

The BOPPPS Teaching Model Combined with the “Task-driven” Teaching Method Application in the Course “Python Programming”

Wenxin Shao

Xi'an Pei hua University , Xi'an, Shaanxi 710199

Abstract: The BOPPPS teaching mode combined with the “task-driven” teaching method in the “python programming” course divides the whole teaching process into six parts: introduction, objective, pre-test, participatory learning, post-test and summary. “The course is divided into six parts: introduction, objectives, pre-tests, participatory learning, post-tests and summaries.

Keywords: BOPPPS model; Task-driven; Python programming

It is a fundamental course in the field of Big Data and Artificial Intelligence, focusing on making students learn how to analyse and solve problems, and then be able to use the ideas and basic methods of Python language for software development to solve some practical problems in life, as well as cultivating students' awareness of code optimisation and safe programming. The course also develops students' awareness of code optimisation and secure programming, and provides a foundation for further use of big data and artificial intelligence, such as data collection and analysis.

The general situation of students is that they have just changed from a high school level learning style of brushing up on their knowledge and understanding to a learning mode of expanding and advancing their abilities; students' ability base is uneven and their learning needs are diverse. “ This has led to poor learning results. In recent years, the BOPPPS teaching model has received widespread attention and is gradually being promoted, with far-reaching effects on both teachers' ‘teaching’ and students' ‘learning’.

1 . BOPPPS model

The BOPPPS model^[1], which originated in North America as a teacher skills training programme, is widely used in instructional design because of its simplicity and ease of use. The model divides the whole teaching process into six parts: B(Bridge-in) introduction, O(Objective), P(Pre-assessment), P(Participatory Learning), P(Post-assessment) and S(Summary). Summary^[2]. The tasks of each stage can be summarised as follows.

(1) B (Bridge-in) Introduction: In this stage the teacher introduces the content in a variety of ways to attract the attention of the students.(2) O (Objective) Objectives: To clarify the objectives of teaching and learning so that students are clear about the level of knowledge and competence they should achieve after completing the course.(3) P (Pre-assessment): This is a survey of students' knowledge through surveys and tests, and provides a basis for subsequent task setting and classroom teaching.(4) P (Participatory Learning): Teachers design multiple teaching and learning activities based on the teaching objectives to actively engage students.(5) P (Post-assessment): This is a test of the effectiveness of learning and the extent to which students have mastered their knowledge.(6) S (Summary) Summarise: reflect on the content of the lesson together and provide feedback.

Compared to traditional teaching, the BOPPPS model places greater emphasis on student initiative and places greater demands on student participation in the teaching process. In addition, more emphasis is placed on feedback during the teaching process. Only when the teacher knows how well the students have mastered the subject can he or she optimise the teaching and learning process and improve the effectiveness of the teaching.

2. Task-driven pedagogy

The so-called “task-driven” means that in the process of learning information technology, students, with the help of teachers, are

closely focused on a common task activity centre, driven by strong problem motivation, through the active application of learning resources, independent exploration and interactive collaborative learning, and in the completion of the set task, leading to Students are guided to produce a practical learning activity while completing a set task. “Task-driven” is a pedagogy based on constructivist teaching theory. It requires the goal-oriented nature of the task and the creation of a teaching context. Students learn by exploring with real tasks. In this process, students will continue to gain a sense of achievement, which will stimulate their desire to learn more and gradually form a virtuous cycle of perceptual mental activity, thus developing the ability to explore independently and to forge ahead with self-learning^[3].

(1) Contextualisation: enabling students’ learning to take place in contexts that are generally consistent with or similar to real-life situations.

It is necessary to create learning situations that are as realistic as possible in relation to the topic at hand and to guide the learners into the learning situation with a real “task” to make learning intuitive and visual.

(2) Identifying the problem (task): in the context of the created situation. An authentic event or problem (task) closely related to the current learning topic is chosen as the central element of learning, so that students are faced with a real-life problem that needs to be solved immediately.

Problem (task) solving has the potential to enable students to activate their prior knowledge and experience more actively and extensively to understand, analyse and solve current problems. Problem solving provides a platform for bridging and expanding old and new knowledge, and refining knowledge through problem solving is precisely what develops students’ inquisitive skills.

(3) Independent and collaborative learning; instead of the teacher directly telling students how they should solve the problem they face, the teacher provides them with clues about how to solve the problem, such as what kind of information they need to collect. The emphasis is on developing students’ ‘independent learning’ skills. At the same time, discussions and exchanges between students are promoted so that each student’s solution to the problem at hand is complemented, revised and deepened through the exchange of different points of view.

(4) Evaluation of effectiveness: The evaluation of the effectiveness of learning consists of two main parts: on the one hand, the evaluation of the process and results of whether students have completed the solution to the problem at hand, i.e. the evaluation of the construction of the meaning of the knowledge learned, and on the more important hand, the evaluation of students’ independent learning and collaborative learning ability.

The most fundamental feature of the “task-driven” teaching method is that it is “task-oriented, teacher-led and student-led”, which has changed the previous “teacher speaks, students listen” and the passive teaching mode of teaching and learning. It has created a new learning mode in which students are actively involved, collaborate independently and explore and innovate. Through practice, the “task-driven” method is found to be conducive to stimulating students’ interest in learning, cultivating their ability to analyse and solve problems, and improving their ability to learn independently and collaborate with others.

3. Classroom instructional design and implementation

The following is an example of the design and implementation of the BOPPPS teaching mode combined with the “task-driven” teaching method in the classroom teaching of python programming, taking the practical training task 1 of python programming: making word cloud diagrams (2 hours) as an example.

3.1 Instructional design process

The detailed instructional design is shown in Table 1

Table 1 Instructional Design of The BOPPPS teaching model combined with the “task-driven” teaching method

Time period	Object	Platform	Teaching activities	BOPPPS applications	Remarks
Before Class	Teachers	Cloud Classes	<ol style="list-style-type: none"> 1. Analysis of the learning situation 2. Teaching content analysis 3. Identifying teaching objectives 4. Release of Guided Learning Teaching Resources 5. Release of the mission statement 6. Post mission resources 7. Pre-lesson resources 	B (Bridge-in) Introduction Objectives O (Objective) P (Pre-assessment)	Issuance of ‘entry rules’ to test students Pre-learning effects and adapting teaching strategies
	Students	Cloud Classes	<ol style="list-style-type: none"> 1. Download the mission statement. 2. Clarify learning tasks 3. Identify teaching objectives (key points) 4. Complete the test 		Before class Blue Book Cloud Classes are intended to look at any Service materials, with the help of course resources Thinking independently about problems

During the lesson	Teachers	Classroom	<ol style="list-style-type: none"> 1. Give specific tasks and define modest tasks 2. Principle analysis into the solution tour guide Q&A 3. Guided student practice and roving first doubts 4. Organise students to present themselves on stage as 5. The results of the evaluation will be assessed by self-assessment, mutual evaluation and teacher leveling. 	P(Participatory Learning)	Auxiliary education information technology: Polaris software, Blue Ink cloud classroom, PPT
	Students	Classroom	<ol style="list-style-type: none"> 1. Clearly defined learning tasks and targeted learning on task 2. Record the key points, discuss the plan and develop the programme 3. Programming as required by the task 4. Presentation on stage to explain and analyse the conclusions 5. Reporting and communication 		
After School	Teachers	Cloud Classes	<ol style="list-style-type: none"> 1. Set extension tasks and go out tests' and guide students through the summaries 2. Discussion Forum Q&A 3. Post a summary of your teaching 	S(Summary) Summary	(before the next class)
	Students	Cloud Classes WeChat group	<ol style="list-style-type: none"> 1. Independently complete sweeping tasks and out door tests to summarise knowledge techniques 2. Ability to generate reports for uploading to Cloud Bango 3. Also participate in WeChat applet voting 4. Participate in learning discussions 5. Extended Learning 	P(Post-assessment)	

3.1.1 Before Class - BOP

Students' pre-study is mainly online, students learn independently through the Blue Ink Cloud platform and Tencent Conference, watch micro-lessons and videos, and complete the "entry test"; teachers release task resources and pre-study resources on the course platform to pave the way for the introduction of tasks in class, and release the "entry test The teacher publishes task resources and pre-reading resources on the course platform to prepare for the introduction of the task in class, and publishes an "entry test" to test the effect of students' pre-reading, adjust teaching strategies and prepare knowledge for the task. The aim is to develop independent learning skills and improve programming abilities. The teacher introduces the lesson content "The 20th Party Congress Report" word cloud map, and throws out the practical training task: Python programming to read the content of the 20th Party Congress Report. txt file and draw the "20th Party Congress Report" word cloud map using the party flag picture. Through surveys and tests on the Blue Ink Cloud Class, the teacher determines which content is suitable for students to learn before class, which content is suitable for classroom organisation and which content is suitable for consolidation and improvement after class; then posts discussion topics on the Cloud Class platform to understand the students' foundation and the problems they need to solve. Based on the questions and feedback collected, teachers create and collect relevant video and document resources, publish them in Learning Connect and set task points based on the content. Students complete pre-test feedback and submit questions on the platform so that teachers can understand their students' knowledge base before class and provide a basis for classroom teaching.

3.1.2 Learning in the classroom - P

Students in the lesson: clarify the learning task, learn the objectives according to the task requirements; record the main points, discuss the plan and form a scheme; design or debug according to the task requirements, solve field problems; present on stage, explain the design division of labour and analyse the conclusions. Teachers issue tasks, clarify course tasks; hands-on code demonstration for principle analysis and explanation, roving guidance and Q&A, organise students' self-examination, present results on stage, carry out self-assessment, mutual assessment and teacher assessment. Explanation of python common third-party libraries through teacher's prior knowledge

The knowledge points will allow students to gradually, circularly master the methods of implementing cool word cloud maps and gain insight into the methods and processes of visualising text data analysis with the jieba and wordcloud libraries in Python.

3.1.3 After School Learning - PS

At the end of the lesson, students complete the extension tasks and out-of-home tests independently to summarise their knowledge and skills, form a report and upload it to the cloud class, as well as participate in the WeChat app poll. The teacher sets out the extension tasks and the "out and about test" and guides students to complete them. At the same time, students present their learning results and insights on stage in small groups through code presentations and PPT reports.

3.2 Assessment and evaluation

3.2.1 Assessment

(1) Attendance accounts for 10 points, using a combination of blue ink cloud classroom and teacher’s personal roll call. The full score is 10 points, with 0.5 points deducted for late arrival, early departure and leave; 1 point deducted for absence.

(2) The classroom timed challenge answer accounts for 20 points. In class, complete the task set within the time limit and upload the results of the task in the Blue Ink Cloud classroom.

(3) 10 points for online voting. On the WeChat app, the class participated anonymously in voting for the word cloud map entry.

(4) 40 marks for the comprehensive practical training report. Complete the practical training tasks assigned by the teacher after the class as required and submit the practical training report (word electronic version).

3.2.2 Evaluation

(1) Students evaluate the course through the Positive Management System, Maxis Evaluation System, etc.)

(2) Questionnaire survey, according to our course teaching quality index system concerns to form a questionnaire, with the help of our MYCOS platform, real-time guidance and understanding of the implementation of the course, the formation of survey analysis report feedback to the lecturers.

(3) Peer evaluation, a dynamic system of listening to courses by industry teachers above the associate level to understand the whole process of course delivery from a professional perspective and to effectively guide teachers to mention the institutional guarantee of teaching quality.

4. Conclusion

Table 2 Analysis of results

Fractional segment	<60	60-69	70-79	80-89	90-100
Number of people	3	3	7	15	9
Proportion	8.11%	8.11%	18.92%	40.54%	24.32%
Average score	79.19		Standard deviation	16.85	

Through the final analysis of the examination results of the class of 37 students as shown in Table 2, 3 of them gave up taking the examination due to personal reasons and failed 8.11%, 40.54% of students scored 80-89 and 24.32% scored 90-100, totaling 64.86%, the class performance has improved significantly compared with the past, and the teaching effect has been significantly improved. The average target achievement was good, and the students’ ability to apply theoretical knowledge, hands-on ability and evaluation ability were all significantly improved, combined with the application of the BOPPPS teaching mode of “task-driven” teaching method in the course of “python programming”, and the result-oriented teaching design mode of practical training tasks in the current classroom teaching. In the case of specialist students’ learning ability, the classroom attendance rate is not high, students are not motivated to attend classes, and their learning habits are poor, which effectively improves students’ enthusiasm and interest in learning, and deepens students’ mastery and understanding of theory and practice, but has little effect on very individual students. In future teaching should strengthen the concept of ideological education, all-round, multi-angle starting, more understanding of the students’ ideological situation, highlighting the individual needs of ideological education, to help form the right motivation for learning. To be a guide for students to refine their character, to be a guide for students to learn knowledge, to be a guide for students to think creatively and to be a guide for students to dedicate themselves to the motherland, one cannot be missing.

References:

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