Developing of Bachelor Student's Learning Achievement in Basic Research Methods in Science through Constructivist-based Teaching

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Abstract. The aim to this research is to study development of bachelor's degree student's learning achievement, majoring in Biology and Zoology in basic research methods in sciences by constructivist-based teaching.at one university in Bangkok. Participants were the bachelor's degree student who, registered the course entitled biology research methodology and in zoology research methodology in second semester of academic year 2013. The qualitative data and the conceptual, interpretation were collected by interviewing, observation, testing forms, attitude forms and satisfaction with learning. Quantitative data were analyzed with finding frequencies and means. Qualitative data were analyzed with content analysis. The findings showed that giving examples that is clear and related to students' research experience could enhance the student' understanding of the lesson. Grouping the students according to their needs with mixed gender and ability could help students to concentrate in learning and promote the cooperation in the activity. Using various methods to engage students in the learning process could lead positive attitude toward learning. Moreover, providing a group of advisor for each group of students also could promote students' learning achievement and desirable behavior. Encouragement, empathy and reward could encourage the students to respond by asking questions and answering to questions in the class.

Keywords: Learning achievement, Basic research methods, Constructivist-based teaching

1. Introduction

Biology and Zoology are branches in Sciences that study about organisms. In order to understand the nature of organisms, it is necessary to use the process of scientific inquiry, which is related to giving explanation or forecasting phenomena by utilizing experiments, reasoning and using an imagination. From National Education Act, B.E. 2542 and second revised edition (revised edition, B.E. 2545), Article 24 Paragraph 2 mentions that "Let institutes and concerned units relating to educational management, manage the learning that emphasizes on learners by promoting thought process, learning capability, process of knowledge inquiry, process of solving problems, process of building a body of knowledge, emphasizing arrangement of activities that help learners

to learn from real experience, evaluating students by considering from their development and using diverse evaluation methods that are suitable for learners and real conditions matching with learners and real conditions." (Office of National Education Committee (ONEC), 2002).

Nonetheless, success in learning management depends on knowledge and experience of instructors. Therefore, it is necessary for teaching activities to qualified instructors that meet the standard mentioned in Article 52 of National Education Act (ONEC, 2002). However, performance of instructors also depends on their original experience (Loucks-Horseley, Love, Stiles, Mundry, Hewson, 2003:7). Positive experience of teachers leads to efficient learning management (Rye and Dana, 1997). However, some instructors are not confident that student centered learning management will have more efficiency than learning which emphasizes on instructors as principle (Chin, 2000). According to concept of scientific technology and society, instructors must encourage students to express ideas and listen to those ideas. Students should participate not only in listening, but also in teaching students and their teacher learning together. Students learn from instructors and instructors also learn from students (Rye and Dana, 1997). In addition, Tsai (2001) found that teaching instructors, who prepare and teach according to concept of scientific technology and society, understand more in this concept and show better performance in teaching according to the constructivism.

Principle of basic research method in science are regarded to be important to the process in education, research and sciences which are to study research, analysis or experiment systematically according to method in science in order to find facts, new knowledge that can bring to set up rules, theories or according to practice. Benefit of researches in sciences has diversification to become building new knowledge, expanding knowledge into perfection and bring that knowledge to make practical uses. Therefore, students will be able to carry on research successfully and must understand all concerned subjects with process in sciences namely, 1) Assigning research problem or research topic, 2) Set hypothesis of the research, 3) Research planning, 4) Research operation, 5) Collecting data, 6) Analysis of data by statistic, 7) Testing hypothesis, and 8) Interpretation and summary of research results (Wongratana, 1999; Chantalakhana and Uechiewcharnkit, 2008; Punpinit, 2009; Promjouy, 2011).

Based on the researcher's teaching experiences, students have knowledge and skill as well as good attitude in connection with writing and method in order to propose research outline. However, it was found that students lacked of understanding in scientific research process, namely limited problem, research problem or research topic, research hypothesis, research design, collection of data, analysis of data and conclusion etc. In addition to lack of experience in writing research outline, knowledge and understand in various topics, namely topic names, research work, writing, introduction, objective, material and method etc. Furthermore, students still have negative attitude to process of research in science and writing research outline is rather difficult. They feel uncertainly to start writing. Therefore, researchers as permanent instructor has an interest in developing success from learning of university students for Bachelor Degree about rules of basic research method in science by having management of learning with emphasis on process of inquiry. The result from this research study will be basic data for educational institutes and concerning universities in management of learning to promote success from learning of students by learning according to the theory of building knowledge by oneself.

Research Objectives

To develop learning achievement of bachelor's degree students on basic research method in science using constructivist-based teaching.

Theoretical Framework

National Education Act B.E. 2542 and revised edition (second edition) B.E. 2545, section 4 direction of educational arrangement, article 24 mentioned that arrangement of learning process for educational institutes and units concerned proceeded in the following: 1) Preparing contents and activities matching with learner's interest and talent by considering differences among individuals 2) Training skill in thought process, management, confronting to situation, and applying knowledge for preventing and solving problems 3) Managing activities to lead the learners to learn from real experience, to be train to be able to work, have thinking ability, love to read and promote long life learning 4) Managing a and teaching by integrating knowledge in various fields proportionally and well balancing including implantation of virtue, good social value and desirable characteristics in each course 5) Promoting and supporting instructors being able to provide atmosphere, environment, learning media and accommodation for learners to occur learning and intelligent including ability to use research as a part of learning process, according to instructors and learners, they might learn together from media of learning and teaching and other scientific sources 6) Managing learning to occur any time, every location where there were jointly cooperation with parent, guardians, and people in all sectors of communities for joint development of learners as potential (ONEC, 2002). The learning theory on principle of managing learning matching with National Education Act B.E. 2542 and revised edition (second edition) B.E. 2545 was Constructivism.

Constructivism was the learning theory of cognitive psychology, which was basis from work result of Piaget and Vygotsky. They explained that structure of wisdom (Scheme) had been developed by passing through process of absorption or thorough permeation (assimilation) and process of adjusting structure of wisdom (accommodation) in order to person being in equilibrium. Piaget believed that everyone would develop respective steps from relative reaction and experience with environment and society. Vygotsky values culture, society and languages which would be the medium in learning while every student had knowledge, understanding concerning something already and new learning would have basis from original knowledge and original experience of learners which would give good efficiency and such knowledge would not have to conflict with original knowledge and understand so that learning increased continuously. Learners were constructors of knowledge by themselves and the important factor was not established process of learning from information but it was the process of learning that learners had to search, look for, survey, investigate, experiment by their own with various means to occur knowledge, understanding and acknowledge meaningfully to be able constructing knowledge organ (Roadrangka, 1997; Siripunkaew, 1998).

Constructivism is learning theory, which learners do not wait for data by imitating words and summaries of other persons, but they construct knowledge on the basis of original experience and from relationship with other person (Richardson, 2003). Therefore, instructors taught according to the theory of constructivist that was important because instructors were leaders to bring this theory into practice in the classroom. From characteristics of managing learning along the theory of constructing knowledge organ by oneself as already mentioned, it was found that learners had opportunity to learn and perform activities matching along direction of Act as prescribed in National Education Act that emphasized learners as importance which was the important heart of educational reform. Therefore, arrangement of learning experience to university students in Biology and Zoology had knowledge and understanding in relation to managing learning along the theory of constructivist by oneself before they would graduate to become scientists that would be strengthened to push forward for success of educational reform.

2. Research Methodology

This research has its roots in the interpretive paradigm. The researchers attempted to understand and to explain to what extent was the constructivist-based teaching approach enhance the bachelor student's learning achievement in Basic Research Methods in Sciences, which they took in the second semester of the 2013 academic year. Using an interpretivist perspective, the researchers analyzed the qualitative data gathered from the interviews with and related documents of learning.

Research Participants

The participants of this study were 43, 3rd year students in of Bachelor of Science (B.S.), majoring in Biology and Zoology of one University in Bangkok. They registered in the course entitled biology research methodology and, zoology research methodology in second semester of academic year 2013. In average, the participants are 20 years old and with 2.89 G.P.A.

Content of the Study

Basic research method in science consists of subtopics as follows: (1) Principles and research methodology in science, (2) Writing research proposal, (3) Research proposal presentation, (4) Information searching, (5) Using reference database, (6) Discussing the problems and difficulties in proposal writing and supplemental activities, (7) Research Ethics, (8) Ethical use of laboratory animals, (9) Usage and maintenance of scientific equipment, (10) Safety standards in the laboratory, and (11) Research proposal presentation.

Research Instruments

1. Journal entries

Journal is a tool that students could record what they have learned including students reviews of the learned contents and activities in each learning period. After the students have learned a lesson, at the end of the class they will write a journal and sent it to the researchers on the next lesson. At the end of semester, there were a total of 11 journals, which each student sent to the researchers.

2. Pre-test and Post-test of research method in science

Researchers develops pre- and post-test for assessment the student's achievement on basic research method. Steps in development of the test are as follow: 1) Synthesizing research works relating to basic research method in science 2) Constructing framework of question in the tests 3) Developing in the tests 4) Evaluating the test by bringing the testing form to 3 experts in educational science to examine the contents to improve correctness, compactness, transparency of question and their scope in order to comply with the objective in constructing the testing form and the researchers can use the testing form which has the characteristic similar to the study groups and return them for correction prior actual evaluation.

3. Presentation evaluation form

The researchers used presentation evaluation form completed by instructor and students to evaluate characteristic of students during presentation, i.e. cooperation both during presentation and working period, understanding of materials, ability to answer questions, details of content and personality.

The presentation evaluation form of this research consists of 5 criteria to evaluate various qualities of students during their presentation. Each criteria ranks form 1-5 in total of 25 scores with an empty space at the end of the form for additional comments.

4. Teamwork evaluation form

The researchers used teamwork evaluation form to investigate the development of teamwork skill in each group of students. Students are evaluators for their own group.

They will comment about participation, listening to other's opinion concentration, enthusiasm, responsibility and cooperation. Evaluation form consists of 4 topics. Each topic has score level of 1-5, summed up to the total score of 24. Students will complete the evaluation form 4 times throughout a semester. Also, at the end of the evaluation form there is a space to write comments.

5. Diagram of social dimension

Diagram of social dimension is the tool to investigate students' relation between team members to improve their attitude, improve their relationship and promote a better atmosphere in the classroom. The diagram of social dimension is constructed by asking students to write down 3 names of students that they would like to work with. Construction of diagram of social dimension will be made prior and after learning management.

6. Attitude test about writing and method to present outline of research work

Researchers develop "Form of measuring attitude to writing and method to present outline of research work" by following these steps to construct the testing form: 1) Inspect document related with writing and proposal presentation method in order to construct question. 2) Constructing question by having 5 options, i.e. strongly agree, agree, neutral, disagree and strongly disagree. The character of contents will be both positive and negative. 3) Bring the form to 3 experts in science and educational science to investigate whether the content comply with the standard. 4) Adjust question forms according to experts' suggestion and then test it with the controlled group of students. 5) Find confidence of the form measured by using alpha coefficient before using it with real study groups as needed.

7. Informal interview log

Researchers recorded information interviews with students to acquire detailed answers as needed or in case the previous answers are unclear. This kind of interview is flexible, and the inquirer can convey questions in different ways until students understand them. If there is any misconception, it can be corrected in a timely manner.

Data Collections

The researchers has explained research details including asked the willingness of students who give data for this research. If there were some students who are not willing to give data, the researchers would not use their data in this research. When researchers and students agree with relating research format and guideline in learning management, the researchers will ask students to work on testing form and measuring attitude form regarding learning scientific research method. Then, the students were asked to write 3 names of students who they wanted to work with in the paper distributed by researchers. This step is for making diagram of social dimension before learning management; it takes 1 hour.

From there, researchers organized activities according to 11 developed plans for a period of 5 weeks, 3 hour each, for total 45 hours. These activities are process of searching by learning management with emphasis not only on content aspect but also on that learners can study by themselves. Students must collect information, make a presentation and then discuss while the help of instructors. In each study period, the researchers records the researcher's learning management, and the researchers asks students to keep the record of learning for rebounding their thought after activities in each topic every time. Besides, the researchers also examines students' answers in the activity result sheets and informal interview in the aspect that researchers needs additional information. Each interview takes about 15-20 minutes. Students in each group evaluate their groups in total of 3 time/month. And after students in each group finish their presentation, the researchers let the students discuss what they still

misunderstand, exchange ideas, and summarize information received from doing activities

When the learning management was completed, researchers asked students to complete testing form and measuring attitude concerning learning in relation to rule of research method in science which are the same set of testing prior learning management and asked students to write 3 names of the students that they wanted to work together for into distributed sheets for making diagram of social dimension of the classroom in 1 hour.

Data Analysis

Researchers established creditability of information by triangulation method from reading and summarizing materials from interview tape, discussion while doing activities, answers of students in activity sheets and records of learning. After that, the data from each student are brought for grouping and found basic statistical values of each group.

For the data of measuring attitude in writing and proposal presentation, the positive scores are classified into 5 levels: in the most agreeable selector in total of 5 scores; very much 4 scores; moderate 3 scores; small 2 scores; and the least 1 score. For negative levies to give scores in reversal and to find basic statistic of scores, attitude to learning in the content of rules of research method in science.

In addition, the researchers considered the presentation evaluation result and evaluation result of groups whether average scores of students in each group in each week were higher or not including considering diagram of social dimension of the classroom after learning management whether there were increasing distribution of student names or not. If student had more relationship, diagram of social dimension after learning would have more distribution of student names than prior the learning management. From there, the researchers found relationship of data by analysis of data from all tools for achieving themes which could clearly reflect to successful result in learning at Master's Degree level on topic of rules of basic research method in science by managing learning with emphasis on searching process. When analysis of data was completed, researchers brought the result back to study groups to examine correction of data interpretation.

3. Research Findings

From data analysis, the researchers presented research result concerning development of student's potentiality in management of learning at level of Bachelor degree on topic of basic research in Zoology and Biology by learning according to constructivist-based teaching as the following themes.

1) Giving clear examples and matching with direct experience in research in order to help students to easier understand learning content

Before managing learning, 35 students did not have enough experience in learning according to theory of constructing knowledge by oneself, but they might be egocentric with managing learning like original form which the instructor waited to explain learning content by power point program and then asked students to record as in the program. And there were some students who still have open-minded to accept management of learning as new line in example of student text which mentioned " I would like to receive instructors' summarized document that get improved from teaching in each year. However, this method was good that we could give our viewpoint at first"

With this reason, researchers explained details about characteristic of managing learning according to line of theory in constructing knowledge by oneself so that

students knew before the beginning of managing learning between management of learning and researchers had surveyed the original knowledge of students in each topic which it was found that majority of students for total of 30 persons still understood concerning searching technical data, article reading, academic subjects, process of research in science, writing outline of special problem, not many that researchers brought examples of research articles and theses in science for students to mobilize brains and discussion or idea exchange in front of the classroom and mentioning composition of research work in science including good and not good characters of writing in each composition for topic of merit in researchers. Researchers brought an example of song and news regarding merit of students as aspect in discussion or ideas exchange.

In addition, researchers invited senior students to exchange experience with students concerning presentation of special problem outline, presentation of research work and working result to be published as technical article in international journal for giving students the most direct experience.

The researchers found that 37students understood process of research in science and could arrange outline of special problem at the end of learning this course as example of student record "I am proud in attempt and working result by oneself and has consciousness that this is learning process in science in order to receive new knowledge and resulted in learning to work." In addition, students still recognized their own research work, realized in importance in the preparation of readiness before presented orally research work and was building inspiring effort to wish for success like senior students after presentation of each senior students, students jointly asked questions both experience and technique of preparation for readiness of senior and still had many questions concerning research work as example of content from record of learning that students mentioned "Learning this course gave me more understanding in method and technique in writing outline of special problem. However, in order to write perfectly, we had to learn by ourselves for accumulating experience."

2) Arrangement of student groups as needed by mixing sex, ability to help others concentrate and ability to cooperation with others.

Before management of learning, researchers found that when students grouping for activities, students often requested to be selected with members in their own closed friends' groups. Students with lower sense of responsibility often stayed in the same group and persuaded others to keep talking which resulted in a learning atmosphere that may led to misunderstood learning content. Example of mentioned student "Dear Instructor, a person who was good in learning, he did not want to select me" and " Dear Instructor, If I had to be with him, I could not dare to chat or propose anything with him." Therefore, researchers had to solve such problem by letting students to select group of 3-4 person before. From there, there was a study of behaviour history in learning of students with lower sense of responsibility before distribution of students to be in each group containing only one.

From management of learning, researchers found that 30 students had skill of working groups in more various fields, i.e. presentation of opinion; listen to proposal of others, ability to present in front of the classroom. From sampling to unofficially interview students, researchers found that students jointly worked in groups with closed friends and had confidence which may lead them to have intention and cooperate in working group as the student said "Working in the same group with closed friend give him or her the courage to express opinion or it would be easier to understand each other. If he or she had to be in the same group with unclosed friend, he or she would not dare expressing any opinion because he or she was afraid that others would turn down her

proposal." From the mentioned data, it was found that there were matching score level. Group of student who were given friends within the group throughout the period of learning, it was found that score levels of all groups increased after students had jointly activity.

3) Using diverse methods for students with participation in process of learning to improve students' attitude toward learning

Before management of learning, researchers found that giving lecture was dull and students might lose their attention but this may lead them to cooperate in other activity. If instructor gave emphasis on lecture and mix it with teaching media in front of the classroom, students would be interested in early period of the lecture only. After that, students would lose their interested and some students will start using their mobile device. This particularly group of students normally sit behind the classroom. In addition, when students were together for discussion in various aspects concerning the content, the researchers found that some students did not wish to participate in discussion an group representative seem to be the same students as in the first week period. Student still did not seem to be familiar with the method of learning with joint discussion that sometimes uses common sense in discussion more than academic knowledge. Some students did not accept or listen to others' opinion. Therefore, these resulted in learning management struggle as usual. So, researchers adjusted management of learning by emphasis on participation of students with more diverse methods, i.e.

- Reduce lecture as content in Power Point Program by increasing discussion with more moving picture or clip video.

- Bring real samples to present and bring them to discussion and exchange idea in the classroom.

- Try to persuade students who do not agree to join discussion by realizing to participate including building up motivation by giving scores to student who has participated.

- Use bingo game to control expression of ideas from each group to eliminate the redundancy of an answer or conclusion. After the students in each group have jointly presented their opinions, then summarize was received. From there, researchers and students jointly summarized. Students in each group will check answers of group and present their opinions that are not the same with others.

- Sampling group names or inform learners to know the frequency in participating expression of ideas or questioning in the classroom.

- Alternate representative from each group to present discussion result in front of the classroom.

- Provide an instructor to supervise each group for suggestion when student was mistaken in the aspect of discussion. This can make the discussion be more compact and help them finish the discussion on time.

- Rotate the seats of students in each semester for students. So, each student could have a change to sit in front of the classroom that is near instructor. This made the students alerted, interested and students intended to learn more.

From management of learning, researchers found that most of students (about how many persons) like joint discussion/exchange of ideas as found in learning record of students. It is mentioned, "This course was very good, and students learned via idea exchange that exercises though process more only receiving. Moreover, by this way, we knew attitude and opinions our friends." Besides, number of times that students lost their concentration during learning activities, for examples, playing smart phone and tablet, chatting outside main points obviously decreased. Students also participated in various activities very nicely. This reduced presentation time, stimulated students in other groups who were waited to do their own presentation to have time to consider their answers and

also stimulated learners to try to present other opinions that were overlooked. This brought about more diverse ideas from the class. It was written in record book of learning that "Learning in practical style or expressing opinion in the class is beneficial; it could be applied to our research" and "Expressing opinion from what we knew before." Researchers summarized attitude of students concerning management of learning on topic of rules of basic research in science by learning as theory of constructivist. It was found that after management of learning, there was average score equal to 3.67.

4) A coach instructor for each group of students helped them in learning and having desirable behaviour.

Before management of learning, researchers found that students were not accustomed with the instructor which resulted in they did not daring to express opinion because they were afraid of criticism and rather not gave cooperation in activities. Most of students would not come on time and that made teaching learning is not complete according to the objectives because the lesson had to be taught continuously. Students who did not come on time would not understand all the content that resulted in boringness, and then they persuaded friends in the group to chat as a student mentioned "Things that made this course was not satisfied and make me want to skip were terrible listeners during others' or my presentation." Besides, some students did not dress according to the regulation of university such as slippers, female students with trousers or t-shirt covered with grown and male students with shirts outside trouser and etc. They reasoned "We do not want to often iron university shirts, it is easier to put on grown instead of ironing our uniform" and "Today I (female) have physical education class, so I dress up like this."

The researchers solved such problem by arranging a coach for looking after students in each group as an advisor while they were brainstorming or analyzing various aspects before representatives of groups came out to present. The researchers found that students tried to express opinions intentional because when there were some doubts, they could ask their coach suddenly that resulted in more understanding about form and details of activities with objective of active and still help solving problems of deficiency in presenting working result in front of the classroom due to group representative often went out to show opinion by oneself without talking, agreeing and collecting ideas from summary of the group. The students showed more enjoyment in learning, had more courage to express opinions and present their work. The students asked questions when they recorded by student "At first, I felt that this class was horrible because I did not know where to start, but later on I found out that this course was more enjoyable than in the beginning and not horrible at all." Thus, atmosphere of the classroom were better and resulted in better relationship of students as seen from diagram of social dimension before learning and after learning. It was found that after learning there was change to select friend who wanted to join work by distributing student groups that were selected more before learning. In addition, familiarity and closeness between instructor and students could help students to improve and amend from subjective for an example, late attending classroom of students during first period of classroom it was found that most of students came late to classroom. Researchers had warned them but in general it could solve the problem during first period but after that students again came late. Researchers used by talking method with students who came late cordially and was very pleased to students who came in time. It was found that student who used to have behaviour by coming late, improved to come in time and suggested friend who also came late to improve to come in time. In addition, it was found that most of students who dressed improperly for an example, putting slippers in the classroom. Research used methods by building familiarity and talking. Similarly it was found that students had well improved.

Researchers had admired students who improved themselves as good examples to other students in the classroom.

5) Encouragement could promote students to ask more questions and give more answers.

In the first week period, the researchers found that students were not familiar with process of learning which students were builders of knowledge by themselves. Therefore, there are only a few students who volunteered to ask and answer and when managing learning had passed for a period of time. Only when there were about 10 students who set up more question and answer but mostly there were original student groups in spite of instructor had given special scores. Thus, researchers tried to build up motivation, especially gave special scores which found that students would come to join in the first period but later on they would begin sluggish which indicated that students still lacked of being enthusiastic in searching knowledge, responsibility, intention and endeavour. Therefore, the learning process was adjusted by talking and inquiring problems/causes that make they did not ask and answer the question. Students gave the reason in the following "I had little basic knowledge and did not understand the topic taught which made me shied to ask question or be afraid of wrong answering"

Thus, researchers tried to encourage and asked about the student's progress form time to time including asking more question to the students. It was found that students tried to answer more. Some students ask and answer questions inappropriately. Researchers tried to indicate advantage and disadvantage by talk to them privately including suggesting impersonally both in and outside the classroom for students to learn mostly by themselves.

4. Conclusions and Discussions

Before management of learning most of students did not have experience of learning as constructivist-based teaching, but they got used to have original learning management that instructor lecturing with Power Point Program and let students jot down on their notebooks. When the researchers managed learning by using theory of constructivist by giving the clearly example and matching with direct experience in research to help students understanding content of learning easier. Grouping students as the students needed in mixed gender and ability helps students to pay more attention and have cooperation in activities. Use of diverse method in order to give students having participation in process of learning management to help students with good attitude to increasing learning. There was a coach for each groups them in learning and promotes desirable behaviour. Encouragement could help students willing to ask and answer questions related to study material.

Before management of learning, characteristic of learning for students who still waited for receiving data that were quite different from learning by theory constructivist which learners were not persons who waited to receive data by imitate word form and summary of others but building knowledge was on basis of original experience and from having more interactions with others (Richardson, 2003). Therefore, a teacher who taught by constructivist-based teaching was important because the teacher was the leader to practice the theory in the classroom.

During management of learning, researchers tried to adjust management of learning to be suitable with learning characteristic of students. It was found that to give a clear example and in line with direct experience in research to help student in easier understanding content of learning in line with Brooks and Brooks (2001) that mentioned a teacher who taught in line with this theory which should be promoted about curiosity of learners by providing direct experience to learners which that experience caused contrariness with hypothesis of students then teachers stimulated learners to join discussion in opinion both between teacher and others. The researchers still found that grouping students according to need of students by mixed gender could help students to have learning intention and cooperation in activities which was different from most researches with emphasis on managing groups in mixed sexes and capability without considering learners need.

Applying diverse method to students makes them have good attitude towards learning. Due to building knowledge by oneself, learners had to search, look for, survey, investigate and research by themselves. Various methods made happening knowledge and understanding and recognizing meaningfully (Rodrangka, 1997). In addition, there were coaches for helping student closely to be good learners and have desirable behaviour matching with National Education Act B.E. 2542 and revised edition (second edition) B.E. 2545, that mentioned that teachers could arrange atmosphere, environmental conditions, learning media and accommodating for learners to learn and be intelligence including develop virtue good social value and desirable character. The most important thing that instructor found was courage, ability to promote students in asking and answering more questions according to the learning content which is additional information from Brooks and Brooks (2001) that teachers who taught by constructivist based teaching should promote learners to ask questions that stimulate thinking process, to ask open-ended questions and to ask questions to each other.

From research result on development of student potentiality by management of learning of bachelor's students Basic Research in Science by constructivist-based teaching, the researchers recommends instructors who were responsible for managing learning to students including personnel concerning with production of teachers that we should manage activities to promote students to be responsible by themselves not by compulsoriness or pressuring students by reducing scores increasing time in discussion for every students to have participation in discussion. Recommendation for future work, researcher should follow up students about researching and presenting in real situation.

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