Journal of Contemporary Educational Research, 2025, Volume 9, Issue 2
http://ojs.bbwpublisher.com/index.php/JCER
ISSN Online: 2208-8474
ISSN Print: 2208-8466

Hybrid Teaching Reform and Practice in Big Data Collection and Preprocessing Courses Based on the Bosi Smart Learning Platform

Yang Wang[1]**, Xuemei Wang**[1]**, Wanyan Wang**[2]*****

[1]School of Computer and Software Engineering, Anhui Institute of Information Engineering, Wuhu 241000, Anhui Province, China

[2]School of Computer and Information, Anqing Normal University, Anqing 246000, Anhui Province, China

***Corresponding author:** Wanyan Wang, 1969854189@qq.com

Abstract: This study examines the Big Data Collection and Preprocessing course at Anhui Institute of Information Engineering, implementing a hybrid teaching reform using the Bosi Smart Learning Platform. The proposed hybrid model follows a "three-stage" and "two-subject" framework, incorporating a structured design for teaching content and assessment methods before, during, and after class. Practical results indicate that this approach significantly enhances teaching effectiveness and improves students' learning autonomy.

Keywords: Big Data Collection and Preprocessing; Bosi smart learning platform; Hybrid teaching; Teaching reform

Online publication: March 4, 2025

1. Introduction

Big Data Collection and Preprocessing is a core course for students majoring in Data Science and Big Data Technology. This course systematically introduces the working principles and applications of the ETL open-source tool Kettle, the log collection system Flume, and the data migration tool Sqoop. The primary objective is to equip students with data analysis skills and foundational development abilities for industry-based projects [1]. Under the traditional teaching model, students frequently reported difficulties in understanding the course content, leading to a high failure rate and unsatisfactory learning outcomes. To address these challenges, a hybrid teaching model was designed and implemented using the Bosi Smart Learning Platform. This reform was based on an analysis of existing issues and aimed at improving overall teaching effectiveness [2].

2. Current status of Big Data Collection and Preprocessing course teaching

Big Data Collection and Preprocessing is a fundamental professional course that has not been offered at our school for long. The school has not placed sufficient emphasis on this course, and its hardware and software facilities remain inadequate [3]. The course covers a broad range of topics and is inherently challenging, leading to low student motivation and poor learning outcomes. Based on previous teaching experience, these issues primarily stem from the following factors [4].

2.1. Extensive teaching content with limited instructional hours

As part of the school's revised talent training program, the course's total credit hours have been reduced from 64 to 48. However, the scope of the content covered by instructors has not decreased, making it more difficult for students to fully absorb and comprehend key concepts [5].

2.2. Weak foundational knowledge in prerequisite courses

Big Data Collection and Preprocessing requires a solid understanding of prerequisite subjects, including Java programming, databases, and big data fundamentals. Since the course content is built upon these foundational topics, students who have not mastered them struggle significantly with the material [6].

2.3. Unengaging and challenging teaching content

This course is highly practical, yet its theoretical components can be tedious when delivered through traditional teaching methods. Students often find lectures unengaging and struggle to grasp key concepts [7]. As a result, they accumulate knowledge gaps over time, leading to a gradual decline in interest and motivation to learn [8].

3. Hybrid teaching content design for Big Data Collection and Preprocessing courses

The Bosi Smart Learning Platform, developed by iFlytek, is an online learning platform that supports both PC and mobile applications, allowing students to access learning materials anytime and anywhere. This flexibility makes it highly convenient for users. Additionally, the platform features a simple interface and comprehensive functionalities, including pre-class video learning, in-class discussions, Q&A sessions, and interactive activities, as well as post-class chapter assignments and experiments. These features facilitate independent and comprehensive learning for students. As a result, our institution has widely adopted the Bosi Smart Learning Platform in teaching [9]. The Big Data Collection and Preprocessing course is designed around the Bosi Smart Learning Platform and leverages Bosi online courses for hybrid teaching reform and practice. In this hybrid teaching model, both teachers and students play central roles. Throughout the three stages—before class, during class, and after class—the Bosi platform facilitates effective communication, ensuring that course instruction proceeds in an organized manner [10].

3.1. Before class

The pre-class stage serves as the preparatory phase for the Big Data Collection and Preprocessing course. Teacher's role: Before class, teachers create a course group on the Bosi platform, add students enrolled in the course, and upload relevant resources such as PPT slides, preview videos, and assignments based on the teaching schedule. The platform enables teachers to monitor students' online learning progress, allowing them to tailor in-class explanations to address specific knowledge gaps identified through students' pre-class engagement data.

Student's role: Students independently log in to the Bosi platform before class to access learning resources, including PPT slides and instructional videos. After watching the videos, students take note of any unclear concepts, enabling them to focus on these areas during the lecture and actively seek clarification from the instructor.

3.2. In class

The in-class stage occurs offline, where teachers conduct face-to-face instruction while utilizing the Bosi platform. Teacher's role: At the beginning of the class, teachers use the Bosi platform for attendance tracking. They review and reinforce students' pre-class learning tasks and provide detailed explanations of key and challenging concepts. The platform also supports interactive activities such as quizzes and discussions, allowing teachers to assess students' comprehension in real time. These activities enhance students' engagement and enable teachers to identify areas requiring further clarification. During experimental sessions, teachers guide students step by step through the experimental procedures. The entire process is shared via the Bosi platform, and students can provide real-time feedback using the "Comments" function. Teachers address student queries as they arise, ensuring that all concepts are thoroughly explained. Additionally, the teacher records the experimental procedures and uploads the video to the platform, enabling students to review the experiment as needed.

Student's role: Students sign in to the Bosi platform using the roll call password displayed by the teacher. They review their pre-class learning, engage with key concepts, participate in discussions, and complete consolidation exercises on the platform. This process facilitates the internalization of knowledge and enhances learning outcomes.

3.3. After class

Teacher's role: After class, teachers utilize the Bosi platform to upload review materials, assign new preview tasks, and distribute homework and experiment assignments. Submission deadlines are set to encourage timely completion and ensure the quality of submitted work. Teachers evaluate experimental reports, provide detailed feedback, highlight common issues, and offer improvement suggestions. Outstanding experimental reports are showcased in class, and students who excel are encouraged to share their work with their peers.

Student's role: Post-class, students complete review tasks, homework, experiments, and new preview assignments using the Bosi platform. After teachers review and grade their submissions, students can access their scores and feedback, identify mistakes, and make necessary corrections promptly.

4. Reform of assessment composition for Big Data Collection and Preprocessing courses

As a fundamental professional course, the Big Data Collection and Preprocessing course follows a hybrid teaching model based on the Bosi platform. To enhance the assessment process, the weight of process-based assessment has been increased, making it the primary evaluation component, while the final assessment carries a reduced weight. Leveraging the advantages of the Bosi platform, the final grade is composed of two parts: daily performance (60%) and final assessment (40%). The daily performance score consists of attendance (10%), homework and class participation (30%), and computer-based performance (60%). The final assessment is based on comprehensive group projects.

4.1. Daily performance

Attendance (10%): Before each class, the instructor initiates a sign-in process on the Bosi Smart Learning Platform, where students enter a roll call password to confirm attendance. Attendance records collected through the platform determine student scores. Three absences result in a zero for this component, while five absences lead to a zero in major performance assessments.

Homework and class participation (30%): Assignments are released after each chapter, with a total of eight assignments throughout the course. The final assignment grade is the average of these eight scores. Classroom participation is assessed through bonus points based on student engagement in answering questions and discussions initiated by the instructor.

Computer-based performance (60%): Given the experimental nature of this course, practical work is particularly significant. The instructor has designed 22 experiments, each integrating theoretical knowledge covered in class. After completing an experiment, students must upload their reports to the Bosi platform, where the instructor evaluates them based on completion rate and accuracy. Additional points are awarded based on students' in-class performance. The final computer-based score is the average of the 22 experiment scores.

4.2. Final assessment

The final assessment constitutes 40% of the total course grade and is conducted through offline project reporting and evaluation. Students are required to form groups of five members. The course spans 16 weeks, and project requirements are announced in the 12th week. Each team must determine a project topic, complete the project design within the given timeframe, and submit project materials before the final defense. Required submissions include a project design report, project presentation (PPT), recorded project video, and source code. Each group is allocated 8 minutes for the defense: 5 minutes for the PPT presentation and 3 minutes for Q&A. During the presentation, teams must showcase their division of labor, project design for data crawling, data cleaning, data collection, and data migration, as well as highlight project innovations and provide a summary. After the presentation, the instructor provides feedback and poses three questions, with individual scores assigned to each team member based on their responses. Students are expected to further refine their projects and upload the final materials to the Bosi platform, where the instructor records and exports the final assessment scores.

5. Effects of hybrid teaching reform

Following the implementation of the hybrid teaching reform in this course, student performance has improved significantly. The distribution of final grades is shown in **Figure 1**. The Level 22 Big Data Development Class, specializing in Data Science and Big Data Technology, consists of 50 students. Among them, 18 students scored between 60 and 79, 12 students scored between 80 and 89, and 20 students achieved scores between 90 and 100. Notably, no student failed the course, and the excellence rate reached 40%. After the reform, the average class score rose to 85.62, approximately six points higher than the pre-reform average of 79.41. Upon completing the course, students provided feedback on the teaching model, with 96.49% recognizing it as distinct from traditional teaching and demonstrating superior effectiveness. Additionally, school and college supervisors praised the reform, acknowledging its significant impact and outstanding results. Based on the teaching evaluation outcomes, instructors can identify areas for improvement to better align with course objectives.

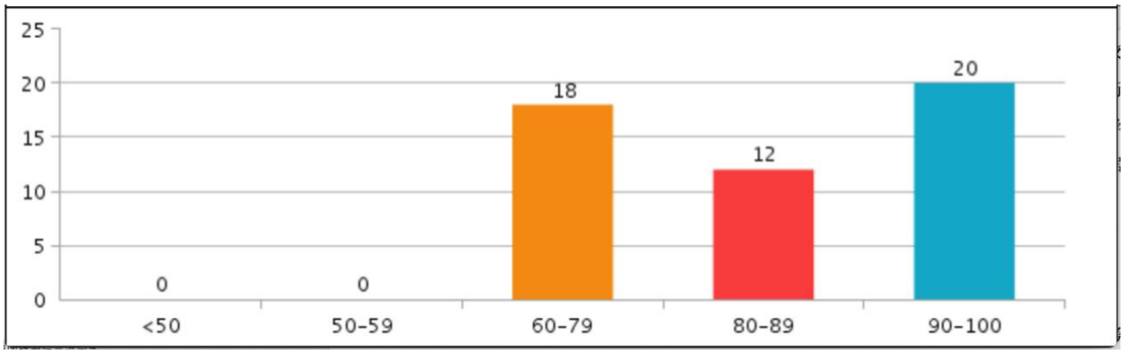

Figure 1. Distribution of students' final grades

6. Conclusion

This study integrates a hybrid teaching model into the Big Data Collection and Preprocessing course, proposing a structured design for course content and assessment methods while evaluating the effectiveness of the teaching reform. The implementation of this hybrid teaching model has yielded positive results, enhancing student engagement and supporting instructors in delivering the course more effectively. Moving forward, further optimization of the hybrid teaching approach will be pursued, with plans to expand its application to additional courses.

Funding

2024 Anqing Normal University University-Level Key Project (ZK2024062D)

Disclosure statement

The authors declare no conflict of interest.

References

[1] Shi W, 2021, Construction of a Hybrid Teaching Model Based on "Rain Classroom"—Taking Computer Application Technology Courses as an Example. Journal of Liaoning Vocational College, 23(07): 47–50 + 58.

[2] Li J, Yu H, 2021, Integration of Online and Offline Hybrid Teaching and Multi-Level Cognitive Network Construction—Taking the "Computer Programming" Course as an Example. Journal of Southeast University (Philosophy and Social Sciences Edition), 23(S1): 149–153.

[3] Huang M, 2022, Research on the Reform of Hybrid Teaching Model in Computer Major Courses in Higher Vocational Colleges—Taking the Java Web Application Development Technology Course as an Example. Journal of Guangxi Radio and Television University, 33(01): 19–23.

[4] Liu J, Zhao S, 2023, Design and Practice of "University Computer Fundamentals" Course under the Hybrid Teaching Model. Wireless Internet Technology, 20(22): 135–137.

[5] Han M, Li Y, Meng J, 2023, Research on Hybrid Teaching Reform of Computer Network Courses Based on OBE. Journal of Shijiazhuang University, 25(03): 126–130.

[6] Lu G, Chen X, Zhao S, et al., 2024, Implementation of the Hybrid Teaching Model of Basic Electronic Circuit Courses Based on Chaoxing Xuedu. Science and Technology Vision, 14(27): 43–46.

[7] Zhang Q, Zhou Y, Feng J, et al., 2024, Research on the Application of Multi-Dimensional Evaluation System Based on Xuexitong in Motion Control System Courses. Computer Knowledge and Technology, 20(31): 174–176.

[8] Song Y, 2024, Application of Hybrid Teaching Model in Computer Programming Courses under the Background of New Engineering. Information and Computers (Theoretical Edition), 36(19): 206–208.

[9] Wang Z, Mao L, 2024, Construction of a Hybrid Teaching Model for the "Fundamentals of Computer Software Technology" Course in Engineering Education. Office Automation, 29(17): 36–38 + 52.

[10] Wu Z, Wu S, Zeng X, 2024, Application of Action-Oriented Hybrid Classroom Teaching Method—Taking the Computer Network Technology Course of Liming Vocational University School of Information and Telecommunications as an Example. Journal of Liming Vocational University, (02): 67–72.