Exploring the Relationship between Multimedia-Integrated Learning on Mandarin Language Achievement in a Malaysian University

[1,2]Soo Yew Phong*, [3]Ijlal Saja, [4]Nurul Asma Mazlan, [5]Nur Aqilah Norwahi

[1,3,4,5]Academy of Language Studies, Universiti Teknologi MARA Cawangan Melaka, Malaysia

[2]School of Literature, Hainan Normal University, China

***Corresponding Author**

DOI: https://dx.doi.org/10.47772/IJRISS.2025.910000035

Received: 29 September 2025; Accepted: 06 October 2025; Published: 03 November 2025

ABSTRACT

This study investigates the relationships between multimedia-integrated teaching strategies, students' use of multimedia-based learning approaches, and lecturers' roles in multimedia use with students' achievement in Mandarin language learning. Using a quantitative survey method, data were collected from 185 non-native Mandarin-speaking undergraduates in a Malaysian university. The study employed Partial Least Squares Structural Equation Modelling (PLS-SEM) and Importance-Performance Matrix Analysis (IPMA) to analyze the relationships between the variables. Findings revealed that students' multimedia-based learning approaches significantly predicted achievement in Mandarin, while teaching strategies and lecturers' roles showed no direct influence. The results highlight the role of learner autonomy and active engagement in multimedia environments for second language acquisition. The study recommends a pedagogical shift toward student-centered learning, enhanced digital literacy training, and more structured integration of multimedia tools in language classroom. It also suggests that future efforts should focus not only on how lecturers teach, but also on how students are guided to use multimedia tools independently in their learning.

Keywords: Mandarin Chinese, Multimedia Integration, Teaching Strategies, Learning Approaches, Lecturer Roles

INTRODUCTION

Mandarin Chinese is increasingly gaining attention as an important foreign language to learn in Malaysia and around the world. In Malaysia, Mandarin has been widely introduced as a third or foreign language in schools and higher education institutions. Along with global economic development, particularly in Asian countries, the need to master Mandarin language is growing because China is one of the world's leading economies. Mastery of the language provides advantages in business, diplomacy, and international trade (Li, 2017). Globally, Mandarin is considered one of the most widely spoken languages in the world, with more than one billion native speakers (Chen, 2019). Therefore, countries in Europe, North America, and Southeast Asia have also taken initiatives to introduce and enhance the teaching of Mandarin as one of the important foreign languages (Wang & Zhang, 2020). The study of Mandarin not only focuses on communication, but also on cultural and literary understanding, which is important in the context of growing globalization (Zhao, 2018).

Despite this growing demand in Mandarin language, many Mandarin leaners continue to struggle with language acquisition, often due to limitations in traditional teaching and learning methods. The use of multimedia technologies has been extensively acknowledged for its potential to enhance language learning outcomes. Nevertheless, empirical evidence regarding their effectiveness or student achievement, particularly in relation to teaching strategies, learner approaches, and the instructional role of educators remains limited within the Malaysian educational context. This gap indicates the need to examine whether the use of multimedia can support the relationshi between teaching strategies, student learning approaches, and language learning outcomes.

Understanding this relationship is important for improving instructional design and promoting more effective language learning experiences in Malaysian universities.

Objective of the Study and Research Questions

This study is done to explore the relationship between multimedia-integrated teaching strategies, students' use of multimedia-based learning approaches and the influence of lecturers' roles in multimedia integration on students' achievement in Mandarin language learning. Specifically, the objectives of the study are:

1. To investigate the relationship between multimedia-integrated teaching strategies and students' Mandarin language achievement.

2. To examine the relationship between students' use of multimedia-based learning approaches and their Mandarin language achievement.

3. To explore the influence of lecturers' roles in multimedia integration on students' achievement in Mandarin language learning.

In other words, this study is done to answer the following research questions (RQ):

RQ1: What is the relationship between multimedia-integrated teaching strategies and students' achievement in Mandarin language learning?

RQ2: What is the relationship between students' use of multimedia-based learning approaches and their achievement in Mandarin language learning?

RQ3: How do lecturers' roles in multimedia integration influence students' achievement in Mandarin language learning?

Based on the RQ, three hypotheses were suggested:

H1: There is no significant relationship between multimedia-integrated teaching strategies and students' achievement in Mandarin language learning.

H2: There is a significant relationship between students' use of multimedia-based learning approaches and their achievement in Mandarin language learning.

H3: Lecturers' roles in multimedia integration do not significantly influence students' achievement in Mandarin language learning.

LITERATURE REVIEW

Multimedia-Integrated in Teaching and Learning Mandarin Language

The application of multimedia in foreign language instruction is widely acknowledged as an effective means to improve teaching and learning. As reported by Tan et al. (2020), In teaching Mandarin, the multimedia can enhance students' knowledge in terms of grammar and pronunciation eradicating vocabulary if more interactive an interesting way. The integration of multimedia (video, audio and learning applications) has shown to grab students' attention, leading to better and more engaging learning solutions (Chin et al., 2019). The customized by Zhang (2018), found that multimedia-based teaching students test scored and traditional teaching of students were lower. This suggests that integrating multimedia in Mandarin instruction may lead to enhanced learning context, and subsequently improve the quality of learning.

Multimedia Learning Approaches and Students' Achievement in Mandarin Language Learning

Using multimedia to teach Mandarin has been proved effective in increasing student achievement. Nguyen et al. (2019) observed that they will direct interaction with multisensory visual-audio-text and creative learning activities to supplement students' foreign language learning. Multimedia, as part of Mandarin instruction, allows students to learn tough things like pronunciation and characters with less difficulty. Moreover, Lee (2020) discovered that language acquisition using apps and online platforms are enabling students to practice at their convenience and location, which proves more beneficial. This phenomenon implies that multimodal methods to teach Mandarin improves students' academic performances and enhances learning.

The Role of Lecturers in Integrating Multimedia to Enhance Mandarin Language Learning Outcomes

Lecturers play an important role in promoting technology and multimedia in teaching Mandarin, for effective learning. A study by Hussin et al. (2021) proved that teachers who made use of technology in their teaching strategies like videos, e-learning platforms and other multimedia resources are able to enhance students' interest which lead authenticates improvement with performance related to the Mandarin language. Similarly, Lim et al. (2020) concluded that teachers, who received education on using technology, were able to make the lessons more appealing and interactive which in turn brought positive effects on the students' performance in Mandarin tests. These lectures orientated lecturers will not only facilitate students' understanding, but also allow students to practice using Mandarin in a more authentic way.

Research Framework

After reviewing the aspects that can influence students' achievement in Mandarin language learning (Tan et al., 2020; Lee, 2020; Zhang, 2018), a research framework is proposed as in Fig. 1. The research model shows how the variables are referred to.

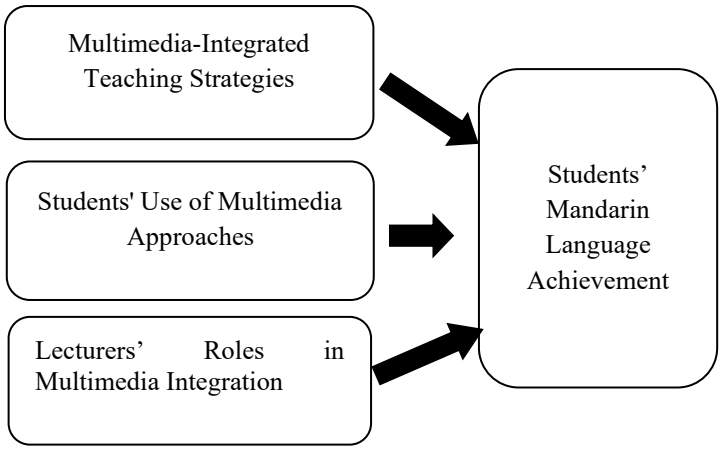

Fig. 1. Conceptual Framework of the Study

RESEARCH METHODOLOGY

Sample

A total of one hundred eighty-five (n=185) undergraduates from Universiti Teknologi MARA (UiTM), Melaka state campus were randomly selected as the participants for this study. All the participants are Malay students, they are non-native Mandarin speakers, ranging between 19 and 27 years old. They had enrolled in the Introductory Mandarin Level I or Level II as their foreign language course. Although all the participants were from the same university, but they live in different states of Malaysia. With the differences in their places of origin, education and social economic background, it is believed that these can provide a variety of perceptions concerning the study. Besides, as they come from various faculties or courses, the differences in academic training, as well as teaching and learning may also provide a variety of learning strategies in learning Mandarin as foreign language.

Instrument

This study employed a quantitative research design using a survey method to exploring the relationship between multimedia-integrated teaching, student learning approaches, and lecturer roles on Mandarin language achievement scores. The questionnaire for this study comprised five parts. Section A has items on demographic profile. Section B, C, D, E consisted of 32 items was to explore the effectiveness of multimedia-integrated in teaching and learning Mandarin measured on a five-point Likert scale, ranging from '1=Strongly Disagree' to '5=Strongly Agree'. The distribution of items and the reliability test of the survey presented in Table 1.

Table 1. Convergent Reliability Test of Survey

Construct	No of Items	Cronbach's Alpha	rhoA	CR	AVE
Section B: Teaching Strategies (TEACHING)	7	0.881	0.900	0.908	0.586
Section C: Learning Approaches (LEARNING)	9	0.879	0.893	0.903	0.511
Section D: Lecturer Roles (LECTURER ROLE)	8	0.938	0.950	0.949	0.699
Section E: Score Achievement (SCORE)	8	0.933	0.936	0.945	0.683

Table 1 shows the reliability and validity of the survey. The analysis shows Average Variance Extracted (AVE) values above 0.50 and Composite Reliability (CR) values exceeding the threshold of 0.70 (Hair et al., 2017). Convergent validity was confirmed as all constructs achieved Internal reliability was supported by Cronbach's Alpha and rhoA values, both above the minimum standard of 0.70 (Cronbach, 1951). These results indicate that this survey instrument is reliable and valid for further structural analysis.

Data Collection and Analysis

The questionnaires were distributed to the subjects who enrolled in Mandarin courses to complete the questionnaires. Respondents were assured of anonymity and confidentiality, and participation was voluntary. A total of 185 valid responses were collected. The data collected from the questionnaire were fed into the computer and analyzed with the help of the Partial Least Squares Structural Equation Modelling (PLS-SEM) as the main analytical approach, which is appropriate for predictive research involving latent constructs and complex causal relationships (Hair et al., 2017). To provide deeper diagnostic insights, Importance-Performance Matrix Analysis (IPMA) was applied.

FINDINGS

Descriptive Analysis for Demographic Profile

This study comprised 185 undergraduate students who responded to the questionnaires distributed and they came from various faculties in Universiti Teknologi MARA, Melaka state campus. Demographically, the sample consisted of 99 females (53.5%) and 86 males (46.5%). They were from the age group 22 to 24 years (n=132; 71.4%), 19 to 21 years (n=50; 27%) and 25 to 27 years (n=3; 1.6%). Almost all respondents were full-time students (98.9%) at the bachelor's degree level, representing multiple academic discipline, including the Faculty of Plantation & Agrotechnology, Business & Management, Science & Mathematics, Accounting, and Hotel & Tourism Management. Although the majority of respondents had no prior knowledge to Mandarin language before enrolled university, but their results from the assessment of Introductory Mandarin Level I showed that 44.2% of students achieved excellent grades, 49.5% obtained good scores, and 1.76% performed at an average level. At Level II, 51.8% of students achieved excellent results, 44.4% obtained good scores, and 3.7% were

average. The 7.6% increase in excellent grades at Level II suggests that the students are capable of mastering Mandarin even without prior exposure to this language. Further discussion of these findings is presented in the discussion section.

Measurement Model

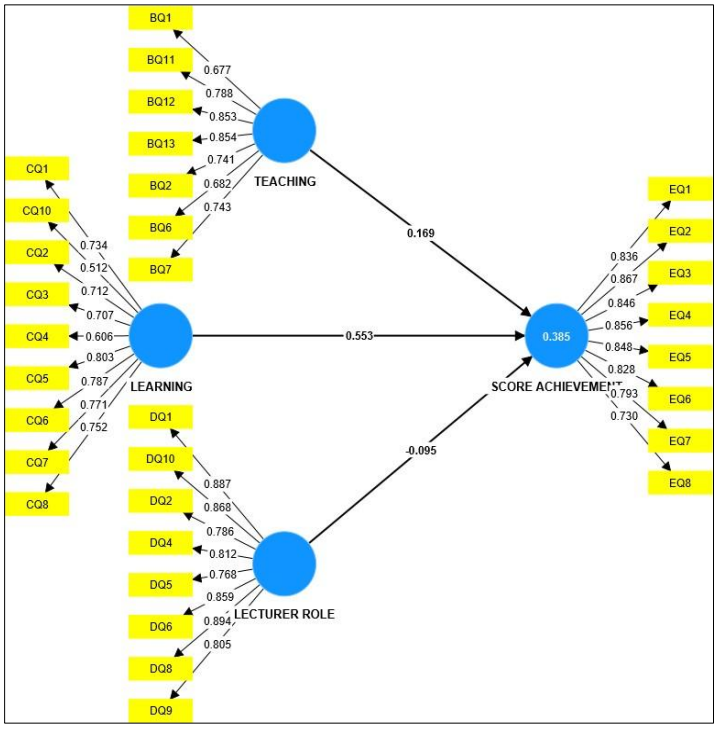

Fig. 2. Reflective Measurement Model

From Fig.2, The PLS-SEM Modelling analysis showed the relationship between all variables. The validity of the discriminant was checked using the criteria of the Heterotrait-Monotrait method, HTMT (Henseler et al. 2015). If the HTMT value is 0.90 or smaller than 0.90, the validity of the discriminant has been achieved (Gold et al. 2001). As described in Table 2, the validity of discrimination between the constructs of the studies is below the prescribed value of 0.90. All values obtained below the HTMT level of 0.90 (Gold et al. 2001) and this indicates that the validity of discriminant has been achieved.

Table 2. Ratio Heterotrait-Monotrait (HTMT)

	LEARNING	LECTURER-ROLE	SCORE	TEACHING
LEARNING				
LECTURER-ROLE	0.672			
SCORE	0.652	0.358		
TEACHING	0.785	0.753	0.512	

Structural Model

In investigating the correlation between multimedia-integrated teaching strategies, students' use of multimedia approaches and lecturers' roles in multimedia integration on students' Mandarin score achievement, three hypotheses were tested between the variables in the study. The SmartPLS 4.0 bootstrapping function (Ringle et al., 2015) was used to test the significant level and t-value of all path coefficients in the study model.

The results of the analysis revealed that both the path coefficient of teaching strategies, learning approaches and lecturer-role were found to significantly affect score achievement at level 0.05 with a value of t ≥ 1.96. Next, the quality of the study model was determined by the effect size (f2), R2 value and Q2 value (Hair et al., 2017). The analysis findings showed an intangible effect size (f2) between the two constructs with (0.007) and (0.252) (Cohen 1988). The value of R2 is medium at 0.3585 in which Q2 exceeded 0 (0.358) has indicated that the study model has a medium predictive relevance (Hair et al. 2017). Finally, the Q2 values for the endogenous constructs was over 0, hence predictive relevance was established. All the results of the study's hypothetical testing analysis and model quality are described in Table 3. Meanwhile, from Fig. 3, the PLS-SEM Modelling analysis showed the significant between all variables.

Table 3. Path Coefficient Test

Hypothesis	Correlation	Std. Beta	Std. Error	t-value	Result	R2	f2	Q2
H1	TEACHING → SCORE	0.169	0.094	1.787	Not Supported	0.385	0.019	0.358
H2	LEARNING → SCORE	0.553	0.083	6.654	Supported		0.252	
H3	LECTURER ROLE → SCORE	-0.095	0.066	1.451	Not Supported		0.007	

SCORE (Score Achievement) **p<0.05, t value greater than 1.96

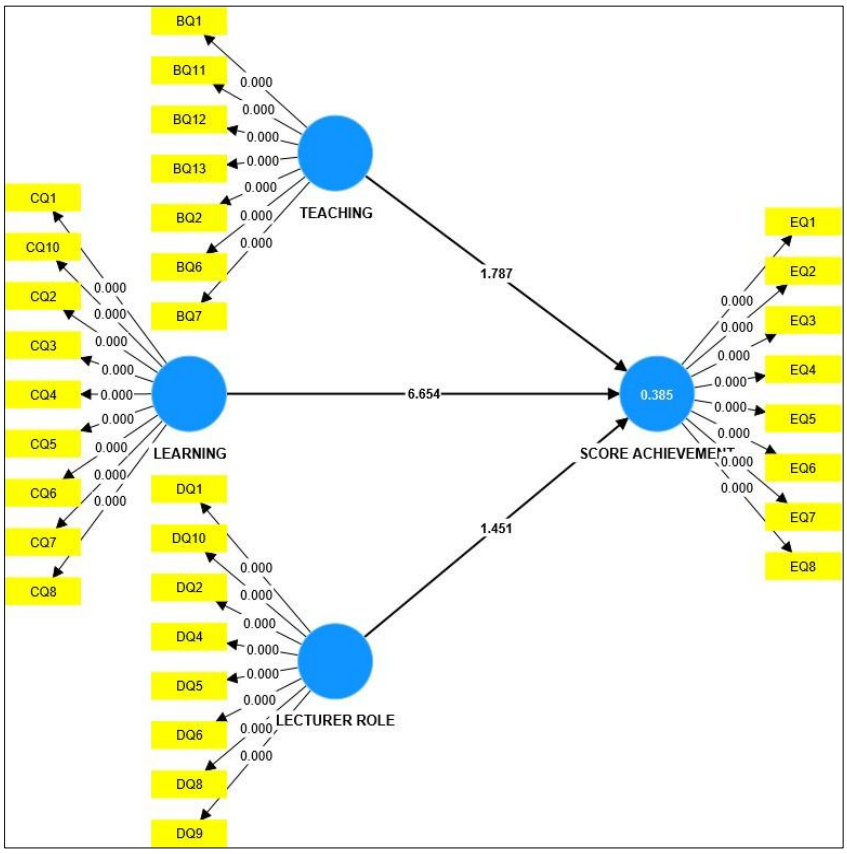

Fig. 3. Reflective Structural Model

Importance-Performance Matrix Analysis (IPMA)

To obtain the diagnostic value of the model, an IPMA analysis was carried out (Martilla and James, 1977). This assessment is based on a comparison between the average value of score achievement (SCORE) and the expectation of PLS which will result in one measure of the importance of each construct in the study model. In more detail, through the analysis of IPMA, the importance and achievement of each factor influencing the score achievement will be identified.

Table 4. IPMA Analysis

Construct	Important (Total Effect)	Performance (Index Value)
TEACHING	0.169	75.531
LEARNING	0.553	74.927
LECTURER ROLE	-0.095	78.623
SCORE		61.262

Table 4 clearly shows that the factor learning style (LEARNING) is the most important factor with performance values (0.553), followed by teaching style (TEACHING) by interest values (0.169) and lecturer Role values (-0.095). While performance between all constructs shows that the lecturer role has the highest values (78.623) compared to teaching strategies (75.531) and learning approaches (74.927). Based on the IPMA analysis, learning methods have a very strong impact on improving the Mandarin language achievement scores of students. However, these students have not fully utilized them. In contrast, the lecturer role is identified as a variable that does not significantly influence students' achievement scores. Accordingly, this analysis will be further discussed in the discussion section.

DISCUSSION

Teaching strategies and Students' Mandarin Language Achievement (H1)

The results showed that teaching strategies ($\beta = 0.169$, $t = 1.787$) were not have a statistically significant influence on students' Mandarin language achievement. This result is partly contradictory to previous studies. For example, Tan et al. (2020) demonstrated that multimodality in the instruction of Mandarin enhanced grammar understanding, and pronunciation and Chin et al. (2019) suggested that student engagement was increased with the use of video, audio clips and apps. The findings were consistent with the results of Zhang (2018) who reported that students participating in multimedia-based instruction had significantly higher scores than who were taught through traditional method alone.

The discrepancy found in this study could mean that lecturers did employ multimedia, but the effectiveness of their use may have been influenced by students' interactions with them. The use of multimedia may increase teaching diversity but does not necessarily lead to an increased efficiency in learning outcomes if it is not combined with active learning methodologies. This is consistent with Zhang (2018) who proposed that student participation is important for multimedia to be effective in language learning.

Learning approaches and Students' Mandarin Language Achievement (H2)

In contrast, learning approaches demonstrated a significant effect on students' Mandarin language achievement ($\beta = 0.553$, $t = 6.654$, $p < 0.05$). This highlights the pivotal role of students' own approaches to learning in

determining their performance. This result suggests that students' individual practices, and learning approaches to learning Mandarin play a crucial role in determining their academic performance. The finding strongly supports the studies of Nguyen et al. (2019), who reported that interactive learning integrating visual, audio, and textual elements enhances comprehension of foreign languages. It also aligns with Lee (2020), who showed that multimedia platforms and applications provide flexible opportunities for practice, allowing students to learn at their own pace and convenience.

Many of the respondents of this study (68.6%) had never studied Mandarin before, multimedia-based learning methods became essential for mastering challenging aspects such as pronunciation and Chinese characters. The results also explain the improvement in excellent grades from Introductory Mandarin Level I (44.2%) to Level II (51.8%), suggesting that multimedia supported consistent progress in achievement even for students without prior exposure to Mandarin. This shows that multimedia learning motivates initiative, self-directed learning and interest in the language because this is the best predictor of academic performance in our study. This reinforces the importance of independent and self-regulated learning in second language teaching and learning, where efficient strategies such as those of metacognitive strategies combined with the use of technology like multimedia impact on comprehension and achievement.

Lecturers' Role in Multimedia Integration and Mandarin Language Achievement (H3)

The lecturers' role (β = -0.095, t = 1.451) was not statistically significantly affect students' Mandarin achievement. This finding differs from the conclusions of Hussin et al. (2021), who reported that lecturers integrating technology improved student interest and performance, and Lim et al. (2020), who showed that lecturers trained in educational technology were able to deliver more engaging and interactive lessons.

Despite the fact that the traits of teachers in this study had elevated performance ratings as indicated by the IPM analysis, they were not directly connected to success. This conclusion suggests that, despite teachers being facilitators, their impact on performance may be affected by other factors—like student motivation, learner independence, or group support. This suggests that the instructors were actively promoting and supporting the use of multimedia – however, the performance ultimately relied on how well students utilized these resources. In other words, the teacher acts as a facilitator, but the success of the students mainly depends on their learning strategies. This aligns with Zhao's (2018) view that language education must go beyond teaching delivery and emphasize learner autonomy in mastering both communication and cultural aspects of the language.

Implications

The implications of these findings are in learning Mandarin as second language is that it needs to be moved towards learner-centered. Although teaching techniques and instructor pressures continued to be relevant influence on outcome, the best predictor of student results was their individual engagement with multimedia learning. This supports the proposition that institutions should not just train lecturers as technology integrators but also prepare students with the skills, motivation and discipline to optimise multimedia resources.

Moreover, the study results can remind researchers to fill in the gaps below from literature review: lack of access to high-tech resources and neglect of long-term multimedia effects (Lee, 2020; Zhang, 2018). To solve these problems will make the multimedia integration continue to play a positive role in students' learning under various circumstances, even students with scanty background of Mandarin.

CONCLUSION AND RECOMMENDATION

This study set out to investigate the effectiveness of multimedia use in Mandarin language teaching and learning, focusing on the relationships between teaching strategies, learning approaches, lecturer roles, and student achievement scores. The findings revealed that learning methods had a significant effect on Mandarin language achievement, while teaching methods and lecturer's roles showed no significant influence.

Overall, the model explained 61.262% of the variance in Mandarin achievement scores, indicating that multimedia use, particularly when employed by students as part of their learning strategies, plays a crucial role

in improving outcomes. This finding reinforces the importance of student-centered learning and highlights that Mandarin achievement is driven more by learner autonomy and active engagement with multimedia resources than by lecturers' teaching styles or facilitation roles.

The results align with previous research that emphasized the potential of multimedia to enhance vocabulary retention, grammar understanding, and overall engagement. However, the lack of direct impact from teaching methods and lecturer roles suggests that multimedia integration in teaching must be complemented by strategies that encourage students to take ownership of their learning.

In conclusion, the study provides evidence that while lecturers and institutions play a supportive role, it is ultimately students' utilization of multimedia learning methods that determines their success in mastering Mandarin language.

Based on the findings and implications of this study, several recommendations can be proposed for lecturers, students, the institution, and future research. For lecturers, it is essential to adopt learner-centered strategies by not only incorporating multimedia in teaching but also designing classroom activities that encourage students to actively use multimedia tools beyond formal lessons. Lecturers should also facilitate independent practice by guiding students toward reliable multimedia platforms, applications, and online resources that support pronunciation, character recognition, and listening skills. In addition, lecturers should engage in continuous professional training in educational technology to ensure effective integration of multimedia and to remain updated with new teaching innovations.

For students, the findings suggest the importance of self-directed learning, where students take initiative to use multimedia tools regularly, as this has been shown to significantly impact achievement. Collaborative learning practices such as group projects and peer-learning activities involving multimedia can also enhance motivation and create a more interactive learning environment. Moreover, students should be supported in developing digital literacy through training sessions or workshops that build confidence in effectively using multimedia learning platforms.

At the institutional level, university should ensure adequate infrastructure and access to multimedia resources, especially for students from rural areas where technological limitations may hinder learning. The integration of AI-based learning platforms could further enhance personalization and provide real-time feedback, addressing gaps highlighted in previous studies. Additionally, the curriculum for Mandarin courses should be enhanced by formally integrating multimedia-based activities and assessments, thereby encouraging consistent and structured use of technology in learning.

Finally, recommendations for future research include conducting longitudinal studies to investigate the long-term effects of multimedia on Mandarin proficiency, which would provide deeper insights into sustained learning outcomes. Comparative studies examining traditional teaching methods, multimedia-assisted teaching, and AI-based approaches are also recommended to determine the most effective strategies. Extending similar research to other population or different universities in Malaysia could broaden the scope and strengthen the generalizability of the findings.

REFERENCES

1. Chin, W. W., Marcolin, B. L., & Newsted, P. R. (2019). A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study. Information Systems Research, 14(2), 189–217.
2. Chen, Y. (2019). The global spread of Chinese language: Trends and prospects. International Journal of Chinese Language Teaching, 4(1), 10-20.
3. Chin, A., Tan, S. L., & Kwek, C. K. (2019). Enhancing language acquisition with multimedia tools: A study on Mandarin language learning. International Journal of Education and Literacy Studies, 7(3), 95-102.
4. Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Lawrence Erlbaum Associates.

5. Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16(3), 297–334. https://doi.org/10.1007/BF02310555
6. Gold, A. H., Malhotra, A., & Segars, A. H. (2001). Knowledge management: An organizational capabilities perspective. Journal of Management Information Systems, 18(1), 185–214.
7. Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). A primer on partial least squares structural equation modeling (PLS-SEM) (2nd ed.). SAGE.
8. Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8
9. Hussin, Z., Ahmad, I. M., & Ibrahim, R. (2021). The role of lecturers in integrating multimedia in language education: Impact on Mandarin learning outcomes. Journal of Educational Technology, 18(2), 125-136.
10. Lee, T. C. (2020). Multimedia-based learning and its effect on Mandarin language proficiency: A study of Malaysian university students. International Journal of Instruction, 13(2), 117-130.
11. Li, J. (2017). The role of Mandarin in Malaysia's education system: Challenges and opportunities. Journal of Language and Education, 13(2), 45-58.
12. Lim, S. H., Abdul Kadir, A., & Mohamed, N. (2020). Lecturer's role in technology integration and its impact on Mandarin language proficiency in Malaysian universities. Asia Pacific Education Review, 21(3), 389-401.
13. Martilla, J. A., & James, J. C. (1977). Importance-performance analysis. Journal of Marketing, 41(1), 77–79.
14. Nguyen, H. T., Sun, J., & Wong, L. H. (2019). The effectiveness of multimedia in second language acquisition: A case of Mandarin. Journal of Educational Technology Development and Exchange, 12(1), 35-45.
15. Ramayah, T., Cheah, J., Chuah, F., Ting, H., & Memon, M. A. (2018). Partial least squares structural equation modeling (PLS-SEM) using SmartPLS 3.0 (2nd ed.). Pearson Malaysia.
16. Ringle, C. M., Wende, S., & Becker, J. M. (2015). SmartPLS 3. SmartPLS GmbH. http://www.smartpls.com
17. Tan, Y. L., Tan, C. K., & Wong, L. F. (2020). The role of multimedia in language learning: A case study of Mandarin in Malaysian universities. Journal of Language Teaching and Research, 11(5), 736-744.
18. Wang, L., & Zhang, Q. (2020). Mandarin Chinese and its global influence: A review of current trends in language learning. Journal of Language Policy and Practice, 6(2), 73-84.
19. Zhang, X. (2018). The impact of multimedia on foreign language learning: A case study on Mandarin language learners. Journal of Educational Technology & Society, 21(4), 32-44.
20. Zhao, H. (2018). Cultural implications of Mandarin learning in the global context. Language and Intercultural Communication, 18(4), 445-460.