The Visualization of Post Practice Management Based on Big Data Analysis

Wei Zhang*, Jialiang Liu and Liwen He
Office of Educational Administration, Foshan Polytechnic, Foshan, Guangdong, 528137, China
*Corresponding author’s e-mail: scnuzhw@163.com

Abstract. Post practice is an important teaching form of vocational education, however, there is a lack of effective management methods in attendance and process monitoring of post practice. Starting from the management difficulties, this paper uses the mobile app management software to collect the data of the students' post practice process, generates the corresponding visualization chart based on the big data analysis technology, carries out targeted and normalized management of each link of the post practice process, and then forms a set of fine management methods for post practice.

1. Introduction
Post practice is an important part of practical teaching in vocational colleges. It is an important way for vocational education to combine work and learning, realize the cooperation between school and enterprise, realize the integration of industry and education. It is also a teaching activity focusing on process teaching and assessment. Compared with the traditional teaching, the teaching elements in post practice have changed. From the perspective of roles, "students" are transformed into "workers". From the perspective of learning space, "classroom" is replaced by "post", and "school" is replaced by "enterprise". In terms of activity form, "teachers teach students learning ability" has changed into "master worker teach students production skills". In terms of time, the "schedule work and rest system" has been transformed into "8-hour work system"[1]. Problems such as long post practice period, scattered post practice locations, large post differences, poor self-control of students, lack of effective constraints, and difficult to guarantee the personal safety of students increase the difficulty of post practice management [2].

First of all, using big data analysis and information technology, this paper analyses the current research situation of post practice in China from a visual perspective. Aiming at the problems existing in management, it explores the fine management of post practice based on the principle of "traceless evaluation and traceable management".

2. Analysis of knowledge map of post practice

2.1 Data sources
In the CNKI journal database, we use "Post Practice" as the title search term to retrieve the post practice research literature from 2000 to 2019. A total of 5,234 document data were obtained, among them, there are 588 papers in core journals and 42 citations in Chinese Social Sciences. As shown in Figure 1. Starting from the volume of papers, the research results of China's post practice increased gradually from 2007 to 2014, reaching its peak, and has declined since 2015.
2.2 Generate keyword knowledge map
We use CiteSpace software to draw keyword knowledge map and do cluster analysis of post practice keywords. In CiteSpace, we set time slicing as "from 2000 to 2019", year per slice as 2, and select "Keyword" in the Node Types function, “Top 40 per slice” in the node threshold setting, and other settings as default. CiteSpace uses TF*IDF weighting algorithm to automatically cluster and visualize, and obtains the keyword co-occurrence map as shown in Figure 2. The modularity value of map(Q value for short) 0.417>0.3 (Q > 0.3 means that the structure of the junction map is significant). The mean contour (S value for short) 0.5509>0.5 (S > 0.5 means that the clustering is reasonable). Therefore, this map is effective.

It can be seen from the graph shown in Figure 2 that eight research clusters, such as "combination of work and study", have been formed in post practice research. Eight clusters represent the current eight main research topics of post practice, which are "# 0 the combination of work and learning", "#1
the problem of post practice", "#2 the schools ", "#3 the strategies of post practice", "#4 the students in vocational colleges ", "#5 the education of teachers", ", "#6 Pingshan "and" #7 vocational colleges".

2.3 Current situation and problems of post practice research

The analysis of knowledge map shows the current situation of the research on the post practice of vocational education, and also reflects the problems existing in the research on the post practice.

2.3.1 Horizontal analysis. The eight research clusters of post practice are relatively macro, including the research on schools, teachers and students, the research on problems and countermeasures, the research on school-enterprise cooperation and the combination of work and learning. These researches are all at macro level, but lack of research at the micro level, such as plan management, process management, post skill improvement, student assessment, etc.

2.3.2 Longitudinal analysis. The research progress of each cluster of post practice has been delayed. As shown in the timeline view in Figure 3, only three clusters of "#0", "#1", "#2" are still in continuous research, while five clusters of "#3", "#4", "#5", "#6", "#7" have been terminated, reflecting the lack of new research hot spots of post practice, which also verifies the research trend shown in Figure 1 (Since 2014, the research results of post practice have declined).

2.3.3 Lack of quantitative analysis. Most of the post practice researches are qualitative analysis, lack of quantitative analysis based on data, lack of data collection and mining in the post practice process. Among the keywords extracted, the frequency of "informatization" keyword is only 7, and no quantitative keywords such as "data" and "Statistics" are found.

2.3.4 Lack of effective information management means. The process management is the difficulty of post practice management, but also lack of effective information management means. Among the keywords extracted, the frequency of "process management" is only 91, and the frequency of "management platform" is only 6. Because of the lack of information management means, it is difficult for the instructor to monitor the practice and master the students' practice status, which is not conducive to learning early warning and practice assessment.

3. Management function design of post practice process based on big data analysis

Big data is the product of the rapid development of the internet, which brings model innovation to teaching process management and assessment. Starting from the problems of post practice process management, using big data analysis, we change the process management of post practice from the following three aspects.

3.1 Mobile phone check-in during post practice

During the post practice, students will submit the data of the post practice process through the mobile phone APP. According to the post arrangement of the post practice enterprise, students can clock in and clock out by using the mobile phone APP, which can accurately record the data of students' commuting time and automatically assess their post practice duration. In addition, while students are punching in, the APP records the geographical location of students' punching in order to facilitate the guidance of teachers to monitor students' post practice locations and determine whether students are practicing in registered post practice enterprises.

3.2 Multiple data sets are easy to manage

Students in the enterprise practice, the school students lack of real-time, effective monitoring and management. If multiple data are collected through mobile APP, such as punch card data, post practice time, post practice log submission and review, post practice post matching rate, students' emotional
reaction during post practice, etc., then data mining and analysis are carried out. Teachers discover potential laws or problems through data mining and carry out problem warning.

3.3 Make management decisions based on data

The value of data lies in the service of management decision. Through data collection, analysis and mining, the rules or existing problems of post practice can be found to provide reliable basis for management decision. If a student has not clocked in for a long time, the instructor will investigate and lower the post practice grade. If the rate of correcting students’ post practice diary is low, the instructor's post practice performance salary will be deducted.

4. Visual analysis of process management of post practice

4.1 Student post practice enterprise and post registration management

The registration of post practice enterprises and post practice positions is the first link of student post practice management. After students register real post practice enterprises and post practice positions on the mobile APP, the instructor will conduct online review, such as whether the positions are professional counterparts and whether the post practice enterprises are real. Through the APP system, the management staff monitors the number of student interns and the status of job registration. The relevant data of each secondary college in a certain period are shown in Figure 4, Figure 5 and Figure 6.

![Figure 4. Statistics of students in post practice.](image)

![Figure 5. Statistics of registration rate of post practice.](image)

It can be seen from Figure 4, the number of students participating in post practices in secondary college during a certain period of time. As can be seen from Figure 5, up to a certain point, the average registration rate of students for positions is 80.46%, among which the lowest is 50.36%. It can be seen from Figure 6, the average matching rate of post practice students in secondary colleges is 77.21%, among which the highest matching rate is 99.72%. Students’ post practice process data were extracted based on mobile APP. After big data analysis, a visualized bar chart was formed. Managers used the key data (such as the lowest registration rate) to manage and assess the responsible person or department.

4.2 Students mobile phone binding rate statistics and analysis

The administrator sorted out the number of interns in advance according to the post practice plan, and pre-registered in the post practice system. Students can only register post practice enterprises and positions with the APP after installing the APP and binding the mobile phone. If students cannot bind to mobile phones, the APP cannot collect data. Therefore, it is necessary to ensure that all students participating in the post practice must bind to mobile phones. As shown in Figure 7, the overall binding rate of each college participating in the post practice is 99.73%, and there are 6 students who are not bound. Based on this, the instructor can focus on these 6 students individually to ensure the accuracy of the source of students' post practice data.
4.3 Student practice attendance management

The period of post practice is relatively long, usually 6 months, and many problems will be encountered in the management of post practice process, such as the students' failure to report when changing post practice enterprises, students' random registration of an unreal or even non-existent post practice enterprise, etc., all these problems bring difficulties to the management of post practice.

As mentioned above, the post practice check-in can effectively solve these problems. When students check in with the mobile APP, the mobile APP records their post practice time in the enterprise. On the other hand, due to the embedded map in the mobile APP, the students recorded the exact address of the post practice enterprise's location (within 1000 meters in diameter) when they checked in, so as to facilitate the monitoring of whether the students practiced in the registered post practice enterprise. If the registered address is inconsistent with the daily check-in address, the instructor and administrator shall verify and confirm and deal with emergencies, as shown in Figure 8.

4.4 Students practice emotional management

Students' long-term practice according to the "eight-hour work system" will experience psychological fluctuations. Although many students can successfully go through the period of psychological fluctuations, if there are students with emotional disorders, teachers need to focus on these students to avoid psychological harm. Therefore, mobile phone APP is used to record students' daily emotions in the form of expression. Through big data analysis, students' post practice emotions are visualized, and the teachers focus on the students who are constantly depressed. As shown in Figure 9, when HXT students in an post practice enterprise are found to be in a constant state of dislike, their guidance teachers need to coach them to understand their post practice status and adjust their post practice status through problem analysis, psychological counselling, post adjustment, colleague relationship mediation and other measures to avoid the occurrence of security incidents.
4.5 Student practice diary management

Post practice diary is a phased summary, generally no less than 4 per month. Students submit post practice diaries through the mobile APP every week, and the teacher corrects and evaluates the grades. The submission rate of the post practice diary is an important index to evaluate students' post practice performance, and the correction rate of the post practice diary is an index to evaluate the instructors. After the visualization of the data of the two indexes, the bar chart is formed as shown in Figure 10 and Figure 11.

It can be seen from Figure 10, the overall diary submission rate of the post practice students in the whole school was 59.78% a week, among which, the diary submission rate of the automobile college was only 44.87%. The student diaries were not submitted in a timely manner, which required the tutor to follow up the student status. It can be seen from Figure 11, the highest correction rate of the post practice diary was 98.64%.

5. Summary

Without the support of information technology, the management of post practice process is difficult for teaching management. Therefore, it is necessary to carry out post practice informatization management based on cloud platform, mobile APP and big data analysis technology. By obtaining the daily post practice registration data, we can accurately locate the post practice students and thus solve the security risks. At the same time, it also has many other functions, such as the post practice hours statistics, online leave request and approval, training inspection, training summary, plan management, etc. Through the collection, statistics, analysis and visualization of students' post practice data, we have realized the fine management of practice process and improved the efficiency of practice management.

References

[1] Wu, J., Chen, K.K., Tan, L.H. (2012) Research on the effective mechanism of the process management of post practice in higher vocational education. Vocational and Technical Education, 2: 54-56.
[2] Liu, J.Y. (2012) Research and practice on the management mode of post practice in higher vocational education. Chinese Vocational and Technical Education, 11: 81-84.
[3] Chen, Y.L. (2012) Historical evolution of the educational technology research areas of in China-cause analysis based on CNKI "two journals" keywords, subject words. E-education Research, 8: 39-40.