

An Enlightenment of 4C/ID Model for Principles of Teaching Ability training for Normal Students

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Abstract. This paper reviewed the problems of principles in the training of normal students, provided integration principle, synchronism principle and supportive principles through the explanation of 4C/ID model, and gave a constructive idea for improvement of the training in teaching ability of normal students.

Keywords: 4C/ID model, teaching ability, principles

1. Introduction

The development of education has already been a key part in the development of the modern society, thus to set up a large, professional and high-qualified group of teachers becomes the common task in front of governments all over the world. The study of the development of teaching profession is a hot topic in the field of international teacher training and has been widely concerned, and the trainings of teaching ability in normal universities and schools set the important foundation of a whole development for a professional teacher. Teaching ability is one of the necessary conditions for a future teacher, it helps students combine the education theory and subject knowledge into a concrete instructional measures[1]. Undoubtedly, teaching ability will affect the result of instruction, thus strengthening the training of normal university students is an essential act to enhance the teaching ability for the future teachers[2].

In China, the training for teaching ability in normal universities is always arranged in the third year, called as educational practice, it usually lasts 4-6 weeks. This golden time should be a chance for students to use the pedagogy, educational psychology and subject knowledge learned at class in the real surroundings with the help of teachers. And accompany with the teaching practice, students accumulate the implicit educational experiences and teaching art by acting as main body[3]. The problems and puzzles in the class and summary and reflections after class will give a full picture of the complexity of instruction and it helps students to solve instructional problems in a more creative way, meanwhile, forming their own teaching styles. In most normal Universities, the training situation is not very optimizing. The causes to this fact are various. Except for the management and system problems of normal university itself, we still need a broad perspective towards the current cultivation principles and methods. There is still a long way to go to improve the model of normal school students teaching, especially in the teaching practice.

2. 4C/ID Model—Design for Complex Learning

4C/ID-model is developed originally by van Merriënboer and others in the early 1990s for the design of training programs for complex skills. It discusses the structure of training blueprints for complex learning and associated instructional methods. The basic claim is that four interrelated components are essential in blueprints for complex learning:(a) learning tasks,(b)supportive information,(c)just-in-time(JIT) information, and(d)part-task practice[4]. Figure 1 shows the graphical view on the four components. This instructional design model supplies a practical framework for complex skill training in many lines of business. It focused on the whole performance objectives, overturned the original thinking way on complex skill acquisition.

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According to this design model, it may not be effective to learn complex skills through the separation of the whole task first, because the sub-skills need coordination to become harmony. Obviously, Training based on 4C/ID instructional model provides an approach for a fast transfer in learning. Instead of partition of main learning task, this ID model reserves the integrality of learning task. Training programs for complex learning should be paid attention not only to the coordination and integration of constituent skills, but also to these qualitative differences in desired exit behavior of constituent skills. In order to identify these qualitatively different performance objectives, constituent skills are classified as either nonrecurrent or recurrent according to Merriënboer. For non-recurrent constituent skills the desired exit behavior varies from problem to problem situation, and is guided by cognitive schemata that steer problem-solving behavior (cognitive strategies) and allow for reasoning about the domain. For recurrent (routine) constituent skills the desired exit behavior is highly similar from problem to problem situation, and is driven by rules that link particular characteristics of the problem situation to particular actions[4].

The basic message of the 4C/ID-model is that environments for complex learning can always be described in terms of four interrelated components.

2.1. learning task

Learning task is used here generically to include case studies, projects, problems and so forth. The case should have a concrete, authentic, whole- task background that are provided to learners in order to promote schema construction for nonrecurrent aspects, and to a certain degree, rule automation by compilation for recurrent aspects. In this case, difficulty of instructional design shifts from separating a whole task to controlling the degree of difficulties on each task level. If we could not control the class of learning task properly, excessive cognitive overload will stop the exploring spirit of students. Compared to the traditional instructional design thinking, 4C/ID instructional model also follows relatively simple to more complex path, while here in the 4C/ID model, each class of task is a whole-task practice.

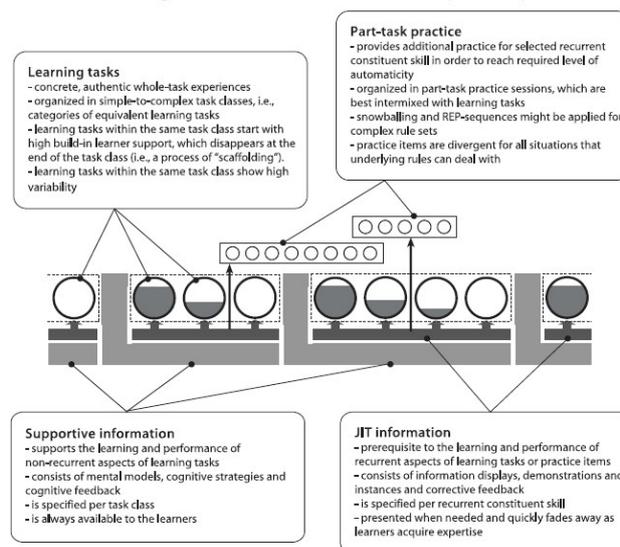


Figure 1. A graphical view on the four components [4]

2.2. Supportive Information

The aim to set supportive Information is for nonrecurrent aspects of learning tasks. Supportive information helps students learn to perform non-routine aspects of learning tasks, which often involve problem solving and reasoning. It explains how a domain is organized and how problems in that domain are (or should be) approached. It is specified per task class and is always available to learners. It provides a bridge between what learners already know and what they need to know to work on the learning tasks. It could be provide in many forms, for example, a video clip for intravenous injection from a skillful nurse with commendatory could be an effective supportive information for a new nurse. With the help of supportive information, students could gradually set up their own cognitive schemata, and conclude a system of problem-solving method, grow from an apprentice to an expert.

2.3. Just-in-time information

JIT information allows students learn to perform routine aspects of learning tasks that are always performed in the same way. It specifies exactly how to perform the routine aspects of the task and is best presented just in time; precisely when learners need it. It is quickly faded as learners gain more expertise. It includes prerequisite skills and correct Procedural directions. Instructional methods primarily aim at supporting recurrent (routine) constituent skills. JIT information could decrease cognitive load. For example, a flow chart with points for attention will be very helpful for a grinding tool worker.

2.4. Part-task practice

Part-task practice typically provides huge amounts of repetition and only starts after the routine aspect has been introduced in the context of a whole, meaningful learning task. Learning task will provide enough practices, while these practices are not enough for automation. In order to realize this goal, part-task practice is needed for extensive training. For example, a teaching practice activity could arrange some part-task practice on blackboard-writing to enhance the speed and aesthetic of writing for future teachers.

In summary, the 4C/ID model is a holistic design model and deals with complexity without losing sight of the separate elements and the interconnections between them. As such it is the opposite of atomistic design where complex contents and tasks are usually reduced to their simplest or smallest elements that can easily be transferred to learners through a combination of presentation (i.e., expository teaching) and practice. Table 1 show the comparison between this holistic 4C/ID model design approaches to traditional instructional approach.

Table 1. The comparison between this holistic 4C/ID model design approach to traditional instructional approach.

	traditional instructional approach	In 4C/ID model's approach
compartmentalization	teach knowledge, skills, and attitudes separately	a concrete, authentic, whole- task background
fragmentation	divide complex learning domain in small pieces, often correspond with specific learning objectives,	paying attention to the relationships between pieces
transfer paradox	highly efficient to reach specific learning objectives, hard to transfer	need more time to acquire while more easy to reach transfer of learning

3. An Enlightenment of 4C/ID Model for Principles of Teaching Ability Training

Teaching ability has three properties, first, comprehensiveness, it needs knowledge, technology and attitude. Secondly, particularity, teaching ability always connected with certain scenarios, third, stabilities, once the student acquired the ability, and this ability could sustain for a long time[5].so we could define teaching ability as a kind of ill-structured knowledge. It is hard to acquire this ability from simply from practice the sub-skills one by one. Atomistic design thinking could not work well in ill-structured knowledge like teaching ability. That is the main reason why the traditional training in teaching practice always works well at single task but bad in the holistic task completion. Look at figure 2; it listed parts of items in teaching ability training.

Some experts suggested using microteaching lab to improve teaching ability of students. They think it is an effective way to strengthen the professional skills as a teacher. We have to admit microteaching lab approach still follow atomistic design ideas, practice the single task one by one first. It deed improve the situation in the imbalance between education theory and instructional practice. While it also has it own problems. First, it cost longer time and more money. Second, students in less-developed areas can't afford this training model. Last, it is still hard in make students aware of the holistic aspects in teaching and the mutual influence among them.

The author suggests adopting 4C/ID model in teaching practice training for normal college students. Through the analysis of teaching ability characteristics, we find that it is a typical complex learning task.

Aiming at the ignorance of unconscious intact activity in training for teaching ability in normal colleges, the author presented 3 principles based on 4C/ID model; they are integrity principle, synchronism principle and supportive principle.

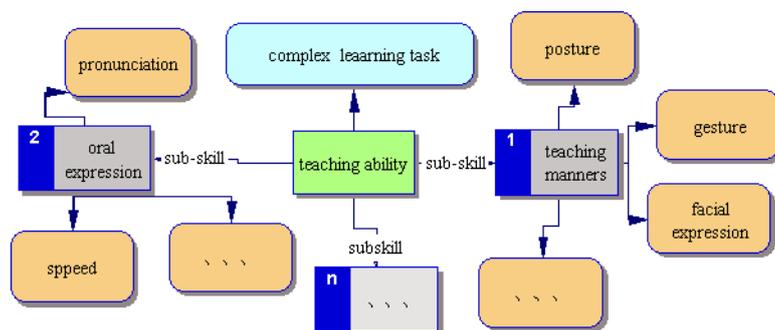


Figure 2 parts of items in teaching ability training.

3.1. Integrity principle

For a long time, normal universities and colleges always adopt a decomposition principle in teaching ability training in teaching practice, divide whole teaching activity into ten small sub-skills, including introducing skill, language skills, question asking skill, explanation skills, variety skills, strengthen skills, demonstration skills, blackboard using skill, ending skills and class organization skills[1]. And the training emphases are in the single item training. They believe one plus one equals two, which means single item training accumulation will naturally bring a holistic task completion in teaching ability practice.

Table 2 Examples of task class design in teaching ability training

Task class	time	introducing skill	language skills	question asking skill	explanation skills	variety skills	strengthen skills	demonstration skill	blackboard using skill	ending skills	class organization skills
Learning task 1	30分	yes	yes	no ⁺	yes ⁺	no ⁺	yes ⁺	yes ⁺	yes ⁺	yes ⁺	yes ⁺
Learning task 2	45分	interesting	Grammar correct	yes	logical	yes	Forms	Picture	in order	obvious	activities
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In fact, the single item training, for example introducing skill, should be trained in a large vision of holistic teaching activity. It is more difficult for normal college students to integrate all the single items into one class[5]. So the teaching practice should focus on the integrity principle. 4C/ID model provide some practical directions in intact task in complex learning, and this directions could be a helpful tool in training normal college students for teaching ability. It listed the possibility of integrity principle and its concrete approaches. Look at table 2.it listed examples of task class design in two round of teaching ability training

3.2. Synchronism principle

Table 2 also reflected synchronism principle. In traditional teaching ability training, we selected one single task to practice first, and then another. This routine seems fast, reasonable and scientific, but it lost simultaneity in the background of whole instructional events, thus it is hard to transfer this ability to new circumstance. Synchronism principle does not means no single sub-skills practice at all. In 4C/ID model, there is still part task practice for additional training. Well this principle always reminds us of following sequence in real instruction event. Even when you practice a single part of one task level, you should not forget the whole picture of problem setting and scenarios. For example, when you discuss with your students about the strategies he or she wants to use in class, it is very necessary to listen to their reasons for the whole task consideration rather than this strategy's benefits.

3.3. Supportive principle

Exemplary principles often listed in training teaching ability. Many experts convince that it is necessary to supply good cases for normal college students, for example, play instructional video of superfine teacher, distribute superior teaching plan. This paper believes that it is necessary to display the outstanding former cases in class to students. And the aim to give students these resources is to provide Supportive information. So we define it as supportive principle. As we all known, teaching is the combination of art and techniques[6]. It is hard to completely imitate from others. Because all the strategies a teacher used in class is highly related to the situation at that time. There is no answer for all kinds of situation in class. It depends on people, time, domain of knowledge and learning environment. Successful instruction may have many forms, while a few good examples could not include all the techniques. In teaching practice, we usually found students imitated strategies of some superfine teacher without consideration of the proper situation. This phenomenon demonstrated that simple supply a good example is not enough. It is very necessary to supply a just-in-time support.

In 4C/ID model, there are two kind of supports, just-in-time support for recurrent constituent skills and supportive information for non- recurrent constituent skills. All these supportive information is shown in the form of case study, including positive examples and counterexamples. Base on the 4C/ID model, teacher should seize the opportunity to provide proper cases (support) in the proper time. Mostly counterexamples are more valuable than positive examples. The aim to arrange teaching practice is not to create superfine teachers. It is neither practice nor necessary. The aim to arrange teaching practice is to help students familiar with the real class setting and practice the educational theories they have learnt in real classroom. It is an elementary preparation for future teachers. Obviously one responsible teacher should spend all his or her life time to improve his or her teaching abilities, and there is no ending. So studying counterexamples will help student grasp the key elements to notice in class soon. For example, to organize students to enjoy the outstanding color-matched PPT documents will still bring bad results, while to provide some bad color-matched PPT documents will leave students deep impression on how to treat background colors.

Secondly, for different kind of skills, the learning supports are quite different. According to 4C/ID model, for non-recurrent constituent skills, case study will help students to construct new cognitive schemata. For example, supply several video clips with some bad questions and good questions listed in class. Let students induce the characteristic of a good question. For recurrent constituent skill, learning support will help student reach the level of automatization.

4. Summary

Teaching is a practice of human improvement. It promises intellectual growth, humane awareness, economic opportunities, civic consciousness, and many other virtues[7]. So it is essential to cultivate a qualified teacher group for our children. Normal universities and normal colleges should make every effort to improve the situation of teaching practice in campus. It helps the future teachers acquire their initial motivation and energy. This article sets out a way of thinking about the problems in teaching ability training in a broader vision. It firstly defines this learning activity as a complex learning domain, and then develops three principles for teaching ability acquisition according to 4C/ID model, an instructional design model for complex learning. Undoubtedly, 4C/ID model supply a new approach for teaching ability training. It emphasizes the Integrity, synchronism and learning support in the holistic level. More researches and deign will be followed in this reformation.

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