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The Impact of Multimedia Teaching Management on Teaching Effectiveness in Dance Majors at Hebei Colleges

Gao GuiLing[1], Subashini K. Rajanthran[2], Gao ShanShan[3], Phawani Vijayaratnam[4], Maya Shakiyeva[5] and Mahwish Farooq[6]

Abstract

The evolution of technology has brought about profound changes in the educational landscape globally, prompting shifts in teaching methodologies across various fields towards sustainable development education. This study employs a quantitative-based correlation analysis to investigate the influence of multimedia teaching management on teaching effectiveness among dance majors in Hebei Colleges. It examines three dimensions: the application of multimedia tools, multimedia training support, and technological infrastructure, aiming to provide a comprehensive understanding of multimedia's implications in dance education. The study focuses on Hebei Normal University, Hebei University of Arts, and Cangzhou Preschool Teachers School, with a total of 643 valid responses collected. Findings reveal that the utilization of multimedia tools, multimedia teacher training support, and technological infrastructure are relatively high (Average scale > 3), correlating with high teaching effectiveness (Average scale > 3) within these institutions. Positive relationships are identified between the application of multimedia tools and teaching effectiveness (correlation coefficient = 0.842, $\beta = 0.087$, $p < 0.001$), multimedia training support for teachers and teaching effectiveness (correlation coefficient = 0.863, $\beta = 0.070$, $p = 0.054$), and technological infrastructure and teaching effectiveness (correlation coefficient = 0.895, $\beta = 0.810$, $p < 0.001$). Notably, technological infrastructure emerges as the strongest predictor of teaching effectiveness (Beta = 0.810, $p < 0.05$). Drawing upon the collegial model, this study proposes recommendations to enhance teaching effectiveness based on the identified correlations. These findings contribute to the ongoing discourse on multimedia integration in dance education, offering insights for educators and policymakers alike.

Keywords: *Multimedia Teaching Management, Teaching Effectiveness, Collegial Model*

INTRODUCTION

The rise of technology has undoubtedly changed the global educational landscape, leading to significant changes in teaching methods across disciplines. Qi (2021) concluded that technology is indispensable in education. This evolution is also evident in the dance program at Hebei University, where multimedia pedagogy has been used to enhance the learning experience of students.

Multimedia teaching methods, including the use of video presentations, interactive software, virtual reality, augmented reality, and other digital technologies, offer a more dynamic and engaging approach to dance education. They serve as powerful tools for representing, explaining, and illustrating complex dance movements and theories that may be difficult to convey through traditional teaching methods. According to Sun, in the process of developing dance works, multimedia technology allows all components of choreography to form a coherent organic whole, which is extremely important (Sun, 2022).

Underlying Theory

The effect of multimedia teaching management on instructional efficacy in dance majors at Hebei institutions has gained attention. The objective of this study is to investigate the correlations among the utilization of multimedia tools in instructional practices, the provision of multimedia training for teachers, the availability

[1] Faculty of Education and Liberal Arts, INTI International University, Nilai, Negeri Sembilan, Malaysia.

[2] Teaching and Learning Center, INTI International University, Persiaran Perdana BBN, PutraNilai, 71800 Nilai, Negeri Sembilan, Malaysia.

[3] Cangzhou Preschool Teachers College, Gao Shan Shan, 062150 Botou, Hebei Province, China.

[4] Faculty of Education and Liberal Arts, INTI International University, Nilai, Negeri Sembilan, Malaysia

[5] Faculty of Education and Liberal Arts, INTI International University, Nilai, Negeri Sembilan, Malaysia
[6] Department of English, FLL, University of Central Punjab, Pakistan

of technological infrastructure, and the administration of education in the field of dance.

In the realm of higher education in Hebei, there is a growing trend of incorporating multimedia resources, encompassing text, images, audio, video, and animation, inside the pedagogical framework to enhance the teaching and learning experiences. Nevertheless, the precise effects of these technologies on the management of education in dance majors have yet to be fully elucidated (Chernov et al., 2021). Therefore, as evidenced by many academic studies, there is a need to examine the correlation between managing the use of multimedia in teaching practice and the effectiveness of teaching in the dance major, as evidenced by many scholarly inquiries. The present study has identified that the utilization of multimedia technology has a substantial impact on the improvement of dance education. examined actual data and emphasized the advantages of using multimedia in dance education. Some research has highlighted the potential of multimedia technology in increasing dance learning experiences (Abdulrahaman et al., 2020). A detailed examination of multimedia technologies in dance education was conducted, highlighting their advantages across multiple facets of dance instruction. Using multimedia resources in the classroom can improve teaching effectiveness in dance education by increasing student engagement, comprehension, and learning outcomes (Yueh et al., 2012).

Furthermore, providing teachers with professional development and support for the effective use of multimedia plays a critical role in enhancing the educational effectiveness of the dance profession. The availability of training programs, workshops, and resources can significantly influence teachers' skills and knowledge in utilizing multimedia tools for instructional purposes (Tokareva，2019)Thus, it is necessary to study the relationship between teachers' multimedia training support and teaching effectiveness.

Additionally, the technological infrastructure available in Hebei colleges and universities is critical for supporting educational multimedia. Factors such as access to multimedia equipment, reliable internet connectivity, and sufficient resources for acquiring and maintaining educational media tools and platforms can impact the effectiveness of multimedia teaching methods (Szymkowiak, et al., 2021). Therefore, it is important to manage the relationship between multimedia technology infrastructure and teaching effectiveness in dance programs.

By answering research questions about these variables and how they relate to each other, this study wants to give useful information about how multimedia teaching management affects the effectiveness of teaching in Hebei colleges for dance majors. The findings can inform educational institutions and policymakers about multimedia technologies' efficacy, teachers' need for training and support, and good technology infrastructure for dance education.

Therefore, the purpose of the quantitative-based correlation analysis is to examine the impact of multimedia teaching management on teaching effectiveness in HeBei Colleges' dance majors through three dimensions, including the application of multimedia tools, multimedia training support for teachers, and technological infrastructure, and to provide a comprehensive understanding of the implications of multimedia in dance education.

LITERATURE REVIEW

Teaching Effectiveness

The concept of teaching effectiveness refers to the capacity of educators to facilitate significant and influential learning encounters among their students (Cahyono and Ludwig, 2018). The use of diverse tactics, techniques, and approaches is employed to enhance student engagement, comprehension, and attainment of educational objectives (Bulut, 2019). Another method of ensuring teaching effectiveness is in enhancing students' motivation in learning. Teachers may consider adopting different genre-based method as an alternative pedagogical tool to motivate students to learn (Wider, 2022). In addition to having subject matter expertise, a highly effective teacher is able to connect with and motivate students, customize instruction to meet each student's needs, and create an environment that is both encouraging and engaging for learning (Ren, Yuan, and Wang, 2021).

Over the years, research on teaching efficacy has changed, and many various facets of this idea have been

examined. Instructional strategies, which entail the choice and application of suitable teaching techniques to increase student engagement and comprehension, are one crucial aspect. Active learning approaches, such as collaborative learning, problem-based learning, and flipped classrooms, have demonstrated positive effects on student achievement and retention (Nantha, 2022).

The capacity to offer students timely feedback that is constructive is another factor in good teaching. In order to direct students' learning and enhance their performance, feedback is essential. Research suggests that effective feedback should be specific, actionable, and focused on both strengths and areas for improvement (Boey and Sathish, 2023). Additionally, the use of formative assessments can help teachers identify students' misconceptions and adjust their instruction accordingly (Elmahdi et al., 2018).

Furthermore, the creation of an inclusive and supportive learning environment is essential for teaching effectiveness. Culturally responsive teaching practices that acknowledge and respect students' diverse backgrounds and experiences have been shown to enhance student motivation, engagement, and achievement (Abacioglu, Volman, and Fischer, 2020). Building positive teacher-student relationships based on trust, respect, and empathy also contributes to a conducive learning climate (Gyeltshen, 2021).

Technology integration in the classroom is another area that can impact teaching effectiveness. Multimedia tools and digital resources have the potential to enhance instruction, increase student engagement, and facilitate personalized learning experiences (Serrano et al., 2019). Research has shown that when technology is used effectively, it can improve students' critical thinking, creativity, and collaboration skills (Li, Zhou, and Lam, 2022).

In conclusion, teaching effectiveness encompasses various factors that contribute to meaningful and impactful learning experiences for students. Instructional strategies, timely feedback, inclusive learning environments, and technology integration are all important elements that educators should consider. By continually exploring and implementing evidence-based practices, educators can enhance their teaching effectiveness and promote positive student outcomes.

Multimedia Teaching Management

In the teaching and learning processes for dance majors in Hebei colleges and universities, this variable focuses on educational multimedia elements such as text, photos, audio, video, and animation. This study investigates the frequency and efficacy of incorporating multimedia resources into instructional methods to augment student engagement, comprehension, and academic achievements. The present meta-analysis investigated the impact of multimedia-based training on academic performance in diverse subject areas and across different grade levels. In accordance with the findings, multimedia education significantly improved student learning outcomes, such as information acquisition, retention, and transfer (Wong and Adesope, 2021). The usage of multimedia tools increases student engagement, as evidenced by their enhanced attention, curiosity, and active participation in educational events (Ullah and Anwar, 2020). The present meta-analysis investigates the impact of multimedia training on student motivation and self-efficacy beliefs. The findings showed that using multimedia in the classroom significantly increased student motivation and self-efficacy, which in turn improved academic performance and engagement (Shi et al., 2018).

Zhang, Kennedy, and Chiasson (2021) did a systematic study wherein they examined scholarly literature and commercial items pertaining to multimedia tools designed for the purpose of enhancing cybersecurity awareness and education. Current trends, the use of instructional design principles, and the empirical evidence demonstrating the efficacy of these tools were all explored in the review. The results of this study can offer valuable perspectives on the efficacy of different multimedia resources, including films, animations, interactive modules, and games, in augmenting cybersecurity awareness and education.

According to a literature review conducted, effective dance education management requires a comprehensive understanding of curriculum development, instructional planning, student assessment, faculty management, resource allocation, and policy implementation. The review highlighted the importance of aligning educational goals with dance program objectives and ensuring that teaching practices support the overall educational mission (Kassing and Jay, 2020).

This variable encompasses the professional development and support provided to teachers at Hebei colleges and universities in effectively using multimedia tools for instructional purposes. It includes factors such as the availability of training programs, workshops, seminars, and resources aimed at enhancing teachers' skills and knowledge in utilizing multimedia tools (Esfijani and Zamani, 2020). This variable assesses the impact of multimedia training support on teachers' instructional practices, their ability to integrate multimedia effectively, and the subsequent influence on educational management in dance majors. This meta-analysis synthesized findings from multiple studies on the effectiveness of multimedia training programs for teachers. The results indicated that multimedia training significantly improved teachers' technology integration skills and their ability to effectively use multimedia tools in instruction (Akram et al., 2022). This systematic review analyzed existing studies on multimedia training programs specifically designed for teachers in online learning environments. The findings highlighted the importance of comprehensive multimedia training in enhancing teachers' online instructional practices and their ability to utilize multimedia tools effectively (Abdulrahaman et al., 2020).

Technological Infrastructure

The components of technological infrastructure encompass various elements, such as the availability of multimedia equipment (e.g., computers, projectors, sound systems), dependable internet connectivity, and adequate resources for procuring and upkeeping educational media tools and platforms. This variable investigates the influence of technical infrastructure and resource availability and quality on the utilization of multimedia tools, teaching practices, and teaching effectiveness within the field of dance majors.

These independent variables together examine the impact of the use of multimedia tools, multimedia training support for teachers, and technological infrastructure on the teaching effectiveness of dance majors at Hebei colleges and universities. Through a comprehensive analysis of these variables, the study endeavors to ascertain their distinct and combined influence on teaching effectiveness practices, while offering valuable perspectives on the optimal integration of multimedia within dance education to augment the attainment of instructional and learning objectives. The present literature review investigates the correlation between technical infrastructure and the attainment of educational equity. The review examined the disparities in access to technological resources and infrastructure among students from diverse socioeconomic backgrounds and their implications for promoting equitable educational opportunities (Talib et al., 2021). This systematic review examined empirical research that explored the impact of technology infrastructure on results in online learning. According to Al-Samarraie (2019), the examination indicated that a dependable and adequately supported technological framework, encompassing high-speed internet, ample bandwidth, and the availability of essential software and tools, played a pivotal role in enabling efficient experiences in online learning. The present literature study investigates the significance of technology infrastructure in the enhancement of teachers' digital competency. The study underscored the importance of sufficient technical infrastructure, encompassing hardware, software, and connectivity, in facilitating educators' successful integration of technology into their pedagogical approaches and augmenting students' proficiency in digital literacy (Boey & Sathish, 2023).

This systematic review examined the relationship between technological infrastructure in educational settings and students' learning outcomes. The findings indicated that a well-developed and robust technological infrastructure positively influenced students' academic performance, engagement, and motivation (Serran et al., 2019).

The teaching of physical dance rhythm combines physical education, music, and dance, so its teaching efficiency and teaching quality are affected by different factors. The use of multimedia in the teaching of physical dance rhythms can help enrich the classroom content of dance teaching, simplify the teaching content, reduce the teaching difficulty, and greatly mobilize students' learning enthusiasm. The article will briefly discuss the application of multimedia teaching tools in the teaching of physical dance rhythms (Kassing and Jay, 2020).

Modern technology's entry into the classroom has significantly improved teaching effectiveness and quality,

and it has had a significant impact on how information is transferred, educational goals, curriculum, students, and instructors in education. This effect is expected as a result of the previous teaching order's equilibrium being upset and a new one being formed. With the establishment of a new teaching order, multimedia will play a greater role (Anthony et al., 2019).

Moreover, We assessed the impact of multimedia teaching techniques on teaching effectiveness. The research discovered a favorable impact of multimedia learning tools on the academic performance of pupils. The suggestion was put forward to develop and employ open and distance learning (ODL) educational resources that integrate multimedia technology. Mısır (2018) recommended further research on instructors' competency in producing, integrating, and using multimedia-enhanced educational materials.

These studies highlight the beneficial effects of multimedia teaching approaches in diverse educational settings. Additionally, they emphasize the significance of teacher competence, student involvement, and educational achievements. However, additional study is required to investigate the competence and efficacy of teachers in utilizing multimedia learning materials.

The following conceptual framework was built based on a review of the literature and the underlying theory (refer to Figure 1).

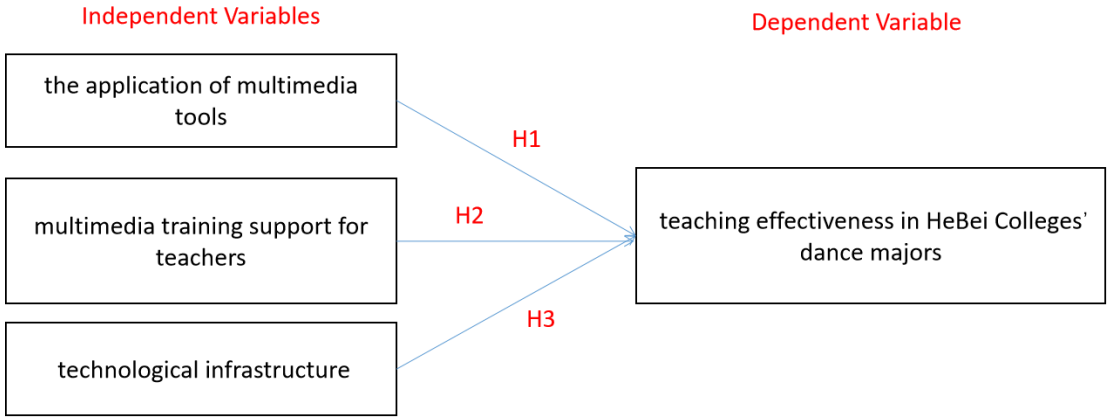

Figure 1 Conceptual framework

RESEARCH METHODOLOGY

Questionnaire Design

In this study, the sample population consists of students from 3 universities. To collect data, a survey was conducted using questionnaires. In Section B, the design of the three independent variables was based on the corresponding literature. 4 questions about teaching effectiveness were adopted (Alexander Eitel, 2021).4 questions about the application of multimedia tools in teaching were adopted (Haukås, 2018; Mudinillah, 2019). 5 questions about multimedia training support for teachers were adopted (Wasserman, 2019). 5 questions about technological infrastructure were adopted (Dashtestani, 2021).

Table 1 ***Questionnaire Design***

Section	Description	No	Source
A	Demographic Profile	3	Single option
B	Problems in the Application of Multimedia Tools in Dance Tea ching	3	Single option
C (Dependent Variable)	Teaching effectiveness	4	Alexander Eitel, 2021

D (Independent Variables)	The application of multimedia tools in teaching	4	Haukås, 2018 Mudinillah, 2019
	Multimedia training support for teachers	5	Wasserman, 2019
	Technological infrastructure	5	Dashtestani, 2021

Population and Sample

There are 7,000 people enrolled in dance majors in Hebei colleges in 2022 (Hebei Education Examination Institute, 2022). The population consists of 1400 students in the study unit. The Krejcie and Morgan sample size calculation, also known as the Krejcie and Morgan table, is a widely used method for determining the appropriate sample size in research studies with a categorical or binary outcome. This method is specifically used when the researcher wants to ensure a representative sample from a larger population (Brown and Jones, 2022).

The Krejcie and Morgan table provides a guideline for researchers to determine the required sample size based on the desired level of confidence (usually set at 95%) and the margin of error (usually expressed as a percentage). The calculated sample size is 300.There are 643 samples collected in total.

Random sampling means selecting a sample from a larger population in such a way that everyone in the population has an equal chance of being selected. It involves selecting individuals or items randomly, without any bias (Field, 2020).

Data Collection and Analysis

Validation and Reliability

Validation will be used to ensure that the survey measures what it is intended to measure. The reliability of this study will also be explored to ensure that it produces consistent results when administered multiple times under similar conditions (James and Steven, 2022).

To conduct the pilot test, the 10% data set sample size should be used to conduct the pilot test. So this study conducts a pilot test based on 30 data points collected from 3 universities to examine whether the questionnaire can be used to collect data further.

Descriptive statistics

Descriptive statistics provide an overview of the data. This provides an understanding of the overall pattern of the data. It usually includes concentrated trend measures such as mean and median and dispersion measures, for example, range, variance, and standard deviation. Descriptive statistics will summarize and organize the data to provide simple summaries about the sample and the measures. Inferential statistics will be used to make inferences about the population based on the sample data (Chekanova, 2021).

Normality Test

To understand the type of data, a normality test will be used. This may be categorical data, sequential data, interval data, or proportional data, each type requiring a different analysis technique. For example, categorical data may need to be analyzed using a chi-square test, while sequential data may need to be analyzed using a Kruskal-Wallis test (Gyeltshen, 2021).

Correlation Analysis

The collected data will undergo statistical analysis using software like SPSS. Methods such as correlation analysis and multiple regression analysis will be used to identify relationships between the application of multimedia tools, multimedia training support for teachers, technological infrastructure, and the state of teaching effectiveness in dance majors (Babich et al., 2021).

Regression Analysis

Regression analysis is a statistical technique used to look at how one or more independent variables and a dependent variable are related (Field, 2020). Regression analysis may be used in the context of the study described to investigate the effects of various factors such as the use of multimedia teaching tools, support for teachers' multimedia training, and the availability of technological infrastructure on teaching effectiveness in dance majors. It helps determine the strength and direction of these relationships and assesses the significance of the predictors (Field, 2020; Babich et al., 2021).

Findings and Data Analysis

This study, based on the 30 samples for the pilot test to conduct KMO, Bartlett's test and Cronbach's alpha, which aims to examine the reliability and validity of the questionnaire. According to Table 2, the KMO value is 0.812, which is higher than 0.6, at the same time, the sig. is 0, which is less than 0.01. Therefore, the questionnaire is valid. The sample size of this study is 300. The researcher approached the colleagues in dance major at three schools, including Heibei Normal University, Heibei University of Arts, and Cangzhou Preschool Teachers School. Finally, this study collected data from 643 participants; no data was missing, therefore, the response rate is 100%.

Demographic Profile

The gender distribution of the surveyed population. There are 643 samples collected in total, of which 197 were male, accounting for 30.6%. And 446 respondents were female, accounting for 69.4%. This indicates that most of the students in dance major are female. According to the statistical results, 127 samples were between 15 and 18 years old, accounting for 19.8%. 497 samples were between 19 and 22 years old, accounting for 77.3%. 19 samples were between 23 and 25 years old, accounting for 3.0%.

The statistical information about the distribution of schools to which the survey population belongs. The participants came from three different schools. According to the statistical results, 90 samples were from Hebei Normal University, accounting for 14.0%. 56 samples were from Hebei University of the Arts, accounting for 8.7%. 497 samples were from Cangzhou Preschool Teachers College, accounting for 77.3%.

The statistical information on the distribution of dance learning experiences among the survey population, with participants' dance learning experiences divided into three categories. According to the statistical results, 512 samples had less than 5 years of dance learning experience, accounting for 79.6%. 74 samples had dance learning experience between 5 and 10 years, accounting for 11.5%. And 57 samples of dance learning experience in more than 10 years, accounting for 8.9%.

Multiple Linear Regression

Table 9 provided is the model summary for a regression analysis. The purpose of this analysis is to examine the relationship between various predictors (technological infrastructure, the application of multimedia tools in teaching, and multimedia training support for teachers) and the dependent variable (teaching effectiveness).

To examine that:

The summary provides several statistics to assess the model's goodness of fit and the strength of the relationship between the predictors and the dependent variable:

R Square represents the proportion of variance in the dependent variable explained by the predictors. Here, it is 0.903, meaning that 90.3% of the variance in teaching effectiveness can be explained by the predictors.

Table 2 ***Model Summary[b]***

				Change Statistics				
R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change

.950[a]	.903	.903	.27771	.903	1982.115	3	639	.000

Refer to Table 2, 'the application of multimedia tools in teaching' and 'technological infrastructure' are both significant predictors of teaching effectiveness, with p-values less than 0.05. 'Multimedia training support for teachers' has a p-value slightly above 0.05, indicating that it might not be a significant predictor.

The coefficient for the application of multimedia tools in teaching is .082. This indicates that, on average, for every one unit increase in the use of multimedia tools in teaching, teaching effectiveness increases by .082 units.

The standardized coefficient (beta) for the application of multimedia tools is 0.087,.suggesting that the relationship between the application of multimedia tools and teaching effectiveness is positive, but relatively weak. The coefficient for multimedia training support for teachers is 0.70. The standardized coefficient (beta) for technology infrastructure is 0.81, indicating a strong positive relationship between multimedia training support for teachers, technological infrastructure and teaching effectiveness. The findings answer the research question as the correlation results, the hypotheses of the relationship between application of multi media tools in teaching, technological infrastructure and teaching effectiveness are supported by regression analysis also, especially consider the three predictors effect together on the dependent variable -teaching effectiveness. However, the weak impact of multimedia training may because the unenough data, and the bias from participants.

Table 3 Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.141	.053		2.659	.008		
	The application of multi media tools in teaching	.082	.023	.087	3.500	.000	.248	4.027
	Multimedia training support for teachers	.070	.036	.070	1.933	.054	.115	8.706
	Technological infrastructure	.824	.035	.810	23.549	.000	.128	7.793
a. Dependent Variable: Teaching effectiveness								

The F-statistic (1982.115) is a measure of the overall significance of the regression model.The p-value of 0.000 suggests that the model is statistically significant.

Table 4

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	458.601	3	152.867	1982.115	.000[b]
	Residual	49.282	639	.077		
	Total	507.883	642			

ANOVA[a]

The results indicate that the application of multimedia tools in teaching and technological infrastructure have a positive and significant impact on teaching effectiveness. The coefficients suggest that improving the quality of technological infrastructure has the strongest effect on teaching effectiveness, followed by the use of

multimedia tools in teaching. However, the relationship between multimedia training support for teachers and teaching effectiveness is relatively weak and only marginally significant. These findings highlight the importance of investing in technological infrastructure and promoting the use of multimedia tools in teaching to enhance teaching effectiveness in the context of the study.

DISCUSSION

In this study, there are 643 valid responses were collected. Among the participants, 30.6% were male while 69.4% were female. The majority of respondents were between 19 and 22 years old, figure as 77.3%. In addition, the largest proportion (77.3%) came from Cangzhou Preschool Teachers College. Most respondents (79.6%) had less than 5 years of dance learning experience.

Regarding the descriptive analysis, in Heibei Normal University, Heibei University of Arts and Cangzhou Preschool Teachers School, the application of multimedia tools in teaching, Multimedia training support for teachers, Technological infrastructure are relatively high (Average scale > 3), and the teaching effectiveness in these schools is high as well (Average scale > 3).

There is a positive relationship between the application of multimedia tools and teaching effectiveness in HeBei Colleges' dance majors. The results of multiple linear regression, the results suggest that the application of multimedia tools in teaching has a positive and significant effect on teaching effectiveness ($\beta = 0.087$, $p < 0.001$). This indicates that using multimedia tools in instructional practices can improve the overall effectiveness of teaching.

Multimedia instruction, including the use of text, images, audio, video, and animation, has a significant positive effect on student learning outcomes, such as knowledge acquisition, retention, and transfer (Wong and Adesope, 2021). The use of multimedia tools in educational settings is positively associated with increased student engagement, including attention, interest, and active participation in learning activities (Ullah and Anwar, 2020). Multimedia instruction enhances student motivation and self-efficacy beliefs, leading to improved academic performance and engagement (Shi et al., 2018).

It is needed to examine teachers' competence and effectiveness in using multimedia learning resources, specifically in the context of dance education in Beijing (You, 2022). Factors such as design, technology, and problem-solving capabilities should be considered when evaluating multimedia platforms for widespread curricular adoption. Effective dance education management requires a comprehensive understanding of curriculum development, instructional planning, student assessment, faculty management, resource allocation, and policy implementation. Alignment between educational goals and dance program objectives is crucial, along with supportive teaching practices (Kassing and Jay, 2020).

The positive results can examine the findings of (Shi et al., 2018; Ullah and Anwar, 2020; Kassing and Jay, 2020; Wong and Adesope, 2021) in HeBei Colleges' dance majors. In addition, it fills the gap of lacking research on the relationship between the application of multimedia tools and teaching effectiveness in HeBei Colleges' dance majors. Although the research examined the hypotheses, the limitation is existing, for example. The findings and recommendation can only suitable for Hebei colleges, especially in dance major. The future study should expand the research field not only focus on dance major.

There is a positive relationship between multimedia training support for teachers and teaching effectiveness in HeBei Colleges' dance majors. The provision of multimedia training support for teachers also shows a positive relationship with teaching effectiveness, although it is marginally significant ($\beta = 0.070$, $p = 0.054$). This suggests that providing training to teachers on utilizing multimedia tools can contribute to enhancing their teaching effectiveness.

Effective use of multimedia tools and digital resources in the classroom can enhance instruction, increase student engagement, and facilitate personalized learning experiences. Technology can improve critical thinking, creativity, and collaboration skills (Serrano et al., 2019; Li et al., 2022). It is important to enhance the effective usage of multimedia tools, therefore, the training to make teachers know how to use the tools integrating with teaching method is needed. Effective feedback should be specific, actionable, and focused on

both strengths and areas for improvement. Formative assessments can help identify students' misconceptions and adjust instruction accordingly (Boey, and Sathish, 2023; Elmahdi et al., 2018). Culturally responsive teaching practices that acknowledge students' diverse backgrounds enhance motivation, engagement, and achievement. Positive teacher-student relationships based on trust, respect, and empathy contribute to a conducive learning climate (Abacioglu et al., 2020; Gyeltshen, 2021).

The positive results can examine the findings of (Abdulrahaman et al., 2020; Esfijani and Zamani, 2020; Akram et al., 2022) in HeBei Colleges' dance majors. In addition, it fills the gap of lacking research on the relationship between multimedia training support for teachers and teaching effectiveness in HeBei Colleges' dance majors. It also sufficient in the research about using collegial model, the training for teachers is benefits these teachers to share with their professional idea about how integrate the multimedia technology into dance teaching. However, the weak relationship is existing may because the insufficient data, and the bias from participants. The various data collected method can be considered to use in the future. There are other limitations, for example. The findings and recommendation can only suitable for in dance major. The future study should expand the research field not only focus on dance major. In addition, other model can be considered to use.

There is a positive relationship between technological infrastructure and teaching effectiveness in HeBei Colleges' dance majors. Furthermore, the technological infrastructure plays a crucial role in teaching effectiveness, showing a strong positive relationship ($\beta = 0.810$, $p < 0.001$). This implies that having adequate technological resources and infrastructure in educational institutions positively impacts teaching effectiveness.

Adequate technological infrastructure, including hardware, software, and connectivity, enables teachers to effectively integrate technology into their instructional practices and enhance students' digital literacy (Boey and Sathish, 2023). Well-developed and robust technological infrastructure positively influences students' academic performance, engagement, and motivation (Serran et al., 2019). The introduction of modern technology into the classroom has greatly improved teaching efficiency and quality, impacting the mode of knowledge transfer, educational objectives, curriculum, students, and teachers (Anthony et al., 2019). Multimedia learning resources have a positive influence on students' academic achievement, and there is a need to further research teachers' proficiency in creating and utilizing multimedia-enhanced instructional materials (Mısır, 2018).

The positive results in the context of multimedia teaching management can examine the findings of (Al-Samarraie, 2019; Talib et al., 2021) in HeBei Colleges' dance majors. In addition, it fills the gap of lacking research on the relationship between technological infrastructure and teaching effectiveness in HeBei Colleges' dance majors. However, there is also a limitation, the data collection may be insufficient to apply the research findings and recommendations to organizations other than the dance majors in Hebei universities. The findings and recommendations can only be suitable for in dance major. The future study should expand the sample size to make the study more representative.

Recommendation

Based on the findings and the collegial model, here are some recommendations to improve the use of multimedia in dance teaching, enhance multimedia training support for teachers, and improve technological infrastructure to enhance teaching effectiveness.

Incorporating Multimedia Tools in Dance Teaching

Integration of multimedia tools

Dance instructors should be encouraged to incorporate multimedia tools, such as videos, interactive presentations, and online resources, into their teaching methods (Wong and Adesope, 2021). This can enhance the learning experience for students by providing visual and interactive elements that complement traditional instruction. For instance, teachers can use movies to highlight performances, show off dance moves, or give background information. Interactive presentations actively include students by incorporating quizzes, activities, or virtual simulations. Additionally, online resources can provide extra materials, music

samples, or choreography videos to further enhance the learning experience.

Professional development

Workshops or other forms of professional development for dance instructors are recommended to help them better incorporate multimedia resources (Ullah and Anwar, 2020). These sessions may concentrate on instructing instructors in the technical facets of using multimedia tools and assisting them in creating pedagogical techniques to maximize their influence on student learning. Workshops may encompass practical instruction in video editing software, assistance in developing interactive presentations, or examination of online platforms for the dissemination and retrieval of multimedia materials. Educational institutions can enhance the proficiency of dance teachers in using multimedia tools successfully by allocating resources towards instructor development.

Cultivate an innovative culture

To encourage innovation and experimentation in dance education, it is important to create a supportive atmosphere that encourages teachers to try out and use new multimedia teaching methods (Akram et al., 2022). This objective can be accomplished by the implementation of initiatives that foster collaboration and knowledge exchange among dance instructors, such as the establishment of peer mentoring programmers or the organization of regular meetings aimed at sharing and disseminating best practices. Administrators can also set up areas or platforms for teachers to demonstrate their cutting-edge teaching strategies, inspiring other teachers to use multimedia resources in their classrooms. Furthermore, the acknowledgment and centralization of educators who effectively incorporate multimedia resources can serve as an additional catalyst for fostering innovation and promoting ongoing enhancement.

Enhancing Multimedia Training Support for Dance Teachers

Offering extensive training programs

Educational institutions should provide in-depth training courses or workshops that focus on multimedia tools and how they can be used to teach dance (Boey & Satish, 2023). These courses should provide dance educators with the skills and knowledge needed to successfully utilize multimedia tools to incorporate into their teaching methods. The training courses cover several topics such as video editing, interactive presentation creation, integration of Internet resources, and effective use of multimedia tools in the field of dance education. By engaging in experiential activities, demonstrations, and interactive dialogues, educators can acquire tangible skills and develop a more profound comprehension of how to effectively use multimedia resources in order to augment student learning.

Collaborative Efforts with Specialists in Educational Technology

To help dance teachers use multimedia tools better, schools should work with educational technology specialists or multimedia experts (Abacioglu et al., 2020; Gyeltshen, 2021). These professionals possess the expertise to offer advice, technical assistance, and optimal strategies for proficiently utilising diverse multimedia products. They have the ability to provide support to educators in the process of choosing suitable educational resources, resolving technological problems, and effectively incorporating multimedia components into their instructional materials. Collaboration between dance instructors and multimedia experts can guarantee that teachers have the necessary resources and knowledge to maximise the use of multimedia tools in dance instruction.

Mentorship or Peer-Support System

Creating a mentoring or peer-support structure can be extremely beneficial to dance instructors as they embark on their journey of utilizing multimedia tools (Abdulrahaman et al., 2020). Experienced dance teachers who are adept in the use of multimedia might act as mentors or peer support providers for new instructors. Professionals have the ability to contribute their specialized knowledge, disseminate effective strategies, and offer continuous support and evaluation to their peers. The mentorship or peer-support system can be effectively facilitated by organizing frequent meetings, seminars, or online platforms that foster collaboration, discussion, and the exchange of resources. By cultivating a nurturing community, dance

educators can acquire knowledge from one another and obtain useful perspectives on the successful incorporation of multimedia resources in their instructional methods.

Improving Technological Infrastructure in Dance Education

Evaluate the existing technology infrastructure

In order to initiate the process, it is important to evaluate the current technological apparatus and pinpoint areas that necessitate enhancement (Serran et al., 2019). This process entails doing a comprehensive assessment of the existing resources, assessing their efficacy, and identifying the components that require updates or enhancements. Once these requirements have been recognized, adequate funds should be set aside to purchase the essential equipment.

Enhancements to hardware components

In addition to hardware enhancements, ensuring reliable internet connectivity is essential for the seamless integration of multimedia applications (Msr, 2018). Dance studios should have a stable and fast internet connection so that people can use online tools, stream videos, and do other multimedia things. The presence of dependable internet connectivity facilitates the ability of educators and learners to access online platforms and engage in real-time collaboration with their peers.

Formulating collaborations with technology enterprises

The establishment of relationships with technology businesses or organizations can present prospects for acquiring supplementary funding or sponsorship (Talib et al., 2021). These collaborative alliances have the potential to mitigate the economic challenges linked to the acquisition of sophisticated multimedia technologies. Dance organizations and IT firms might work together to investigate possibilities for special pricing, group purchases, or even sponsorship programmers that offer financial support.

LIMITATIONS, FUTURE RESEARCH, AND CONCLUSION

This study provided the theoretical and conceptual framework for carrying out more study in this field, using the collegial model as a basis for subsequent investigations. The research only focused on the impact of multimedia teaching management on teaching effectiveness, which did not consider other factors may influence teaching effectiveness or student learning outcomes. For example, the study did not consider the role of curriculum design or student motivation in dance education. Future studies will explore more variables.

Another potential limitation is the exclusive use of the Bush collegial model(Bush, 2020). While this theory may be useful in understanding the organizational structure and decision-making processes within educational institutions, it may not fully capture the complexities of teaching and learning in dance education. Nowadays, in management practice, education organization uses mixed management theory. For example, the College model is widely used by university organizations, and formal models are generally used for management behaviors under rules and regulations. When members are not active, we can consider using the subjective model to explore the needs of members. However, more and more organizations attach importance to cultural construction (Bush, 2020). However, only three variables were used in the study and no model could be referenced. Future studies could consider incorporating additional theories for example formal models to provide a more comprehensive understanding of the factors impacting teaching effectiveness in dance education.

While this study provides valuable insights into the impact of multimedia teaching management on teaching effectiveness in Hebei colleges' dance majors, its findings should be interpreted with caution due to limitations such as the use of a convenience sample and the narrow focus on the bush collegial model theory. Future research could address these limitations and provide a more nuanced understanding of the factors impacting teaching effectiveness in dance education.

In conclusion, in Hebei colleges dance major, the level of application of multimedia tools in teaching, multimedia training support for teachers, technical infrastructure, and teaching effectiveness are relatively

high. The findings of this study are basically consistent with those of other scholars in the past. In other words, the application of multimedia tools, multimedia training support for teachers, and technical infrastructure have a positive impact on the teaching effectiveness of dance majors in Hebei colleges. In addition, technology infrastructure is the strongest predictor of impact. The results of regression analysis show that training for teachers has no significant effect on teaching effectiveness. This may be caused by the bias of respondents. To reduce such bias, interviews may be used to collect more detailed data in the future. In addition, among the population surveyed in this study, the proportion of females is higher than that of males. However, the gender ratio did not affect the results of the analysis, because it was not a significant factor in this study. Future studies will fully consider whether gender and age have significant differences in the study results.

In general, this study filled the gaps in the research on the relationship between the application of multimedia tools in teaching, multimedia training support for teachers, and technical infrastructure and teaching effectiveness of dance majors in Hebei colleges. In addition, it filled the gap in the study of the college model, but in the current practice of educational management, mixed models are more worthy of use, such as the formal model, subjective model, and cultural model. Future studies will select other theories, fully consider other influencing factors, and use various methods to collect data. The study emphasized the importance of multimedia teaching management in dance courses. The study provided guidance for future research and provided insights into incorporating multimedia tools into dance education. These efforts are aimed at improving the learning experience and creating an environment conducive to multimedia education.

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