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Practice of Didactical Autonomous-Collaborative Mode in the Cause of Natural Resources Science

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Abstract: According to the long-playing practical experience of teaching innovation in the Cause of Natural Resources Science, the researcher brought forward a didactical autonomous-collaborative mode with its content, technique and characters. It consists of three interdependent taches of independent preparation, discussion in classroom and communal summarizing, by which individuals with different study basic and capacity could learn from each other and make progress together. In these procedures scientifically constitute and manage the study groups is the setup base, adequately and efficiently utilize time is the crux, befittingly cope with inhomogeneous learners is the guarantee, and successfully induce students to put forward and envisage vary types of questions is the knack.
Keywords: Teaching, Autonomous-Collaborative Mode, Natural Resources Science.

INTRODUCTION

To modern didactical view of point, teaching is not only a procedure of students' obtaining knowledge thereout instructor's steering, also an integrated process of sensibility sharing, value communion, new information hunting and anima experience partaking. Because of this, 'research-discussion teaching [1]', 'cooperative learning[2, 3]', 'innovative practice teaching [4]' and so on have sprung up to change traditional rigid cramming teaching in the tide of teaching reform of the course of Natural Recourses Science. The author in College of urban and environment science (now as College of geographical science) of Shanxi normal university engaged in teaching Natural Resources Science for many years, also endeavors to try a new teaching method: autonomous-collaborative teaching according to the nature of the subject and the content of the course.

CHARACTERS OF AUTONOMOUS-COLLABORATIVE TEACHING

Autonomous-collaborative teaching is the organic combination of autonomous learning and collaborative learning. Autonomous learning claims motile learning activity, viz. learners to study with self-conscious by and on their own. It opposes to study passively or loathly and sparkplugs learner's active participation; emphasizes breeding pupil's strong study motivation and dense learning interest[5]. While collaborative teaching encourages its objects participate in the process initiatively. It changes the traditional pattern and orientation and has the advantage of developing skills of plan negotiation and the resolution of differences with students adopting various functional roles of teacher, enquirer, critic, or debater with the more able as well as the less able group members benefiting[6].

We often compare learning to fishing. In the face of one and the same pound with as much fish, different fisherman will have distinct ingathering as a result of respective fishing experience and skills, still uncoordinated striving; And with the restrict of pound relieved, i.e. fishing freely in natural fishery, this distinction will be much more presented. If these fishermen could get into an unrestricted ground where each can look into and learn other's harvest and gaining experience through unfurling their owns, they will improve and perfect their fishing skills and ingathering together. This just as in the autonomous-collaborative teaching mode, basing plenary independent preparation, discussing in classroom and communal summarizing helps every student learn from other's strong points to offset he's weakness then make interdependent progress.

How to gain its ends is every allied research's keystone. We encircled settling learner's questions, which were classified trifocal, to gain the autonomous-collaborative teaching's aim.

The first kind of questions (labeled as As in the text) is those impact the learners' understanding or grasping of learning materials. Just as every pupil will

gain distinctly, they will encounter different obstacles as well. For example, the less able in arts may fall across difficult of literal or conceptual comprehension; while the less able in math may don't clear about those key mathematic formulas. These emergent embarrassments are the basic brick and tile of a learner's episteme edifice. They are customarily enshrouded by instructor's knowledge flooding in traditional teaching system. It is the first mission to let every pupil have opportunity to discover and account for their own handicaps.

The second kind of questions (labeled as Bs in the text) is the essential information that needs students command. Each published teaching material has its own unique style for certain professional knowledge, which is known as instructional program in traditional teaching system. This knowledge is result of interrelated special field research and is the base of human's correlative science advancement. It is radical to students who are doing special learning. So they are the emphases and required learners hold.

The third kind of questions (labeled as Cs in the text) is that only may come into being after one successfully solves the As questions and master the Bs in learning activity. This view is supported by the observation that the self-explaining students tend to ask more precise and related questions in subsequent study[7]. Usually there are no answers for these questions in the selected textbooks, even unknown in the whole special field. Many instructors can not give satisfying answers to them, and it is understandable that many teachers choose to feed students with vast knowledge avoiding this kind of query generate and advanced. But they are often the drive's sources and breaking through points for learner's even the whole science domain's progress. So it is encouraged fit to kill in the autonomous-collaborative teaching mode.

PRACTICING AUTONOMOUS-COLLABORATIVE TEACHING IN NATURAL RESOURCES SCIENCE

Collectivity teaching design

Normally Natural Resources Science is partitioned into two portions of integrative science and departmental science through study object (or through character into academic technique part and practice application part). These two parts were treated selectively as shown in table 1.

Table-1 : Natural Ressources Science curriculum's arrangement

Teaching content		Teaching mode	Hour arrangement (period)
pandect	the study system and research content of natural resources science	tradition lecture	2
	method and principle for research and applying of natural resources science	tradition lecture	5
	character and category of natural resources	tradition lecture	2
	measurement of acquirability and analysis of scarcity inbeing for natural resources	tradition lecture	3
monomial	estimate of climate resource and climate productivity	autonomous-collaborative teaching	5
	estimate of land resource and its carrying capacity	autonomous-collaborative teaching	5
	estimate of water resource and its carrying capacity	autonomous-collaborative teaching	5
	estimate of mineral resources and its exploitation-utilizing	autonomous-collaborative teaching	5
	estimate of biological resource and biodiversity protection	autonomous-collaborative teaching	5
	estimate of energy resources and energy - environmental effects	autonomous-collaborative teaching	5
	utilization of marine resources and marine environmental protection	autonomous-collaborative teaching	5

The total curricula teaching time is 51 periods. Pandect part cost 12, in which tradition lecture for system and research content, method and principle, character and category of natural resources will be given. Autonomous-collaborative teaching mode will be applied in the 7 monomial parts, which cost 5 periods averagely and make up to about 35. There are 4 periods remained for flexible use, such as mobilization and communication, disposing, checking, summarizing etc.

Learning groups constructing and managing

It is crucial to establish and manage study groups appropriately in the autonomous-collaborative teaching activity. Group amount and size should be

adapted to equality distribution of material content to carry through discussion and communion. According to the Collectivity teaching design, the research commonly take 7 members as yardstick to partition and take the remnants (usually take those be familiar with class work) as ministrant for the teacher.

In the autonomous-collaborative teaching practice process, first, allotted the 7 monomial parts to each member by individual interest within every group. Each member should do two kinds of basic work: on the one hand, sum up and note the As and Cs questions (together with their settled situation in subsequent discussion and communion)of his own assignment and hand in both electronic and text mode document of Bs as a part of his midsemester grade; on the other hand, energetically take part in every part of discussion and communion in class, preparing to act as instructor by lecturing his assigned knowledge system at any moment when be taken out or appointed.

Process link

There are 3 main link blocks in the autonomous-collaborative teaching. They supplement each other to help learners achieve the aim of independent development through settling all kinds of questions that are discover and brought forward in self-culture.

Self-culture preparation

It will cost 1-2 periods for this sect in each monomial part and should be accomplished by each individual learner respectively after instructors have done the leading and arranging work before. To learning individuals, the mission is to find out-confront study obstacles and to construct their respective knowledge framing through reading and consulting related materials, utilizing their controllable classroom and extracurricular hours efficiently. This is the embodiment of self-help, self-conduct and self-discipline characters of the autonomous learning. Certainly all of these should be on the premise that there has instructor's sufficient induction of knowledge background explaining, study goals confirming, reference directing, learning cause and mission guiding etc. If have teaching text for the cause, giving some class hour let pupils reading is necessary.

Class Discussion

Process of discussion should be implemented in class, being supervised by teacher. It will cost 20-30 minutes for group learners to primarily figure out their questions through consulting each other. This is part of the collaborative learning fashions achieving, especially for the settlements of As questions, which can not be advanced in the traditional lecture teaching. Simultaneity through exchanging opinions of the knowledge content may inspire the learning individuals bring more penetrating Cs questions. All of these are the base and guarantee for the next tache.

Summarizing and Communion

This portion mainly aim at the Bs and Cs, and the unsettled As questions with polymorphic communion mode. It need 2-3 class hours, which accounts for the great mass of monomial parts. Firstly , instructors should help to span As obstacles that can not be raveled out in group discussion. Then to the Bs questions, it can be accomplished by learning commissaries who act as teacher to give lecture, also can be fulfilled through quizzing-answering games enjoyed by both teacher and student. As for all kinds of Cs questions, instructors should see daylight from them and try to actively response, or acknowledge disability honestly, encourage learners to do more consulting work. Theirs being is the directions for future special learning.

Study effect checking

Table 2 demonstrates the checking of learning effect of autonomous-collaborative teaching. The main assessing (account for 60%) of exam course was closed-book exam, which emphasized particularly on the Bs knowledge needed grasp. While that of test course was special thesis that emphasized particularly on the Cs questions. Both of these two type courses need combining midterm test, which be used to control autonomous-collaborative teaching carrying through smoothly by noting and settling vary questions that learners met in the study procedure. This is of much more importance to those who is less able in self-determination and self-knowledge.

Table-2:Study effect checking of Natural Resources Science

Exam course				Test course			
Composing	Content	Percentage（%）		Composing	Content	Percentage（%）	
Term End	Closed-book exam	60		Term End	Special thesis	60	
Midterm	Study note	10	40	Midterm	Study note	10	40
	Knowledge system	30			Knowledge system	30	
Colligation	Total	100		Colligation		100	

CONCLUSIONS AND RECOMMENDATIONS

The ultimate aim of this study is to attempt an innovation that try to change the ubiquitous status quo that most of the students on campus are learning passively, subjectively or impersonally. That is a heavy in hand problem for most instructors. To and through the practice, there are some experience and recommendations here.

Scientifically constitute and manage study groups

Learning groups should be constructed in principle that furthest interdependent connection of knowledge, character, habit and ability shaped among each group members. This is extremely significant in the class discussion. It is the premises of any positive interdependence[8]. taking place in the procedure of collaborative learning. Simplex partition on free will may result in uneven distribution. To avoid this, the teacher should be familiar with his teaching objects or resort to assistants. It has been agued and approved that many students are not well cultivated to be effective collaborators and they may suffer from collaboration by simply exposed to or forced to collaborative learning [9]. Other than constitute the setup base scientifically, gives enough guidance and timely intervention is important Also, collaborative consciousness mobilization, collectivism inspiring and assessing, all need the teacher do much more endeavor avoid keeping out of the collaborative learning.

Adequately and efficiently utilize time

In collaborative learning practices time utilizing is the annoying problem to both teachers and students. Class hour is limited for instructors to do pre mobilizations and coaching, set up constructing, organizing discussions and knowledge summarizing, etc. While there are always some students talking about irrespective topics in the class discussion, or giving pleonastic lectures without emphasis. That needs the instructor to organize and control the class environment resourcefully. When come to the self-culture preparation, many students allege they have not enough time after school to use, and always follow the collaborating learning without sufficient preparing. That is the autonomous ability and consciousness lack's result. How to mobilize the learners' positivity and initiative is the way out also the dead angle of educational innovation. Latest study following certain learning groups indicate that knowing more about the challenges and possible conflicts in a poorly functioning group can yield important information for designing and implementing instructional support to overcome challenges within collaborative learning [10].

Befittingly cope with inhomogeneous learners

Individual diversity exists impersonally. Befittingly cope with inhomogeneous learners is crucial in the autonomous-collaborative teaching. We know that there are always some students that used to listening with questions and selection, enriching their learning life and constructing their knowledge edifice automatically, even in the traditional teaching system. They have commanded impactful learning skills and often unfold themselves excellently anywhere. Discovering and depending on them better may largely help instructors achieve the aim of autonomous-collaborative teaching. Still there are many 'good' pupils who get used to the lecture teaching. They could accomplish assignment commendably and acquire good grades. But they may feel like a fish out of water even collide at beginning of any educational innovation[10]. In fact they account for most outcome characters of the traditional didactical system. Lacking independent learning consciousness, habit and ability, that is what modern innovations try to alter. To those few students that disinclined in any curriculum learning, often skipping classes disables, instructors should take pains to attract them into the learning activities, let them taste favorable atmosphere of study and communion together in the collaborative groups.

Selecting appropriate content

Different content has diverse applicability to teaching modes. That is true for natural resources science course teaching reforms. "Natural Resources Science" is an integrated rising subject[11]. Its monomial resources portions have been developed for hundreds to thousands years and matured in each special fields in theoretic, technique, application and function etc. These human profound sapiential rimes are the bases of Natural Resources Science knowledge system. Both teachers and students in the course teaching activity should probe into them at full steam exoterically. That is why we choose these portions as the learning objects in the autonomous-collaborative teaching practice.

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