Evaluating the Impact of Film and Television on Student Learning Outcomes in Chinese University Education: A Quantitative Analysis

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***Abstract*—In this quantitative study, we examined the impact of film and television on student learning outcomes in Chinese university classrooms, employing the Technology Acceptance Model (TAM) as a theoretical framework. The research involved a survey of 316 undergraduate students in Chengdu, China, with data analyzed using Statistical Product and Service Solutions (SPSS) and Structural Equation Modelling (SEM). The results revealed significant positive correlations between the Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) of film and television and student learning outcomes, highlighting the crucial role of students' perceptions of these multimedia tools in educational settings. This study provides valuable insights for educators and curriculum designers, emphasizing the importance of integrating film and television into the curriculum thoughtfully, focusing on content relevance and accessibility. The findings contribute to the broader discourse on multimedia integration in education, affirming the potential of film and television as effective tools in enhancing student learning outcomes.**

***Keywords*—Technology Acceptance Model (TAM), questionnaire survey, education technology, film and television, learning outcome**

I. Introduction

The integration of innovative technologies in educational settings, a trend gaining momentum globally, is reshaping teaching methodologies and learning outcomes [1]. In Chengdu, a vibrant hub of China's educational and technological evolution, the incorporation of film and television within university classrooms offers a promising avenue to enrich the academic experience. This study seeks to quantitatively evaluate the impact of these multimedia tools in higher education settings among undergraduate students in Chengdu, employing the Technology Acceptance Model (TAM) as its foundational theoretical framework.

As developed by Davis in 1989 [2], TAM is a well-established model for understanding technology acceptance and usage. Within the context of Chengdu's university classrooms, TAM facilitates a detailed examination of two critical aspects: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) of film and television as educational tools. PU, in this context, is defined as the extent to which teachers and students believe that these multimedia tools enhance educational outcomes such as engagement, knowledge retention, and skills development [3]. PEOU refers to the effort needed to integrate these tools effectively into the educational process [4].

The main objective of this study is to examine the correlation between the utilization of film and television in university courses and the academic achievements of students in Chengdu, China. The study takes place in Chengdu, where traditional Chinese culture and current technical achievements coexist. This setting offers an excellent opportunity to examine the use of innovative multimedia tools in higher education. The research investigates the impact of PU and PEOU on student learning outcomes using the TAM. It also considers external factors such as the availability of technological resources, teacher training, and students' previous experience with multimedia tools. The study aims to comprehend the interplay of these elements within the distinct educational and cultural environment of Chengdu, which may influence the efficacy of film and television as teaching tools.

This research has been conducted due to the growing emphasis on multimedia as a central element of contemporary educational practices. Despite the widespread usage of television and film in many educational contexts, there is a lack of empirical research explicitly examining their effectiveness within Chengdu's distinct cultural and technological context. This domain offers a compelling study opportunity to investigate how individuals perceive and improve their learning experiences in higher education through the use of these tools. In addition, the TAM framework incorporates external aspects such as technological infrastructure and prior multimedia experience into our research. This allows us to gain a better understanding of the real effectiveness of these tools, assuming they are useful at all. The significance of this study is in its potential to authorize the use of film and television in educational settings, hence enhancing student engagement and facilitating increased learning outcomes. By doing this, it enhances the overall development of educational technology and offers valuable information for higher education policymakers at both local and global levels.

II. Literature Review

A. Films and Televisions in Education

In the realm of contemporary education, the adoption of multimedia technologies has marked a significant transition from conventional teaching methods [5]. This shift is particularly notable in the integration of film and television as instructional tools [6]. These mediums have been embraced for their ability to provide dynamic and engaging content, which caters to the diverse learning preferences of students. The utilization of film and television in educational

contexts has shown promising results in enhancing student engagement, offering varied perspectives, and facilitating a deeper understanding of complex topics [7, 8]. In addition, scholars such as Hussain *et al.* [9], have elucidated the principles and reasoning underlying the study and game design. Furthermore, this endeavor represents a novel and pioneering use of technology in the realm of education. This evolution reflects a broader trend in education, where multimedia technologies are being increasingly recognized for their potential to transform learning environments into more interactive and stimulating spaces.

Within this landscape of technological integration in education, the TAM has emerged as a critical theory for understanding and evaluating the adoption of new technologies in learning environments [10]. TAM, with its focus on PU and PEOU, provides a basic framework to assess how educators and learners perceive and interact with technological tools. In the context of film and television, PU might encompass the perceived ability of these media to enhance learning by making content more relatable and accessible. Meanwhile, PEOU could involve considerations of how easily these tools can be incorporated into existing curricula and teaching practices.

Research applying TAM in educational settings has demonstrated that both PU and PEOU are significant predictors of teachers' and students' acceptance and use of technology [10]. Study of Vandeyar [11] have shown that when multimedia tools are perceived as useful and user-friendly, there is a greater likelihood of their adoption and integration into teaching strategies. This relationship is particularly crucial when considering the use of film and television in education, as these technologies require not only technical resources but also a pedagogical shift to be effectively integrated into teaching and learning processes.

Hence, the current adoption of multimedia technologies in education, specifically film and television, aligns closely with the principles outlined in TAM. The model's emphasis on PU and PEOU provides valuable insights into the factors that influence the successful integration of these technologies into educational settings.

B. Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) of Film and Television in Education

The concepts of PU and PEOU, central to the TAM, are crucial in understanding the adoption and effectiveness of film and television as an underlying theory. PU, as defined in TAM, refers to the belief that using a particular technology would enhance job performance [12] or, in educational contexts, improve the teaching and learning process. Specifically, in the realm of educational multimedia, this belief translates into the understanding that film and television can significantly improve learning outcomes [13]. The effectiveness of these media often lies in their ability to present information in a visually engaging and contextually rich manner, thereby making complex concepts more accessible and relatable for students [14]. Study of Gorder [15] have shown that educators' perception of multimedia tools as beneficial strongly correlates with their integration into curricula. This is especially true for film and television, which, by offering diverse narratives and perspectives, can make learning experiences more inclusive and comprehensive.

Beyond mere content delivery, the literature suggests that the perceived usefulness of film and television in education extends to enhancing critical thinking skills, fostering creativity, and facilitating a deeper understanding of cultural and societal issues [16, 17]. Films and television programs, when carefully selected and aptly integrated into the curriculum, can be powerful tools for stimulating discussion, critical analysis, and reflective thinking.

PEOU, another key determinant in TAM, refers to the ease associated with using a technology [2]. In educational settings, this encompasses the user-friendliness and accessibility of multimedia tools for both teachers and students. The ease of integrating film and television into educational practices significantly influences their adoption [18]. Factors such as the availability of technical resources, the simplicity of the technology, and the support provided for using these tools in educational settings are crucial considerations. Mustofa *et al.* [19] indicates a close link between the perceived ease of using film and television as educational tools and their actual usage in classrooms. When educators find these tools easy to operate and incorporate into their teaching methodologies, they are more inclined to use them regularly. Similar to how educators behave, the ease of use also applies to students. They are more inclined to interact with and gain advantages from multimedia content when they perceive it as accessible and pertinent to their learning experiences.

In summary, the literature on PU and PEOU underscores the significance of these perceptions in the successful adoption and effective utilization of film and television as teaching tools. These factors not only influence the decision to integrate these technologies into the classroom but also have a substantial impact on the overall effectiveness of teaching and learning processes. The subsequent sections will delve into how these aspects of TAM specifically relate to the use of film and television in educational settings and their influence on student learning outcomes.

C. The Impact of Film and Television on Learning Outcomes

In the context of evaluating student learning outcomes in university settings, particularly with the integration of film and television as educational tools, it is crucial to adopt a comprehensive approach that extends beyond traditional academic performance metrics. This section adopts a broader perspective on learning outcomes, emphasizing not only course exam scores but also students' self-perceived progress and achievements in learning.

Traditionally, student learning outcomes in higher education have been measured by objective metrics such as exam scores [20]. However, some educational research advocates for a more holistic view, recognizing the importance of students' self-awareness regarding their learning progress [21]. This aspect becomes particularly significant when assessing the impact of innovative teaching tools such as film and television. These mediums can influence students' engagement, motivation, and perception of their learning journey in ways that are not immediately

quantifiable through traditional exam scores [22].

Several studies emphasise the importance of taking into account students' self-perceptions when assessing learning outcomes. Harris and Brown [23] have indicated that students' self-assessment of their understanding and skills can be a significant indicator of their actual learning progress. Additionally, students' perceptions of their engagement and motivation in a course have been closely linked to the effectiveness of the teaching methods employed [24]. This is especially true when multimedia tools are used, as these tools can create a more dynamic and engaging learning environment.

In the specific context of using film and television in education, there is evidence suggesting that these tools can enhance student learning outcomes in various ways. Films and television programs, when thoughtfully integrated into the curriculum, can stimulate interest, foster deeper understanding, and enhance critical thinking skills [25]. This integration can contribute to a more engaging learning environment, positively influencing students' self-perception of their learning.

III. Methodology

A. Integration Theoretical Framework Based on TAM

In this study, we adopt the TAM as our theoretical framework to investigate the adoption of film and television in educational settings in Chengdu, China. TAM, with its core constructs of PU and PEOU, serves as an apt lens for examining how these multimedia tools are integrated into university education. Specifically, we focus on PU and PEOU because of their direct relevance to our research aim, exploring the effectiveness and integration ease of film and television as educational aids. PU concerns the collective perceptions among students and educators about the potential of film and television to enhance learning by making it more engaging and deepening content understanding [2, 12]. PEOU, on the other hand, addresses the perceived operational ease of these tools in educational contexts, considering factors such as technical simplicity, resource availability, and support level for educators and students [2, 18].

Addressing the reviewer's comment, it's pertinent to note that while TAM encompasses additional components like Behavioral Intention to Use and Actual Use, this study specifically emphasizes PU and PEOU. This focus stems from our objective to investigate the initial acceptance and perceived characteristics of multimedia tools rather than their actual deployment or resultant usage patterns. Nevertheless, we recognize the importance of a comprehensive theoretical exploration and, therefore, have also considered external influences such as technological infrastructure, educator training, and students' prior multimedia exposure. These factors are critical in contextualizing the adoption and efficacy of film and television in the educational sphere, thereby extending the traditional TAM framework to better align with the specific educational milieu of Chengdu.

Consequently, our theoretical framework, as illustrated in Fig. 1, not only builds on TAM's foundational constructs of PU and PEOU but also integrates these additional contextual factors. This approach provides a broader perspective on the dynamics influencing the acceptance and implementation of film and television as educational tools in university classrooms. By doing so, we aim to contribute to the understanding of multimedia tool integration in higher education, highlighting its implications for enhancing educational effectiveness and Student Learning Outcomes (SLO).

Based on the theoretical framework, the following hypotheses are proposed:

H1: The PU of film and television in education is positively associated with improved SLO.

H2: The PEOU of film and television in education is positively associated with enhanced SLO.

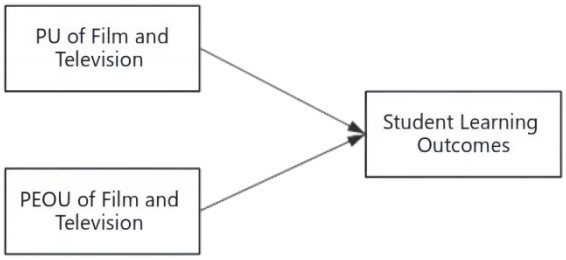

Fig. 1. Theoretical framework.

These hypotheses reflect the direct influence of PU and PEOU on student learning outcomes, omitting actual use as a mediating variable. This approach simplifies the model to focus on the primary relationships as indicated by TAM, providing a more straightforward analysis of the impact of film and television in educational settings.

B. Research Design

This study employed a quantitative research design, utilizing a survey-based approach to gather data. This method facilitates the collection of empirical data that can be statistically analyzed, offering clear, objective insights into the effectiveness of these multimedia tools as educational resources. Additionally, this approach enables the examination of correlations and potential causal relationships between the variables of interest.

In addressing the types of film and television content considered for this study, emphasis was placed on educational documentaries, instructional videos, and subject-specific films and television series that directly relate to the curriculum of the targeted universities and departments. The selection was guided by the relevance of content to the course objectives, aiming to enhance understanding, engagement, and retention of course material among students. This criterion for selecting film and television content ensures that the study focuses on multimedia tools that are integral to educational delivery and learning enhancement in higher education settings.

Participants were randomly selected from three universities in Chengdu, China, comprising undergraduate students with direct exposure to and experience with integrating film and television in educational settings. Recruitment involved collaboration with university faculties and departments, utilizing channels such as email notifications and classroom announcements to disseminate information about the study and its objectives. Interested

students were invited to participate voluntarily, aiming for a diverse sample to ensure that the findings are representative and can be generalized to a broader university student population.

The choice of this demographic was informed by their first-hand experience with the use of film and television in their courses, which is integral to understanding the impact of these tools on learning outcomes. The criteria for participant selection included current enrollment in courses that utilize film and television as part of the curriculum, ensuring that the study captures a range of experiences and perceptions regarding the use of these multimedia tools in an educational context.

C. Data Collection and Analysis

The study employed a structured questionnaire as the main tool for data collection, conducted between November 20th and December 1st, 2023. This survey seeks to evaluate the TAM components, specifically PU and PEOU, in addition to the broader concept of student learning outcomes in the context of film and television use in higher education. The survey consists of five Likert-scale questions that enable participants to assess their level of agreement with statements on the multimedia technologies utilized in their schooling.

Data collection is conducted using Wenjuanxing (https://www.wjx.cn/), a popular and efficient online survey platform in China. This platform is selected for its user-friendliness and wide accessibility, ensuring a smooth survey experience for participants. University students in Chengdu are invited to participate in the survey through an email that includes a link to the Wenjuanxing questionnaire.

To maximize response rates, follow-up reminders are sent periodically throughout the data collection period. The survey is kept open for a specific timeframe to allow sufficient participation. All responses are collected anonymously to maintain confidentiality and encourage honest and uninhibited feedback from participants.

After collecting the survey data, demographic information analysis, reliability and validity and SEM analysis were performed to explore the relationships between PU, PEOU and the impact on student learning outcomes.

IV. Result

A. Demographic Information

Fig. 2 illustrates the dataset used in this work, which includes responses from 316 undergraduate students in Chengdu city, China. The dataset consists of 157 males and 159 females, indicating a nearly equal distribution of genders. The participants' ages are exclusively within the range of 18 to 24 year. Regarding their academic progression, the distribution spans from first-year undergraduates to those in their final year, offering a comprehensive view of the undergraduate experience across different stages of academic development. This demographic composition ensures a representative sample of the undergraduate community, which is essential for the study's relevance and applicability.

Fig. 2. Demographic overview.

B. Reliability and Validity

The reliability of the questionnaire used in this study to assess PU, PEOU, and Student Learning Outcomes (SLO) in the context of film and television in education is confirmed by internal consistency analysis. As shown in Table 1, the reliability analysis of the questionnaire, examining PU, PEOU, and SLO, reveals high internal consistency across the board, as evidenced by Cronbach's alpha values ranging from 0.832 to 0.845 and item-total correlations between 0.438 to 0.586. Based on the views of Taber [26], Cronbach's alpha values of 0.7 or higher indicate acceptable internal consistency. These metrics indicate that each item significantly contributes to its respective construct, with no single item's removal markedly improving the scale's reliability. This underscores the robustness of the questionnaire, ensuring that the PU and PEOU scales effectively capture their intended constructs, and even the slightly lower correlations within SLO items still contribute positively to assessing student learning outcomes.

Table 1. Deletion of statistical summary of analysis items

	Average value after deletion of items	Variance after deletion of items	Correlation of deleted items with the total after deletion of items	Cronbach's alpha coefficient after deletion of items
PU1	46.608	18.226	0.542	0.836
PU2	46.592	17.899	0.586	0.833
PU3	46.595	18.127	0.565	0.834
PU4	46.595	18.039	0.586	0.833
PEOU1	46.595	17.842	0.586	0.832
PEOU2	46.576	18.188	0.561	0.835
PEOU3	46.576	18.41	0.516	0.838
PEOU4	46.633	18.354	0.53	0.837
SLO1	46.589	17.494	0.438	0.845
SLO2	46.579	17.146	0.501	0.84
SLO3	46.494	17.584	0.445	0.844
SLO4	46.585	17.024	0.527	0.837

Table 2 presents the results of the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's test of sphericity, which are crucial for assessing the suitability of data for factor analysis. The KMO value is 0.899, indicating excellent suitability for factor analysis, as values above 0.8 are considered very good [27]. Bartlett's test yields a chi-square value of 1138.875 with a *p* value of 0.000, strongly rejecting the null hypothesis that variables are unrelated, thereby confirming the appropriateness of the data for factor analysis. These results validate the dataset for identifying underlying factor structures in the study.

Table 2. KMO and Bartlett's test

Measure		value
KMO		0.899
Bartlett's Test of Sphericity	Chi-Square	1138.875
	df	66
	p	0.000

C. Structural Equation Modelling (SEM) Analysis

Table 3 presents an analysis of the regression coefficients within the study focusing on the impact of film and television in education. The table includes detailed regression data for each path in the model, encompassing nonstandardized and standardized regression coefficients, standard errors, z scores, and *p* values.

The analysis reveals statistically significant relationships between the PU and PEOU of film and television and their impact on student learning outcomes. Specifically, the path from PU of film and television to learning outcomes shows a nonstandardized coefficient of 0.527 with a *z* score of 4.880, indicating a positive association between PU and Learning Outcomes. Similarly, the path from PEOU of film and television to learning outcomes is also significant, with a nonstandardized coefficient of 0.579 and a *z* score of 5.618, suggesting a positive impact of PEOU on Learning Outcomes.

Table 3. Model regression coefficient summary

X→Y	Nonstandardized coefficient	SE	*z* (CR Value)	*p*	Standardized coefficient
PU of Film and Television→SLO	0.527	0.108	4.880	0.000	0.492
PEOU of Film and Television→SLO	0.579	0.103	5.618	0.000	0.621

Note: Arrow symbol "→" is used to represent regression impact relationships or measurement relationships.

Fig. 3 concisely demonstrates the significant positive impacts of PU and PEOU on SLO within the realm of using film and television in education. With standardized coefficients of 0.492 for PU and 0.621 for PEOU, the model visually underscores the robustness of these relationships, backed by statistical evidence (*z* scores and *p* values). This visual representation not only reinforces the empirical support for the theoretical propositions of the TAM, but also emphasizes the practical implications of integrating multimedia tools effectively in educational settings to enhance student learning outcomes.

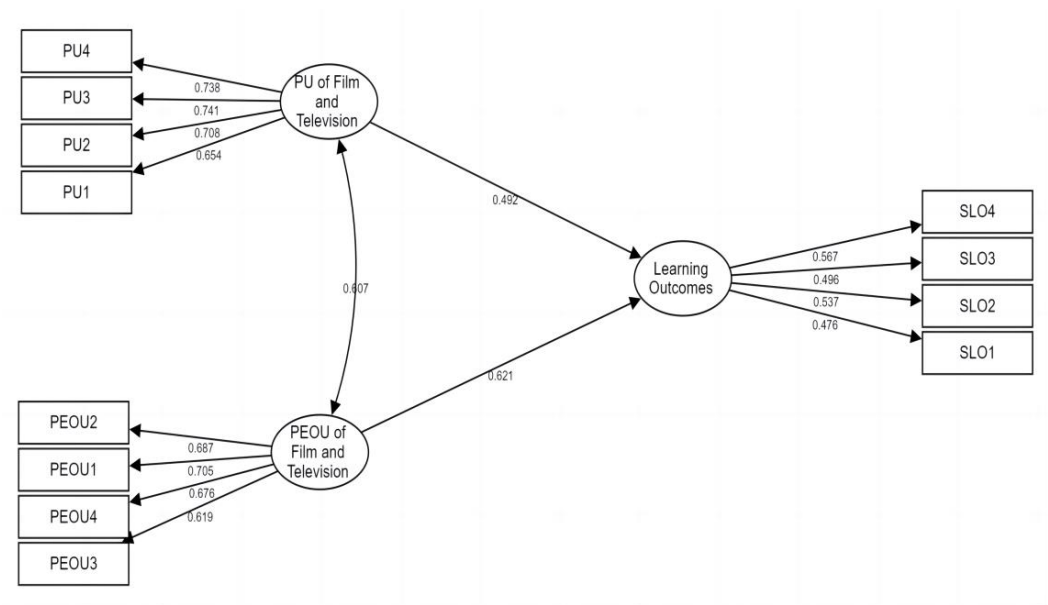

Fig. 3. Model results.

V. Discussion

The observed positive correlation between PU and student learning outcomes aligns with the fundamental principles of TAM. This suggests that when students perceive these multimedia tools as relevant and beneficial to their learning process, their engagement and comprehension are likely to increase. This finding has practical implications for curriculum design, indicating the need for careful selection and integration of film and television content that is directly relevant to the learning objectives.

Similarly, the positive association between PEOU and student learning outcomes highlights the importance of user friendliness in educational technology. This finding suggests that the effectiveness of film and television as educational tools is partly contingent on their ease of use. When these tools are accessible and easy for students to engage with, they are more likely to have a positive impact on learning

outcomes. This underscores the need for educational institutions to invest in suitable technological infrastructure and provide adequate support for both students and educators in using these tools.

Despite these insights, the study has limitations. Its context-specific nature may restrict the generalizability of the findings to other educational settings or demographic groups. Additionally, the reliance on quantitative data leaves room for future research incorporating qualitative methodologies, which could provide a richer understanding of the experiences and perceptions of students and educators regarding the use of film and television in education. In addition, according to the research conducted by Attan and Bolong [28], the use of social media for communication can have an impact on an individual's happiness. Therefore, future studies can explore this aspect in the field of education to examine the influence of multimedia. One might also investigate the incorporation of e-learning with cinema and television and its influence on student performance, following the research conducted by Fattah *et al.* [29].

In conclusion, the study contributes to the understanding of multimedia integration in educational contexts, emphasizing the significance of perceived usefulness and ease of use in enhancing the effectiveness of film and television as educational tools. The findings offer valuable implications for educators, curriculum designers, and educational institutions, pointing towards the need for thoughtful integration of these tools in teaching strategies to optimize learning outcomes.

VI. Conclusion

This study explored the impact of film and television as educational tools in a university setting, particularly focusing on their PU and PEOU and how these perceptions influence student learning outcomes. The SEM analysis provided valuable insights into these relationships.

The SEM analysis revealed a statistically significant positive association between the PU of film and television and student learning outcomes, as indicated by the regression coefficient of 0.527 and a *z* score of 4.880. This finding supports Hypothesis 1 that higher perceived usefulness of film and television in education is associated with improved student learning outcomes. The strong and significant coefficients for PU and its indicators (PU1 to PU4) further validate the construct's reliability and its representation in the study.

Similarly, the relationship between the PEOU of film and television and student learning outcomes was found to be statistically significant, with a regression coefficient of 0.579 and a *z* score of 5.618. This confirms Hypothesis 2 that higher perceived ease of use of these educational tools is positively associated with enhanced student learning outcomes. The robust coefficients for PEOU and its indicators (PEOU1 to PEOU4) underscore the validity of this construct within the model.

This study elucidates the process of incorporating film and television into instructional practices. The study's findings indicate that the PU and PEOU of film and television positively impact student learning results, underscoring their significance in the utilization of multimedia tools at the university level. These findings indicate that teachers should assess the efficacy and user-friendliness of these devices to optimize learning outcomes.

This study highlights the significance of perceived utility and user-friendliness in the integration of film and television as instructional tools. The SEM study yields substantial statistical data that corroborates these conclusions, offering valuable insights into instructional technologies.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

Zhao Yunman was primarily responsible for conceptualization, methodology design, and data collection. She also played a crucial role in the interpretation of data, drafting of the manuscript, and revision process. Tan Wee Hoe was involved in the study's conceptual framework, provided insights into the methodology, and contributed to the analysis of data. Additionally, he reviewed and edited the manuscript, ensuring the clarity and accuracy of the findings and arguments presented.

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