SCIENTIFIC CULTURE

www.sci-cult.com

SCIENTIFIC CULTURE, Vol. 12, No. 1.1, (2026), pp. 1121-1131
Open Access. Online & Print

DOI: 10.5281/zenodo.11425183

RESEARCH ON THE MULTIDIMENSIONAL TEACHING MODEL OF JIAOZHOU YANGKO ART AND STUDENTS' LEARNING WILLINGNESS

Wang Xiaoli[1] and Adzira Husain[1*]

[1]Universiti Utara Malaysia, Malaysia, School of Creative Industry Management & Performing Arts, Universiti Utara Malaysia, wangxiaoli43210@126.com, https://orcid.org/0009-0008-7372-353X

Received: 10/10/2025
Accepted: 10/11/2025

Corresponding Author: Adzira Husain (adzira@uum.edu.my)

ABSTRACT

This study investigates how a multidimensional teaching model can enhance students' willingness to learn Jiaozhou Yangko, a form of traditional Chinese folk dance, through the lens of the Stimulus–Organism–Response (SOR) framework. Drawing from a sample of 450 university students enrolled in Jiaozhou Yangko courses across three universities in Shandong Province, the research examines how stimulus variables (artistic elements, classroom teaching methods, and extracurricular teaching methods) influence internal psychological states specifically learning cognition and learning emotion which in turn affect students' behavioral response, namely their willingness to continue learning and promoting the art form. Quantitative data were collected through a structured questionnaire and analyzed using exploratory factor analysis, regression analysis, and structural equation modeling. The findings confirm that both cognitive and emotional engagement mediate the relationship between teaching stimuli and learning willingness. While both cognition and emotion influenced students' motivation, emotional engagement proved to be the stronger driving force. The study contributes to the theoretical expansion of the SOR model in the field of arts education and provides practical guidance for the preservation and revitalization of intangible cultural heritage. Limitations and directions for future research including longitudinal and cross-cultural studies are also discussed.

KEYWORDS: Jiaozhou Yangko, Multidimensional Teaching Model, SOR Model, Cultural Heritage Education.

1. INTRODUCTION

Jiaozhou Yangko, a representative folk dance from Shandong province, is renowned for its dynamic characteristics of "stretching, grinding, twisting, and resilience" as well as the distinctive "three curves" posture, vividly reflecting the cultural spirit of Shandong and the vitality of working people. Recognized as part of China's national intangible cultural heritage, its value lies not only in its complete vocabulary of body movements but also in its embodiment of local history, folk customs, and collective memory (Zhao, 2025). However, in the context of globalization and modernization, folk arts rooted in agrarian traditions face increasing challenges to both their ecological environment and their modes of transmission, making effective preservation and contemporary revitalization an urgent task.

In practice, the transmission of Jiaozhou Yangko within educational settings encounters significant difficulties. Current teaching often relies on relatively homogeneous methods, placing excessive emphasis on the mechanical imitation of external movement forms and repetitive skill drills, while neglecting the deeper cultural, aesthetic, and symbolic meanings embedded in the art (Yang & Fei, 2022). This imbalance where technique is prioritized over cultural interpretation renders the learning process superficial, diminishing students' engagement and identification with the art form (Cui, 2022). Moreover, the gap between traditional teaching models and the interactive, digital learning preferences of today's students further reduces the effectiveness and appeal of such courses.

To address these challenges, innovation in pedagogical approaches has become imperative. Instead of a unidirectional, skill-oriented model, a multidimensional teaching framework is needed one that integrates theory and practice, combines online and offline platforms, and harmonizes traditional transmission with modern innovation (McCarthy & McNamara, 2021; Otterborn et al., 2024). Such an approach can enhance multisensory learning, activate students' cognitive and emotional participation, and ultimately strengthen their willingness to continue learning and promoting the art. Student willingness, as a central psychological construct, plays a decisive role in predicting learning persistence and behavior, thereby serving as a key indicator for the success of educational reform in the context of intangible cultural heritage (Lee & Taylor, 2022; Weinberger & Shonfeld, 2018).

The theoretical foundation of this study is the Stimulus–Organism–Response (SOR) model, a framework widely applied in psychology, consumer behavior, and increasingly in education research. The SOR model posits that external stimuli (S) influence internal psychological states (O), which then shape individuals' behavioral responses (R) (Larsen et al., 2023; Ravishankar et al., 2024). In the present research, the multidimensional teaching model of Jiaozhou Yangko is conceptualized as the external stimulus; students' cognitive understanding and emotional experience function as the organismic variables; and their willingness to continue learning represents the behavioral response. This model provides a clear analytical pathway for examining how teaching interventions translate into sustained learning motivation. By applying SOR to the context of traditional dance education, this study not only expands the model's applicability but also provides a structured lens for understanding the interaction between pedagogy and student psychology in arts education.

Accordingly, this research aims to answer a central question: Can a multidimensional teaching model, by strengthening students' learning willingness through both cognitive and emotional mechanisms, serve as an effective pathway for the contemporary transmission of Jiaozhou Yangko and similar forms of intangible cultural heritage in educational settings? Beyond its applied value for improving Jiaozhou Yangko teaching, the study also carries theoretical significance. By integrating advanced educational theory with the practical needs of cultural heritage preservation, it empirically investigates the chain of relationships between teaching intervention, psychological mechanism, and behavioral outcome. The findings are expected to provide both a theoretical model and empirical evidence for the design of intangible cultural heritage education, deepening the practice of "bringing intangible cultural heritage into classrooms" and offering new insights into the sustainable development of traditional arts.

2. LITERATURE REVIEW

Based on the theoretical framework of the SOR model (Stimulus–Organism–Response), this study aims to systematically explicate how the multidimensional teaching model of Jiaozhou Yangko influences students' internal psychological processes through external stimuli, ultimately manifesting as positive learning intentions. The model provides a clear theoretical pathway for understanding the interactive mechanism of "teaching" and "learning" in arts education. The discussion is organized along three dimensions

stimulus variables, organism variables, and response variables aligned with the pedagogical characteristics of Jiaozhou Yangko.

2.1. Stimulus Variables

Stimulus variables refer to the diverse external interventions and content elements adopted in teaching (Chen et al., 2024). **In this study, they include three core dimensions** the artistic elements of Jiaozhou Yangko, classroom teaching methods, and extracurricular teaching methods. Collectively, these variables constitute the external environmental system that shapes students' psychological processes (Fegely et al., 2024).

Artistic elements serve as the fundamental source of stimulation, encompassing the distinctive movement vocabulary, musical features, costumes, props, and performance forms of Jiaozhou Yangko. The dynamic qualities of "twist, grind, stretch, and resilience" and the "three bends" body posture establish a unique system of visual symbols, while the locally distinctive rhythms and melodies form an auditory aesthetic medium. These elements are not only aesthetically appealing but also carry profound cultural significance and regional characteristics (Vukadin et al., 2016; Wingström et al., 2022). Their systematic presentation in teaching can provide students with multisensory aesthetic experiences, stimulating their curiosity and motivation to explore. Importantly, when traditional elements are integrated with contemporary aesthetics, they create a cultural resonance effect, enabling students to appreciate both the traditional artistry and its relevance to modern life (Wang et al., 2024).

Classroom teaching methods represent the primary channel for instructional delivery, encompassing teacher demonstrations, movement breakdowns, cultural explanations, and group collaboration (Özbay & Çınar, 2021). Traditional oral and demonstrative transmission ensures the accuracy of artistic inheritance, while modern educational technologies such as multimedia presentation, virtual simulation, and cross-cultural comparative analysis greatly enhance the vividness and interactivity of teaching (Orhun, 2009). A multimethod approach accommodates diverse learning styles and, more critically, transcends the **limitations of conventional pedagogy** providing precise movement analysis at the technical level, deeper cultural interpretation at the cultural level, and more diverse avenues of knowledge construction at the cognitive level (Hui et al., 2022).

Extracurricular teaching methods function as crucial extensions and supplements to classroom teaching, including workshops, performance participation, online learning resources, and community-based practice (Wannapiroon & Pimdee, 2022). These methods collectively create a three-dimensional, open learning environment that breaks the constraints of traditional classroom space and time (Leiva-Olivencia et al., 2021). Through direct guidance by intangible cultural heritage inheritors, students gain authentic artistic transmission; through community performance participation, they experience the art within its living cultural context; through online platforms, they self-direct their learning progress and access a wide array of resources (Moreno Cortez & Nevárez Montes, 2025). This diversified extracurricular teaching system not only expands the physical space for learning but also deepens and enriches students' modes of engagement.

2.2. Organism Variables

Organism variables represent the internal psychological processes that occur after students are exposed to external stimuli, primarily including learning cognition and learning emotion (Genc et al., 2017). These internal processes serve as key mediators linking external stimuli with eventual behavioral responses (Luo et al., 2024).

Learning cognition refers to students' understanding and knowledge construction regarding the ontology of Jiaozhou Yangko, encompassing mastery of movement skills, recognition of stylistic features, and comprehension of cultural connotations. Effective cognitive construction requires not only accurate imitation of external forms but also the internalization of the cultural logic and aesthetic principles underlying the movements (Castro-Alonso et al., 2024). For instance, the cognitive grasp of the movement "twist" involves not merely reproducing its form but also understanding its deep-rooted connections with the lifestyles and aesthetic traditions of the Shandong people (Reinhold et al., 2024; Woo et al., 2024). Such deep-level cognition enables students to transcend superficial technical imitation and truly grasp the artistic essence and cultural spirit of Jiaozhou Yangko. Moreover, cognition also involves metacognitive monitoring students' awareness and regulation of their learning progress, outcomes, and challenges.

Learning emotion refers to students' affective experiences and emotional responses during the learning process, including interest, aesthetic enjoyment, cultural identification, and self-efficacy (Hascher, 2010). Positive emotional experiences

significantly enhance students' motivation and engagement. In learning Jiaozhou Yangko**, students may undergo various emotional fluctuations** initial curiosity toward an unfamiliar art form, frustration when encountering difficult movements, a sense of achievement after skill mastery, and eventually a deep emotional attachment and sense of responsibility for cultural inheritance (Ahmed et al., 2023). Such emotional trajectories influence not only immediate learning states but also long-term attitudes and behavioral orientations toward Jiaozhou Yangko. Notably, in cross-cultural or cross-regional contexts, emotional responses can be more complex, encompassing feelings of estrangement due to cultural differences or attraction due to cultural novelty.

2.3. Response Variables

Response variables represent the final behavioral manifestations of the learning process. In this study, they are operationalized as student willingness, which includes tendencies toward sustained participation, active learning, and enthusiastic promotion (Ma & Lei, 2024). Response variables serve as crucial indicators of instructional effectiveness and predictors of cultural transmission outcomes.

Student willingness can be observed and assessed across multiple dimensions at the cognitive level, it manifests as the proactive pursuit of further resources and deeper cultural understanding; at the behavioral level, it is evident in continued course participation, voluntary engagement in related activities, and active artistic practice; at the social level (Pishghadam et al., 2023). It emerges in students' readiness to introduce and promote Jiaozhou Yangko to others. These behavioral tendencies collectively constitute a complete sequence from reception to internalization to dissemination thereby reflecting the ultimate impact of instructional interventions.

2.4. Research Hypotheses and Theoretical Model

Although the present study adopts the SOR framework as its central analytical lens, it is important to situate this choice in relation to alternative pedagogical models. Constructivist learning theory emphasizes the active role of learners in constructing knowledge through interaction with social and cultural contexts, highlighting processes such as reflection, meaning-making, and collaborative dialogue (Özbay & Çınar, 2021). Similarly, experiential learning theory, as articulated by Genc (2017), stresses the cyclical interplay of concrete experience, reflective observation, abstract conceptualization, and active experimentation, providing a dynamic model for arts education where practice and reflection reinforce each other. Compared with these frameworks, the SOR model offers a more structured causal pathway by explicitly linking external teaching stimuli with internal psychological states and observable behavioral intentions. This clarity is particularly valuable in the context of Jiaozhou Yangko education, where both cognitive understanding and emotional resonance must be simultaneously activated to sustain learning willingness. By incorporating elements of constructivist and experiential perspectives within its stimulus variables (e.g., collaborative learning, community practice), the present study leverages the strengths of these traditions while retaining the analytical rigor of the SOR model. Thus, the theoretical positioning not only bridges existing pedagogical theories but also highlights the distinctive contribution of the SOR framework to cultural heritage education research. Drawing on the SOR framework and the preceding analysis of variables, this study proposes the following hypotheses.

Stimulus variables exert a direct influence on organism variables. The richness and expressiveness of artistic elements significantly enhance students' cognitive engagement and emotional investment; the diversity and appropriateness of classroom methods directly shape cognitive efficiency and affective quality; the extensiveness and practicality of extracurricular methods further consolidate and deepen classroom learning effects.

H1: Stimulus variables significantly influence learning cognition

H1a: Artistic elements exert a significant positive effect on learning cognition

H1b: Classroom teaching methods exert a significant positive effect on learning cognition

H1c: Extracurricular teaching methods exert a significant positive effect on learning cognition

H2: Stimulus variables significantly influence learning emotion

H2a: Artistic elements exert a significant positive effect on learning emotion

H2b: Classroom teaching methods exert a significant positive effect on learning emotion

H2c: Extracurricular teaching methods exert a significant positive effect on learning emotion

Organism variables exert a decisive influence on response variables. The depth of students' learning cognition directly affects their willingness to persist, while emotional identification with the art serves as

the key factor sustaining long-term motivation.

H3: Learning cognition exerts a significant positive effect on student willingness

H4: Learning emotion exerts a significant positive effect on student willingness

Organism variables mediate the relationship between stimulus variables and response variables. External instructional stimuli must operate through internal psychological processes to translate into behavioral intentions, reflecting the core mechanism of the SOR model.

H5: Learning cognition mediates the relationship between stimulus variables and student willingness

H6: Learning emotion mediates the relationship between stimulus variables and student willingness

The theoretical model developed in this study fully illustrates the operational pathway of Stimulus–Organism–Response. It provides a systematic framework for understanding the mechanisms underlying the effectiveness of Jiaozhou Yangko pedagogy, while also offering theoretical foundations and practical guidance for optimizing teaching design and enhancing cultural transmission.

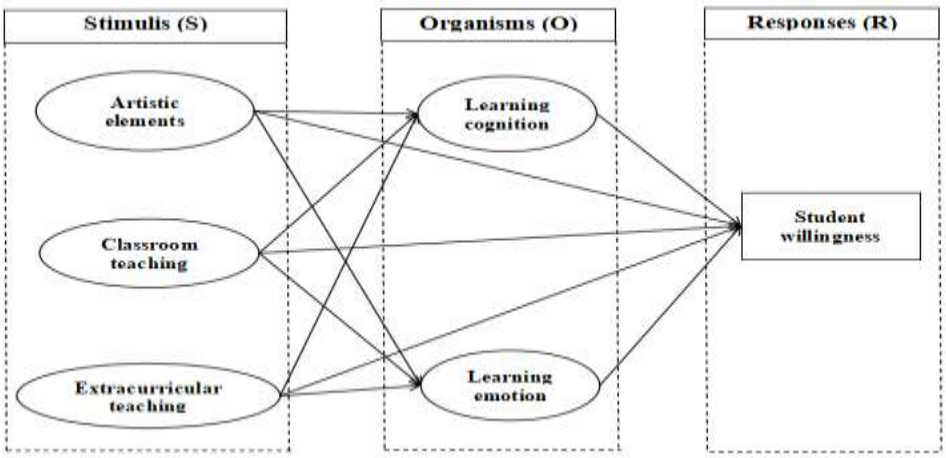

Figure 1: Quantitative Research Framework.

3. RESEARCH METHODS

This study adopts a quantitative research design, guided by the SOR theoretical framework. Data were collected through a structured questionnaire that assessed students' experiences with the multidimensional teaching model of Jiaozhou Yangko. The three dimensions of the SOR model stimulus, organism, and response were operationalized into measurable variables. Statistical techniques were employed to test reliability and validity, followed by the application of structural equation modeling (SEM) to evaluate the model fit and examine causal relationships. In addition, regression analyses were conducted to explore both the direct and indirect effects of teaching stimuli on cognitive and emotional processes as well as on students' willingness to learn.

3.1. Questionnaire Design

The primary research tool was a self-developed questionnaire constructed around the core components of Jiaozhou Yangko instruction. **A total of 30 items were included, distributed equally across six variables** artistic elements, classroom teaching methods, extracurricular teaching methods, learning cognition, learning emotion, and learning willingness. Each construct was measured by five items. Responses were recorded on a seven-point Likert scale, ranging from 1 ("strongly disagree") to 7 ("strongly agree"), which allowed for greater differentiation in attitudes and perceptions.

The questionnaire was designed with a balance between comprehensiveness and feasibility. Thirty items provided sufficient indicators for statistical modeling while keeping the survey manageable for participants. Multiple items per construct enabled a multidimensional assessment of each variable, thereby enhancing reliability and validity.

Operational definitions of the variables are summarized as follows

Artistic Elements: The distinctive characteristics of Jiaozhou Yangko, such as movement vocabulary, music, costumes, and overall aesthetics, reflecting its cultural richness (Vukadin et al., 2016; Zhao, 2025).

Classroom Teaching Methods: Instructional practices within the classroom, including teacher demonstrations, step-by-step breakdowns, multimedia integration, and collaborative learning

(Genc et al., 2017; Hui et al., 2022).

Extracurricular Teaching Methods: Extended learning approaches outside the classroom, such as workshops, community performances, online learning platforms, and guidance from heritage bearers (Leiva-Olivencia et al., 2021; Wannapiroon & Pimdee, 2022).

Learning Cognition: Students' understanding and knowledge acquisition, including skill mastery, stylistic recognition, cultural comprehension, and self-monitoring of progress (Castro-Alonso et al., 2024; Woo et al., 2024).

Learning Emotion: Affective responses during learning, such as interest, sense of achievement, cultural identity, and self-efficacy (Ahmed et al., 2023; Hascher, 2010).

Student Willingness: Behavioral intentions and future commitment, including continued learning, participation in performances, and promotion of Jiaozhou Yangko (Pishghadam et al., 2023; Zhao, 2025).

By covering perceptual, cognitive, emotional, and behavioral dimensions, the questionnaire ensured comprehensive measurement of the SOR model in this educational context.

3.2. Sampling Procedure

The study targeted undergraduate students enrolled in Jiaozhou Yangko elective courses at three universities in Shandong Province. These institutions were selected because of their relatively standardized curricula, ensuring that participants shared comparable learning experiences and minimizing extraneous variation.

The total population consisted of 612 students, 145 from Shandong Women's University, 232 from Shandong Polytechnic, and 235 from University of Jinan.

Based on widely accepted sample size determination methods, a minimum of approximately 240 participants was required to ensure reliability of results. To achieve adequate coverage, a cluster sampling approach was adopted, facilitated by course coordinators who provided access to the full student lists (Fugard & Potts, 2015). This method guaranteed inclusivity and increased response rates, while also improving efficiency in data collection.

To maintain proportional representation, the minimum number of valid responses required from each institution was calculated according to the population distribution. The sampling distribution is presented in Table 1.

Table 1: Sampling Distribution.

Institutions	Population	Proportion (%)	Distributed Questionnaires	Minimum Valid Responses
Shandong Women's University	145	23.7	145	58
Shandong Polytechnic	232	37.9	232	92
University of Jinan	235	38.4	235	92
Total	612	100	612	242

This proportional sampling ensured that the data reflected the characteristics of the overall population and provided a sound basis for statistical analysis.

3.3. Data Analysis Methods

The collected data were analyzed using SPSS 26.0, following a series of statistical procedures designed to evaluate both the measurement quality of the questionnaire and the relationships among variables. To begin with, exploratory factor analysis (EFA) was applied in order to identify the underlying factor structure of the measurement items. Prior to conducting EFA, the Kaiser-Meyer-Olkin (KMO) statistic and Bartlett's test of sphericity were used to assess sampling adequacy and data suitability. Items with low factor loadings were removed, and the extracted factors were examined to ensure that they aligned with the theoretical constructs proposed in this study (Watkins, 2018).

After establishing the factor structure, the reliability and validity of the questionnaire were tested. Internal consistency for each construct was assessed using Cronbach's Alpha coefficient, and values above 0.70 were regarded as evidence of satisfactory reliability (Christmann & Van Aelst, 2006). Construct validity was confirmed by examining whether the factors derived from the analysis corresponded to the conceptual definitions of the six dimensions, namely artistic elements, classroom teaching methods, extracurricular teaching methods, learning cognition, learning emotion, and learning willingness.

Subsequently, Pearson correlation analysis was carried out to examine the degree and direction of linear associations between variables. This analysis provided an overview of how closely the constructs were related to each other, offering initial evidence for the hypothesized pathways in the SOR model.

Following the correlation analysis, multiple regression analysis was performed to evaluate the predictive power of the independent variables. Specifically, the stimulus variables were regressed on the organism variables to examine their direct effects

on students' cognitive and emotional responses, while the organism variables were further regressed on the response variable to determine their influence on learning willingness. The significance of the regression coefficients allowed for the testing of the core hypotheses regarding direct relationships.

Finally, the study employed mediation effect testing to investigate whether learning cognition and learning emotion acted as intermediary mechanisms between stimulus and response. The Bootstrap resampling method with 5,000 iterations was used to estimate indirect effects, and confidence intervals were calculated to determine statistical significance. This step ensured a rigorous evaluation of the mediating role of internal psychological processes in transforming external teaching stimuli into students' behavioral intentions.

Through these procedures, the study was able to verify the soundness of the measurement model, explore the relationships among variables in depth, and provide empirical evidence for the operation of the SOR framework in the context of Jiaozhou Yangko education.

4. FINDING AND DISCUSSION

Data collection was conducted over the course of one month, during which questionnaires were distributed to students enrolled in Jiaozhou Yangko courses at three universities in Shandong Province. The collection period is June 2025, following the completion of Jiaozhou Yangko dance courses at various institutions. A total of 512 questionnaires were returned, and after excluding those with missing or invalid responses, 450 valid questionnaires were retained for analysis. Female respondents accounted for 69.9%, while male respondents made up 30.1%. The final sample included 96 valid questionnaires from Shandong Women's University, 172 from Shandong Polytechnic, and 182 from University of Jinan, exceeding the minimum requirement for statistical analysis.

To evaluate the factor structure of the measurement instrument, exploratory factor analysis (EFA) was conducted. Results showed that all items loaded strongly on their intended factors, with factor loadings exceeding 0.50, confirming the structural validity of the six latent variables.

The KMO values of all dimensions ranged between 0.76 and 0.88, and Bartlett's test of sphericity was significant at $p < 0.001$, indicating that the data were suitable for factor analysis. The explained variance of each construct exceeded 55%, confirming the adequacy of the measurement model.

Table 2: Results of Exploratory Factor Analysis.

Variables	Factor Loadings				
Artistic Elements	AE1: 0.762	AE2: 0.781	AE3: 0.735	AE4: 0.719	AE5: 0.771
Classroom Teaching	CT1: 0.812	CT2: 0.837	CT3: 0.792	CT4: 0.844	CT5: 0.819
Extracurricular Teaching	ET1: 0.821	ET2: 0.749	ET3: 0.768	ET4: 0.703	ET5: 0.722
Learning Cognition	LC1: 0.775	LC2: 0.727	LC3: 0.787	LC4: 0.790	LC5: 0.753
Learning Emotion	LE1: 0.800	LE2: 0.749	LE3: 0.782	LE4: 0.769	LE5: 0.757
Student Willingness	SW1: 0.822	SW2: 0.779	SW3: 0.791	SW4: 0.817	SW5: 0.793

Table 3: Results of Structural Validity Analysis.

Variable Dimensions	KMO	Bartlett's Test	Variance Explained	Item Retention
AE	0.812	$p < 0.001$	61.20%	Retain all
CT	0.835	$p < 0.001$	63.45%	Retain all
ET	0.861	$p < 0.001$	64.12%	Retain all
LC	0.874	$p < 0.001$	66.58%	Retain all
LE	0.783	$p < 0.001$	58.74%	Retain all
SW	0.796	$p < 0.001$	60.92%	Retain all

The reliability test showed Cronbach's Alpha values all above 0.75, composite reliability (CR) above 0.70, and AVE values ranging from 0.53 to 0.65, demonstrating that all constructs exhibited satisfactory reliability and convergent validity.

Table 4: Results of Reliability Analysis.

Variable Dimensions	Cronbach's α	CR	AVE
AE	0.812	0.820	0.554
CT	0.846	0.852	0.592
ET	0.865	0.871	0.636
LC	0.853	0.861	0.561
LE	0.771	0.776	0.537
SW	0.789	0.794	0.566

Pearson correlation analysis showed significant positive relationships among all variables. Stimulus variables (AE, CT, ET) were strongly correlated with both LC and LE, and these organism variables in turn exhibited significant positive correlations with SW, providing preliminary support for the hypothesized model.

To further test the hypotheses, multiple regression analysis was conducted. The results revealed that AE, CT, and ET significantly predicted both LC and LE. Moreover, both LC and LE significantly predicted SW, with emotional engagement showing a relatively stronger effect compared to cognitive engagement.

Finally, mediation effect testing was carried out using the Bootstrap method. Results indicated that LC consistently mediated the relationship between

all three stimulus variables and SW. LE also mediated the relationships, but its effect was stronger for CT and ET than for AE, suggesting that classroom and extracurricular methods evoke stronger emotional connections.

Table 5: Result of Multiple Regression Analysis.

DV	IV	β	t	p	R^2
LC	AE	0.221	6.120	0.000	0.632
	CT	0.204	5.840	0.000	
	ET	0.192	5.470	0.000	
LE	AE	0.174	4.780	0.000	0.591
	CT	0.162	4.390	0.000	
	ET	0.139	3.920	0.000	
SW	AE	0.121	3.550	0.000	0.718
	CT	0.113	3.270	0.001	
	ET	0.097	2.980	0.003	
	LC	0.182	4.490	0.000	
	LE	0.328	7.040	0.000	

Table 6: Result of Mediation Effect Testing.

Path	Mediator	β	t	p	Result
AE → SW	via LC	0.178	4.321	0.001	Supported
CT → SW	via LC	0.166	3.975	0.001	Supported
ET → SW	via LC	0.158	3.740	0.001	Supported
AE → SW	via LE	0.095	2.849	0.004	Supported
CT → SW	via LE	0.145	3.976	0.001	Supported
ET → SW	via LE	0.132	3.555	0.001	Supported

Grounded in the SOR framework, this study systematically examined the dynamic relationships among stimulus, organism, and response variables in the context of Jiaozhou Yangko education. The empirical findings provide robust support for all proposed hypotheses.

First, the results confirm that stimulus variables exert a significant positive influence on students' learning cognition (H1a, H1b, H1c). Artistic elements, with their distinctive movement vocabulary and rich cultural symbolism, enhanced students' ability to recognize stylistic features and interpret underlying aesthetic logics. Classroom teaching methods, particularly those combining demonstration, multimedia, and collaborative learning, further promoted efficient knowledge acquisition. Extracurricular teaching activities consolidated classroom learning by situating the art within authentic cultural contexts. Collectively, these findings affirm H1 and demonstrate that diverse forms of external instructional stimuli are effective in deepening students' cognitive engagement (Cui, 2022).

Second, the analysis shows that stimulus variables also significantly enhance learning emotion (H2a, H2b, H2c). Artistic elements stimulated curiosity and aesthetic enjoyment; classroom methods encouraged emotional resonance through interaction and cultural storytelling; and extracurricular activities generated strong affective identification by immersing students in community and performance settings. These results validate H2, suggesting that well-designed teaching strategies foster not only intellectual comprehension but also meaningful emotional experiences, which are indispensable in arts education.

With regard to the influence of organism variables on response, the findings confirm that both learning cognition and learning emotion positively predict students' willingness to continue learning (H3 and H4). Cognitive development enables students to perceive the depth and cultural significance of Jiaozhou Yangko, thereby sustaining their motivation for further exploration. Emotional engagement, however, exerted a stronger effect, underscoring the critical role of affective identification in driving long-term participation and willingness to promote the art (Otterborn et al., 2024). These results highlight the dual yet asymmetrical contribution of cognition and emotion in shaping student behavior: while cognition provides the necessary foundation, emotion serves as the more decisive force in sustaining motivation.

Finally, the study demonstrates the mediating function of organism variables. Learning cognition consistently mediated the relationships between all stimulus variables and student willingness (H5), while learning emotion also acted as a significant mediator (H6). This confirms that external instructional stimuli must be internalized through psychological processes before being transformed into behavioral intentions, reflecting the core mechanism of the SOR model. The dual mediation pathways indicate that students' engagement with Jiaozhou Yangko is not merely the result of exposure to artistic content but emerges from an internalized process that integrates cognitive understanding with emotional resonance.

Taken together, these findings offer important theoretical and practical implications. From a theoretical perspective, the study validates the applicability of the SOR model in the domain of traditional arts education, showing how external teaching strategies can be systematically mapped onto students' cognitive and emotional responses, which in turn shape their behavioral intentions. From a pedagogical perspective, the results suggest that effective transmission of intangible cultural heritage requires a balanced emphasis on both cognitive construction (e.g., accurate skill acquisition and cultural interpretation) and emotional cultivation (e.g., fostering identification, enjoyment, and a sense

of belonging) (Lee & Taylor, 2022). This dual focus ensures that students not only understand the technical and cultural dimensions of the art but also develop the willingness to sustain and disseminate it.

In conclusion, this study demonstrates that the multidimensional teaching model of Jiaozhou Yangko enhances students' learning willingness through the combined pathways of cognition and emotion. The results underscore that cognitive engagement functions as a consistent and reliable mediator, while emotional engagement, though more variable, exerts stronger motivational force. These findings provide empirical evidence for optimizing teaching practices in the field of traditional performing arts and reinforce the broader view that successful arts education must simultaneously engage the mind and the heart to achieve enduring educational and cultural outcomes.

5. CONCLUSION

This study applied the SOR framework to investigate how stimulus variables including artistic elements, classroom teaching methods, and extracurricular teaching methods affect students' cognitive and emotional responses, which in turn shape their willingness to continue learning Jiaozhou Yangko. The results confirmed all proposed hypotheses: external stimuli significantly enhanced both cognitive and emotional engagement; cognition and emotion each positively influenced learning willingness; and both served as mediators linking instructional design to behavioral intentions. These findings underscore the dual importance of cognitive understanding and emotional resonance in sustaining students' motivation and highlight the broader value of integrating traditional cultural practices into contemporary education. By demonstrating how a multidimensional teaching model fosters cultural identity and transmission, this study provides both theoretical insights for arts education research and practical guidance for the preservation and revitalization of intangible cultural heritage.

Despite its contributions, the study is not without limitations. The data were collected exclusively from students in three universities within a single province, which may limit the generalizability of the findings to broader contexts. The reliance on self-reported questionnaires also introduces potential biases, as responses may reflect subjective perceptions rather than objective behaviors. Furthermore, while this study adopted a cross-sectional design, it did not capture the long-term dynamics of how cognition and emotion evolve over extended learning periods or across different cultural settings. These limitations suggest the need for cautious interpretation of the results.

In addition, two supplementary limitations should be noted. First, as the study relied on self-administered questionnaires, the findings may be affected by response bias. Some participants may have provided socially desirable answers or exaggerated/understated their level of engagement and willingness, which introduces potential threats to the objectivity of the data. Second, the sample exhibited strong cultural homogeneity, being drawn solely from university students within Shandong Province. This concentration of cultural background may obscure differences in cognition and emotional responses that could emerge in cross-cultural or cross-regional contexts, thereby limiting the external validity of the findings.

Future research could extend this work in several directions. Longitudinal studies would provide deeper insight into the sustained effects of cognitive and emotional engagement on learning willingness, while cross-cultural comparisons could illuminate how students from different backgrounds respond to traditional Chinese performing arts. In addition, mixed-methods approaches that combine quantitative modeling with qualitative interviews or classroom observations would yield a richer understanding of the learning process. Expanding the research to other forms of intangible cultural heritage beyond Jiaozhou Yangko may also help verify the broader applicability of the SOR model in arts education. Such efforts will not only strengthen the theoretical foundations of this field but also contribute to more effective strategies for transmitting traditional culture in modern educational contexts.

Acknowledgements: This research acknowledges the strong support provided by Universiti Utara Malaysia.

REFERENCES

Ahmed, N., Al Aghbari, Z., & Girija, S. (2023). A systematic survey on multimodal emotion recognition using learning algorithms. Intelligent Systems with Applications, 17, 200171. https://doi.org/10.1016/j.iswa.2022.200171

Castro-Alonso, J. C., Ayres, P., Zhang, S., et al. (2024). Research avenues supporting embodied cognition in

learning and instruction. Educational Psychology Review, 36(1), 10. https://doi.org/10.1007/s10648-024-09847-4

Chen, M. C., Chan, T.-W., & Chen, Y. H. (2024). How to encourage students continue learning English on podcast? The perspectives of stimulus-organism-response and interest driven creator theory. Interactive Technology and Smart Education, 21(1), 131–148. https://doi.org/10.1108/ITSE-06-2022-0076

Christmann, A., & Van Aelst, S. (2006). Robust estimation of Cronbach's alpha. Journal of Multivariate Analysis, 97(7), 1660–1674. https://doi.org/10.1016/j.jmva.2005.05.012

Cui, R. (2012). The research of analysis and classification of physical immaterial cultural heritage's basic characteristics. In T. Zhang (Ed.), Future computer, communication, control and automation (pp. 265-270). Springer. https://doi.org/10.1007/978-3-642-25538-0_48

Fegely, A., Hagan, H., Warriner, G., et al. (2024). The teaching methods classroom meets virtual reality: Insights for pre-service teaching methods instructors. TechTrends, 68(2), 358–369. https://doi.org/10.1007/s11528-024-00936-3

Fugard, A. J. B., & Potts, H. W. W. (2015). Supporting thinking on sample sizes for thematic analyses: a quantitative tool. International Journal of Social Research Methodology, 18(6), 669–684. https://doi.org/10.1080/13645579.2015.1005453

Genc, M., Genc, T., & Rasgele, P. G. (2017). Effects of nature-based environmental education on the attitudes of 7th grade students towards the environment and living organisms and affective tendency. International Research in Geographical and Environmental Education, 27(4), 326–340. https://doi.org/10.1080/10382046.2017.1382211

Hascher, T. (2010). Learning and Emotion: Perspectives for Theory and Research. European Educational Research Journal, 9(1), 13-28. https://doi.org/10.2304/eerj.2010.9.1.13

Hui, J., Zhou, Y., Oubibi, M., Di, W., Zhang, L., & Zhang, S. (2022). Research on Art Teaching Practice Supported by Virtual Reality (VR) Technology in the Primary Schools. Sustainability, 14(3), 1246. https://doi.org/10.3390/su14031246

Larsen, I. B., Blenker, P., & Neergaard, H. (2023). The entrepreneurial mindset in entrepreneurship education: What can we learn from S-O-R models?. Education + Training, 65(8-9), 1043–1069. https://doi.org/10.1108/ET-09-2022-0364

Lee, J. S., & Taylor, T. (2022). Positive psychology constructs and Extramural English as predictors of primary school students' willingness to communicate. Journal of Multilingual and Multicultural Development, 45(7), 2898–2916. https://doi.org/10.1080/01434632.2022.2079650

Leiva-Olivencia, J. J., López-Berlanga, M. C., Miñán Espigares, A., & Villegas Lirola, F. (2021). Compulsory Education Teachers' Perceptions of Resources, Extracurricular Activities and Inclusive Pedagogical Training in Spain. Sustainability, 13(9), 5171. https://doi.org/10.3390/su13095171

Luo, T., Mohamed, A. E., & Yusof, N. S. (2024). Travel Choices and Perceived Images Influenced by AI Interactive Approaches of Travel Apps: An Evidence From Chinese Mobile Travel Users. SAGE Open, 14(4). https://doi.org/10.1177/21582440241290393

Ma, S., & Lei, L. (2024). The factors influencing teacher education students' willingness to adopt artificial intelligence technology for information-based teaching. Asia Pacific Journal of Education, 44(1), 94–111. https://doi.org/10.1080/02188791.2024.2305155

McCarthy, K. S., & McNamara, D. S. (2021). The Multidimensional Knowledge in Text Comprehension framework. Educational Psychologist, 56(3), 196–214. https://doi.org/10.1080/00461520.2021.1872379

Moreno Cortez, C. S., & Nevárez Montes, J. (2025). Extracurricular arts: Effects on creativity and academics. Journal of Creativity, 35(1), 100094. https://doi.org/10.1016/j.yjoc.2025.100094

Orhun, F. B. (2009). Training & teaching style in accessing a desired classroom discipline at visual art courses. Procedia - Social and Behavioral Sciences, 1(1), 692–696. https://doi.org/10.1016/j.sbspro.2009.01.121

Otterborn, A., Sundberg, B., & Schönborn, K. J. (2024). The impact of digital and analog approaches on a multidimensional preschool science education. Research in Science Education, 54(1), 185–203. https://doi.org/10.1007/s11165-023-10133-6

Özbay, Ö., & Çınar, S. (2021). Effectiveness of flipped classroom teaching models in nursing education: A systematic review. Nurse Education Today, 102, 104922. https://doi.org/10.1016/j.nedt.2021.104922

Pishghadam, R., Derakhshan, A., Zhaleh, K., & Panahi, Z. (2023). Students' willingness to attend EFL classes with respect to teachers' credibility, stroke, and success: A cross-cultural study of Iranian and Iraqi

students' perceptions. Current Psychology, 42, 4065–4079. https://doi.org/10.1007/s12144-021-01738-z

Ravishankar, K., Subramani, A. K., Jan, N. A., & David, R. (2024). Determinants of students' enrolment intention of higher education in foreign universities: An empirical study using stimulus-organism-response (SOR) model. International Journal of Management in Education, 18(3), 173–197. https://doi.org/10.1504/IJMIE.2024.138238

Reinhold, F., Leuders, T., Loibl, K., Henrike, B., & Janson, A. (2024). Learning mechanisms explaining learning with digital tools in educational settings: A cognitive process framework. Educational Psychology Review, 36(14). https://doi.org/10.1007/s10648-024-09845-6

Vukadin, A., Lemoine, J. F., & Badot, O. (2016). Opportunities and risks of combining shopping experience and artistic elements in the same store: a contribution to the magical functions of the point of sale. Journal of Marketing Management, 32(9–10), 944–964. https://doi.org/10.1080/0267257X.2016.1186106

Wang, Y., Xi, Y., Liu, X., & Gan, Y. (2024). Exploring the Dual Potential of Artificial Intelligence-Generated Content in the Esthetic Reproduction and Sustainable Innovative Design of Ming-Style Furniture. Sustainability, 16(12), 5173. https://doi.org/10.3390/su16125173

Wannapiroon, N., & Pimdee, P. (2022). Thai undergraduate science, technology, engineering, arts, and math (STEAM) creative thinking and innovation skill development: A conceptual model using a digital virtual classroom learning environment. Education and Information Technologies, 27(5), 5689–5716. https://doi.org/10.1007/s10639-021-10849-w

Watkins, M. W. (2018). Exploratory Factor Analysis: A Guide to Best Practice. Journal of Black Psychology, 44(3), 219-246. https://doi.org/10.1177/0095798418771807

Weinberger, Y., & Shonfeld, M. (2018). Students' willingness to practice collaborative learning. Teaching Education, 31(2), 127–143. https://doi.org/10.1080/10476210.2018.1508280

Wingström, R., Hautala, J., & Lundman, R. (2022). Redefining Creativity in the Era of AI? Perspectives of Computer Scientists and New Media Artists. Creativity Research Journal, 36(2), 177–193. https://doi.org/10.1080/10400419.2022.2107850

Woo, D. J., Wang, D., Guo, K., & Lee, J. (2024). Teaching EFL students to write with ChatGPT: Students' motivation to learn, cognitive load, and satisfaction with the learning process. Education and Information Technologies, 29, 24963–24990. https://doi.org/10.1007/s10639-024-12819-4

Yang, G., & Fei, M. Y. (2022). The artistic value of Shandong intangible cultural heritage folk dance. Proceedings of the 2022 International Conference on Comprehensive Art and Cultural Communication (CACC 2022). Advances in Social Science, Education and Humanities Research. https://doi.org/10.2991/assehr.k.220502.074

Zhao, H. (2025). An analysis of relationship between dramatic form and dance motion of Jiaozhou Yangko dance. Research in Dance Education, 1–8. https://doi.org/10.1080/14647893.2025.2524111