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The Backward Design of "Scientists who changed the world"

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Abstract: The backward design of curriculum benefits teachers and students, because its first stage is desired result which runs through the whole process of teaching. Thus, this allows students and teachers to monitor their respective learning efficiency and teaching outcomes at any time. Moreover, it also includes supporting evidence and learning activity aligning with the first sage. All these can successfully avoid textbook coverage and activity-oriented teaching. The most important is to promote teaching and learning.

1. Introduction

Backward design, also called backward planning or backward mapping, is a way of curriculum plan, which educators use to design instructional techniques and learning activities to achieve desired learning goals. Backward design begins with the objectives of a unit or course—what students are expected to learn and be able to do—and then proceeds "backward" to create lessons that achieve those desired goals. It goes against the traditional teaching process——locating a particular topic, selecting a resource, choosing specific instructional methods, causing learning and assessing students' understanding of material, from which educators can get the learning outcome by hope. Otherwise, the backward design approach is more by design than by hope. It is also called as the three-stage approach: identify desired results; determine acceptable evidence and plan learning experiences and instruction. Identifying desired results requires educators consider their goals, examine established content standards (national, state, district), and review curriculum expectation. The way in the second stage encourages teachers and curriculum planner to first "think like an assessor" before designing specific units and lessons, and thus to consider up front how they will determine if students have attained the desired understands. According to the desired results and the assessing standards, educators design a list of activities in orders. As a matter of fact, backward design provides a gestalt: the desired results are like the light, guiding the direction for our study; the assessments (stage 2) and learning activities (stage 3) are aligned to the desired results (stage 1).[1]

"General Senior High School Curriculum Standards"（abbreviated as "Curriculum Standards" in the following）has pointed out students in senior high schools should have such cultural competencies——comprehending the diversity and richness of world cultures and having a sense of community with a shared future for mankind; analyzing and distinguishing the value orientations reflected by cultural phenomena, and consciously strengthening cultural confidence; drawing on fine cultures and cultivating correct values, positive aesthetic tastes and high moral emotions; telling China's stories in English and describing and interpreting Chinese and foreign cultural phenomena in English.[2] English teachers in our country use Curriculum Standards as blueprint to guide our teaching activities.

2. The Case of Backward Design on "Scientists who changed the world"

This paper will take "Scientists who changed the world" as an example. This unit is from 2020 senior English, unit 4 in book 3, which is published by Yilin Press. The theme of this unit is "man and society" and the topics involved is "scientists, scientific discoveries and scientific spirits". The reading part of this unit is a news report on a Chinese scientist, Tu Youyou, wins 2015 Nobel Prize. Then, design the curriculum plan of this unit from "backward".

2.1. Stage 1: to identify desired results

The designing contents in the first stage include learning objectives and the learning results that represent the achievement of the goals.[3] Learning objectives include unit objective and ideological objectives. The learning results include anticipating transfers, anticipating understanding, knowledge and skill to be acquired.

Unit Objectives. They are composed of key competencies and English curriculum objectives. The concrete unit objectives are as the following. This unit requires students to read a news report on a Chinese Nobel Prize winner; write a plan for the school Science Festival; read a lecture transcript about the value of science and make a fact file about a scientist.[4] These are mainly connected with language use, cultural awareness, thinking capacity and learning ability in fields of key competencies. For example, students can analyze and understand contents and structure to locate information. They can also learn about the inverted pyramid of news report. As a result, they can have access to information in many ways to form their ideas about a scientist in his field. Moreover, they have to appreciate scientists' spirits. At the meantime, they'd better apply the structure or language points to telling other Chinese scientists' stories.

Ideological Objectives**.** After learning this unit, students can appreciate the value of science, witness the development of science and talk about the relationship between the development of science and the progress of human society. The students are guided to perceive, analyze and discuss the cultural connotations and value orientation in the texts. They also absorb the essence of Chinese cultures, develop cross-cultural communication strategies and ability actively, enhance national identity, strengthen cultural confidence, and spread and promote the socialist culture with Chinese characteristics.[2]

2.2. Stage 2: to determine acceptable evidence

In the first stage, the desired results just include four facets: knowledge, skill, understanding and transfer. It will focus on assessments of transfer; in addition, it also gives supporting evidence of understanding from six facets. A valid assessment of transfer ability requires two elements not found in mere recall: a novel look and feel to the task, and c context that requires students to tailor prior learning to a concrete situation. Students must be able to make these judgments and

applications independently.[5] For example, after the unit, students use their writing skills (a general repertoire) to develop a news report to the people around you (a specific task, purpose, and audience). Understanding as transfer is revealed through six facets of understanding, as the followings. 1) explanation: what is inverted pyramid of news' structure? What are the elements of news? What are the features of title and language of news? What are the characteristics of news stories about people? 2) interpretation: why did the scientists change the world? How did they change the world? What has been the impact of scientist's contribution? 3) application: what does a scientist have in the informational era if he wants to change the world? 4) perspective: how do the students evaluate 2024 Nobel Prize winner in chemistry? 5) empathy: students are asked to give a news report about 2024 Nobel Prize winner in chemistry as a journalist. 6) self-knowledge: how do students introduce another famous scientist to the other students? How do students introduce a common person around them to other people just because of something that the common person did? All these six facets can prove that students achieve the desired results. In fact, some tests, quizzes, prompts, etc. can be used as supplementary ways to check the learning and teaching outcomes. Wisely, students' self-assessment and reflection are necessary as supporting evidence of desired results.

2.3. To plan learning experiences and instruction

It's time to take into consideration—— the sequence of teaching and learning experiences; the key teaching and learning activities. It will use WHERETO[1] to code each activity.

W—— Ensure that students understand WHERE the unit is headed, and WHY

H—— HOOK students in the beginning and HOLD their attention throughout.

E1—— EQUIP students with necessary experiences, tools, knowledge, and know how to meet performance goals.

R—— Provide students with numerous opportunities to RETHINK big ideas, REFLECT on progress, and REVISE their work.

E2—— Build in opportunities for students to EVALUATE progress and self-assess.

T—— Be TAILORED to reflect individual talents, interests, styles, and needs.

O—— Be ORGANIZED to optimize deep understanding as opposed to superficial coverage.

The list of tasks in the unit are as follows.

1) Tell the students the desired results and they should have the ability of getting information by surfing the internet and matching language ability of writing a news report about a person's story. Introduce the theme and the topics of the unit. (W)

2) Ask students to match the scientists and their contribution and make a brief introduction of the scientists combined with the pictures to activate their related knowledge storage and attract their interest. (W, H)

3) Guide students to read the news report on Chinese scientist wins 2015 Nobel Prize to know about the inverted pyramid structure, the language features and the characteristics of the titles and the writing methods of a news report. Accumulate related expressions and sentence patterns in order to prepare for their speaking and writing tasks. (E1)

4) Brainstorm to get their own patterns of a new report on a person and do self-assessment and peer assessment. After that, revise their patterns. (E1, E2, R)

5) Read the news report and "the value of science" to do group work on appreciating the value that science has brought and conclude the sprits that scientist have in common. (E1, E2, R, O)

6) Guide students to strengthen their cultural confidence and tell other Chinese scientists' stories. (R, O)

7) Share the ideas about 2024 Nobel Prize winner in Chemistry. (T)

8) Write a news report about a common person around you and do group work on their own writings. (T, R, O)

9) To conclude what they have learned and display their weak points. (E2)

3. Reflections on the backward design

The backward design reverses the traditional model of curriculum design——deciding teaching objective from curriculum standards or textbooks, choosing teaching resource and material, and assessing their learning and teaching outcomes. Nevertheless, the backward design puts desired results and assessment prior to a list of teaching and learning activities. The advantages of the changed order are that the desired results continue throughout the whole teaching process; teachers and students are encouraged to use a circle-back approach to check whether their activities are aberrant from the goals or not. That's to say, the stage 1 is being as a guideline to monitor the whole teaching process.

It is wise that all the activities provided should be the supporting evidence for the desired results. Teachers design the activities because it can be needed for assessing targeted goals. Teachers hope for a return from these familiar and favorite activities and get revision to support the desired results.

According to the backward design , teachers would execute the last stage——suitable teaching methods and teaching material, which depend on their contribution to the desired results and assessing standards, not the popularity of instructional methods among educators.

The position of the textbook will be changed: it is not so important. In the past, textbook just dominates the teaching process as the primarily supporting resource. In nuit design——"Scientists who changed the world", teachers give more some supplementary material on 2024 Nobel Prize winner, which provides comparison, deep thinking among scientists in different countries and in more competitive information era, which gives evidence of desired results and assessment. It also changes the thinking dimensions of teachers and helps teachers go far in the process of curriculum planning.

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