	0.063	**0.652**	-0.028	0.052	0.04	0.011	0.137	0.637
D3	-0.011	0.047	**0.688**	-0.077	-0.004	0.011	0.041	0.133	0.564
D4	-0.009	0.078	**0.656**	-0.014	0.125	0.085	0.128	-0.075	0.66
D5	-0.077	-0.017	**0.992**	-0.041	-0.047	-0.053	-0.083	0.004	0.767
E1	0.058	0.074	0.106	0.158	-0.06	**0.706**	-0.046	-0.126	0.71
E2	-0.059	0.056	-0.118	-0.159	0.131	**0.913**	-0.009	0.035	0.707
E3	0.185	-0.077	0.033	0.107	-0.092	**0.616**	0.063	0.036	0.628
E4	0	0.068	0.09	0.074	-0.018	**0.751**	-0.082	-0.006	0.703
F1	0.051	-0.085	-0.009	0.095	0.004	0.084	-0.043	**0.694**	0.565
F2	0.054	0.096	0.085	-0.033	-0.029	-0.1	0.022	**0.898**	0.877

H1	-0.078	0.018	-0.066	**0.683**	-0.02	0.133	0.034	0.16	0.629
H2	-0.049	0.016	0.051	**0.784**	0.136	-0.042	-0.022	0.074	0.693
H3	-0.042	0.025	-0.026	**0.893**	0.036	-0.043	-0.012	-0.135	0.671
H4	0.086	-0.039	-0.086	**0.757**	-0.088	0.009	0.067	0.051	0.641
K1	0.08	0.153	-0.002	-0.071	**0.749**	0.029	0.068	-0.174	0.631
K2	-0.175	-0.044	-0.016	-0.015	**0.824**	0.12	0.087	0.135	0.757
K3	0.149	-0.064	0.009	0.102	**0.706**	-0.03	-0.138	0.058	0.549
K4	0.048	-0.091	0.151	0.053	**0.648**	-0.053	-0.018	-0.049	0.523

Extraction Method: Principal Axis Factoring。

Rotation Method： Promax with Kaiser Normalization.[a]

5. Discussion

Measuring students' acceptance of using short video platforms as an aid in piano learning is crucial to understand their perspectives, benefiting teachers, parents, and platform developers as key stakeholders. Incorporating external variables into the Technology Acceptance Model (TAM) is essential to accurately capture students' genuine experiences after usage. To the best of the researchers' knowledge, a comprehensive survey instrument for assessing the acceptance of online learning platforms among middle school piano students is currently unavailable. This oversight aligns with a prevailing tendency to overlook the application of rigorous scientific methodologies in examining the deployment of Internet-based e-learning instruments within educational settings (Martínez-Torres et al., 2008). Therefore, we modified and integrated four primary instruments from the past studies to establish an instrument that combines students' SDL characteristics, their PS and acceptance of using short video platforms for piano learning. The modification process follows the guidelines for instrument modification. It undergoes reliability and validity testing and exploratory factor analysis (EFA) to enhance researchers' confidence in this instrument for data collection.

Given the absence of existing instruments directly suitable for our study's objectives, the modification of an instrument became necessary. The factors and items of the current instrument primarily derived from two sources: The "Learners' Acceptance of E-learning" survey, created by Lee et al. (2009), examined the acceptance of e-learning among Korean university students. In modifing the instrument, we incorporated items that were previously excluded by Lee et al. (2009) in the sub-scales of IC, TM, and DLC (items identified by items code + a, such as A5a). These modified items were thoughtfully integrated into the current study's instrument, given that the current study and the research by Lee et al. (2009) deal with different contexts, including participants' age groups, geographical locations, specific professional backgrounds, and cognitive conditions. After conducting this study, it was shown that the items originally excluded and subsequently incorporated into the instrument exhibit robust reliability and validity within the context of this research.

The items removed by Lee et al. (2009) are thought to be more appropriate for middle school students' psychological needs. For instance, A5a, as teacher motivation falls under external motivational factors, is categorized as extrinsic motivation. Considering that students in this age group often derive their motivation for learning from encouragement by teachers and parents (Hughes & Kwok, 2007), the author speculates that this factor may significantly influence their attitude towards the continued use of short video platforms for piano learning.

Following a comprehensive assessment of the reliability and validity of the Behavioural Intention to Use Short Video Platform subscale, one item was ultimately removed from the study: "I think using short video platforms as an aid should be implemented in other classes." Although this particular item had a high Cronbach's alpha value in Lee et al.'s (2009) study, the present research shows that its content does not accurately reflect the BI. This difference may be due to the fact that piano learning is not a core subject in Chinese schools, making it difficult to extrapolate this learning method to other core subjects.

Additionally, the sub-scale of PU is derived from the consolidation of duplicate questions pertaining to the same variable ('PU') found in the instruments utilized by Chou (2014) and Lee et al. (2009). Both pre-modified instruments were administered to students currently engaged in academic studies in Asian countries. Chou (2014) also employed a survey on 'students' attitudes towards online learning' to assess the attitudes of Taiwanese university students towards online learning. Both instruments pertain to students who are currently studying in Asian countries. The analysis revealed strong inter-item correlations (CITC > 0.4) (Griep et al., 2009) and satisfactory internal consistency (Cronbach's Alpha > 0.7) (Deng et al., 2020) among the instrument's items. The final Cronbach's Alpha values ranged from 0.812 to 0.9, with CITC values ranging from 0.627 to 0.771. Additionally, exploratory factor analysis identified eight eigenvalues greater than 1, consistent with our preset factors. Thus, the modified instrument exhibits adequate reliability and validity. It is evident that the modified instrument is better suited for investigating the acceptance of short video platforms among piano students within the Chinese context. It is recommended that, in future inquiries into the acceptance of utilizing specific technologies to aid piano learning among students, this instrument be employed.

6. Conclusion

The purpose of this study is to modify a suitable instrument for evaluating the acceptance level among Chinese middle school students regarding the use of short video platforms as an aid in piano learning. Existing instruments predominantly focus on the opinions of university students towards E-learning or distance learning, lacking specificity for music learners. Moreover, the level of acceptance of using short video platforms for piano learning amongst middle school students remains unclear. To enrich the investigation of this regard items from different instruments were modified and subjected to exploratory factor analysis (EFA) to extract the most relevant factors for this study. This instrument is valuable for both teachers and parents as it informs real-life experiences of students, thus contributing to the further improvement of the user experience and the continued development of similar online learning platforms.

Ethics Approval and Consent to Participate

The study has been approved by the Universiti Malaya Research Ethics Committee (UMREC) number UM. TNC2/UMREC_2373. Informed consent was obtained from all subjects involved in the study.

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Conflict of Interest

The authors declare no conflicts of interest.

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