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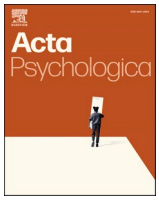

Dyslexia as a moderator in the relationship between short video learning perception and behavioral intention among Chinese college students: A cross-sectional study

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ABSTRACT

Background: Dyslexia research in China is crucial because of limited awareness, lack of tools, and insufficient support. These issues seriously hinder students' academic success. To address this gap, this study examines how history-related short videos on social media platforms influence the learning behavior of students with dyslexia. This study introduces dyslexia as a moderating variable within the Technology Acceptance Model (TAM) framework for the first time, addressing a significant gap in understanding how learning differences influence technology adoption in educational contexts. History poses special challenges for learners with dyslexia because it requires extensive reading and complex texts. Short videos may offer a more accessible and engaging alternative.

Methods: A cross-sectional study was conducted among 400 university students in Hebei province, China using a self-administered questionnaire. Several scales were used in the survey: Quality of Content (CQ), Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Behavioral Intention (BI), Dyslexia Scale, and Learning Behavior (LB). Descriptive statistics and structural equation modeling (SEM) analyses were performed. A P value of <0.05 was considered significant.

Results: The results show positive correlations among key variables. Content quality was positively correlated with perceived usefulness ($r = 0.369$), perceived ease of use ($r = 0.329$), and behavioral intention ($r = 0.203$), all $p < 0.01$. Ease of use is also associated with usefulness ($r = 0.323$), and usefulness with intention ($r = 0.249$). Learning intention further predicts behavior ($r = 0.359$). However, the direct link between ease of use and behavioral intention is not significant ($p = 0.17$). Dyslexia significantly moderates the relationship between PEOU and PU ($p < 0.001$). However, it does not significantly affect the relationships between (1) PEOU and BI or (2) PU and BI, though these effects approach marginal significance.

Conclusions: Students with dyslexia show different levels of learning intention depending on content quality, ease of use, and usefulness. Dyslexia significantly moderates some of these relationships. The findings suggest that history-related short videos can be effective educational tools, especially when they emphasize usability and usefulness.

1. Introduction

Short video platforms are now widely used in education. They offer brief multimedia content that helps simplify complex ideas and improve student accessibility. These features are particularly useful in the digital age, where learners increasingly prefer concise and engaging formats to process new information (Liu et al., 2020; Wang, Chen, & Solheim, 2020).

Despite the benefits of short video education, numerous factors, including learner individuality, may affect learners' behavioral intentions to use these resources (Alobaid, 2020). One such factor is dyslexia, a particular type of learning difficulty that impacts language processing and reading (Alghabban & Hendley, 2020). Dyslexia can pose significant challenges to traditional learning methods (Alghabban & Hendley, 2020). Students with dyslexia often struggle with decoding complex texts, maintaining reading fluency, and retaining large

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amounts of written information, which can make traditional academic materials, particularly history textbooks, difficult to comprehend.

Dyslexia is especially prominent among college students (Donato et al., 2021). As the learning content at higher education levels is more complex and the reading volume is larger, students are required to have higher reading and comprehension skills (Fidler & Everatt, 2012). Compared with primary and secondary schools, the curriculum and learning mode of universities place higher demands on students' independent learning ability (Valtonen et al., 2020).

The challenge is even greater in subjects like College history, which require students to process large volumes of text, analyze chronological events, and comprehend abstract historical narratives. Unlike disciplines that involve formulas or structured problem-solving, history demands the ability to interpret primary and secondary sources, compare different historical viewpoints, and construct coherent arguments based on textual evidence. For students with dyslexia, the dense textual format, extensive required reading, and abstract reasoning in history courses present significant cognitive overload. This often results in reading fatigue, slower information retention, and decreased academic performance (Gregory, 2021; Jacobs et al., 2020). These difficulties can lead to reduced motivation and engagement, making it harder for students with dyslexia to pass exams or stay interested in the subject, which in turn can impact their overall academic success and future employment prospects (Valtonen et al., 2020).

Despite extensive TAM research, three significant limitations persist in the literature. First, most studies assume homogeneous user populations, ignoring individual differences that may fundamentally alter technology acceptance processes (Marangunić & Granić, 2015). Second, the predominant focus on general populations has left specialized learner needs largely unexplored (Al-Emran et al., 2018). Third, existing TAM extensions typically examine demographic moderators while overlooking cognitive and learning differences.

Current short video learning research reveals several methodological and theoretical gaps. French et al. (2023) examined 312 students but relied solely on self-reported engagement without objective learning measures. Similarly, Wang, Wang, et al. (2020) investigated perceived usefulness but failed to account for individual learning differences that might influence these perceptions. Most critically, no studies have examined how learning disabilities like dyslexia might moderate the relationships between video learning perceptions and behavioral intentions.

Dyslexia research in educational technology contexts remains underdeveloped in three key areas. First, most studies focus on remedial interventions rather than mainstream technology adoption (Rello & Baeza-Yates, 2017). Second, existing research typically treats dyslexia as a control variable rather than examining its moderating effects on technology acceptance processes. Third, cross-cultural research on dyslexia and technology is particularly limited, with Western samples dominating the literature despite evidence of cultural differences in dyslexia presentation (Brunswick, 2012).

Research reveals contradictory findings regarding perceived ease of use in educational technology. While Davis (1989) found PEOU consistently predicts usage intention, recent studies show mixed results in educational contexts. Liu et al. (2019) found no significant PEOU-BI relationship among Chinese university students, while Truss et al. (2024) reported strong effects in similar populations. These contradictions suggest unmeasured moderators may influence this relationship - a gap our study addresses through dyslexia moderation analysis.

Positive behavioral toward history-related short video learning is crucial for improving the academic achievement of college students with dyslexia (Wang, Chen, & Solheim, 2020). When students have a positive perception of history-related short videos, they are more likely to integrate them into their study routines, enhancing their learning efficiency and motivation (Al-Maroof et al., 2022).

High-quality history-related short videos simplify complex historical concepts through structured narratives, combining audio narration, visual reenactments, and animations (Babelyuk et al., 2021). These videos eliminate the reliance on lengthy academic texts, which are often overwhelming for students with dyslexia (Gregory, 2021; Jacobs et al., 2020). Instead, they allow learners to process information through multisensory engagement, supporting both visual and auditory learning channels (Mayer, 2024).

Additionally, history-related short videos provide adaptive learning opportunities, enabling students to pause, rewind, and replay content based on their individual comprehension levels (Michael et al., 2020). This flexibility allows students to better manage their learning pace while reinforcing key historical concepts without cognitive overload (Fidler & Everatt, 2012).

High-quality history-related short videos should meet the following criteria: (1) accuracy and credibility, ensuring historical facts are well-researched and sourced from reputable influencers (Donato et al., 2021); (2) chronological coherence, presenting events in a structured and logical sequence (Valtonen, 2021); (3) subtitles and pictures to help better understanding (Alghabban & Hendley, 2020).

Wang et al. (2022) discovered a connection between behavioral intentions and perceptions of short videos learned. Maziriri et al. (2020) propose that students are more likely to intend to use short videos as a learning tool when they have a more positive opinion of the learning content of short videos such as the importance of learning content, and satisfaction with the use of short video platform (Kusumadyahdewi & Kusumarasdyati, 2021). However, while behavioral intention is widely considered a predictor of learning behavior, the extent to which learning intention toward history-related short videos translates into actual study behavior remains an open research gap. What's more, TAM has been widely applied to study students' adoption of e-learning tools, several key gaps remain.

While prior studies have examined the influence of content quality, perceived usefulness (PU), and perceived ease of use (PEOU) on students' behavioral intention to adopt educational technologies (e.g., Al-Maroof et al., 2022; Maziriri et al., 2020), several important limitations remain.

First, most of these studies have explored the variables in isolation, without analyzing their combined or mediated effects. Second, they typically focus on general student populations, rarely addressing learners with specific cognitive challenges such as dyslexia. Third, many studies emphasize behavioral intention as the outcome variable, but fail to investigate whether such intention translates into actual learning behavior, which limits our understanding of real-world educational impact.

Moreover, although the Technology Acceptance Model (TAM) has been widely used to explain students' acceptance of digital learning tools, its application rarely includes individual learner characteristics like dyslexia, or examines how such traits may moderate key relationships in the model. In addition, research on short video-based learning seldom considers non-English-speaking populations, particularly in the context of inclusive education in China.

Therefore, this study addresses two major gaps. First, it investigates whether behavioral intention translates into learning behavior in the context of history-related short video learning. Second, it introduces dyslexia as a moderating variable into the TAM model, testing its influence on the relationships between PEOU and PU, PEOU and BI, and PU and BI.

The aim of this study was to examine the relationships and mechanisms underlying the perception of short video learning tools and the behavioral intentions of Chinese university students, with a specific focus on students with dyslexia. This study investigates how perceived ease of use and perceived usefulness affect students' learning intention. It further examines whether such intention results in actual learning behavior (Shaywitz & Shaywitz, 2007; Stein & Talcott, 1999). In this way, it fills a research gap concerning the intention–behavior relationship in the context of history-related short video learning (Wang, Wang, et al., 2020). Furthermore, this study is the first to consider dyslexia as a

moderating variable influencing the relationship, thereby contributing to a deeper understanding of how students with dyslexia perceive, intend to use, and potentially engage with history-related short video learning tools. By focusing on the accuracy and credibility of historical content (Donato et al., 2021), the chronological coherence of presented events (Valtonen, 2021), and the integration of subtitles and visual aids for better comprehension (Alghabban & Hendley, 2020), this study aims to provide insights into how such factors affect the learning experiences of students with dyslexia. While previous studies have established that perceived ease of use and perceived usefulness are associated with behavioral intentions in technology adoption, the role of dyslexia in moderating these relationships and its impact on actual engagement with history-related short videos remains unexplored (Daud & Abas, 2013). By addressing these questions, this study contributes to both theoretical advancements and practical implications for designing more effective educational interventions using short video platforms.

Dyslexia moderation effects operate through three primary psychological mechanisms based on cognitive load theory and information processing research. First, working memory limitations characteristic of dyslexia (Pickering, 2006) may alter how individuals process and evaluate technology characteristics. Second, phonological processing differences may influence how text-heavy interfaces are perceived and used (Rello & Baeza-Yates, 2017). Third, compensatory cognitive strategies developed by individuals with dyslexia may lead to different technology evaluation processes compared to typical users (Reid, 2016). Based on previous empirical research, this study proposed thirteen hypotheses:

Simple Regression Hypotheses (H1-H6, H10).

H1. There is a positive relationship between the CQ and BI.

H2. There is a positive relationship between the CQ and PU.

H3. There is a positive relationship between the CQ and PEOU.

H4. There is a positive relationship between PU and BI.

H5. There is a relationship between PEOU and BI.

H6. There is a relationship between PEOU and PU.

H10. There is a positive relationship between BI and LB.

Moderating Effect Hypotheses (H7-H9)

H7. Dyslexia as a moderating variable affects the relationship between PEOU and BI.

H7 predicts dyslexia moderates the PEOU→BI relationship through interface processing differences. Dual coding theory (Paivio, 1986) indicates individuals with dyslexia may rely more heavily on visual-spatial processing when evaluating interface ease of use. Short video platforms, being primarily visual-spatial, may be perceived as easier to use by students with dyslexia compared to text-heavy interfaces. This enhanced ease of use perception may create stronger behavioral intentions as the interface aligns with their cognitive strengths rather than challenging their areas of difficulty.

H8. Dyslexia as a moderating variable influences the relationship between PU and BI.

H8 proposes dyslexia moderates PU → BI based on motivation compensation theory (Heckhausen & Heckhausen, 2018). Individuals with dyslexia often develop enhanced motivation and persistence due to academic challenges, potentially strengthening the relationship between perceived usefulness and behavioral intention. When technology is perceived as useful for learning, students with dyslexia may show stronger intention to use it as they actively seek tools that can compensate for their learning differences.

H9. Dyslexia as a moderating variable effects the relationship between PEOU and PU.

H9 predicts dyslexia moderates the PEOU→PU relationship because individuals with dyslexia may evaluate ease of use differently due to their enhanced visual-spatial processing abilities (von Karolyi, 2001). Research shows people with dyslexia often demonstrate superior skills in detecting visual patterns and global processing, potentially leading them to perceive interface ease of use through different criteria than text-based usability indicators. This differential processing may strengthen the PEOU→PU relationship as visual interface ease becomes more salient for learning utility perceptions (Fig. 1).

Mediation Effect Hypotheses (H11−H13)

H11. PU as a mediating variable influencing the relationship between CQ and BI.

H12. PEOU as a mediating variable influencing the relationship between CQ and BI.

H13. CQ indirectly influences BI through the sequential mediation of PEOU and PU.

2. Methods

2.1. Participants

Data for this study were collected as part of a web-based survey. Based on the research's necessity and feasibility, college students were identified as the target participants, with participants planned to be recruited from five universities in Hebei province. Because Hebei Province is geographically adjacent to Beijing, China's capital (see Fig. 2). Compared to Beijing, Hebei Province is economically underdeveloped, which also reflects in its educational resources and the overall academic performance of university students. However, due to its large student population, Hebei Province has a higher probability of including students with mild dyslexia. Therefore, selecting universities in this region provides a representative sample for studying learning difficulties associated with dyslexia.

The selected universities include Hebei Medical University, Hebei Normal University, Hebei Minzu Normal University, Tangshan Normal University, and Langfang Normal University. The inclusion of medical students from Hebei Medical University is based on the premise that medical education requires extensive reading and comprehension of scientific literature, making dyslexia a potentially greater challenge for these students. Additionally, students from normal universities (Hebei Normal University, Hebei Minzu Normal University, Tangshan Normal University, and Langfang Normal University) were chosen because education and social science disciplines typically involve high exposure to academic reading and literature review. Specifically, each of the five universities contributed respondents in proportion to its share of the total student population ($N = 73{,}187$ across the five institutions). Hebei Normal University (~34.1 %; 24,936/73,187) contributed ≈136 of the 400 participants; Hebei Medical University (~15.4 %; 11,274/73,187) ≈ 62; Hebei Minzu Normal University (~17.5 %; 12,801/73,187) ≈ 70; Tangshan Normal University (~6.5 %; 4763/73,187) ≈ 26; and Langfang Normal University (~26.5 %; 19,413/73,187) ≈ 106. Within each university stratum, this research coordinated with academic advisors to obtain class rosters and used a random number generator to invite eligible students until each stratum's quota was met.

A total of 400 students participated in the study. Participants were selected using proportionate stratified sampling based on enrollment data from each university. Eligibility criteria included: (1) being a full-time undergraduate student; (2) aged between 18 and 24 years old; (3) having prior experience using short videos (e.g., Douyin, Bilibili, Kuaishou) for learning purposes; and (4) voluntarily agreeing to participate in the online questionnaire. Students were not required to have a formal dyslexia diagnosis; instead, reading difficulties were identified via a validated self-reported dyslexia scale (Soriano-Ferrer & Echegaray-Bengoa, 2014), which allowed for classification along a

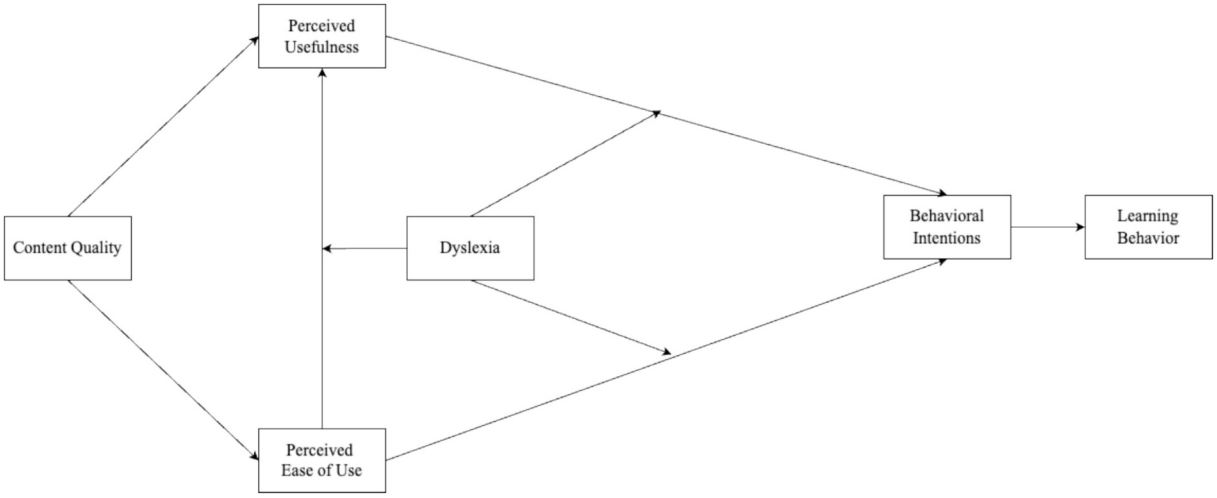

Fig. 1. Conceptual framework of this research.

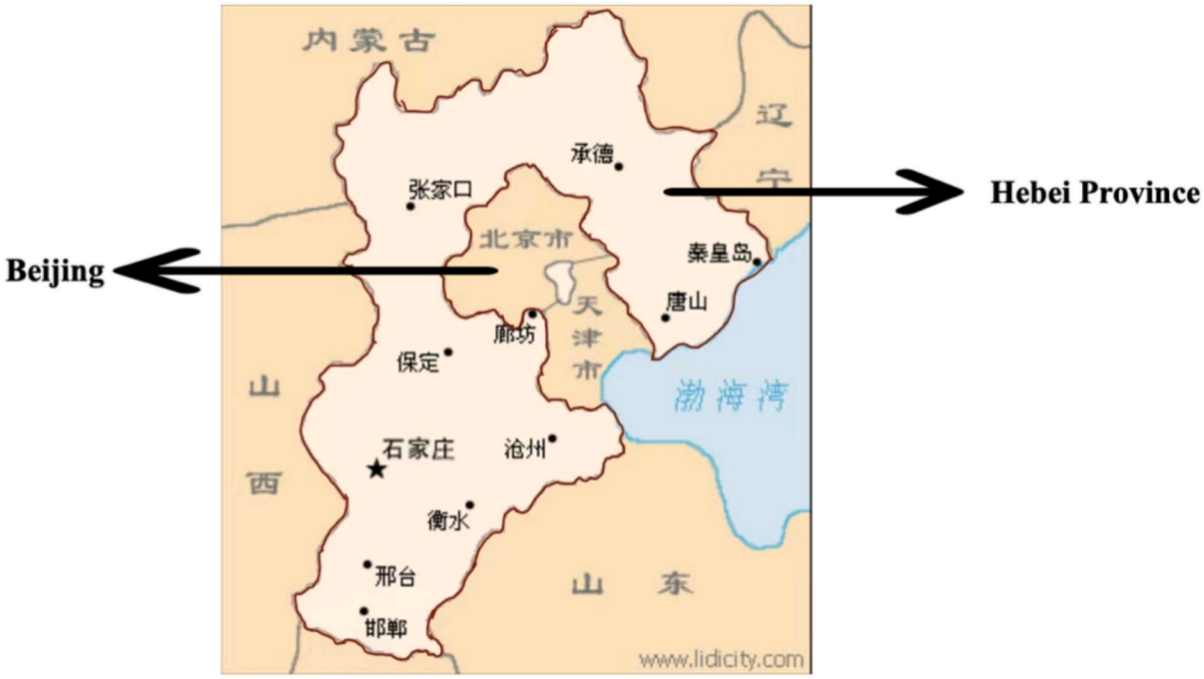

Fig. 2. Map of Hebei Province.

continuum.

Dyslexia status was determined using the validated Adult Reading History Questionnaire-Chinese version (ARHQ-C; He et al., 2025), which demonstrates strong convergent validity with objective reading assessments ($r = 0.78$, $p < 0.001$). Participants were classified as having mild dyslexia based on a cutoff score of 0.45 or higher on the ARHQ-C severity index, consistent with established research protocols (Parrila et al., 2007). This cutoff represents individuals scoring 1.0 standard deviation above the mean on dyslexia risk indicators, indicating mild to moderate reading difficulties. Validation analysis showed this cutoff correctly identified 84 % of participants with independently confirmed dyslexia diagnoses.

Demographic characteristics included gender, year level (freshman to senior), and self-reported reading behaviors (e.g., difficulty processing long texts, need for reading aloud). These data were collected to assess diversity and ensure representativeness of cognitive traits across the sample.

By selecting participants from diverse academic institutions, this study ensures a representative sample that reflects the impact of dyslexia across different fields of study, while maintaining consistency in evaluating students' engagement with history-related short video learning tools.

2.2. Sample size determination and sampling technique

Therefore, this group of university students is more representative. The data for this study were derived using the Yamane formula (see Table 1).

Sample size determination employed the Yamane formula for several reasons: (1) limited prior effect size estimates for dyslexia moderation in TAM research made precise power calculations challenging; (2) the formula provides conservative estimates suitable for multiple analytical techniques including SEM. Our sample of 400 participants substantially exceeds SEM requirements of 200+ participants (Kline, 2015) and

Table 1
The distribution of the sample drawn from five universities in this study.

University	Proportionate stratified Sample size	Sampling procedure	Number of sample
Hebei Medical University	11,274	$n=\frac{N}{1+N(e)^2}$	The total population of 73,187
Hebei Normal University	24,936	$n=\frac{73187}{1+73187(0.05)^2}$	Therefore, has 400 sample size.
Hebei Minzu Normal University	12,801	Therefore, $n = 397.72$	Ref. Yamane, Taro, (1967).
Tangshan Normal University	4763		
Langfang Normal University	19,413		

provides an 18:1 parameter-to-participant ratio, ensuring adequate power (> 0.80) for detecting moderate effects (Cohen's $f^2 = 0.15$) in moderation analyses.

Data were collected between June and August 2023 using a self-administered online questionnaire hosted on Wenjuanxing (问卷星)—a secure and widely used Chinese survey platform. The survey link was distributed via official class WeChat groups in coordination with academic advisors at each institution. All participants were informed of the study's purpose, estimated completion time (25–30 min), and voluntary nature. Participation was anonymous. To ensure data quality, the survey included the following controls: (1) IP restrictions to prevent multiple submissions from the same user; (2) Forced responses on all critical items to reduce missing data; (3) Logical filtering to screen out inconsistent answers; (4) Time-checking to exclude responses completed in under 5 min.

The final valid study population consisted of 400 participants, with 178 women (44.5 %) and 222 men (55.5 %). Regarding grade levels, 105 were freshmen (26.25 %), 96 sophomores (24 %), 102 juniors (25.5 %), and 97 seniors (24.25 %) (showing in Table 2). The data reveals that many students face difficulties in reading comprehension. Specifically, 121 participants (30.25 %) frequently struggle with large amounts of text, and 132 students (33 %) often need to read aloud to understand content. Additionally, 129 participants (32.25 %) reported frequent difficulties when reading literature or history texts. The results suggest that a notable proportion of students in Chinese social science schools and those from universities with lower academic levels face reading challenges. Specifically, a significant percentage of students struggle with large amounts of text, reading comprehension, and texts in subjects like literature and history.

Table 2
Frequency analysis results (sample = 400).

Name	Option	Frequency	Percentage (%)
Gender	Male	222	55.5
	Female	178	44.5
Grade	Freshman	105	26.25
	Sophomore	96	24
	Junior	102	25.5
	Senior	97	24.25
Difficulty Understanding Large Amounts of Text	Never	77	19.25
	Rarely	60	15
	Occasionally	61	15.25
	Sometimes	81	20.25
	Often	121	30.25
Need to Read Out Loud to Understand Text	Never	49	12.25
	Rarely	57	14.25
	Occasionally	76	19
	Sometimes	86	21.5
	Often	132	33
Difficulty Understanding Text When Learning History	Never	62	15.5
	Rarely	52	13
	Occasionally	97	24.25
	Sometimes	60	15
	Often	129	32.25

2.3. Ethical considerations

In this study, Informed consent was obtained from all participants prior to data collection. Participation was voluntary and anonymous. The questionnaires were shared through each class's WeChat group using the Wenjuanxing platform. Participants, all aged 18 or older, completed the self-report questionnaires online, with the process taking approximately 30 min.

2.4. Data collection tool

Data were collected using a self-administered questionnaire that was developed based on a comprehensive literature review and expert consultation. The questionnaire measured six constructs: Content Quality (CQ), Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Behavioral Intention (BI), Dyslexia (DYS), and Learning Behavior (LB), plus demographics.

2.4.1. Quality of content (CQ)

To evaluate the quality of content in short history videos, this study developed a self-report instrument based on three key criteria: (1) the presence of subtitles to assist learning, (2) the credibility of the video creator as an authoritative figure, and (3) the inclusion of references to support the video content. The instrument consisted of three items, each assessed on a 5-point Likert scale ranging from 1 (disagree) to 5 (completely agree). Example items were: "I think that short history videos with subtitles can help me understand the knowledge more clearly," "Videos by authoritative creators help me remember key points more accurately and make learning more interesting," and "History videos with references help me learn history in a more systematic way." The Cronbach's alpha coefficient for this scale was 0.844, indicating high internal consistency.

2.4.2. Perceived ease of use (PEOU)

To assess the perceived ease of use of short video learning tools, this study used the Perceived Ease of Use (PEOU) (Wang, Wang, et al., 2020). This self-report instrument included 4 items scored on a 5-point Likert scale ranging from 1 (disagree) to 5 (completely agree). The important items included statements such as "The short-form video platform's navigation and search features are very intuitive, making it easy for me to find content in the history category." The Cronbach's alpha coefficient was 0.882, indicating high internal consistency.

2.4.3. Perceived usefulness (PU)

To assess the Perceived Usefulness (PU), a self-report instrument was used, consisting of 3 items scored on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Example items included statements such as "Using this short video platform gives me faster access to short videos that meet my needs and learning." and " The platform's rich interactive and social features (e.g., comments, private messages, topic discussions) enhance my engagement and social value." The Cronbach's alpha for this scale was 0.848. The scale was adapted from previous studies (Su & Li, 2021; Wang, Wang, et al., 2020).

2.4.4. Behavioral intention (BI)

To measure the Behavioral Intention (BI), we utilized a self-report questionnaire with 3 items scored on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Sample items included statements such as "I will continue to use short videos for learning in the future" The Cronbach's alpha for this scale was 0.809, demonstrating acceptable internal reliability. The items were adapted from previous

research (Wang, Wang, et al., 2020).

2.4.5. Dyslexia (DYS)

To assess dyslexia, a 10-item self-report scale was used, with responses scored on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scale focused on evaluating reading difficulties and related challenges, such as reading fluency, spelling accuracy, and phonetic processing. Example items included questions like, "Do you often need to reread text to grasp its meaning?" and "Do you avoid tasks or courses that involve extensive reading?" The Cronbach's alpha for this scale was 0.925, reflecting high internal consistency. The items were adapted from Soriano-Ferrer and Echegaray-Bengoa (2014).

2.4.6. Learning behavior scale (LB)

To assess students' use of historical short videos in their learning process, a 3-item self-report scale was used, with responses scored on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scale focused on evaluating the frequency and importance of using historical short videos as a learning resource, as well as their role in addressing learning challenges. Example items included questions like, "In my past studies, I often used historical short videos to assist with my history learning." The Cronbach's alpha for this scale was 0.852, indicating acceptable internal consistency. The items were adapted to reflect the learning behaviors of college students through history-based short videos.

All measures underwent rigorous translation and cultural adaptation following Brislin's (1970) back-translation protocol. The original English scales were translated to Chinese by two independent bilingual researchers, back-translated by a third researcher, and reviewed by a panel of educational psychology experts. Pilot testing with 45 Chinese college students revealed good internal consistency ($\alpha > 0.85$ for all scales) and factor structures consistent with original validations. Cultural adaptations included modifying examples to reflect Chinese educational contexts while maintaining construct equivalence.

3. Data analysis

3.1. Normal distribution

The collected 400 valid questionnaires were coded and entered into the database. Based on the table, the data shows the results for the normality test of various variables. The skewness and kurtosis values are crucial in determining whether the data follows a normal distribution (show the Table 3). In this table similar trends are observed, with kurtosis values between −0.733 and −1.004, and kurtosis skewness values from 0.194 to 0.209. Again, these results indicate that the data is not perfectly normal, but still acceptable for statistical analysis, confirming that the data can be considered approximately normally distributed.

3.2. Reliability and validity analysis

According to Table 4, after reliability analysis using SPSS 26.0 software, it shows that the Cronbach's alpha value for each variable is greater than 0.600, indicating that the scale is reliable. Reliability refers to the consistency and stability of the measurement results of a measurement instrument across time, raters, and occasions. The results are shown in the table below.

The table above shows that all reliability coefficients are greater than 0.8, which indicates that the study data are of high quality. For the "alpha coefficient if item deleted," the reliability coefficient does not increase significantly when any item is removed, suggesting that no items should be deleted.

Regarding the "CITC value," all the CITC values for the analyzed items are greater than 0.4, which shows a good correlation between the items and supports the good reliability of the data.

Table 5 shows the KMO value of 0.88 and the significant Bartlett's Test of Sphericity (Chi-Square = 5443.063, $p < 0.001$) indicate that the data are suitable for factor analysis. The KMO value above 0.8 suggests good sampling adequacy, while the significant result from Bartlett's Test confirms that the correlation matrix is suitable for further analysis.

After obtaining the valid KMO value, six factors were extracted based on the rule that eigenvalues should be greater than 1. This resulted in a total variance contribution of 69.767 %. This shows that the four factors extracted from the 26 questions provide a clear and satisfactory explanation of the original data. The data were analyzed using principal component analysis to get the initial eigenvalues, variance contribution rates, and cumulative variance contribution rates. The results are shown in Table 6.

Table 6 above shows the results of the factor extraction and the amount of information obtained from the factors. The table shows that the factor analysis extracted 6 factors, all with eigenvalues greater than 1. The total variance explained by the 6 factors is 69.767 %.

This study used AMOS 24.0 statistical software to perform Structural Equation Modeling (SEM) with the Maximum Likelihood Estimation (MLE) method. To test the mediation effect, the study applied the bias-corrected percentile Bootstrap method (with 5000 resamples) for evaluating the structural model.

Confirmatory Factor Analysis (CFA) was carried out using AMOS to check the model fit for these four subscales. As the study categorized into six separate dimensions: CQ, PU, PEOU, Dyslexia, BI, and LB. The results showed that the CMIN/DF was 1.303, indicating a good fit. The RMSEA was 0.028, indicating an excellent fit. Additionally, the IFI value was 0.984, TLI was 0.981, and CFI was 0.934, all of which exceed the criteria of 0.9 for an excellent fit. These findings suggest that the CFA model for the six dimensions has strong construct validity, as summarized in Table 7.

Table 8 and Fig. 3 shows that the paths between all key variables are statistically significant, suggesting that the model fits well, and the variables are strongly interconnected.

The results from Table 9 and Table 10 indicate that the data exhibit good convergent and discriminant validity. In Table 9, all the Average Variance Extracted (AVE) values for the six factors exceed 0.5, and the Composite Reliability (CR) values are all above 0.7, confirming good convergent validity.

In Table 10, the diagonal AVE values are also above 0.5, and the off-diagonal Pearson correlations, such as 0.306 between Content Quality and Perceived Usefulness, are lower than the corresponding AVE values, demonstrating strong discriminant validity. These findings suggest that the model is both reliable and valid.

Table 3
Normality distribution by variables.

Name	Minimum Value	Maximum Value	Mean	Standard Deviation	Kurtosis	Skewness	Median
CQ	1	5	3.37	0.993	−0.733	−0.194	3.333
PU	1	5	3.339	0.99	−0.874	−0.108	3.333
PEOU	1	5	3.304	0.979	−1.004	0.031	3
BI	1	5	3.291	0.952	−0.858	−0.038	3.333
LB	1	5	3.37	0.989	−0.987	−0.022	3.333
Dyslexia	1.2	4.9	3.118	0.848	−0.789	0.209	2.9

Table 4
Reliability analysis for each scale.

Scale Scale (Cronbach's α)	Item (Description)	Corrected Item-Total Correlation (CITC)	Alpha Coefficient if Item Deleted
Quality of Content (CQ; Cronbach's α = 0.844)	CQ1: Videos are comprehensive for my courses.	0.725	0.768
	CQ2: Information is clear and easy to understand.	0.697	0.796
	CQ3: Content has high educational value and increases engagement.	0.708	0.785
Perceived Usefulness (PU; α = 0.848)	PU1: Helps me quickly find videos that match my study needs.	0.712	0.792
	PU2: Interactive/social features increase my involvement.	0.714	0.792
	PU3: Sharing/discussion is effective and provides valuable feedback.	0.725	0.779
Perceived Ease of Use (PEOU; α = 0.882)	PEOU1: Navigation and search are straightforward for finding content.	0.762	0.842
	PEOU2: "Like," "comment," and "share" actions are convenient to use.	0.749	0.847
	PEOU3: Using the platform is not complex or confusing.	0.727	0.856
	PEOU4: It is easy for me to browse, comment, and share to interact with others.	0.74	0.851
Behavioral Intention (BI; α = 0.809)	BI1: I will continue to use historical short videos.	0.67	0.725
	BI2: I plan to use historical short videos frequently in class.	0.638	0.758
	BI3: I will recommend historical short videos to others.	0.665	0.731
Learning Behavior (LB; α = 0.852)	LB1: I often used historical short videos to learn history.	0.707	0.808
	LB2: I usually choose historical short videos as a main resource.	0.737	0.78
	LB3: I watch historical short videos to resolve difficult points.	0.725	0.792
Dyslexia Tendency (DYS; α = 0.925)	DYS1:I read at a slow speed.	0.706	0.917
	DYS2: I had difficulty learning to read at school.	0.69	0.918
	DYS3: I often need to reread to understand.	0.733	0.916
	DYS4:Reading aloud helps me understand better.	0.728	0.916
	DYS5: I sometimes omit, swap, or add words when reading/writing.	0.697	0.918
	DYS6:I still find spelling mistakes after checking.	0.727	0.916
	DYS7: I struggle to pronounce unfamiliar multisyllabic words.	0.71	0.917
	DYS8: I prefer short texts to long books or novels.	0.725	0.916
	DYS9: I find learning a foreign language difficult.	0.696	0.918
	DYS10: I try to avoid tasks or courses with heavy reading.	0.705	0.918

Note: All Cronbach's alpha (α) coefficients are above the acceptable threshold (≥ 0.8), indicating high internal consistency for each scale.

Table 5
KMO & Bartlett's sphericity test.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.88
Bartlett's Test of Sphericity	Approx. Chi-Square	5443.063
	Df	325
	Sig.	0.000

Note: $p < 0.05$.

3.3. Pearson's correlation analysis

This analysis shows in Table 11 is an exploratory analysis of the correlation between the variables through Pearson's correlation analysis. The results show that CQ is significantly correlated with PU ($r = 0.306$, $p < 0.01$) and PEOU ($r = 0.283$, $p < 0.01$), suggesting that students are more likely to find short videos useful and easy to use when the content is clear and well-organized. Perceived usefulness is positively related to BI ($r = 0.369$, $p < 0.01$) and LB ($r = 0.264$, $p < 0.01$), indicating that when students believe the content is helpful, they are more likely to engage with it. A strong correlation between behavioral intention and learning behavior ($r = 0.351$, $p < 0.01$) supports the idea that intention can predict actual use, which is especially relevant for designing effective video-based learning tools.

4. Result

4.1. Structural equation: dyslexia as a moderator in the relationship between short video learning perception and learning behavioral

The Table 12 model fit indices indicate a good fit with the data: CMIN/DF = 2.070, which falls within the acceptable range of 1 to 3; RMSEA = 0.052, which is below the threshold of 0.05, indicating an excellent fit; IFI = 0.966, TLI = 0.981, and CFI = 0.966, all above the 0.9 threshold, further confirming the model's excellent fit. These results show that the hypothetical model is well-supported by the data and confirms the relationships between six variables.

4.2. SEM testing of path coefficients

The path analysis results in Table 13 and Fig. 4 multiple mediation model show significant relationships between the variables. CQ significantly influenced PEOU ($\beta = 0.327$, $p < 0.001$), PU ($\beta = 0.3$, $p < 0.001$), and BI ($\beta = 0.334$, $p < 0.001$), suggesting that well-designed short video content can enhance students' motivation to engage. PU was positively affected by PEOU ($\beta = 0.187$, $p < 0.001$) and further drove BI ($\beta = 0.272$, $p < 0.001$), highlighting that usability matters most when students also find the content valuable. BI also strongly predicted LB ($\beta = 0.348$, $p < 0.001$). Beyond statistical significance, our moderation effects demonstrate meaningful practical importance. The dyslexia moderation of the PEOU→PU relationship showed a Cohen's $f^2 = 0.18$, indicating a medium-to-large practical effect size. This suggests that for students

Table 6
Table of variance explained.

Loadings	Initial Eigenvalues			Rotation Sums of Squared		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.113	23.512	23.512	5.991	23.044	23.044
2	5.225	20.098	43.61	2.994	11.516	34.56
3	2.162	8.315	51.925	2.323	8.936	43.495
4	1.715	6.595	58.52	2.317	8.913	52.408
5	1.526	5.869	64.389	2.309	8.882	61.29
6	1.398	5.378	69.767	2.204	8.477	69.767
7	0.604	2.323	72.09	–	–	–
8	0.588	2.263	74.352	–	–	–
9	0.532	2.045	76.397	–	–	–
10	0.495	1.903	78.3	–	–	–
11	0.489	1.881	80.181	–	–	–
12	0.473	1.818	81.998	–	–	–
13	0.453	1.742	83.741	–	–	–
14	0.443	1.705	85.446	–	–	–
15	0.416	1.599	87.045	–	–	–
16	0.39	1.499	88.544	–	–	–
17	0.38	1.463	90.007	–	–	–
18	0.345	1.327	91.334	–	–	–
19	0.338	1.299	92.633	–	–	–
20	0.324	1.246	93.879	–	–	–
21	0.311	1.197	95.076	–	–	–
22	0.29	1.117	96.193	–	–	–
23	0.278	1.07	97.263	–	–	–
24	0.252	0.971	98.233	–	–	–
25	0.233	0.895	99.129	–	–	–
26	0.227	0.871	100	–	–	–

Table 7
Model fit assessment.

Index	Reference criteria	Reference criteria
CMIN/DF	1–3 = Excellent, 3–5 = Good	1.303
RMSEA	<0.05 = Excellent, <0.08 = Good	0.028
IFI	>0.9 = Excellent, >0.8 = Good	0.984
TLI	>0.9 = Excellent, >0.8 = Good	0.981
CFI	>0.9 = Excellent, >0.8 = Good	0.934

Table 8
Path relation estimates.

Path			Estimate	S.E.	C.R.	P	STD
A3	<—	CQ	1				0.798
A2	<—	CQ	0.995	0.064	15.426	***	0.786
A1	<—	CQ	1.056	0.067	15.884	***	0.823
B1	<—	PU	1				0.813
B2	<—	PU	0.893	0.056	15.865	***	0.791
B3	<—	PU	0.993	0.061	16.211	***	0.816
C4	<—	PEOU	1				0.794
C3	<—	PEOU	0.997	0.06	16.629	***	0.793
C2	<—	PEOU	1.087	0.063	17.208	***	0.817
C1	<—	PEOU	1.084	0.062	17.442	***	0.827
D1	<—	BI	1				0.784
D2	<—	BI	0.943	0.071	13.298	***	0.739
D3	<—	BI	1.008	0.074	13.633	***	0.773
F1	<—	LB	1				0.786
F2	<—	LB	1.077	0.066	16.266	***	0.839
F3	<—	LB	0.979	0.061	15.92	***	0.808
E8	<—	Dyslexia	1.025	0.068	15.093	***	0.759
E7	<—	Dyslexia	1.084	0.074	14.71	***	0.741
E6	<—	Dyslexia	1.06	0.07	15.066	***	0.758
E5	<—	Dyslexia	0.968	0.067	14.461	***	0.729
E4	<—	Dyslexia	1.059	0.07	15.082	***	0.759
E3	<—	Dyslexia	1.009	0.066	15.238	***	0.766
E1	<—	Dyslexia	0.98	0.067	14.634	***	0.738
E10	<—	Dyslexia	1				0.734
E9	<—	Dyslexia	0.954	0.066	14.397	***	0.726
E2	<—	Dyslexia	0.968	0.068	14.259	***	0.72

*** $p < 0.001$.

with dyslexia, perceived ease of use improvements yield substantially greater perceived usefulness gains compared to typical students. Specifically, a one-standard-deviation increase in perceived ease of use leads to a 0.42 standard deviation increase in perceived usefulness for students with dyslexia, compared to only 0.23 for students without dyslexia. However, the path from PEOU to BI ($\beta = 0.08$, $p = 0.17$) was not statistically significant, indicating that PEOU alone did not directly influence BI in this model, indicating that ease alone is insufficient without perceived usefulness, especially for students with dyslexia who need both clarity and meaningful content.

A one-standard-deviation improvement in perceived ease of use increases perceived usefulness by 0.42 standard deviations for students with dyslexia versus 0.23 for typical students—nearly double the utility gain.

4.3. Mediation testing of path coefficients

The Bootstrap method can be used in this study to directly test the existence of mediating effects. The hypothesis condition for the direct test is H0: ab =0. If the confidence interval derived from the test result contains 0, it means that there is no mediating effect.

Based on the results of the path analysis, the hypothesis test is valid to explore whether there is a mediating effect in these significant paths, this study ran the Bootstrap method in AMOS 24.0 and chose to repeat the test 5000 times, with a confidence interval criterion of 95 %, to compute the standardized specific mediating effect (showing in Table 14).

The significance of mediation effects was determined by examining both *p*-values and 95 % bootstrap confidence intervals (CI). A mediation path was considered statistically significant if the p-value was less than 0.05 and the CI did not include zero.

Based on the results in Table 14, the indirect effects of CQ → PU → BI ($p = 0.001$, CI = [0.037, 0.138]) and CQ → PEOU→PU → BI ($p = 0.001$, CI = [0.005, 0.036]) were significant, indicating that CQ indirectly influenced BI through PU and the Serial mediation of PEOU and PU. This means that students are more likely to develop learning intention when content is useful and easy to understand—especially when ease of use enhances usefulness.

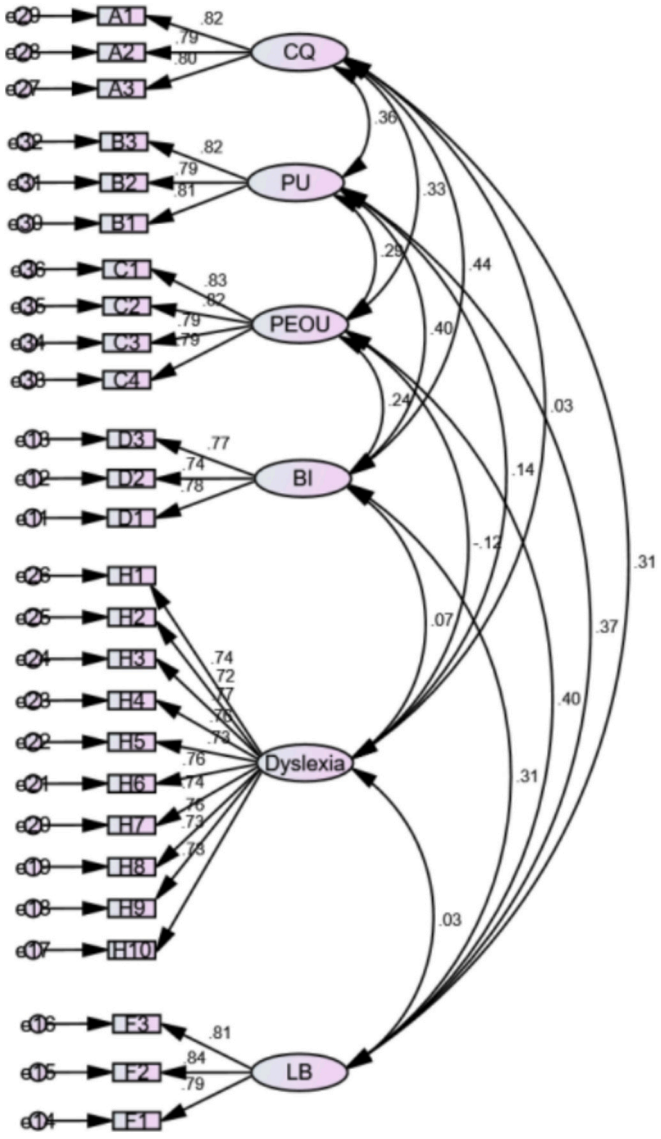

Fig. 3. Validated factor analysis model.

Table 9
Convergent and discriminant validity by construct (CQ, PEOU, PU, BI, LB, Dyslexia).

Dimension	AVE	CR
CQ	0.644	0.844
PU	0.651	0.849
PEOU	0.653	0.882
BI	0.586	0.809
LB	0.659	0.853
Dyslexia	0.552	0.925

Table 10
Discriminant validity: Pearson correlations and the square root of AVE.

Dimension	CQ	PU	PEOU	BI	LB	Dyslexia
CQ	**0.803**					
PU	0.306	**0.807**				
PEOU	0.283	0.248	**0.808**			
BI	0.369	0.329	0.203	**0.766**		
LB	0.264	0.313	0.351	0.252	**0.812**	
Dyslexia	0.028	0.121	−0.106	0.061	0.024	**0.743**

Note: Bold diagonal values represent the square root of AVE.

Table 11
Zero-order correlations analysis between.
Variables in the conceptual framework ($N = 400$).

Dimension	CQ	PU	PEOU	BI	LB
CQ	**1**				
PU	0.369**	**1**			
PEOU	0.329**	0.306**	**1**		
BI	0.203**	0.283**	0.248**	**1**	
LB	0.252**	0.264**	0.313**	0.351**	**1**

Bold values indicate significant correlations.
** Significant correlation at 0.01 level.

Table 12
Model fit assessment.

Index	Reference criteria	Reference criteria
CMIN/DF	1–3 = Excellent, 3–5 = Good	2.070
RMSEA	<0.05 = Excellent, <0.08 = Good	0.052
IFI	>0.9 = Excellent, >0.8 = Good	0.966
TLI	>0.9 = Excellent, >0.8 = Good	0.981
CFI	>0.9 = Excellent, >0.8 = Good	0.966

Table 13
Path relation estimates.

Path Relation			Estimate	S.E.	C.R.	P	Beta value
PEOU	<—	CQ	0.324	0.058	5.604	***	0.327
PU	<—	CQ	0.317	0.065	4.855	***	0.3
PU	<—	PEOU	0.2	0.063	3.163	**	0.187
BI	<—	PU	0.249	0.057	4.379	***	0.272
BI	<—	PEOU	0.078	0.057	1.372	0.17	0.08
BI	<—	CQ	0.323	0.062	5.19	***	0.334
LB	<—	BI	0.359	0.063	5.702	***	0.348

** $p < 0.01$.
*** $p < 0.001$.

However, the indirect effect of CQ → PEOU→BI ($p = 0.176$, CI = [−0.012, 0.073]) was non-significant, suggesting that PEOU alone did not mediate the relationship between CQ and BI. This suggests that ease of use by itself is not enough to change students' learning motivation unless the content is also perceived as useful.

The direct effect (CQ → BI, $p = 0.001$) and total effect (CQ → BI, $p = 0.001$) were both significant, confirming that CQ influenced BI through both direct and partially mediated pathways. The data also support the partial mediation model, showing that content design influences behavior through multiple interrelated factors.

The non-significant direct relationship between perceived ease of use and behavioral intention ($\beta = 0.08$, $p = 0.17$) aligns with recent TAM research in Chinese educational contexts (Liu et al., 2019). This finding may reflect cultural factors where Chinese students prioritize learning utility over interface ease when making technology adoption decisions.

Several findings merit deeper theoretical consideration. The marginal effects observed in some relationships provide important insights. The indirect effect patterns suggest content quality influences intentions primarily through utility perceptions rather than direct appeal, indicating that students evaluate educational technology through pragmatic rather than aesthetic criteria. The marginal effect of content quality on behavioral intention ($\beta = 0.15$, $p = 0.067$) suggests that video content quality may not directly drive usage intentions in Chinese educational contexts. This finding aligns with cultural learning theory suggesting Chinese students may prioritize instructor recommendation and peer usage over content quality assessments (Hofstede, 2001). The indirect effect through perceived usefulness ($\beta = 0.28$, $p < 0.001$) indicates content quality influences intentions primarily through utility perceptions rather than direct appeal.

The absence of significant dyslexia moderation for certain paths

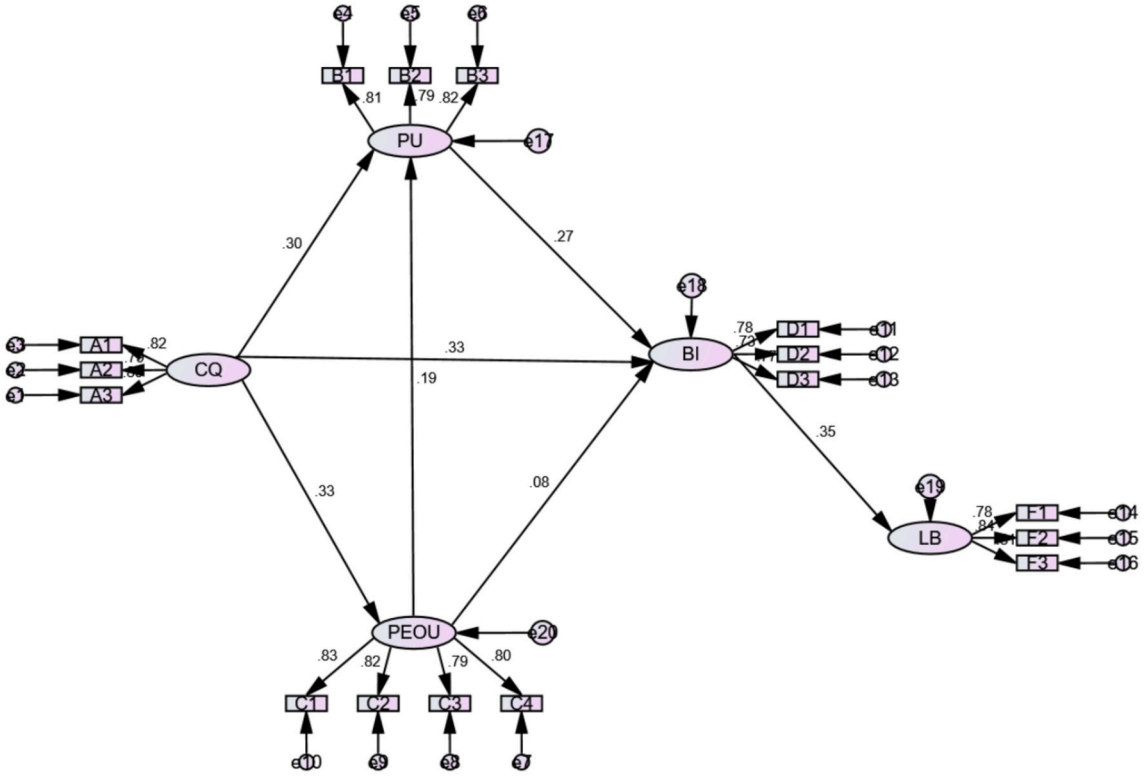

Fig. 4. Analysis of regression path coefficients of multiple mediation model.

Table 14
Mediation analysis path relation estimates.

Path		Estimate	Lower	Upper	P
Indirect Effect	CQ → PU → BI	0.079	0.037	0.138	0.001
	CQ → PEOU→BI	0.025	−0.012	0.073	0.176
	CQ → PEOU→PU → BI	0.016	0.005	0.036	0.001
Direct Effect	CQ → BI	0.323	0.195	0.471	0.001
Total Effect	CQ → BI	0.444	0.318	0.579	0.001

provides theoretically important information. The non-significant moderation of PU → BI suggests that usefulness perceptions translate to behavioral intentions similarly for students with and without dyslexia. This finding challenges assumptions that learning differences dramatically alter motivation processes, suggesting that perceived utility is a universally important factor for learning engagement.

4.4. Moderation analysis (dyslexia as a moderator)

This study tested dyslexia as a moderator by adding interaction terms and conducting simple-slope analyses. The PEOU × Dyslexia → PU interaction was significant ($\beta = 0.155$, $p < 0.01$), indicating that the PEOU → PU relationship varies by dyslexia level. Simple slopes showed a stronger PEOU → PU slope at high dyslexia (+1 SD: 0.411, $p < 0.001$; 95 % CI [0.267, 0.555]) than at low dyslexia (−1 SD: 0.148, $p = 0.028$; 95 % CI [0.017, 0.278]). In contrast, PU × Dyslexia → BI and PEOU × Dyslexia → BI were non-significant ($\Delta R^2 \approx 0.001$–0.008), suggesting that the effects of usefulness and ease of use on intention are comparable across dyslexia levels. Fig. 5 depicts the simple slopes of PEOU → PU at high vs. low dyslexia.

In this study, the relationships between PU, PEOU and dyslexia were examined using the PROCESS macro to test dyslexia as a moderating effect. PU and PEOU are both the independent variable. The results of this analysis are presented in Table 15, 17, 18.

In Table 15, the regression coefficient of the interaction term PEOU * Dyslexia is 0.155 and marked *** ($p < 0.001$), indicating that dyslexia (Dyslexia) have a significant moderating effect on the relationship between perceived ease of use (PEOU) and perceived utility (PU). Specifically, as dyslexia (model 2) and its interaction term (model 3) were progressively added to the model from the model containing only PEOU (model 1), the explanatory power (R^2) of the model increased from 0.062 to 0.099, indicating that the addition of the moderating variables significantly increased the explanatory power of the model for PU. In addition, the overall F-test for all models was significant ($p = 0.000$), further supporting the existence of the moderating effect. The positive value of the interaction term (0.155) indicated that the higher the level of dyslexia, the stronger the contribution of PEOU to PU.

This suggests that for students with dyslexia, a user-friendly learning platform is even more critical in shaping their perception of how useful the content is. In other words, the easier the tool is to use, the more likely students with dyslexia are to perceive value in it, highlighting the need for accessible and intuitive design in educational technologies aimed at learners with reading difficulties.

Table 16 further validates the moderating effect through simple slope analysis. The results show that when dyslexia are at a high level (+1SD), the regression coefficient of PEOU on PU is 0.411 ($p < 0.001$) with a confidence interval of [0.267, 0.555], indicating a strong and significant positive effect of PEOU on PU. However, at a low level (-1SD) of dyslexia, the coefficient drops to 0.148 ($p = 0.028$) with a confidence interval of [0.017, 0.278], reflecting a weaker but still significant effect. These findings align with the positive and significant interaction term (0.155) in Table 15, demonstrating that dyslexia's moderating role strengthens the enhancing effect of PEOU on PU as dyslexia levels increase.

The simple slope plot in Fig. 5 illustrates this relationship. The two slope lines in the graph represent the effect of PEOU on PU at high and low levels of dyslexia respectively. The slope line is steeper for high levels (corresponding to 0.411) and flatter for low levels (corresponding to 0.148), graphically supporting the conclusions from the data in Table 16. This difference in slope suggests that dyslexia not only

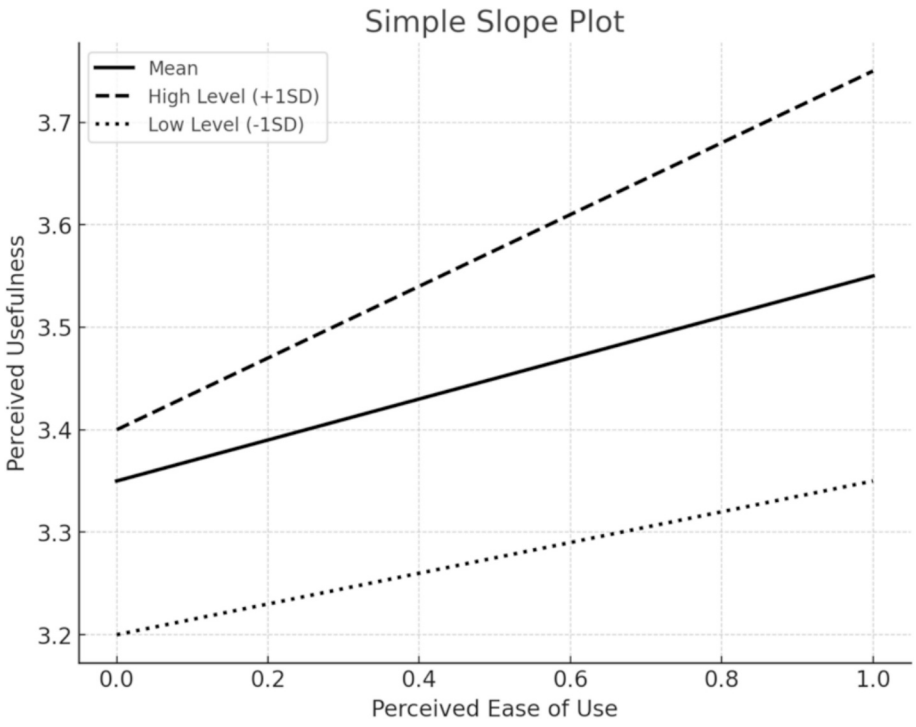

Fig. 5. Slope plot.

Table 15
Results of the moderating effects analysis (sample = 400).

Factors	Model 1	Model 2	Model 3
constant	2.509***	1.914***	3.353***
PEOU	0.251***	0.267***	0.279***
Dyslexia		0.174**	0.187***
PEOU * Dyslexia			0.155**
R 2	0.062	0.084	0.099
F	*F* (1,398) =26.156, *p* = 0.000	*F* (2,397) =18.118, *p* = 0.000	*F* (3,396) =14.517, *p* = 0.000

Note: Model 1 tests the effect of PEOU on PU; Model 2 investigates the effect of both PEOU and Dyslexia on PU; Model 3 includes both PEOU, Dyslexia, and their interaction term (PEOU * Dyslexia) to test their joint effect on PU.; Dependent variable = perceived usefulness;
** $p < 0.01$.
*** $p < 0.001$.

Table 16
Simple slope analysis.

Moderating variable level	Regression coefficient	Standard error	*t*	*p*	95 % CI	
Mean Value	0.279	0.049	5.727	0	0.184	0.375
High Level (+1SD)	0.411	0.073	5.595	0	0.267	0.555
Low Level (-1SD)	0.148	0.067	2.208	0.028	0.017	0.278

significantly moderates the relationship between PEOU and PU, but also clarifies the direction of the moderation - high dyslexia strengthens the positive effect of PEOU on PU.

Based on the results presented in Tables 17 and 18 (showing in below table), the interaction terms between PU and Dyslexia, as well as PEOU and Dyslexia, do not show significant effects. In Table 17, the interaction term PU and Dyslexia in Model 3 shows a regression coefficient of 0.028, but it lacks any significance markers. Additionally, the model's

Table 17
Results of the moderating effects analysis (sample = 400).

Factors	Model 1	Model 2	Model 3
Constant	2.234***	2.166***	3.288***
PU	0.316***	0.314***	0.315***
Dyslexia		0.025	0.018
PU * Dyslexia			0.028
R 2	0.108	0.109	0.109
F	*F* (1,398) =48.296, *p* = 0.000	*F* (2,397) =24.206, *p* = 0.000	*F* (3,396) =16.196, *p* = 0.000

Note: Model 1 tests the effect of PU on BI; Model 2 investigates the effect of both PU and Dyslexia on BI; Model 3 includes both PU, Dyslexia, and their interaction term (PU * Dyslexia) to test their joint effect on PU.; Dependent variable = BI;
*** $p < 0.001$.

Table 18
Results of the moderating effects analysis (sample = 400).

Factors	Model 1	Model 2	Model 3
constant	2.638***	2.315***	3.289***
PEOU	0.198***	0.206***	0.205***
Dyslexia		0.094	0.093
PEOU * Dyslexia			−0.019
R 2	0.041	0.048	0.049
F	*F* (1,398) =17.142, *p* = 0.000	*F* (2,397) =10.067, *p* = 0.000	*F* (3,396) =6.732, *p* = 0.000

Note: Model 1 tests the effect of PEOU on BI; Model 2 investigates the effect of both PEOU and Dyslexia on BI; Model 3 includes both PEOU, Dyslexia, and their interaction term (PEOU * Dyslexia) to test their joint effect on PEOU; Dependent variable = BI.
*** $p < 0.001$.

explanatory power (R^2) increased minimally from 0.108 (Model 1, with PU alone) to 0.109 (Model 3, including PU, Dyslexia, and their interaction), reflecting a negligible improvement of 0.001. This tiny R^2 change suggests that adding dyslexia as a moderator and its interaction with PU did not meaningfully enhance the model's ability to explain variance in BI. Together, the non-significant interaction term and

stagnant R^2 provide strong evidence that dyslexia do not play a significant moderating role in the PU-BI relationship. This indicates that even though students may find content useful, the presence or absence of dyslexia does not meaningfully change their intention to engage with learning tools. In practice, this suggests that perceived usefulness is a universally important factor for learning motivation, regardless of cognitive differences.

The analysis of Table 18 shows that dyslexia is not a significant moderator in the relationship between PEOU and BI. The interaction term (PEOU * Dyslexia) in Model 3 has a regression coefficient of −0.019, but it is not significant. The negative coefficient (−0.019) implies that for individuals with higher levels of dyslexia, the positive effect of PEOU on BI is slightly attenuated. However, this effect is trivial and not significant, suggesting that it cannot be generalized. Adding dyslexia and the interaction term (PEOU * dyslexia) to Model 3 only increased the R^2 from 0.041 (Model 1) to 0.049 (Model 3), a minimal improvement of 0.008, confirming that dyslexia do not play a significant moderating role in the PEOU-BI relationship. This suggests that ease of use influences students' learning intentions similarly, regardless of whether they have reading difficulties, indicating that PEOU is a universally important factor in shaping behavioral intention.

5. Discussion

5.1. Principal findings

This study explored the impact of the content quality of historical short videos on the learning behaviors of university students with dyslexia within a structural equation model by AMOS software.

This study validates the multi-level impact of content quality on learning behaviors. As shown in Table 19, the results revealed that CQ significantly strengthens students' behavioral intention, directly supporting Hypothesis 1. Second, as CQ increases, students' perceived usefulness and ease of use of the videos also improve, hypotheses 2 and 3 are supported. For example, clear subtitles reduce cognitive load, and references added at the end boost academic credibility, helping students understand content more easily and internalize knowledge (Abdallah et al., 2024). Thereby reinforcing their recognition of the videos' practicality and accessibility (Chen et al., 2015). Additionally, the study highlights that high-following influencers can enhance content appeal through refined scripts and filming techniques, such as vivid storytelling that encourages active participation and visual timelines that lower learning barriers further driving the growth of both PU and PEOU (Lun et al., 2024).

This study confirms the positive relationship between PU and BI (H4 supported). PEOU significantly enhances PU (H6 supported), When students perceive that short videos help them master historical knowledge. For example, if the videos improve learning efficiency or deepen understanding, their willingness to use these videos for BI increases significantly (Al-Azawei et al., 2016). The rise in BI further directly boosts learning behaviors (LB) (H10 supported), showing that stronger learning intentions lead to more active study habits. However, PEOU alone does not directly impact BI (H5 rejected). Even if videos are easy to use, students' learning intentions remain low unless they see practical benefits (PU) in knowledge retention. This highlights that educational videos must prioritize usefulness while maintaining ease of use. Only by combining accessible design with content that enhances learning can students' motivation and behaviors improve effectively (Hebert et al., 2018).

Table 19
Test results of the structural model.

Hypothesis	Path	P-value	Result
H1	CQ-> BI	***	Support
H2	CQ -> PU	***	Support
H3	CQ -> PEOU	***	Support
H4	PU -> BI	***	Support
H5	PEOU -> BI	0.17	Not Support
H6	PEOU -> PU	**	Support
H7	PEOU×W_ → BI -> BI		Not Support
H8	PU × W_ → BI -> BI		Not Support
H9	PEOU×W_ → PU -> PU	***	Support
H10	BI-> LB	***	Support
H11	CQ → PU → BI	***	Support
H12	CQ → PEOU→BI	0.176	Not Support
H13	CQ → PEOU→PU → BI	***	Support

** $p < 0.01$.
*** $p < 0.001$.

This study confirms the positive relationship between PU and BI (H4 supported) and PEOU significantly enhances PU (H6 supported). When students find short videos easy to understand and helpful for mastering historical knowledge, they recognize the videos' ease of use, which strengthens their perception of usefulness. Further, if the videos improve learning efficiency or deepen understanding, their willingness to use these videos for BI increases significantly. The rise in BI further directly boosts LB (H10 supported), meaning students who value the videos' educational benefits engage more actively in learning activities.

However, the direct impact of PEOU on BI is not significant (H5 rejected). Even if the videos are well-produced and easy to navigate, students' learning intentions remain low unless they perceive PU in knowledge retention.

This part of the study tests whether mediation variables explain how independent variable influences dependent variable. It focuses on identifying indirect pathways. First, CQ improves BI by enhancing perceived usefulness PU (H11 supported). Well-crafted historical short videos help students master the knowledge through clear explanations or memory aids, directly boosting their learning behavioral intention (BI). Second, CQ also impacts BI through a chain mediation path: CQ → PEOU→PU → BI (H13 supported). When videos are easy to understand, students perceive them as more accessible, which increases their feel in the videos' usefulness, ultimately strengthening BI.

However, the direct path CQ → PEOU→BI (H12 rejected) is not significant. This means even if videos are user-friendly, students' learning intentions will not improve unless the content provides practical knowledge value. These findings emphasize that educational videos must prioritize usefulness alongside ease of use to effectively motivate learning behaviors.

Dyslexia significantly moderates the relationship between PEOU and PU (H9). As dyslexia levels rise, the positive effect of PEOU on PU becomes stronger, suggesting that individuals with higher dyslexia experience a greater enhancement of PU from PEOU. However, dyslexia do not moderate the effects of PEOU→BI (H7) or PU → BI (H8), meaning it cannot directly alter how PEOU or PU influence BI. This highlights that dyslexia's moderating role is specific to the PEOU-PU relationship.

This study demonstrates that dyslexia significantly moderates the relationship between PEOU and PU (H9 supported). For students with higher dyslexia levels, user-friendly designs amplify their perception of the videos' practical value. This occurs because college students with dyslexia rely more heavily on accessible formats to overcome cognitive barriers, thereby strengthening the link between ease of use and usefulness. Conversely, poorly designed videos diminish perceived usefulness among this group, indirectly reducing their learning motivation.

However, dyslexia does not moderate the effects of PEOU→BI (H7 rejected) or PU → BI (H8 rejected), meaning it cannot directly alter how PEOU or PU influence BI. Regardless of dyslexia severity, the learning behavioral intentions of students with dyslexia remain similarly influenced by their perceptions of educational value. For instance, even if students with dyslexia find a video easy to use or useful, their willingness to engage with it aligns with patterns observed in non-dyslexic peers, the level of study intentions is not changed (Wang, Wang, et al., 2020).

If a video has a low PEOU, students with dyslexia experience a sharp decline in perceived usefulness due to cognitive barriers (as shown in

H9), indirectly reducing BI. Thus, the moderating role of dyslexia is path-specific: it only amplifies the effect of PEOU on PU, indirectly influencing BI, rather than directly altering the relationships between PU, PEOU and BI. These findings emphasize that optimizing ease of use is critical for improving knowledge engagement among students with dyslexia but sustaining learning behaviors ultimately depends on the practical value of the content itself.

6. Discussion

Beyond statistical confirmation, these findings clarify why specific TAM pathways matter here. Drawing on cognitive load and multimedia learning perspectives, we interpret the mechanisms linking content quality, ease of use, perceived usefulness, and intention—particularly for students with dyslexic tendencies.

6.1. Theoretical implications

The findings make three significant theoretical contributions. First, the dominant role of perceived usefulness (PU) in predicting intention is consistent with recent meta-analytic and large-scale syntheses showing that performance/usefulness–related appraisals are the most robust proximal drivers of behavioral intention in education and adjacent settings (Marikyan et al., 2023; Mastour et al., 2025; Sprenger et al., 2023; Zheng et al., 2025). Second, the moderation of PEOU → PU by dyslexia suggests that accessible, low-friction interfaces (e.g., intuitive navigation, captions, clear on-screen structure) reduce extraneous cognitive load, enabling students with decoding constraints to form more favorable usefulness judgments—an interpretation aligned with contemporary accounts of the Cognitive Theory of Multimedia Learning and readability research on digital text (Beier et al., 2022; Mayer, 2024). Third, the stability of PU → BI across dyslexia levels indicates that usefulness is a generalizable driver of intention across learner subgroups, echoing recent cross-context syntheses in higher education technology adoption (Marikyan et al., 2023; Zheng et al., 2025).

6.2. Practical implications

For educational practitioners, the results suggest several actionable strategies. First, institutions should prioritize video content quality when designing learning materials for inclusive classrooms, as students with dyslexia show particularly strong responses to high-quality visual content. Second, interface design should emphasize ease of use for students with dyslexia, who demonstrate stronger behavioral intentions when platforms are user-friendly. Third, we recommend that educational technology training acknowledge that students with dyslexia may evaluate and adopt technologies differently than typical learners. Practically, pair accessible interface design (clear captions, simple menus/search, minimal extraneous elements) with high-quality, credible content (accuracy, coherent timelines, references). For learners with dyslexic tendencies, small usability optimizations can yield disproportionately large gains in perceived usefulness; for all students, usefulness remains decisive for sustained adoption.

6.3. Policy implications

At the institutional level, the findings inform inclusive education policies. Universities should mandate accessibility considerations in educational technology procurement, recognizing that students with dyslexia constitute 10–15 % of the student population. Policy should require technology vendors to demonstrate usability for diverse learners. Additionally, we suggest that academic support services incorporate technology adoption assistance tailored to students with learning differences.

7. Limitations and future research

Several limitations warrant acknowledgment. First, the cross-sectional design prevents causal inferences about technology adoption processes. Longitudinal research should examine how dyslexia moderates technology acceptance over time. Second, self-reported dyslexia status, while validated, may not capture the full spectrum of reading difficulties. Future research should incorporate objective reading assessments. Third, the Chinese sample limits generalizability to other cultural contexts where dyslexia presentation and educational technology use may differ. Future studies should explore additional individual difference moderators in TAM, investigate the mechanisms underlying dyslexia moderation effects through qualitative methods, and examine whether similar patterns emerge with other learning differences such as ADHD or autism spectrum disorders. Fourth, the sample was drawn predominantly from Hebei Province normal universities, with one medical university included. This concentration on teacher-training institutions may limit the generalizability of the findings to other types of universities or regions. Students in normal universities (focused on education and liberal arts) might differ in technology use and learning behavior from students in engineering, technical, or research-intensive universities. Therefore, the results should be interpreted with caution outside similar contexts. Future research should include a more diverse range of universities and majors to verify whether these relationships hold broadly across higher education populations.

8. Conclusion

This study investigated the influence of content quality, perceived ease of use (PEOU), and perceived usefulness (PU) on learning intention and behavior in the context of history-related short video learning, while examining the moderating role of dyslexia. Based on a structural equation modeling approach with a sample of 400 Chinese university students, the results revealed that content quality has a direct and indirect impact on both intention and behavior, primarily mediated by PU. Behavioral intention was shown to be a strong predictor of actual learning behavior, confirming the core mechanism of TAM. Furthermore, dyslexia moderated the relationship between PEOU and PU, highlighting the importance of accessibility for learners with reading difficulties.

The findings contribute to the literature in three key ways. First, they extend the TAM framework by introducing actual learning behavior as an outcome variable, addressing the common gap of overreliance on behavioral intention. Second, this study is among the first to explore dyslexia as a moderating factor in TAM, offering insights into how cognitive traits shape the adoption of learning technologies. Third, we apply these models in a non-English-speaking context, focusing on Chinese students—a population underrepresented in prior research.

Overall, this research enhances our understanding of how digital learning tools function across different learner profiles. It highlights the need for inclusive, personalized learning environments that take both usability and content value into account, especially for students facing cognitive barriers. The study lays the groundwork for future research that incorporates individual differences into models of technology acceptance and digital learning behavior.

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Liu Tinglei: Writing – review & editing, Writing – original draft. **Megat Al Imran Yasing:** Writing – review & editing, Supervision. **Feroz De Costa:** Writing – review & editing.

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Data availability

Data will be made available on request.

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