Teaching English Public Speaking to Chinese Students of Science and Engineering Based upon Cognitive Load Theory

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Abstract. This thesis focuses on John Sweller’s cognitive load theory and probes into the possibility of teaching English public speaking to students in four steps: watch and read, watch and imitate, watch and retell, adapt and reproduce. The teaching materials and activities should be designed from easy to difficult sequence and from part to whole sequence so as to lower students’ cognitive load and to enhance their learning effectiveness.

Introduction

Generally speaking, university students of science and engineering in China are good at dealing with data, charts and experiments. They are noted for their keen observation, deep analysis and clear logic. But on the whole, they are not expressive enough to be active participants in English class in spite of the fact that they can score high in English written tests. They are not fluent and confident English speakers. In addition, they are also novice public speakers. Faced with a new course called English public speaking, they might feel overwhelmed. As is known to us all, feelings of success and low anxiety facilitate learning. What is the teacher supposed to do to alleviate students’ worries and anxieties in the first place and to boost their self-confidence in English public speaking in the second place? The answer lies in cognitive load theory.

1. John Sweller’s Cognitive Load Theory

Cognitive load theory was developed by John Sweller in the late 1980s. In cognitive psychology, cognitive load refers to the total amount of mental effort being used in the working memory. There are three types of cognitive load: intrinsic, extraneous, and germane. Intrinsic cognitive load is the effort associated with a specific topic. Extraneous cognitive load refers to the way information or tasks are presented to a learner. Germane cognitive load refers to the work put into creating a permanent store of knowledge, or a schema.

Cognitive load theory assumes human cognitive resources to be limited. When a learning activity requires more cognitive capacity than what a learner is equipped with, it causes an overload on the learner’s cognition, which eventually results in failure in the learning activity [1]. Cognitive load theory provides a direction for teachers to ponder on the design of pedagogical materials, presentation of the material and the interpretation of learning difficulties experienced by students. Intrinsic cognitive load has a lot to do with a teacher’s design of pedagogical materials. Intrinsic cognitive load is the inherent level of difficulty associated with a specific instructional topic. This inherent difficulty may not be altered by an instructor. However, many schemas may be broken into individual "subschemas" and taught in isolation, to be later brought back together and described as a combined whole [2]. Extraneous cognitive load is under the control of a teacher because it is generated by the manner in which information is presented to learners. By carefully designing a teacher can avoid loading learners with artificially induced barriers. Schema construction (or germane load) is highly related to cognitive load and is beneficial to learning. It is very important for teachers to reduce extraneous cognitive load and redirect the learner’s attention to cognitive
processes that are directly relevant to the construction of schemas. All in all, cognitive load theory provides a general framework and has broad implications for instructional design, by allowing instructional designers to control the conditions of learning within an environment or, more generally, within most instructional materials. Specifically, it provides empirically-based guidelines that help instructional designers decrease extraneous cognitive load during learning and thus refocus the learner’s attention toward germane materials, thereby increasing germane (schema related) cognitive load. [3]

2. The Application of Cognitive Load Theory to Teaching English Public Speaking

Cognitive load theory plays a significant role in teaching because of its assumption that “human cognitive capacity is limited, learning difficulty arises when an overwhelming amount of information in need of being processed exceeds the working capacity.” [4] When it comes to teaching English public speaking, the teacher, who is also the instructional designer and speech instructor, really needs to spare no efforts to design class activities which students feel most confident in and generate least anxiety. If the teacher approaches teaching students in this direction, then student’s cognitive load is more likely to be in line with their learning. In turn, students feel more prepared to be challenged by more difficult activities in public speaking class. As far as I am concerned, the application of cognitive load theory to teaching English public speaking can be conducted in the following four steps: watch and read, watch and imitate, watch and retell, adapt and reproduce. Besides, the teaching materials and activities should be designed from easy to difficult sequence and from part to whole sequence so as to lower students’ cognitive load and enhance their learning effectiveness.

2.1 Watch and Read

As mentioned previously, on the whole, university students of science and engineering in China are not expressive enough to be active participants in English class. Since they are not fluent and confident English speakers and they are also novice public speakers, at the very beginning the top priority of the teacher is to help them loosen their tongues in class. The simplest and easiest way is reading aloud. Reading aloud is more enjoyable when it is initiated by watching video clips from an English movie. In addition, the teacher should wisely choose reading materials no more than 50 words just to encourage more students to read in public. For example, the two mini-speeches delivered by the two leaders of the two opposite armies for boosting morale before war from the movie *Troy* are the ideal materials for class use:

① All my life I’ve lived by a code. And the code is simple: honor the gods, love your woman and defend your country. Troy is the mother to us all. Fight for her!

② My brothers of the sword, I’d rather fight beside you than any army of thousands. Let no man forget how menacing we are, we’re lions! Do you know what’s there, waiting, beyond that beach? Immortality, take it! It’s yours!

After watching the video clip twice, students are first encouraged to choose one mini-speech and read aloud by themselves. This may better prepare them for reading aloud in front of other classmates. Next, when they are so frequent in their own reading, they are more willing and competent to read aloud in public. The purpose of this instructional design is to build up their self-confidence in speaking and to feel the power of speech through watching and reading.

2.2 Watch and Imitate

Once students realize it is not that scary to speak English in public, they are right on the way to overcoming shyness and anxiety. At this point the teacher can move one step further by encouraging them to watch a video clip and imitate the speaker. Still the material for imitation should be strictly limited to no more than 100 words. If the material is too long, it will make artificially induced barriers that intimidate and silence the students who are just beginners. The following materials are two examples:

③ See, so many of us stand here tonight because of their sacrifice, and longing, and steadfast
love, because time and again, they swallowed their fears and doubts and did what was hard. So today, when the challenges we face start to seem overwhelming or even impossible, let us never forget that doing the impossible is the history of this nation. It’s who we are as Americans, it’s how this country was built.

This is our chance to answer that call. This is our moment. This is our time to put our people back to work and open doors of opportunity for our kids; to restore prosperity and promote the cause of peace; to reclaim the American Dream and reaffirm that fundamental truth — that out of many, we are one; that while we breathe, we hope, and where we are met with cynicism, and doubt, and those who tell us that we can't, we will respond with that timeless creed that sums up the spirit of a people: Yes We Can.

Material ③ is chosen from one of Michelle Obama’s speeches in support of Barack Obama’s re-election. Material ④ is chosen from Barack Obama’s victory speech after his first election. Both are motivating in content, intermediate in difficulty and moderate in length. They can be used as helpful visual aids for speech practice. Imitation doesn’t necessarily mean speaking without notes, here it only means imitating by reading aloud with the notes on the screen. What’s more, imitation is a two-step process: the imitation of the speech itself goes first; the imitation of the manner in which the speech was delivered goes second. The purpose of this instructional design is to further boost students’ self-confidence in speaking and to raise their awareness of the power and beauty in speeches.

2.3 Watch and Retell

Both reading and imitation can be viewed as the oral repetition of the given visual materials. But English public speaking is more than simple repetition. That’s why students should be encouraged to retell on the basis of the given visual materials. Retelling is more difficult than repetition but less challenging than reproducing, thus it is the suitable class activity within students’ reach after they are psychologically ready to try more and speak more. Still, a well-designed teaching process is needed so as not to create cognitive overload: firstly, the length of the chosen material shouldn’t exceed 150 words; secondly, some key words should be highlighted to help students with their retelling; thirdly, the teacher may offer differentiated practices to those whose cognitive load levels in speech skills are different. The following is an example of the instructional plan:

8 years ago, I was just another new immigrant, finding it so hard to earn my living by selling the art in the street. But I believe, if I work hard enough, one day I’ll become one of you: a truly successful American. Today, this award proves that America is a true land of opportunity. I’m the living proof of that. I have a successful career, a loving wife, and an adorable child. I would especially like to say thanks to my boss —— Mr. John Queenland. Finally, I would like to say thanks to all of you. I love you. I love America. And this is my piece of American dream. Thank you!

Some Key Words for Reference

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<thead>
<tr>
<th>8 years ago</th>
<th>immigrant</th>
<th>But I believe</th>
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<tbody>
<tr>
<td>Today</td>
<td>a true land of opportunity</td>
<td>the living proof</td>
</tr>
<tr>
<td>Finally</td>
<td>give thanks to</td>
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Material ⑤ is chosen from the movie Treatment and is an award-winning speech. There are no unfamiliar words or long and complicated sentence structures that might discourage students at first sight. What’s more, students are given some key words for reference in their retelling after watching the video clip, which is of great assistance in lowering the difficulty of the speaking task. Students with higher level in oral ability may choose to retell the whole speech in their own ways while students with lower level in oral ability may just choose to retell a part of the speech. The purpose of this instructional design is to provide smooth and natural transition for students who are supposed to deal with the practice of reproducing next.
2.4 Adapt and Reproduce

The charm of giving a public speech lies in its informative or persuasive power to influence the audience through flexible and creative verbal art. This cannot be achieved without the speaker’s efforts and skills in adapting the already-known information and reproducing his/her own language and message. After going through the initial preparatory stage of reading, imitation and retelling, students finally come up to the more demanding stage of adapting and reproducing. Once again, careful design of class activity is a must: on one hand, the chosen input material before speaking should be easily adapted to half-a-minute or one-minute speech; on the other hand, students are encouraged to speak extemporaneously, that is to say, they are encouraged to reproduce the input information with their own outline and language. The following is an example of the instructional plan:

*If we don’t act now, my island nation will be submerged by the rising sea. If we don’t act now, the Arctic ecosystem will be lost forever. If we don’t act now, our forests will turn into deserts. Higher temperatures and droughts will threaten our farmlands. Our emissions will continue to pollute the air. If we don’t act now, warmer oceans will cause more severe storms like hurricane Katrina. If we don’t act now, this is climate change. There is something you can do about it. Help Seal the Deal. You can help us seal the deal at the UN Climate Conference in Copenhagen. Sign the climate petition online and make your voice heard. Help us Seal the Deal.*

This input material is a video made by some environmentalists to raise public’s awareness of the harm of climate change. Although it is not a speech, it is a wonderful material to be adapted to half-a-minute or one-minute speech. Instead of providing students with some key words for speaking directly, the teacher encourages students to speak extemporaneously on the basis of their own outlines and language preferences. Repeated practices of this similar kind can get students well on the way to becoming more experienced public speakers.

Conclusion

English public speaking is of great significance to university students of science and engineering in China not only because it can improve their oral ability in English but also because it can help tap their leadership potential through public speaking. But these students are just beginners when they are faced with this new course, so beginners’ classroom experience is very critical to their future learning success. Cognitive load theory provides good guidance in teaching: teaching materials should be carefully chosen and teaching activities should be appropriately designed from easy to difficult sequence and from part to whole sequence so as to lower learners’ cognitive load and ensure a successful learning experience bestowed on novice speakers from the outset. The four-step instructional design on the basis of cognitive load theory: watch and read, watch and imitate, watch and retell, adapt and reproduce, can lower learners’ anxiety, boost their feelings of success and enhance their learning effectiveness.

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References

