

*An Action Research on the Integration of Pinyin Instruction in Chinese Language Teaching Through the Use of Object-Based Teaching Material*

Yeh Ting-Yu, Chung Yuan Christian University, Taiwan

The Asian Conference on Education 2023  
Official Conference Proceedings

**Abstract**

This research focuses on action research in the field of Mandarin Chinese teaching. It emphasizes the process and outcomes of converting unidirectional Mandarin pinyin materials into bidirectional interactive materials suitable for Interactive Whiteboards. Considering the equipment conditions of the research site, the researcher repurposed the Chinese Pinyin materials and practically applied them in the classroom for learners of Mandarin as a second language. The participants were 14 adult learners of Mandarin with a starting point of zero proficiency, all aged over 20, and were all enrolled in a visa program affiliated with a university's Mandarin Learning Center. To delve deeply into the teaching situation, this study utilized classroom recordings, teaching notes, converted materials, and classroom observations as research tools. Additionally, after class, learners were asked to fill out a feedback questionnaire designed using a Likert 5-point scale. Through descriptive statistical analysis of teaching recordings and questionnaire results, the study will offer suggestions and areas of improvement regarding learners' performance, teacher-student interaction, and the operation of the Interactive Whiteboard. This research seeks to answer three main questions: (1) What are the principles for converting unidirectional lecture-based materials into bidirectional Interactive Whiteboard materials? (2) What are the teaching strategies for using Interactive Whiteboard materials in Mandarin teaching classrooms? And (3) What are the operational suggestions and areas of improvement for Interactive Whiteboard materials in Mandarin teaching classrooms? The results of the study will provide empirical recommendations for the digital Mandarin teaching field, hoping to make a modest contribution to this area.

Keywords: Interactive Whiteboard, Teaching Chinese as a Second Language, Object-Based Digital Materials, Digital Teaching, Chinese Pinyin

**iafor**

The International Academic Forum  
[www.iafor.org](http://www.iafor.org)

## **1. Introduction: Interactive Whiteboards in Mandarin Chinese Teaching Classrooms**

With the advancement of Information and Communication Technology (ICT), the educational environment has evolved from the early configurations of chalkboards or whiteboards and the use of traditional teaching resources such as paper materials, physical teaching aids, and videotapes, to the widespread use of digital devices and multimedia materials such as projectors, computers, and Interactive Whiteboards today, significantly enhancing teaching efficiency and diversity (Purdue Online & Purdue, 2023). In the context of the new normal, equipment such as Interactive Whiteboards, auto-focus cameras, and wireless microphones have become an indispensable part of Mandarin teaching. Moreover, the ability to proficiently utilize digital teaching platforms and tools has become a fundamental requirement for Mandarin teachers (Lian, 2021a). The use of emerging technologies like Interactive Whiteboards to effectively stimulate learning motivation and interactivity is a focal point of current educational concern.

## **2. Research Purpose**

This research focuses on the Interactive Whiteboards as its main research tool, leveraging its software features such as material extraction, storage, IRS instant feedback, annotation, dragging, and browsing functionalities in Mandarin language classrooms. The study aims to convert traditional unidirectional Chinese Pinyin teaching materials into bidirectional, interactive digital materials. After the development of these materials, they will be practically applied in Mandarin classrooms through action research. The goal is to summarize the principles of transitioning from unidirectional to bidirectional interactive teaching materials and to thoroughly investigate the strategies for using Interactive Whiteboards in Mandarin teaching, as well as operational recommendations and potential directions for improvement. This endeavor seeks to contribute to the integration of educational technology in Mandarin teaching.

## **3. Literature Review**

### **3.1 Interactive Whiteboards**

With the development of information technology, Interactive Whiteboards have been widely used in various teaching fields. Research indicates that the interactive and visual benefits of Interactive Whiteboards can significantly enhance the quality of teaching, which is highly affirmed by educators (Hennessy & London, 2013). They not only replace traditional physical teaching methods but also, in conjunction with the SAMR model, facilitate the digital transformation of education. Interactive Whiteboards are powerful tools that can import, store, drag, annotate, etc., providing teachers with more flexible teaching operations and attracting students' attention with diverse presentations (Fawzi & Zuhrieh, 2011). The use of Interactive Whiteboards can promote students' memory and writing abilities, inject new vitality into the classroom, and enhance teacher-student interaction (Barbarić Pardanjac et al., 2018). Compared to traditional teaching methods, they make learning more intuitive and proactive, which is beneficial for the development of cognitive, affective, and psychomotor skills. In summary, Interactive Whiteboards have become an indispensable and important auxiliary tool in contemporary classrooms.

## **3.2 Object-Based Digital Teaching Materials**

### ***3.2.1 Teaching Methods for Interactive Whiteboards***

Participatory teaching methods emphasize the active involvement of students in the learning process, placing them at the core of instruction and breaking away from the traditional unidirectional mode of delivery (Xie, 2008). By employing questioning, discussion, and case studies, these methods foster student engagement, which can enhance learning interest, initiative, and creative thinking (Ciobanu, 2018). Appropriate instructional design is also key to its success (Inguva et al., 2018). Object-based teaching focuses on the interaction between students and physical objects to deepen understanding and application of knowledge (Chatterjee & Hannan, 2015; Lin, 2023). Applying participatory teaching methods to Interactive Whiteboards instruction not only enhances classroom interaction but also improves learning outcomes, keeping students highly interested and focused (BECTA, 2007; Wang, 2016). In summary, integrating participatory strategies with Interactive -Whiteboards teaching is an effective instructional method adopted in contemporary classrooms.

### ***3.2.2 Object-Based Digital Teaching Materials***

According to the research by Netolicka and Simonova (2017), educators can effectively create visual teaching resources using the SMART Notebook. Moreover, these virtual teaching materials are not only durable but can also be modified and manipulated according to needs, providing convenience for future teaching. Owens (2012) further suggests that designing course materials with SMART Notebook and incorporating its diverse functions to create various teaching activities, such as competitions, games, and assessments, can shift the teaching focus to a student-centered approach. This not only increases student participation but also stimulates their curiosity, thereby enhancing their motivation to learn. SMART Notebook, in instructional design, not only increases students' interest and motivation but also immerses them in learning through the novel experience of touch interaction, achieving a state of flow and thus enhancing learning effectiveness. Owens also believes that this tool should be used to support student collaboration in small groups to help them achieve specific learning objectives. Xu (2012) also mentions in his research that SMART Notebook has a variety of powerful features, such as adjusting image transparency, combining and splitting images, as well as copying and locking objects; it also includes functions like hyperlinks, flipping, spotlight, and screen masking, making the creation of Interactive Whiteboards multimedia materials much easier. In summary, these studies indicate the SMART Notebook provides educators with a set of strategies to accommodate different learning styles and needs in the classroom.

In the field of Mandarin teaching, using Interactive Whiteboards in conjunction with object-based digital materials has become an important teaching strategy to promote classroom interactivity. Lin (2023) points out in her research that the use of object-based digital materials on Interactive Whiteboards significantly aids cognitive development and skill practice for students through actions such as "dragging," "writing," and "touching the screen," effectively stimulating learners' perceptual potential. According to the nine stages of learning proposed by Gagnè (1985), it is confirmed that using object-based digital materials in Interactive Whiteboards teaching can strengthen learners' intrinsic motivation. Using Interactive Whiteboards as a teaching tool and integrating digital objects into teaching materials has not only become a popular strategy in teaching but also highlights the

feasibility and advantages of combining object-based materials with Interactive Whiteboards in Mandarin teaching.

### **3.3 Digital Chinese Pinyin Teaching**

In the field of Mandarin teaching, integrating multimedia objects has become a preferred strategy. In the digital teaching of Chinese Pinyin, educators can utilize various multimedia resources such as videos, audio, animations, and interactive games to enrich the content of instruction. Huang (2010) discusses the benefits of multimedia teaching, noting that it can stimulate multiple senses of learners simultaneously, thereby enhancing memory retention. Multimedia objects not only facilitate the execution of the teaching process but also bring a variety of stimuli to learners, further improving learning effectiveness. Ren (2010) in his research on the design of Chinese Pinyin teaching materials using multimedia, also mentions that the use of hyperlinks can integrate reading and practice more systematically. Citing the dual-coding theory (Mayer, 2002), he explains that presenting Pinyin symbols in specific colors through animation effects, which provide both visual and auditory stimuli, aids learners in recognition and absorption.

Huang and Ren further suggest that corresponding oral diagrams or animations should be added to multimedia Chinese Pinyin teaching materials or classrooms to simulate the pronunciation parts and their operations, helping learners to understand the mechanism of Chinese Pinyin pronunciation in depth. Additionally, using recording functions to document learners' vocal practice is an effective strategy; educators can provide immediate corrections to learners' pronunciation through these recordings.

In the realm of Chinese Pinyin instruction, we have witnessed the evolution from traditional paper-based materials to digital teaching resources. With the introduction of digital technology, contemporary teaching strategies have integrated visual, auditory, and interactive elements, not only creating a more efficient and engaging teaching model for educators but also presenting a more attractive and effective learning experience for learners. However, to fully realize the advantages of digital Chinese Pinyin teaching, depends on educators possessing a profound literacy in digital education and combining appropriate instructional design and execution strategies.

### **3.4 The Utilization of Bloom's Cognitive Taxonomy in Teaching Strategies**

#### ***3.4.1 Bloom's Taxonomy 2.0***

Bloom's Taxonomy of Educational Objectives is a systematic classification of educational goals. This framework was originally developed by Benjamin Bloom in 1956, with the intention of enhancing the quality of instruction and improving teaching outcomes. The taxonomy has profound implications for curriculum design, teaching assessment, and the evaluation of learning outcomes. The original classification focused primarily on the cognitive domain of educational objectives; however, in 2001, Anderson and Krathwohl revised it, expanding it to include the affective domain and the psychomotor domain, thus making it more relevant to contemporary educational needs. According to the research by Lin (2023), Bloom's taxonomy aims to encourage educators to delve deeply into the cognitive, skill, and attitudinal domains of teaching. Within the cognitive domain, the taxonomy categorizes learning objectives into six levels, ranging from basic to higher-order: Remembering: the ability to recall learned knowledge, Understanding: the ability to grasp the

meaning of learned material, Applying: the ability to use learned material in new situations, Analyzing: the ability to explain the underlying meanings or principles of learned knowledge so that others can understand the conveyed content, Evaluating: the ability to organize learned knowledge into a systematic structure of one's own, and Creating: the ability to critique objects or information encountered based on previously learned knowledge or methods. The hierarchy is illustrated as follows:

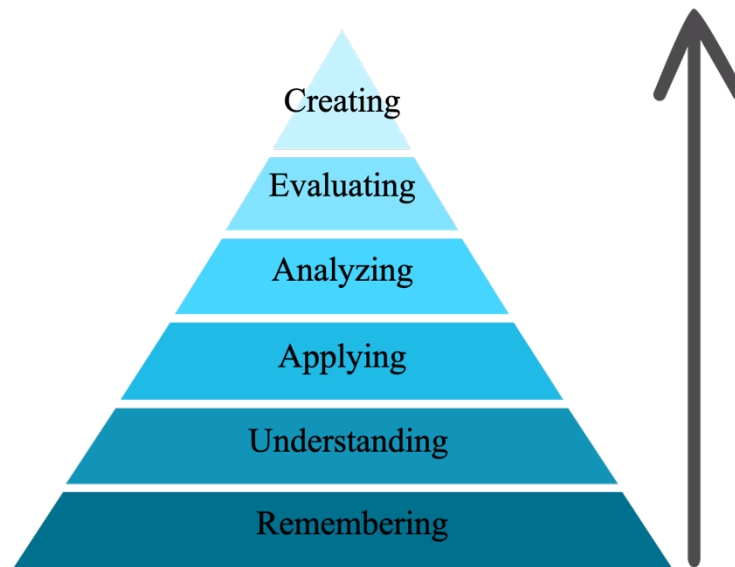


Figure 1: Bloom Taxonomy Level 2.0 (Huitt, 2011)

Bloom's Taxonomy emphasizes the transformation of educational expectations into tiered instructional objectives, which are then used to systematically formulate curricula to enhance learning outcomes (Lin, 2023). Based on this classification, Anderson and Krathwohl (2001) proposed a series of instructional verbs (Huitt, 2011), providing educators with clear guidance that aligns with student learning needs. Through these verbs, educators can clearly grasp teaching objectives, and students can more precisely understand their learning purposes, thereby optimizing the quality of teaching and learning. In summary, the instructional verbs within Bloom's Taxonomy enable educators to effectively translate teaching expectations into tiered objectives, systematically design curricula, and improve learning motivation and outcomes.

### ***3.4.2 Teaching Strategies***

As educational technology advances, teaching strategies continue to evolve from a singular model of knowledge transmission to one that emphasizes diversity, interactivity, and student-centeredness. For instance, the Direct Method emphasizes intuitive knowledge conveyance, while game-based learning uses game interactions to deepen understanding, prompting encourages autonomous exploration, demonstration teaching showcases skills, and cooperative learning emphasizes teamwork (ViewSonic Library, 2020). These strategies aim to stimulate learning potential and promote student development. In the context of interactive materials, educators should develop appropriate strategies to guide students in acquiring knowledge and correctly operating the materials (Lin, 2023; Merrill et al., 1991). Borsook and Higginbotham (1991) propose seven elements for the design of interactive materials: immediacy of response, non-linear access to information, adaptability, feedback, options, bi-directional communication, and information granularity. In summary, contemporary

teaching strategies emphasize diversity, interactivity, and a student-centered approach, and educators should formulate appropriate strategies in conjunction with the characteristics of the materials to maximize teaching effectiveness.

#### **4. Research Methods**

This study employed action research methodology, following Lewin's (1946) four steps of planning, action, observation, and reflection, to apply Pinyin teaching materials on an Interactive Whiteboard for Mandarin language instruction, observing its impact and feasibility in the teaching environment. The subjects were 14 Mandarin language learners over the age of twenty with no prior knowledge of the language, including 2 from Indonesia, 1 from South Korea, 8 from Thailand, 1 from Honduras, and 2 from Vietnam. The instructional experiment was conducted over approximately 9 sessions, each lasting 50 minutes. The research setting was a Mandarin Language Teaching Center at a university in Taiwan, equipped with Interactive Whiteboards and other devices to meet the needs of a blended teaching approach. The teaching process involved video recording, observational note-taking, and after-class feedback questionnaires and interviews with learners to understand their perceptions of using the Interactive Whiteboard. This study utilized the myViewBoard software to adapt the teaching materials for the Interactive Whiteboards, conducting an instructional experiment to observe the impact and feasibility of Interactive Whiteboards in Mandarin language teaching.

#### **5. Result**

##### **5.1 The Principles for Converting One-Way Lecture-Based Materials Into Two-Way Interactive Whiteboard Materials**

In the realm of pedagogical methodologies, Bloom's Taxonomy stands as a foundational framework enabling educators to systematically fulfill predefined educational objectives. The present study seeks to innovate the realm of Pinyin instruction by transforming static PowerPoint resources into dynamic, two-way interactive materials, facilitated by the specialized capabilities of Interactive Whiteboard software. This conversion process is characterized by the strategic employment of the software's unique design functionalities to construct progressive exercise activities that address and rectify the limitations inherent in the original one-directional materials.

The research strategy involves a structured division of Pinyin instructional content into four principal segments, organized in alignment with their pedagogical sequence: Finals, Initials, Tones, and Rules. The investigative thrust will revolve around devising a set of detailed guidelines and standards for the conversion of linear instructional materials into reciprocal, interactive resources optimized for use with Interactive Whiteboards. This framework will be informed by the instructional verbs outlined in Bloom's Taxonomy.

At the Remembering level, educators are poised to employ interactive objects and strategic organization within the material to facilitate memory and description. Provision for written output will be incorporated within the material's layout, enabling notation, while Pinyin symbols sharing phonetic characteristics will be grouped and linked for easy listing. Progressing to the Understanding level, space for annotation will again be allocated, with imagery integrated via the whiteboard's multimedia functionalities to enhance associative learning, while touch control mechanisms will be harnessed for instructional follow-through.

As the curriculum escalates to the Applying stage, educators will be encouraged to mark Pinyin symbols unobtrusively on page corners, easing the cognitive load of learners and supporting demonstration. Integration of auditory elements with Pinyin symbols will enhance whiteboard writing exercises, aiding in selection, while hyperlinked audio within questions will bolster teaching efficacy and self-assessment through examination. The Analyzing level mandates a simplification of Pinyin learning through strategic symbol placement, the design of interactive Pinyin objects for comparative learning, and the creation of sorting activities to aid in distinguishing phonetic nuances.

Evaluating level strategies encompass the design of engaging games like Sticky ball or Scratch-off to randomize Pinyin symbol practice for sound selection, alongside the creation of dictation exercises and audio playback for assessment purposes. Lastly, at the pinnacle of Bloom's Taxonomy—the Creating level—educators will facilitate the separation and recombination of initials, finals, and tones, guiding learners through interactive practice for Pinyin recognition, and utilizing Instant Response Systems to prompt impromptu Pinyin spelling by learners, thus fostering real-time correction and heightened engagement for reorganization.

## **5.2 Teaching Strategies for Applying Interactive Whiteboards to Chinese Pinyin Teaching**

In the classroom, a concept may be suitably introduced through more than a teaching strategy to guide learners in absorbing and applying the knowledge, while simultaneously employing multiple teaching strategies. The researcher will summarize and organize the teaching strategies applicable to the use of Interactive Whiteboards in Chinese Pinyin instruction based on the teaching strategies proposed by the ViewSonic Library (2020) through a literature review. The Direct Instruction method, as a traditional and proven effective model, emphasizes the teacher's leading role and intuitive teaching. With the aid of Interactive Whiteboards, teachers can instantly display multimedia materials and use annotation functions to enhance students' understanding. Play-based learning, especially gamified learning, provides an environment where education is integrated with fun, allowing students to develop social interaction and critical thinking within the game. Interactive tools on Interactive Whiteboards, such as dice and spinners, empower students to control the learning process, thereby enhancing motivation. Digital game-based learning further combines instructional content with game elements, using board games and computer games to promote a deeper understanding of basic concepts. Educational software for Interactive Whiteboards can design various interactive games, such as snakes and ladders and scratch cards, to alleviate learning pressure. The Prompting method guides students to explore answers through questions and suggestions, aiming to motivate students to exceed learning objectives. The magnifying glass or masking functions of Interactive Whiteboards can provide timely assistance during the teaching process, especially in learning spelling rules, where phased exercises help students consolidate knowledge. The demonstration teaching method guides students step by step through the teacher's demonstration, which is particularly common in problem-solving or step-by-step instruction. Interactive Whiteboards can display tongue position diagrams and audio files to help students learn correct pronunciation. Cooperative learning encourages students to work in teams to achieve learning objectives. The grouping function of Interactive Whiteboards and educational software can design cooperative activities to promote mutual learning among students. The Think/Pair/Share strategy focuses on a student-led learning process, where students exchange thoughts within small groups. The drag-and-drop function of Interactive Whiteboards can be used to design pairing

exercises to facilitate discussion among students. Peer-Assisted Learning Strategies give students the lead in the learning environment, with the teacher playing a supporting role. The game design function of Interactive Whiteboards allows students to think, discuss, and correct each other in group activities, thus deepening the understanding and application of knowledge. The application of these teaching methods not only improves teaching efficiency but also enhances the learning experience of students.

### **5.3 Classroom Feedback Questionnaire**

Following the implementation of the action research cycle, the researcher asked the study participants to fill out a classroom feedback questionnaire created using the Likert Scale. Each question had five options, ranging from 1 to 5, representing "strongly disagree," "disagree," "neutral," "agree," and "strongly agree," respectively. The questionnaire was translated into the participants' native languages before being distributed for completion. A total of 14 participants filled out the questionnaire, with nationalities including 2 from Indonesia, 1 from South Korea, 8 from Thailand, 1 from Honduras, and 2 from Vietnam. The researcher calculated the number of respondents per question, the average score, and the standard deviation (SD), with the average and standard deviation reported to two decimal places.

The questionnaire was divided into three parts: 11 questions on the course itself (C1-C11), 4 questions on unidirectional lecture-style materials (P1-P4), and 12 questions on bidirectional interactive materials (M1-M12), each numbered accordingly and analyzed for internal consistency using the SPSS system. For the course section C1-C11, the alpha value was 0.785, with a standardized item alpha of 0.848; for the unidirectional lecture-style material section P1-P4, the alpha value was 0.745, with a standardized item alpha of 0.778; for the bidirectional interactive material section M1-M12, the alpha value was 0.911, with a standardized item alpha of 0.923, all indicating a high degree of correlation.

In evaluating the effectiveness of the Pinyin course, students gave high ratings to the course's interest, teaching methods, interactivity of the materials, and the teacher's teaching attitude. Feedback from the course section indicated that the majority of students (10) strongly agreed that the course was interesting (C1) and believed that the course provided clear guidance on pronunciation (C3), with an average score of 4.57 and a standard deviation of around 0.78, showing consistency in student opinions. Furthermore, students generally believed that the teacher's guidance (C5) and patient teaching (C6) were crucial to learning Pinyin, with average scores of 4.79 and 4.71, respectively, and standard deviations of 0.6 and 0.63, indicating a high consensus on the positive evaluation of the teacher.

Regarding the materials, whether it was the unidirectional lecture-style Microsoft PowerPoint materials (P1-P4) or the bidirectional interactive myViewBoard materials (M1-M12), students provided very positive feedback. In particular, the fun (M9-M11) and convenience (M7) of the myViewBoard materials received the highest average scores of 4.86, with a standard deviation of 0.55, showing a high level of satisfaction and agreement among students. Students felt that these materials not only enriched the classroom content but also increased their interest and efficiency in learning Pinyin.

Overall, this feedback indicates that students have a positive attitude towards the design and implementation of the Pinyin course and believe that the teaching methods and material



design effectively facilitated Pinyin learning. These results provide positive guidance for further improving course design and teaching methods.

#### **5.4 Semi-structured Interview**

After the study participants completed the post-class feedback questionnaire, the researcher inquired about their willingness to participate in interviews and conducted semi-structured interviews with those who agreed. A total of 7 participants were interviewed, including 5 from Thailand and 2 from Vietnam. There were 8 interview questions, which were translated into the native languages of the interviewees according to their nationalities. The questions were divided into four categories: one on the course aspect, three on the material aspect, two on the operational aspect, and two on other aspects. Based on the responses from the interviewees, the following conclusions can be drawn:

Learners generally had a positive experience with the Pinyin course, the materials used, and the use of the interactive whiteboard. Interviewees from Vietnam and Thailand unanimously agreed that the Pinyin course was substantially helpful in their study of Mandarin, finding the course easy to understand and engaging. Particularly, the Interactive Whiteboard as a teaching tool was highly praised by the learners; they found it not only convenient and user-friendly but also effective in enhancing learning interest and efficiency through gamified teaching. Learners gave positive feedback on the interactivity of the Interactive Whiteboard materials and the technological approach to teaching, believing that these features helped them quickly absorb new knowledge and vocabulary.

In terms of material content, learners generally felt that the current materials were already very comprehensive and did not suggest any need for improvement or additional features. They indicated that the existing material design met their learning needs and that visual teaching through the Interactive Whiteboard made the learning process more intuitive and efficient. Moreover, students also believed that the Interactive Whiteboards were not only suitable for Pinyin learning but could also be effectively used for other areas of Mandarin learning, such as vocabulary and sentence teaching.

Overall, learners affirmed the application of Interactive Whiteboards in Mandarin teaching and expressed gratitude and satisfaction with the teacher's teaching methods. They felt that the teacher's instruction was already very effective, with no additional suggestions or comments. This indicates that the Interactive Whiteboard, as a teaching tool, plays a significant role in enhancing the effectiveness of Mandarin teaching and the learning experience of students.

#### **6. Conclusion and Suggestions**

Regarding the conversion of unidirectional expository materials into bidirectional interactive materials, teachers should be able to successfully complete the conversion if they follow the principles set forth in Section 5 and pair them with appropriate teaching strategies. The study subjects all gave high evaluations for the conversion of unidirectional expository materials into bidirectional interactive materials. As for the Pinyin course, according to the results of questionnaires and interviews, the Pinyin course received high praise from students, especially in terms of the course's interest, clarity of pronunciation, and the teacher's teaching methods, all of which received enthusiastic feedback from students. Regarding the converted materials, whether using Microsoft PowerPoint or myViewBoard as a teaching tool, students

gave positive evaluations. Among them, myViewBoard, due to its high interactivity and diversity, was considered an effective tool for helping students learn Pinyin. Concerning the benefits of teaching tools, the tools used by teachers in the classroom, such as myViewBoard, not only increased students' interest in learning but also helped them better grasp Pinyin. Students also believed that the teacher's proficient operation and problem-solving abilities were key to the success of the course. Regarding the aspect of learning attitude, although some students felt nervous during class, overall, students had a positive attitude towards the Pinyin course, finding it interesting and helpful for learning. However, during the operation or conversion process, some difficulties might be encountered, causing disruptions or limitations in the conversion process or teaching. The researcher will now provide operational and teaching suggestions based on the observations recorded during the conversion process, the teaching process, and the opinions of the study subjects.

1. Continued Use of myViewBoard: Given the high praise for myViewBoard from students, it is recommended that teachers continue to use this tool in subsequent courses. To further stimulate students' interest in learning, teachers can explore the various interactive features within myViewBoard.
2. Strengthen Game-Based Teaching: Considering that students found the games in the Interactive Whiteboard materials to be significantly helpful for learning, it is recommended that teachers incorporate more game elements when designing courses to enhance students' motivation and learning outcomes.
3. Expand Teaching Content: The Interactive Whiteboard is not only suitable for Pinyin teaching but can also be applied to other Mandarin courses, such as vocabulary and sentence learning. Teachers are encouraged to consider integrating the Interactive Whiteboard into more courses to provide a more diverse learning experience for students.
4. Attention to Students' Emotional Needs: Given that some students may feel nervous during class, it is recommended that teachers include more relaxation and interactive sessions in the course design to reduce students' anxiety.
5. Optimize Material Operation: Considering system limitations, it is recommended that teachers control the number of pages to less than 50 when creating materials to avoid crashes on standard Windows system computers. If using a large screen, the number of pages should be controlled to less than 100. Regarding the limitations of fade-in and fade-out animations, teachers are advised to plan the sequence of object appearances in advance when designing materials to ensure smooth teaching. When using the Interactive Whiteboards, since only one link can be selected at a time, it is recommended that teachers plan the links in advance to ensure that teaching is not disrupted.

In summary, despite some operational limitations of myViewBoard, its benefits in teaching cannot be overlooked. Teachers are advised to consider the above suggestions when operating or converting materials to ensure smooth teaching and effective student learning.

## References

- 林佳柔。(2023)。華語文互動式數位教材理論分析研究。(未出版之碩士論文)。中原大學應用華語文學所。
- 李季蓉。(2022)。漢語拼音數位化教材發展設計研究。(未出版之碩士論文)。中原大學應用華語文學所。
- 任海波。(2010)。漢語拼音教學多媒体教材的設計理念及其實現方法。國際漢語教育, 4。
- 汪怡伶。(2016)。互動式電子白板融入國中英語學習環境：談學生參與。(未出版之碩士論文)。國立臺灣師範大學教育學所。
- 連育仁。(2021)。疫情與後疫情時代的複合教學準備與實踐。評鑑雙月刊, 9, 35–40。
- 徐政。(2012)。互動式電子白板輔助國小高級學童複合圖形面積學習效之研究。
- 黃娟。(2010)。試論多媒體與對外漢語教學。技術與市場, 17(8), 156–157。
- 謝智娟。(2008)。参与式教学方法在课堂教学中的应用。中国成人教育, 141–142。
- Anderson, L. W., & Krathwohl, D. R. (2001). *A taxonomy for learning, teaching, and assessing : a revision of Bloom's taxonomy of educational objectives : complete edition*. New York: Addison Wesley Longman, Inc.  
<https://eduq.info/xmlui/handle/11515/18824>
- Barbarić Pardanjan, M., Karuović, D., & Eleven, E. (2018). The interactive whiteboard and educational software as an addition to the teaching process. *Tehnicki Vjesnik*, 25(1), 255–262. <https://doi.org/10.17559/TV-20160310173155>
- Fawzi Fayeze Ishtaiwa, & Zuhrieh Shana. (2011). The use of interactive whiteboard (IWB) by pre-service teachers to enhance Arabic language teaching and learning. *Learning and Teaching in Higher Education: Gulf Perspectives*, 8(2), 17–34.  
<https://doi.org/10.18538/lthe.v8.n2.65>
- Helen J. Chatterjee, & Leonie Hannan. (2015). *Engaging the Senses: Object-Based Learning in Higher Education*. New York: Routledge.  
<https://books.google.co.in/books?id=E7K1CwAAQBAJ&lpg=PA4&dq=Engaging%20the%20Senses%3A%20Object-Based%20Learning%20in%20Higher%20Education&pg=PR4#v=onepage&q&f=false>
- Huitt, W. (2011). Bloom et al.'s Taxonomy of the Cognitive Domain. *Educational Psychology Interactive*. <http://www.edpsycinteractive.org/topics/cogsys/bloom.html>
- Inguva, P., Lee-Lane, D., Teck, A., Anabaraonye, B., Chen, W., Shah, U. V., & Brechtelsbauer, C. (2018). Advancing experiential learning through participatory design. *Education for Chemical Engineers*, 25, 16–21.  
<https://doi.org/10.1016/j.ece.2018.10.001>

- Jan Netolicka, & Ivana Simonova. (2017). SAMR Model and Bloom's Digital Taxonomy Applied in Blended Learning/Teaching of General English and ESP. 2017 *International Symposium on Educational Technology*.  
<https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8005435&tag=1>
- M. David Merrill, Zhongmin Li, & Mark K. Jones. (1991). Second Generation Instructional Design (ID 2). *Published Educational Technology*, 30(1), 7–14.
- Mayer, R. E. (2002). Multimedia learning. *Psychology of learning and motivation*, 41, 85–139.
- Nicoleta Ramona Ciobanu. (2018). Active and Participatory Teaching Methods. *European Journal of Education*, 1(2), 69–72.
- Purdue Online, & Purdue. (2023). *The Evolution Of Technology In The Classroom | Purdue Online*. <https://online.purdue.edu/blog/education/evolution-technology-classroom>
- Sara Hennessy, & Laura London. (2013). *Learning from International Experiences with Interactive Whiteboards: The Role of Professional Development in Integrating the Technology* 89. <https://doi.org/10.1787/5k49chbsnmls-en>
- Travis H. Owens. (2012). *Smart Technologies In a Technology Classroom: Integration Investigation of Smart Board & Smart Notebook into a 7--12 Technology Education Classroom*.
- ViewSonic Library. (2020, 十二月30)。複合教學：優化學習空間的 12 種教學方法。ViewSonic Library。 [https://www.viewsonic.com/library/zh-hant/教育/複合教學：優化學習空間的-12-種教學方法/#zhi\\_jie\\_jiao\\_xue\\_fa](https://www.viewsonic.com/library/zh-hant/教育/複合教學：優化學習空間的-12-種教學方法/#zhi_jie_jiao_xue_fa)

**Contact email:** [tiffany.yeh0422@ehuayu.org](mailto:tiffany.yeh0422@ehuayu.org)