How to Promote Deep Learning of Chinese Language Learners in Asynchronous Interaction Mode: Taking Recorded Courses as an Example

Xia Zhan(✉)

Chengdu Polytechnic, Chengdu 610041, China
xizzxx@126.com

Abstract. From the cognitive perspective, this article takes the recorded course as an example to analyze the online courses in asynchronous interaction and study how to promote deep learning of learners who study Chinese as a second language under such interaction mode. The ways to stimulate deep learning are given by studying the influence of asynchronous interaction on the learning process and objectives of deep learning: interactive chains should be established to stimulate active learning and inquiry-based learning which leads to deep learning. Furthermore, deep learning can be enhanced through elaborately designed content and presentation, specifically, making courseware conform to the principles of multimedia teaching and utilizing learners' general cognitive ability and language features.

Keywords: asynchronous interaction · deep learning · learning Chinese as a second language

1 Introduction

Second language teaching is highly dependent on actual scenarios and communicative environments. Synchronous interaction can simulate such scenarios and environments to a certain extent. Therefore, live broadcast teaching has become one of the mainstream modes of online teaching in recent years. The research on live streaming courses has also received more attention, while the research on recorded courses under asynchronous interactive is still insufficient. The importance of asynchronous interaction is not inferior to that of synchronous interaction in second language online teaching. The flexibility of time and place determines that the asynchronous interaction mode will always have a place in online teaching. During the epidemic, the curriculum of online courses for overseas Chinese language learners confirms this view. Affected by the time difference and the network conditions in the countries where international students live, the actual use of recorded courses is no less than that of live courses. For example, 80% of Chinese language skills courses from Beijing Language and Culture University are in recording mode, 73% of that in live mode, and 83% of that in both recording and live mode [1].

Compared with synchronous interaction, asynchronous interaction has the advantage that "students can control their own learning time and progress to a certain degree, having

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the opportunity to reflect" [2]. Asynchronous interaction provides learners with time slots for deep learning in their learning progress. What influence does asynchronous interaction have on the learners' learning process? What are the specific objectives of deep learning? How to promote the deep learning of Chinese language learners in recorded courses of asynchronous interactive mode? This paper intends to illustrate these issues from a cognitive perspective.

2 The Influence of Asynchronous Interaction on Learners' Learning Process

Moore pointed out that interaction in teaching is generally divided into three types: learner-content interaction, learner-teacher interaction, and learner-learner interaction [3]. According to the time at which the interacting sides receive feedback, the interaction is divided into synchronous interaction and asynchronous interaction. Synchronous interaction is real-time and non-repeatable, and the interacting participators need to communicate within a specific time, while asynchronous interaction, which provides learners with sufficient time to understand information and readily leads to in-depth discussions, is non-real-time and repeatable [4, 5].

Recorded courses based on asynchronous interaction transmit more knowledge content and give learners a longer reaction time than live streaming courses with synchronous interaction. Learners can follow their learning process and have sufficient time to merge newly received and existing knowledge into one. With new knowledge being sorted and being classified into the existing knowledge schema, learners' knowledge system is reconstructed. In addition, learning through the asynchronous interactive mode enables learners to improve autonomous learning ability, promote the development of metacognition, and adjust their learning behaviors and strategies.

However, asynchronous interaction focuses on input and provides delayed feedback most of the time, causing potential negative impacts on the learning process: learning in the asynchronous interaction mode is usually dominated by unilateral input, lacking real-time interaction from teachers and other learners. Although more information can be transmitted within the same period, the learner's attention capacity is limited, particularly without much interaction. Unless learners have strong learning motivation, it is difficult for the brain to maintain the information-processing state for a long time; information, which enters working memory after being filtered by attention, requires timely and effective processing to get into long-term memory. However, the input forms of the information under the asynchronous interaction mode tend to be relatively simple, and there is a lack of real-time interaction from teachers and other learners. It is not conducive for the brain to process the information elaborately; the feedback lag is likely to cause passive learning, which is adverse to the generation of deep learning and the realization of advanced cognitive goals.

3 The Objectives of Deep Learning

Knowledge and information can be transmitted through online courses with today's information technology. It is of no value if online courses only complete the transmission of knowledge and information without deepening students' learning experience.

Attention should be paid to deep learning in the information technology environment [6]. Therefore, the recorded courses in asynchronous interactive mode should be aimed at promoting deep learning of learners.

Deep learning emphasizes the transfer and application of knowledge, the construction of knowledge, and the cultivation of thinking ability. It focuses on learners' higher-order thinking. If deep learning is achieved, a learner can take advantage of various learning strategies to process knowledge based on understanding, establish connections between existing and newly learned knowledge, and apply what the learner has learned to solve problems in practical situations [7]. The opposite is shallow learning, which means grasping the plain meaning of information through memory. Contrasting with Bloom's Taxonomy of Cognitive Objectives revised by Anderson et al., shallow learning can correspond to memorization and understanding, while deep learning corresponds to an application, analysis, evaluation, and creation [8]. In the following table, the objectives of deep learning at such levels are illustrated by taking vocabulary and grammar structures teaching as an example (see Table 1).

Table 1. The objectives of deep learning.

Cognitive level		Vocabulary	Grammar structures
Shallow learning	Remember	Memorize the forms, meanings, parts of speeches, and fixed collocations of words.	Memorize the forms and meanings of grammar structures.
	Understand	Understand the components as well as the word-building ways, and be able to recognize, translate and paraphrase words and phrases.	Understand the prototype of grammar structures, and be able to translate and paraphrase the sentences with the structures.
Deep learning	Apply	Apply words and fixed collocations to complete communicative tasks according to a specific situation.	Apply grammar structures to complete communicative tasks according to a specific situation.
	Analyze	Analyze the usage conditions of words and fixed collocations, distinguish words from synonyms and compare with antonyms.	Analyze the usage conditions of grammar structures, and compare them with similar structures.
	Evaluate	Evaluate whether words are appropriately used in a specific context.	Evaluate whether the grammar structures are appropriately used in a specific context.
	Create	Use words and fixed collocations at the discourse level.	Use grammatical structures at the discourse level.

With current technical means, learners can reach remember level and understand level through recorded courses. The cognitive levels of shallow learning are not challenging to achieve in the asynchronous interactive mode. However, achieving the cognitive levels of deep learning involves learners' higher-level cognitive ability and the ability to work with multiple cognitive abilities simultaneously. Specifically, the apply level is to train the preliminary ability of problem-solving; the analyze level is to train the reasoning ability which refers to distinguishing, classifying, comparing, and summarizing knowledge; the evaluate level is to cultivate the learners' judge ability based on specific standards and critical thinking; the create level focuses on the ability of planning and comprehensive application, with which learners can process the information comprehensively and reconstruct them into a whole. It can be seen from the four cognitive levels of deep learning that the learner's initiative and inquiry are the most important, and the teacher plays the role of a guide in the whole learning process, giving verification and feedback to the learner's attempts. Among them, the apply level put the highest demand on the timeliness of interaction.

4 Promoting Deep Learning with Interactive Chains

The learner's initiative and inquiry depend on interaction, as the interaction process is the basis for stimulating initiative and inquiry. Generally, the basic steps of the recorded course under asynchronous interaction include lectures, exercises and activities, and feedback. Interaction is a two-way process. In the practice and activities step, interaction, in which learners, learning content, teachers, and other learners are involved, is highly in demand. This step and the feedback step form an interactive chain, while lecturing is a one-way output from teacher to learner. To enhance learners' initiative, it is necessary to integrate the lecture step into the interaction formed by the other two steps so that the entire learning process can form a complete interactive chain.

In asynchronous interaction, the hysteresis provides learners with a time gap for thinking and causes untimely feedback. Some technical on the teaching platform can help achieve machine-generated "synchronized interactions" in asynchronous interaction mode.

There are online and offline exercises and activities. According to whether or not they are interspersed in the explanation, online exercises and activities are divided into online synchronous exercises and activities (in class) and asynchronous exercises and activities (after class). Corresponding feedback is instant feedback and non-instant feedback (see Fig. 1). Instant feedback in asynchronous interaction can be achieved in two ways: one is using instant chat tools such as WeChat and QQ, and the other is using human-computer interaction on online teaching platforms. For example, teachers can preset answers and explanations of exercises on platforms such as MOOC, Thunder Class, and Sojump, through which students can automatically obtain feedback after submitting their answers. Non-instant feedback means include emails, forums, network learning communities, etc.

Synchronous exercises and activities and instant feedback are suitable for testing a single knowledge point in class due to their strong timeliness, while asynchronous exercises and activities and delayed feedback are suitable for inspecting the comprehensive

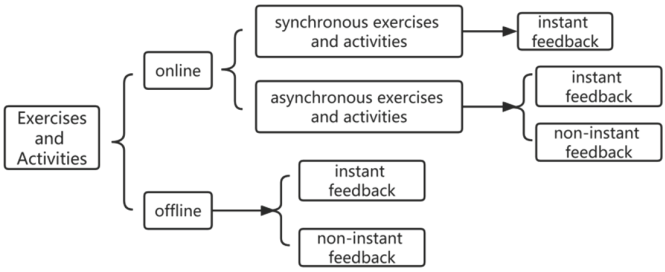

Fig. 1. Instant and non-instant feedback of exercises and activities.

Table 2. The design of grammar structure teaching in the recorded course.

NO.	Steps	Descriptions
1	Online synchronous exercises and activities	First, several sentences with target grammar structure are presented with scenarios in a video. Then the learners are required to summarize the prototype and usage conditions of the target grammatical structure by doing preset online questions.
2	Feedback (With lecture)	Instant feedback is prepared on the platform and learners can verify the answers after submission. And then the learners can watch the presetting explanation video for explanation.
3	Online synchronous exercises and activities	Learners complete exercises by an online platform according to given situations.
4	Feedback (With lecture)	Instant feedback is prepared on the platform. After submitting the answers, learners can verify and watch the presetting explanation video.
5	Online asynchronous exercises and activities	After class assignment: posting and giving comments through an online forum or learning community.
6	Feedback	Non-instant feedback

application of knowledge after class. In face-to-face or synchronous interaction mode, learner-content interaction, learner-instructor interaction, and learner-learner interaction occur at the same time. These interactions can mutually complement expanding learners' understanding of learning content. However, such interactions mainly occur separately in asynchronous interaction mode, so it is necessary to make learners observe the interaction between teachers and other learners and the interaction among learners. For example, through the learning community, a non-instant feedback way of exercises

and activities, learners can interact with teachers and other learners by posting and replying based on the given tasks. The grammar structure teaching is taken as an example to illustrate the above analysis (see Table 2).

The above teaching steps consist of three interactive chains. Steps 1 and 2, 3 and 4, and 5 and 6 form interactive chains respectively, in which learners are the main subject. When the learner completes learning behavior, instant feedback and lecture from the teacher are given through the platform. The lecture here is not a unilateral input but a response triggered by the learner's learning behavior, interacting with the previous learning behavior. The formation of the interactive chain is the premise of conducting inquiry-based learning, which can stimulate learning enthusiasm to a greater extent than the traditional "lecture-practice-feedback" model, creating conditions for deep learning.

5 Promoting Deep Learning Through Content Presentation and Design

The learner-content interaction is implicit, embodied in the way of presentation, while the learner-teacher interaction and the learner-learner interaction are explicit, embodied in the design of exercises and feedback. To facilitate learners' deep learning in asynchronous interaction, in addition to the interactive chain analyzed above, attention should also be paid to the design and presentation of learning content. Several suggestions are proposed as follows:

5.1 Following the Design Principles of Multimedia Teaching

Mayer put forward seven principles for presentation design in multimedia teaching and emphasized the importance of the presentation design for learners, especially those with low knowledge levels [9]. These principles are also significant for designing recorded courses in asynchronous interaction mode:

5.1.1 Reducing Cognitive Load and Redundant Information

Interesting pictures or sounds are sometimes added to the courseware to attract learners' attention. However, experiments have shown that attractive but irrelevant information cannot enhance learners' learning, occupying their memory capacity instead. A concise presentation enables learners to focus on critical information and organize them into meaningful forms [9].

5.1.2 Using Dual-Channel Input

There are two information processing channels for learners, which are used to present visual and auditory materials respectively. When both channels are used to process input information, the learners' cognitive resources will be used effectively, and better learning can be achieved [10].

5.1.3 Texts and Pictures are Presented in Close Proximity in Space and Time

Studies have shown that the spatially adjacent presentation of texts and corresponding pictures is better than the separated presentation of those, and presenting both simultaneously is better than presenting sequentially. The proximity principle allows learners to build a cognitive connection between texts and images, building a relationship between corresponding visual and verbal manifestations [9].

6 Utilizing the General Cognitive Ability of Learners

Deep learning is a cognition-processing process as well as a knowledge-constructing process. when receiving new information, learners integrate them with known information. in the following problem-solving learning process, learners need to constantly revise and reorganize the integrated information, which involves general cognitive abilities such as attention, working memory, planning, monitoring, understanding, reasoning, and generalization. As taylor put it, any in-depth analysis of language phenomena is based on human cognitive ability [11]. Language acquisition depends on learners' general cognitive ability [12], so designing teaching interaction must consider it. the methods guiding learners to solve problems include analogy, means-goal heuristic, induction, deduction, etc. here elaborates the former two methods as follows:

The analogy is to solve a new problem with the method previously used on similar problems before. For example, when a learner learns the structure of "verb phrase + 的 + noun" with a modification function, it can be analogous to the previously learned structure "adjective + 的 + noun" which has a similar prototype and function with the target structure. Hence "adjective + 的 + noun" structure can be reviewed first, and then the context with the "verb phrase + 的 + noun" structure is given to allow learners to infer the structure of "verb phrase + 的 + noun".

When conducting the means-goal heuristic, the problem is decomposed into several sub-problems. Then these sub-problems are handled by reducing the difference between the starting state and the goal state [13]. For example, the communicative task of "inviting friends to a birthday party" can be divided into several sub-tasks: choose the invitee and ask if they are available; give the reason for the invitation and tell the party time and location; express expectation or regret if the invitee receives the invitation or not.

6.1 Applying Language Features

Cognitive linguistics believes that language has three features: experiential, metaphorical, and etymological [14]. The experiential feature is the premise of the other two. Language reflects human perception and cognition of the world. When people receive language information, the image and sense are generated based on each one's own experience to help people understand the information. The metaphorical feature makes experienced bodily sensations and experiences abstract and conceptualizing. The etymological feature explains the connection between language form and meaning.

In face-to-face drills, teachers can directly use the experiential feature, such as body movements and props, to allow students to combine physical perception and language. However, it is difficult to achieve such direct experience in asynchronous interactive

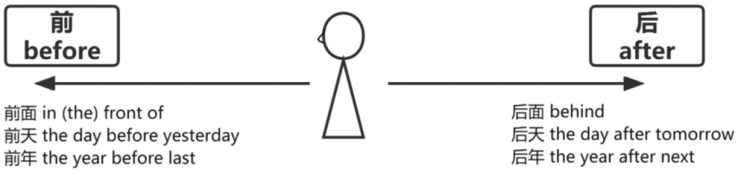

Fig. 2. Image schema of locations words"前" and "后".

teaching. Therefore, it is replaced by image presentation. For example, when practicing the "把" structure, learners are given several video clips with a particular context, and they are expected to choose the appropriate clip according to the given sentence with the "把" structure.

According to the metaphorical feature, one inspiration for content designing under asynchronous teaching is to place more importance on image schema. Image schema links learners' abstract concepts and concrete structures [15], and involves learners' cognition of spatial relationships as well, which is conducive to understanding concepts, analyzing metaphors, reasoning, etc. [16]. For example, the location words "前" and "后" refer to the concept of time as well, and it is easier to understand with the schema (see Fig. 2).

7 Conclusions

In order to promote learners' deep learning in asynchronous interaction mode, the adverse effect in asynchronous interaction should be considered, and the corresponding compensation strategies should be adopted as well according to the objectives of deep learning, such as setting up the interactive chains and attaching importance on content design and presentation. It is notable that the general cognitive abilities of learners and features of language implicitly and positively impact the learning effect. Thus, teaching design under asynchronous interaction mode involving those factors can enhance the deep learning of learners.

With the development of technology, there will be more possibilities for online teaching in the asynchronous interaction mode in the future. This article mainly analyzes how to promote deep learning from the perspective of curriculum design. Further research can concentrate on the learner and analyze the development of the learner's metacognition in the asynchronous interaction mode.

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