

Comparative Analysis of Senior High School Information Technology Optimal Course Teaching Based on S-T Analysis Method

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Abstract: Teaching is a very complicated process of bilateral activities between teachers and students. When people evaluate and analyze the teaching process of a class, the results may be somewhat subjective, which does not play an effective role in improving the quality of teaching. This paper uses the S-T analysis method to compare and analyze the process of the ministerial, provincial and municipal optimal lessons of senior high school information technology courses from the platform "One Teacher, One Optimal Lesson". It can be used as a reference for senior high school information technology teachers to evaluate the classroom, and it is significant for teachers to conduct deep reflection on and improve their own teaching in light of the evaluation results.

1. Introduction

Information technology courses at the high school stage are of special significance for the cultivation of learners' information literacy. Teachers are also required for higher ability to apply information technology. Both teachers and students play an important role in classroom teaching whose analysis can not only help teachers improve their professional qualities and career development, but also help students get a better grasp of the knowledge. S-T analysis method is a teaching analysis method that can intuitively show the teaching mode [1]. It quantifies the teaching process, which can help teachers to scientifically analyze classroom teaching, present teachers and students' behavioral change in order at any time as well as the teaching mode on a graph. Thus, Teachers can better analyze and optimize classroom teaching in order to improve teaching skills.

2. S-T analysis method

S-T or Student-Teacher is an effective and quantitative analysis method for the teaching process [2]. In this method, student behavior is represented by S, and teacher behavior is represented by T.

A class of about 45 minutes is sampled every 30 seconds. Teacher behavior T refers to visual and auditory information transmission behavior, including teacher explanations, demonstrations, writing on the blackboard, prompts, questions and roll calls, evaluation and feedback. Student behavior S refers to all behaviors other than teacher behavior T, including students' speaking, thinking, calculating, taking notes, doing experiments or completing homework, and being silent [3].

The classroom teaching mode can be represented by two different graphics, one is represented by the S-T curve with T as the horizontal axis and S as the vertical axis; the other is the Rt-Ch diagram representing the teaching type. According to the Rt-Ch data, the teaching is divided into four different teaching modes: practice-based, teaching-based, dialogue-based, and hybrid-based [4].

Teacher behavior occupancy rate R_t and teacher-student behavior conversion rate Ch are two very important parameters in S-T analysis. The larger the R_t value, the more teacher behaviors occur in the whole class. The Ch value is between 0 and 1, which is a sign of the degree of interaction between teachers and students [5]. The closer the Ch value is to 1, indicating that the teacher-student conversation in the classroom is harmonious and the atmosphere is active; The Ch value approaches

0, indicating the lack of interaction between teachers and students, and the heavy and boring classroom teaching atmosphere.

3. Using S-T method to analyze lesson examples

The teaching video lesson examples selected here are high-quality lesson examples of various levels of "One Teacher, One Optimal Lesson" in 2018, including 4 ministerial-level lessons denoted by A1 ~A4, 4 provincial-level lessons B1 ~B4 and 4 municipal-level lessons C1 ~C4, a total of 12 teaching videos of optimal lessons.

According to the level of the lesson examples, the 4 lesson examples of the same level and the lesson examples of the same teaching content at different levels are analyzed by S-T curve respectively.

3.1 The same level lesson analysis

(1) Analysis of optimal lessons

The 4 selected ministerial level lessons are A1 "Exhaustive Analysis", A2 "First Understanding of QR Code", A3 "Ubiquitous Information" and A4 "Intelligent Information Processing". The S-T curve diagram is shown in Figure 1.

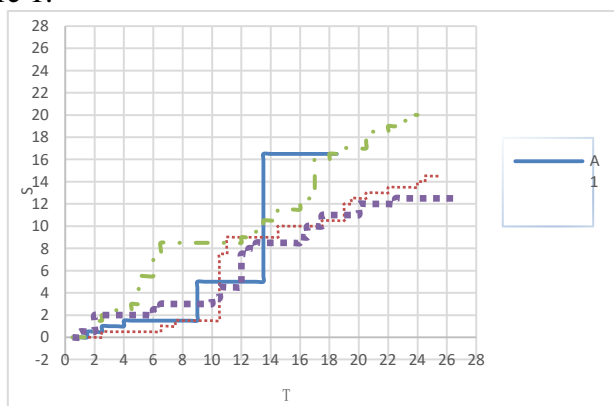


Figure 1 S-T curve diagram of ministerial optimal lessons

From the S-T curve, it can be found that there are two long vertical line segments in A1, indicating that the students' autonomous learning activities are carried out in stages. The short horizontal line and short vertical line are alternately changed at the beginning of the teaching, indicating that the new course is introduced through interaction between teacher and students. During the course of teaching new courses, students explore tasks and student behaviors occur for a long time. Example A2 has a long vertical line segment. Other than that, the horizontal line segment and the vertical line segment frequently change, which means that students have only one long-term autonomous learning activity. Most of the time, teachers and students interact with each other, and the teacher guide students to acquire knowledge by asking questions. Example A3 has two short vertical line segments, which means that the teacher offers students 2 short-term independent study. Example A4 has a short vertical line segment, which means that students have only one self-learning activity. Most of the time, the teacher guides students to experience learning by asking questions and demonstrating. It can be seen from the figure that the teacher's teaching process is based on student activities according to the key knowledge of this lesson, and other teaching content is carried out through teacher-student interaction, such as teacher's questions and students' thinking and answers.

(2) Analysis of provincial optimal lessons

The 4 selected provincial level lessons are B1 "Network Information Security Prevention", B2 "Select Structure", B3 "Select Computer Animation Tools" and B4 "Computer Network Identity-IP Address". The S-T curve diagram of the provincial lessons is shown in Figure 2.

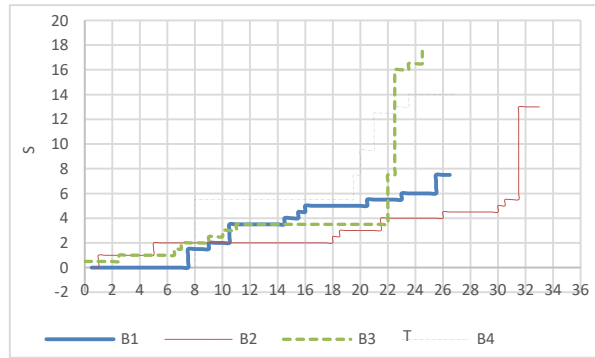


Figure 2 S-T curve diagram of provincial optimal lessons

As for B1, there are only two short-term student autonomous activities in the entire class, and the teacher behavior occupies a larger proportion. This indicates that the entire class is teacher-centered and students' autonomous learning is ignored. Although there are videos played during the lesson, the behavior still belongs to the teacher behavior. As for B2, the teacher's behavior appears in the front, and a long-term student autonomous activity in the back, indicating that the classroom is dominated by teacher activities. In lesson B3, the teacher behavior comes first, and then student independent learning activities over 3 minutes appear twice, indicating that the lesson is a combination of teaching and practicing. There are many autonomous learning activities in lesson B4 where there are 4 student activities of 2 minutes or more. Based on the video, we can know that the teacher assigns corresponding homework after teaching something new to allow students to learn and complete tasks independently, and in this process the teacher will give certain hints.

It can be seen from the S-T curve that the teachers' behavior is dominant in the classrooms of B1 and B2, which means that the classroom is mainly based on teaching and practicing. Compared with B3 and B4, there are slightly less teacher behavior and much student behavior in B1 and B2. However, all the four provincial-level optimal lessons have much teacher behavior than student behavior.

(3) Analysis of municipal optimal lessons

The 4 selected municipal lessons are C1 "The Impact of Information Technology on Social Development", C2 "What is Recursive Method", C3 "Website Making and Debugging" and C4 "Intelligent Information Processing". The S-T curve diagram of the municipal optimal lessons is shown in Figure 3.

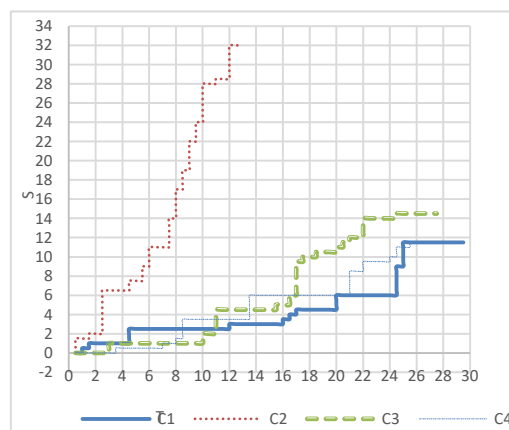


Figure 3 S-T curve diagram of municipal optimal lessons

It can be seen from the figure that the trend of lesson C1, lesson C3 and lesson C4 are similar. There is much teacher behavior in C1 and C4 with two vertical line segments of more than 2 minutes. During this period of time, students study independently. There are 3 vertical segments of 2 minutes or more in lesson C3, indicating that there is much student behavior in lesson C3 than in C1 and C4. The curve of lesson C2 is obviously different from that of the other three lessons, which tends to be more vertical and much student behavior. It shows that this class focuses on students' independent learning, and the teacher lectures little.

3.2 An analysis of lesson examples of the same teaching content at different levels

Comparing the excellent courses at all levels with the same textbook version and teaching content, the same teaching content in this research is A4, C4 of "Intelligent Information Processing". The levels of them are ministry and municipal optimal lessons. The S-T curve is shown in Figure 4.

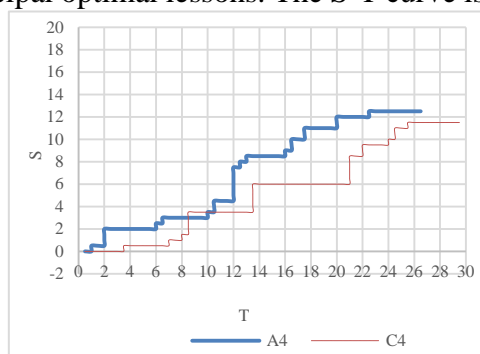


Figure 4 S-T curve

It can be seen from the figure that there are many horizontal line segments in lesson A4 and C4, indicating that the teacher has too much behavior, and the time for students' independent learning is too short. Besides, the horizontal line and the vertical line are alternately changed, and the classroom teaching is conducted through interaction between teachers and students. Combining the lesson video, we can know that although the teaching content of the two lesson examples is the same, the teaching process design is different. In lesson A4, the teacher uses robotic snakes and intelligent robots to introduce the new lesson, learning materials are diverse, the interaction between teachers and students is frequent and the experiential activities for students are abundant. In the course of lesson C4, the teacher uses his mobile phone to demonstrate the operation to the students while teaching. Finally, the teacher plays a video to trigger active interaction and enthusiastic discussion among students. It can be seen from the S-T curve that in the introduction stage, there are student behavior in A4 and C4, indicating that the students have spoken or thought in the introduction stage.

3.3 Rt-Ch calculation results and teaching mode analysis

The Rt and Ch values and teaching modes of the 12 lesson examples are shown in Table 1. Lesson B1, B2, C1, and C4 are teaching-based, A3 is dialogue-based, C2 is practice-based, and other lessons are hybrid-based. It can be seen that the majority of high school information technology teachers use a mixed teaching model. Through the analysis of the content of the video, the teaching mode adopted by the teacher for the review class is practice; for the conceptual content, the teaching mode used by the teacher is lecture and dialogue, and for the practical content, the teaching mode adopted by the teacher is a mixed type. High school information technology is a subject from practice to inquiry. The core of the curriculum is to take students' interest as the direction, so as to make students active in the inquiry of information technology. Which teaching mode is adopted is determined by the teacher according to the certain teaching content.

By watching and analyzing these 12 lessons, it is found that the ministerial-level optimal lessons are partial to the theoretical knowledge explanation, and the teacher's teaching does not occupy a long time like other optimal lessons, which gives priority to students' experience and exploration. Through the analysis and solution of problems one by one, students are able to think actively and deeply as well as arouse learning motivation.

In order to better analyze the lesson activities, by watching the lesson video, In the part of lead-in, the difference between the ministry-level optimal lessons and other lessons is whether to use the game to introduce the new lesson. Lead-in is the beginning of a lesson and a keynote of the whole class. A good introduction can create a relaxing and pleasant classroom atmosphere, which can concentrate students' attention at the first beginning. Student activities are an important part of the entire class, so these four-level optimal lessons all use various types of student activities, which mobilize students'

enthusiasm for learning. Among them, student self-inquiry is the most common activity used by teachers.

Table 1 Rt and Ch calculation results of 12 lessons

Lesson number	N	Nt	G	Rt	Ch	Teaching mode
A1	70	37	11	0.53	0.14	hybrid-based
A2	80	51	27	0.64	0.33	hybrid-based
A3	88	48	41	0.55	0.45	dialogue-based
A4	78	53	29	0.68	0.36	hybrid-based
B1	68	53	19	0.78	0.26	Teaching-based
B2	92	66	19	0.72	0.2	Teaching-based
B3	84	49	21	0.58	0.24	hybrid-based
B4	82	54	13	0.66	0.15	hybrid-based
C1	82	59	21	0.72	0.24	Teaching-based
C2	90	26	29	0.3	0.3	Practice-based
C3	84	55	27	0.65	0.31	hybrid-based
C4	82	59	21	0.72	0.24	Teaching-based

3.4 Effectiveness Analysis

According to the S-T method analysis of 12 lessons, the advantages of the teaching process in the high-quality lessons are summarized to provide reference for senior high school information technology teachers.

(1) Highlight student-centered status

In today's advocacy of "students being classroom masters", the teacher-centered lesson, as a traditional teaching method are believed to weaken students' engagement in classroom and even result in losing interests and enthusiasm with teaching for a long time and under a negative atmosphere. In conversational lessons, teachers raise questions to guide students to study with frequent interactions between teachers and students. However, if teachers do not offer students enough time for independent thinking and self-inquiry, students will feel bored in the classroom. In the teaching process, teachers must know how to appropriately guide students to be the real master of the class, so that the students can become the main body of the classroom and the master of learning, which means teachers must leave enough time for the students to learn independently in the classroom.

(2) Enrich classroom activities

In the lead-in part of the lesson, teachers can use a variety of methods to focus the students' attention in the classroom, so that students can actively participate in and have a strong interest in the learning. In the teaching process, interesting activities are used to make students dedicate themselves to learning. If teachers do not offer enough time for the students to fully express and present themselves, the students will be prone to desertion, distraction, and even get tired of learning. Through the analysis of these 16 optimal lessons, it is found that senior high school information technology classroom activities are abundant and colorful, and the combination of information technology teaching and real life can continuously create real situations in the classroom, allowing students to start learning in real and interesting situations. In different parts of teaching, problems close to real life are set up to awaken students' resonance and allow them to create a collision of ideas in the process of solving problems, develop positive thinking, and get real growth.

4. Summary

Teaching is a complex cognitive process. This research only uses one method for analysis, which is relatively single. The analysis of the classroom teaching process may not be in-depth and thorough enough. A variety of methods can be used, such as the analysis software NVivo11.0, so as to achieve the combination of quantitative and qualitative analysis. However, this research also shows to a certain

extent that senior high school information technology classrooms are student-centered, and the classroom activities are abundant, which reflects the concept of quality education.

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