ORIGINAL ARTICLE

Digital Teaching Research Based on the Intelligent Research and Training Platform: Citing the Practice of the Chinese Teaching and Research Group of Senior Secondary School Affiliated to Xingyi Normal University for Minorities as a Case Study

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Abstract: *The Intelligent Research and Training Platform (IRTP) of the National Center for Educational Technology (NECT) is an application designed to integrate AI technology and teacher education in response to the "Artificial Intelligence + Teacher Education" strategy, in order to provide teacher professional development and power the advancement of basic education. In this study, a school teaching and research team conducted instructional research on the seventh-grade Chinese lesson Wisteria, utilizing analytical reports of classroom observation, teaching behavior, and teacher ability matrix generated by the Intelligent Research and Training Platform's big data-based evaluation of classroom teaching for this lesson. Using data analytics and scale grading, this kind of practice helps teachers get better at doing research in their own fields.*

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THE Intelligent Research and Training Platform of the National Center for Educational Technology (NCET) is a precision teaching research platform that supports regional and school-online or online-offline blended teaching research. It makes digital teaching research viable and fruitful by combining AI technology with teacher training in an efficient manner. When scale-based analysis and AI learning analytics are used, teaching research methods, teacher professional development, and monitoring of teaching quality all get a lot better.

The "Four-order Strategy" for digital teaching research, developed by NCET, includes the following applications: fundamental teaching research; large-scale online teaching research; intelligent precision teaching research; and blended collaborative teaching research. In order to demonstrate how to use the applications provided by the Intelligent Research and Training Platform to modify the teaching process and improve instruction, this study uses the teaching research on the Chinese lesson Wisteria in the seventh grade conducted by the Chinese language teaching and research group of Senior Secondary School Affiliated to Xingyi Normal University for Minorities (Xingyi is the capital city of Southwest Guizhou Autonomous Prefecture). In addition to improving the results of teaching studies, this kind of digital teaching research can help teachers improve their research skills, information literacy, and management skills.

Utilizing the Basic Teaching Research Application to Improve Classroom Instruction

Powered by developing technologies such as AI, big data, cloud computing, and the 5th generation of communication technology, the Intelligent Research and Training Platform is able to record in-depth information regarding classroom interactions. Through recorded and stored data of instructional activities, teachers can assess the teaching process from a variety of perspectives, find the gaps between their instructions and the requirements, and get more opportunities for in-depth investigations. The Platform's basic teaching research application can be used to plan lessons and study them in order to create a pattern of teaching research that is based on data rather than on experience (Dai et al., 2022).

This application was used by the teaching and research team to evaluate the effectiveness of the Wisteria lesson's instruction. According to the Platform's AI learning analytics, the teacher lectured for 87.13% of the class period, and the first activity took place in the classroom for 15 minutes before the pupils' performance decreased to 20% after 28 minutes (**Figure 1**). The class was categorized as being dominated by the teacher. Given this, we asked, "What kind of instructional activity design can get students more interested in learning and improve their language skills?"

In an effort to identify answers to the issues, the teaching and research group then researched pertinent literature and looked into connected elements. The "A Strategy to Enhance Student Chinese Language Competence" fishbone diagram was created in the end (**Figure 2**). It has four parts: (i) teaching strategies, objectives, and tasks; (ii) instructional materials, such as learning scenarios, formative evaluation, and rewritten learning objectives; (iii) classroom culture, which emphasizes a learning environment and encourages student inquiry; and (iv) student learning, which includes attentive listening, group work, and independent study.

Initiating Large-Scale Online Teaching Research
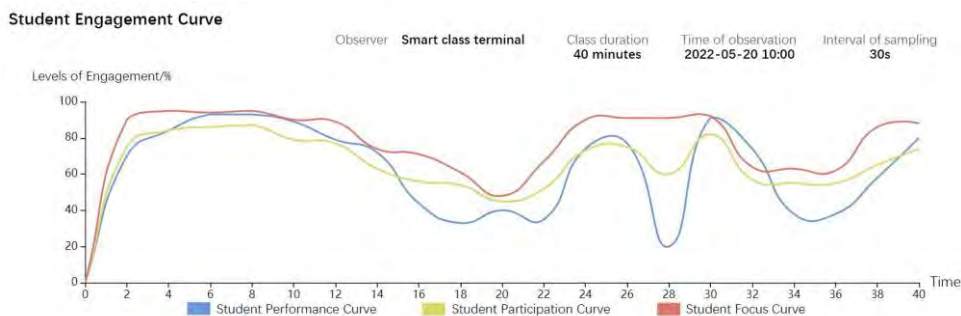
Figure 1. Student Engagement Curve.
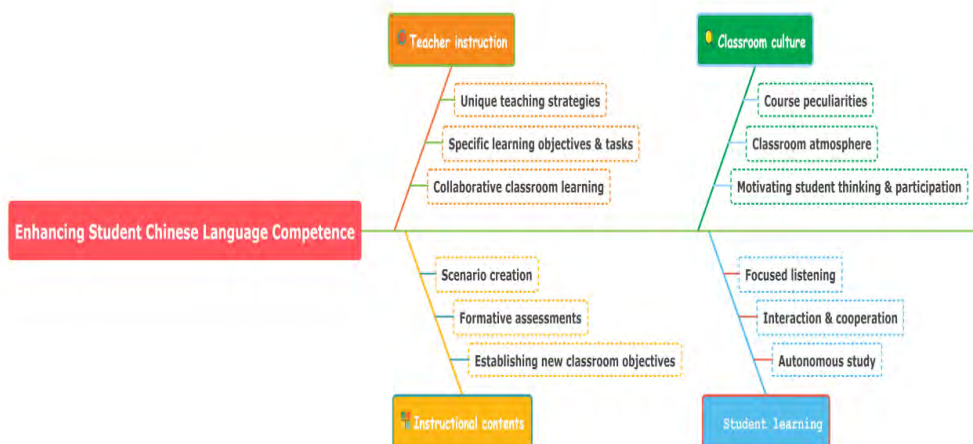
Figure 2. A Strategy to Enhance Student Chinese Language Competence.

The Platform's extensive online teaching research application enables each individual instructor to post standardized digital learning resources online so they can be effortlessly transported across geographies and organizations reliant on the openness of the internet. This free-flowing pattern of communication has also given rise to a new kind of connection among educators that satisfies their demands for deep contact and knowledge sharing. In this social network, educators can freely express their thoughts and find inspiration for fresh ideas. A teacher can access lessons shared online by their peers and find solutions to their own issues after registering on the Intelligent Research and Training Platform. A simple digital terminal and an internet connection are all that are needed for this learning procedure. Teachers can also create or join groups on the site by using real-time videos, trust values, and personal information identification. Teachers from various schools and areas come up with the research themes for their group and use theme-based group discussions and brainstorming to identify solutions to
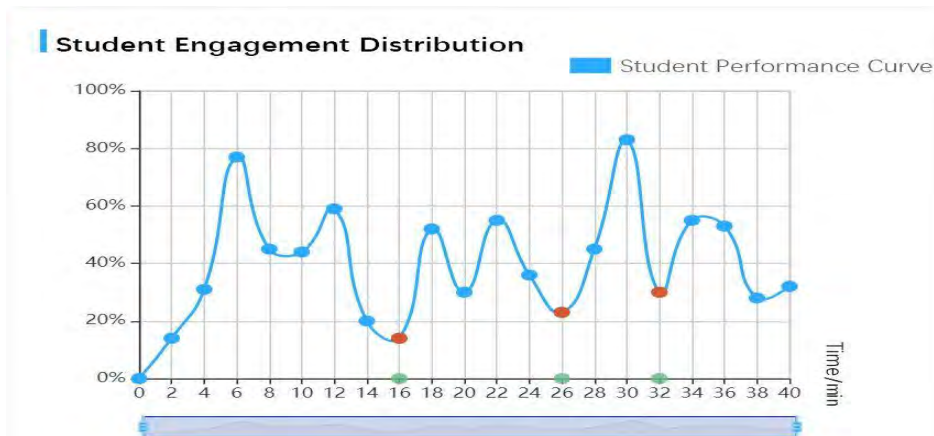
Figure 3. Student Engagement Distribution in the Demonstration Lesson of *Tough Journey.*

Nos.	Observation dimensions	Behaviors	*Wisteria* (%)	*Wisteria* (%)
1		Reading & writing	26.43	40.25
2		Raising questions	0.72	0.61
3	Student Behaviors	Focused listening	62.13	40.53
4		Inter-student interaction	1.43	11.29
5		Answering questions	9.29	7.32
6		Blackboard presentation	0.00	0.31
7	Teacher Behaviors	Classroom lecturing	87.13	60.78
8		Teacher-student interaction	7.15	25.23
9		Classroom inspection	5.72	13.68

Figure 4. A Comparison of Student and Teacher Behaviors in the Two Trials of the Lesson *Wisteria.*

their teaching challenges. During this process, everyone in the group shares what they know, which leads to new experiences (Ai, 2020).

For instance, data analytics findings show that a demonstration lesson for A Tough Journey is a paradigmatic situation that many junior secondary Chinese teachers can use as a model. Members of our teaching and research group were urged to use the platform's extensive online teaching and research application to analyze this lesson in-
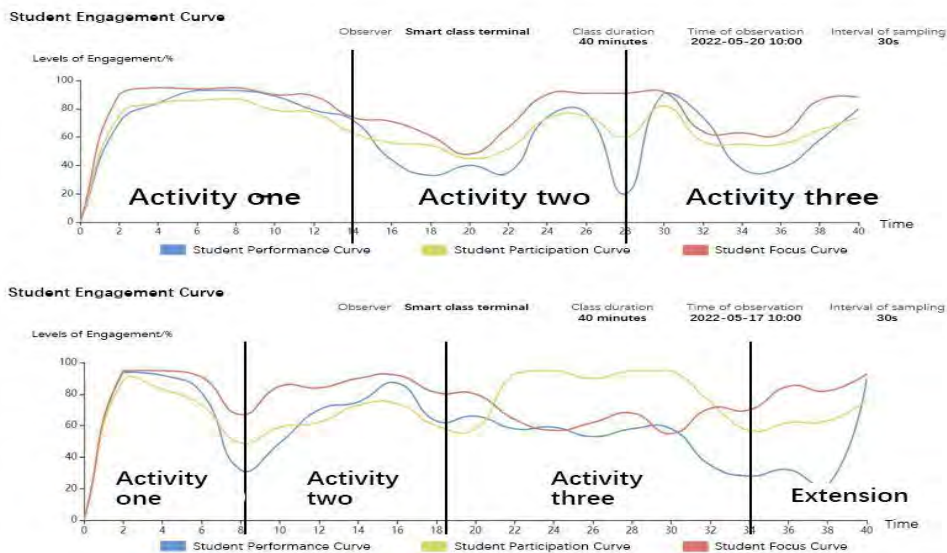
Figure 5. A Comparison of Student Engagement Curves for the Two Trials of the lesson *Wisteria*.
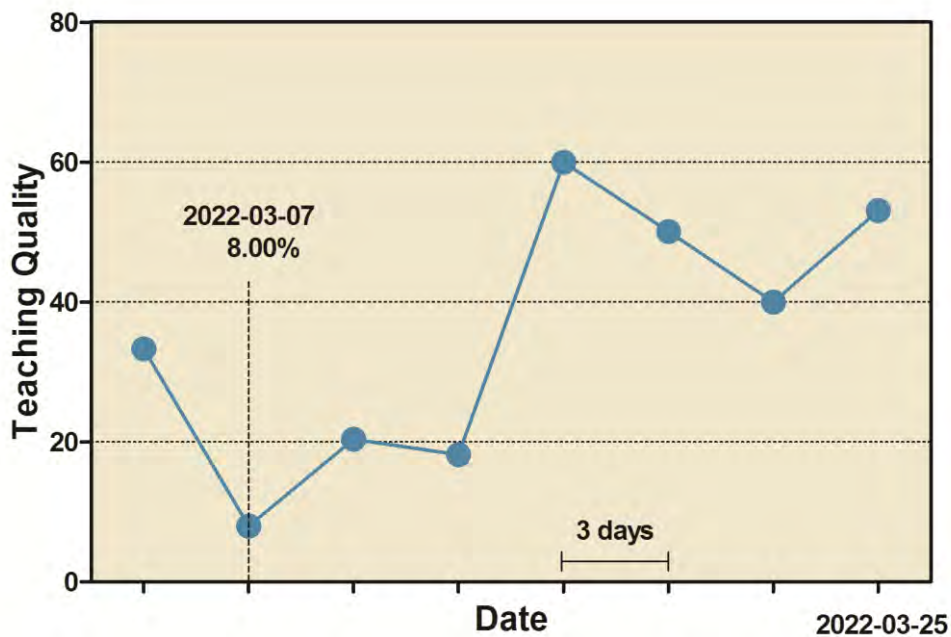

Figure 6. A Personal Periodic Portrait – Teaching Quality.

depth. According to the analytical report of the demonstration lesson of A Tough Journey created by the intelligent research and training platform, the student performance curve in the three intervals between the sixteenth, twenty-sixth, and thirty-second minutes is fluctuating on the student engagement distribution diagram (**Figure 3**), indicating a lack of consistency in the students' behaviors. Nevertheless, an examination of the lesson's video revealed that the students' erratic actions were compatible with the lesson's structure because, at the time, they were doing group inquiry assignments as instructed by the teacher. The emphasis of the lesson's lesson plan is on this assignment. The outcomes of the data analytics also indicated that the teacher had good control over the development of the class. Teachers who were watching this lesson online gave comments at significant moments and wrote suggestions in the note sections.

Classroom culture, specific learning objectives, and task division were discovered to have significant positive effects on the teaching outcomes of the demonstration lesson A Tough Journey by the teaching and research group. Informed by this discovery, we modified the Wisteria lesson plan using the standard fish bone diagram. **Figure 4** depicts the findings of data analytics for the two trials of this lesson in terms of classroom behavior. Interactions between students and between students and teachers were much better in the second trial. The amount of lecturing and classroom inspection was adjusted to a reasonable level, and a blended teaching model was used instead of the teacher-centered model used in the first trial.

The mean value of the student engagement curve grew from approximately 80% in the first trial to approximately 87% in the second trial, as depicted in **Figure 5**. The increase from 78 to 90 points on the scale indicates an improvement in all dimensions. Examining relevant data showed that the new teaching plan has helped students learn Chinese better.

Employing the Intelligent Precision Teaching Research Application to Promote Teacher Professional Development

Learning analytics is an emerging field of study that uses data on students' learning behaviors, artificial intelligence, and analytic models to evaluate academic progress, forecast future performance, and identify potential problems. Cai & Li (2021) argues that visual output and displays of data analysis outcomes are fundamental to learning analytics. Learning data visualization helps measure and effectively illustrates the teaching process and its outcomes. Consequently, learning analytics can also be used to improve the quality of instruction. Similarly, NECT's Intelligent Research and Training Platform can generate real-time and dynamic records of the training process of in-service teachers in order to create portraits of their teaching motivation, ability, and preferred teaching style, so as to better assist training participants in understanding their own teaching outcomes and provide targeted improvement plans. School teaching and research organizations can also use the teaching data of trainees obtained by the platform to diagnose classroom instruction by analyzing specific situations to address prevalent issues (Huang & Ruan, 2022).

For example, the Personal Periodic Portrait of Teaching Quality created by the Platform for the author for the previous semester (**Figure 6**) shows that in a class on February 28th, teacher lecturing accounted for 98.62% of the total teaching behavior, while teacher-student interaction took up only 1.38%; a class on March 7th scored only

8% in terms of teaching quality. The other two members of the teaching and research group received scores of 17.2% and 13.7% for their two classes on March 8th, respectively, according to their individual periodic portraits. As a result, the data diagnosis revealed that the quality of classroom instruction at the start of the semester was subpar. After introducing the Intelligent Research and Training Platform, the teaching and research group implemented a number of online theme-based teaching research activities to assist teachers in creating better teaching strategies. These strategies were later used in classroom instruction and significantly increased the quality of the teachers' instruction. The author's Personal Periodic Portrait revealed that the second half of the semester's average instruction quality scored 77.5%. The teacher-centered teaching approach has given way to blended and practice-based classroom approaches. The teaching skills of the other people in the group also got a lot better, and one of them got an 82.2% score.

Conclusion

The Intelligent Research and Training Platform of NCET incorporate teacher research and training into educators' everyday teaching practice. Visualization of learning data on the platform facilitates a move from an experience-based to an "experience + data-based" education research pattern. IT-enabled teaching research maximizes the utilization of high-quality educational resources, hence enhancing the professionalism and quality of instruction of instructors.

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