REALITY OF SCIENCE TEACHING CAPABILITY TRAINING FOR PRIMARY EDUCATION STUDENTS AT HUNG VUONG UNIVERSITY

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Abstract
This article presents a perspective on the reality of training in Science teaching capacity for primary education students at Hung Vuong University. The object of research is training activities to develop science teaching capacity, including subjects in the training program, teaching methods, pedagogical training activities, etc. Research methods used consist of theoretical research method and interview method. The results show that the amount of training time devoted to forming and developing Science teaching capacity for students majoring in Primary Education at Hung Vuong University is still modest, with not much change between the different schools. During the review and adjustment of the training program, professional training activities only focused on training skills in lesson planning and organizing teaching of Vietnamese and Math subjects. The research results also provide useful information to help the Hung Vuong University will carry out improvement activities in the future to further improve the effectiveness of training students in the Primary Education major in general and the capacity to teach Science subjects in particular. From there, after graduating, students can perform well in the General education program in 2018.

Keywords: Teaching capability, science teaching capability, primary education, primary education program.

1. Introduction
Science in elementary school refers to objects, phenomena, and the relationships between them in the surrounding natural and social environment, to the human body and health. Unlike other subjects, the learning objects of science are specific things and phenomena, so learning this subject must also be based on specific things and phenomena of the surrounding environment. They are very close to students and students are exposed to them before going to school, in daily life, at home, in the locality, from people around them and even from mass media [1]. In the
2006 general education program (GEP) and the 2018 GEP, students are introduced to science from grade 1 in the subject Nature and society. In grades 4 and 5, science is separated into a separate subject [2].

Science teaching capacity (STC) can be understood as the ability to design and organize Science learning activities effectively to meet specific regulations on the Science curriculum in upper elementary schools based on combination between knowledge of natural sciences, knowledge of teaching methods, means and techniques. STC plays an important role for primary school teachers in general and Primary Education students in particular to meet the requirements of professional standards for teachers as well as output standards curriculum for students. Because in primary schools, besides teaching Math and Vietnamese, elementary teachers are also directly responsible for teaching Science. STC helps Primary teachers/Primary Education students to perform well in “building teaching and education plans in the direction of developing student qualities and abilities; using teaching and educational methods in the direction of developing students’ qualities and abilities; testing and evaluating in the direction of developing students’ qualities and abilities” (According to the promulgated regulations on teacher professional standards according to Circular 20/2018/TT-BGDĐT as well as the output standards of many training programs in the primary education sector) [3,4]. This article presents the current situation and suggests solutions for training activities that contribute to the formation and development of STC for students majoring in the Department of Primary Education at Hung Vuong University (HVU).

2. Methods

In this study we use two methods: theoretical research method and interview method.

Theoretical research method was used to research and learn about Science subject in elementary level, learn about the theoretical basis of STC, and learn about the Primary Education program (PEP). From there, clarifying the characteristics of Science, the structure of STC and the characteristics of the PEP in which contribute to the formation and development of STC for students.

The interview method was applied to find out more about the reality of training activities in subjects that contribute to the formation and development of STC for students majoring in Primary Education at HVU. The interview objects included managers in the faculty of Primary and Early childhood education (3 managers), and lecturers directly teaching the Basic of nature in elementary school and the Nature and Society teaching method in Primary level at HVU (7 lectures), and Student majoring in Elementary Education, Course 18 (65 students). The interview content includes: The role of STC in meeting the learning outcome of the PEP, subjects in the program, training activities, professional practice that contribute to the formation and development of STC for students majoring in Primary Education.

3. Results and discussion

3.1. Science curriculum in elementary schools

According to GEP 2018, Science subject in elementary school contributes to forming and developing students’ love of people and nature; scientific imagination, interest in understanding the natural world; awareness
of protecting the health of oneself, family and community; awareness of saving and protecting natural resources; awareness of responsibility towards the living environment. In addition, Science subject also contributes to the formation and development of students’ general competences: autonomy and self-study competence, communication and cooperation competence, problem solving and creativity competence. In particular, this subject contributes to forming and developing natural science capacity in students (including components: Natural science awareness; understanding of the surrounding natural environment; applying knowledge, learned skills); Help children have initial understanding of the natural world; Initially, have the skills to understand the surrounding natural environment and the ability to apply knowledge to explain objects, phenomena, relationships in nature, solve simple problems in life and take appropriate actions, good behavior to protect the health of yourself and others, protect natural resources and the surrounding environment [5].

Science topics include matter, energy, plants and animals, fungi, bacteria, people and health, organisms, and the environment [5]. These topics are all inherited from the 2006 GEP.

From the characteristics of the Science subject, from the orientation on methods of forming and developing the main qualities, general abilities and natural science abilities, it can be seen to form and develop students’ qualities and abilities according to the program’s regulations, teachers need to be fully equipped with background knowledge related to teaching topics, and be trained in the application of specific teaching methods in teaching Science and Society, be trained in using teaching aids and information technology to support teaching.

3.2. Science teaching capability

Different studies on the concept of competence agree that each capability consists of 3 main components [6]:

i) Capability components describe one or more activities in the specific area of expertise, demonstrating the latent human capabilities;

ii) Competence elements are the basic skills that make up each component;

iii) Behavior indicators are the expected outputs of elements, components, etc.

Competent persons in a certain field of activity must have all the following basic signs [7]: Having systematic/in-depth knowledge or understanding of that type/field of activity; Knowing how to carry out that activity effectively and achieve results consistent with the defined purpose (including defining specific goals, appropriate ways/methods of action/choosing solutions, etc.) and conditions and means to achieve the goal; Act effectively, respond flexibly and effectively in new and strange conditions.

The teaching capacity of teachers in general includes the following elements: Knowledge and understanding capacity of teachers; Capacity to design teaching plans (lesson design); Capacity to use teaching methods and techniques; Capacity to use teaching aids and information technology to support teaching; Capacity to use Language; Capacity to understand students’ level in teaching and education; Capacity to develops the program [8].

Based on the structure of teaching capacity, signs of a person having capacity in a certain field and the structure of teaching capacity in general, we propose that Science teaching capacity includes the following elements and behavioral manifestations:
<table>
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<th>Elements</th>
<th>Behavior indicators</th>
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| 1. Natural Science Capability                                          | - Ability to aware Science knowledge.  
|                                                                        | - Ability to discover Scientific.  
|                                                                        | - Ability to apply knowledge and skills learned.  
|                                                                        | - Ability to relate learned Natural Science knowledge with Science knowledge in the elementary school curriculum.                                                                                                      |
| 2. Capability to design science teaching plans                         | - Determine the goals of teaching Science topics.  
|                                                                        | - Determine teaching methods and means appropriate to the goal of developing qualities and abilities.  
|                                                                        | - Design activities in teaching Science to meet the goal of developing qualities and abilities.  
|                                                                        | - Design tools to evaluate the level of meeting goals.  
| 3. Capability to use teaching methods and techniques in teaching Science| - Knowledge of specific methods and techniques in teaching Science.  
|                                                                        | - Apply the steps in each method and technique in accordance with the goals and content of teaching.  
|                                                                        | - Flexibly convert teaching methods and techniques to suit the goal of developing qualities and capabilities.  
| 4. Capability to use teaching aids and information technology to support science teaching and learning | - Use visual aids in teaching at the right time and in accordance with the lesson content.  
|                                                                        | - Use visual aids in teaching that are appropriate to the characteristics, physiology, and cognitive level of students.  
|                                                                        | - Use information technology in searching for information to serve lessons;  
|                                                                        | - Use information technology in designing and implementing teaching plans.  
| 5. Capability to use Scientific language                               | - Deep language content;  
|                                                                        | - Simple and vivid language form;  
|                                                                        | - Have the skills and techniques to use one’s emotional ability in front of students by taking advantage of and coordinating speech with secondary language and means of language.  
|                                                                        | - Evaluate general capacity through studying Science subjects.  
|                                                                        | - Evaluate natural science capacity.  
| 7. Capability to develop Science curriculum                             | - Evaluate documents, establish the relationship between the knowledge requirements of the program and the cognitive level of students;  
|                                                                        | - Rebuild documents to form a lecture structure that is both consistent with cognitive logic, pedagogical logic, and appropriate for cognitive level of students. |

### 3.3. Training activities to develop Science teaching capacity for students majoring in Primary Education at Hung Vuong University

**3.3.1. The subjects in the training program aim to develop Science teaching capability**

Research results on the PEP of HVU and a number of pedagogical universities show:

- In the PEP at HVU in particular and a number of other educational institutions in Vietnam in general, there are subjects to be selected to help form and develop STC for students. Subjects include compulsory subjects and elective subjects (Table 2).
Table 2. Comparison of PEPs between HVU, Hanoi Pedagogical University 2 and Thai Nguyen University of Education

|----------|----------------------------|---------------------------------|---------------------------------|
| Compulsory subjects | - Environmental education (2 credits)  
- Child physiology (2 credits)  
- Basic of nature in elementary school (2 credits)  
- Basic of nature and society in elementary 1, 2 (4 credits)  
- Natural basis part (2 credits - applies to training courses from K19 and earlier). | - Physiology of children of primary school age (2 credits)  
- Basic of nature and society in elementary school (3 credits) | - Child physiology in elementary school (2 credits)  
- Basic of nature and society in elementary school 1 (3 credits),  
- Basic of nature and society in elementary school 2 (3 credits) |
| Elective subjects | Discovery science in elementary school (K18)/Building and organizing experiential activities skills in teaching science in elementary schools (K18, K20)/Teaching science in elementary schools based on a competency approach (K20). | General physics (2 credits); Creatures around us (2 credits); General chemistry (2 credits) | None |
| Compulsory subjects | Nature and society teaching methods in primary schools (2 credits) | - Teaching methods for natural and social subjects in elementary schools 1, 2 (4 credits)  
- Pedagogical practice 3 (3 credits – 1 credit for teaching Science and Society) | - Teaching methods for natural and social subjects in elementary schools (3 credits).  
- Pedagogical practice 1, 2 (6 credits) |
| Elective subjects | Teaching science in elementary schools based on a competency approach (2 credits); Building and organizing experiential activities skills in teaching science in elementary schools (2 credits) | None | None |

From the results of Table 2, it can be seen that the similarity between the training programs is that the required subjects are Natural and Social Foundations, and Child physiology in elementary school. The duration of the subjects to equip students with knowledge to be able to teach Science can be said to be equivalent to other education institutions, but the subjects form skills in teaching science in elementary schools at HVU is still modest. In addition, although there are several subjects included in elective subjects (it can be said to be quite diverse compared to the training programs of Hanoi Pedagogical University 2, Thai Nguyen University of Education), in reality HVU
always guides students to choose subjects related to Vietnamese or Math but has never chosen subjects related to science.

The PEP of HVU also has many changes between versions of the review and update of the training program, but only for (mandatory) subjects aimed at forming Establishing and developing for students the ability to teach Science subjects with almost no change in subject duration or subject name [9].

In the PEP of HVU, the Environmental Education subject (BIO284) provides knowledge about natural resources, land, and water. This knowledge helps students to teach part of the content on the topic “Matter”. The Child Physiology subject (BIO257) provides knowledge about biological indicators, functions and functional activities of cells, organs, and organ systems in the child’s body,... This knowledge helps students be able to teach content on the topic “Human and health”. The Natural Foundations in elementary school subject (BIO259) provides knowledge about the human body and health, plants and animals, environment and natural resources, knowledge about matter, and energy sources. This knowledge helps students be able to teach part of the content on the topic “Matter” and the topic “Energy”.

If we compare the content of the Basic of Nature subject in elementary school (BIO259), we can see that there is not enough coverage of the subject’s background knowledge with the Science teaching topics prescribed in the general education program. allocation of periods for related knowledge is not reasonable. Specifically, in the topic Energy, grade 4 has the content of sound, light, heat, thermal energy, solar energy (related to the Physics subject) [5] but in the Basic of Nature subject in elementary school there is no content about this part [11]. Topics related to Biology knowledge take up 54% of the lessons (3 times more than the amount of time devoted to the topic of Matter/Energy), but in the Basics of Nature subject in elementary school, only 20 periods are spent (including theory and exercises, discussion) i.e. equal to the number of periods with knowledge for the Chemistry subject.

In the subject “Teaching Methods of Nature and Society” in elementary schools, the time devoted to teaching natural subjects (including Science subjects) is 20 periods. Meanwhile, with the need to use experiments and practice to develop the ability to understand the surrounding natural environment, students are only approached from a theoretical perspective [12]. In the subject Regular Pedagogical Training, there is no content for fostering STC [13].

- Results of interviews with lecturers, managers, and students show:
  + 100% of lecturers, managers and students agree and strongly agree that science teaching capacity plays an important role in meeting the output standards of the training program in the general education sector.
  + 100% of lecturers, managers and students evaluated that the PEP arranged subjects that contributed to the formation and development of STC for students majoring in Primary Education. Most students can also point out which subjects are in the curriculum.
  + Regarding the completeness of the knowledge content of subjects supporting STC: 41.3% of opinions are considered complete, 58.7% of opinions are considered relatively complete.
  + Regarding the duration of the subjects: 81.3% of opinions rated the duration
of subjects to equip science teaching knowledge are appropriate and very suitable. The duration for the subjects on forming science teaching skills assessed are relatively appropriate (34.7%), not suitable (41.3%).

3.3.2. Training activities aim to form and develop Science teaching capability

When studying in depth the detailed syllabi of the subjects: Natural foundations in primary schools, Natural teaching methods in primary schools and comparing them with the structure of teaching capacity in Science that we proposed above, we can see:

- Advantages: Students have received:
  + Fostering knowledge of Science subjects;
  + Fostering knowledge about science teaching methods;
  + Training in designing science teaching plans (2 periods in class), 4 periods of design practice and teaching practice.

  The main teaching and learning methods are presentations and group discussions.

- Disadvantages:
  + With 4 periods, it can be said that it is too few to be able to evaluate the extent to which students design lesson plans and practice teaching.
  + Students have few opportunities to: foster their capacity to evaluate learning outcomes in Science subjects; Science program development capacity.
  + Teaching organization methods do not pay attention to students’ self-study activities.

  Interview results show that in regular pedagogical training activities subject, students only focus on preparing lesson plans and practicing teaching lessons related to Math and Vietnamese in elementary school (100% opinions). Besides the subjects in the curriculum, Faculty of Primary and Early childhood Education does not organize any supplementary activities to help students practice more science teaching skills (100% opinions). On the lecturers’ side, there is a proposal to add contents about sound, light, heat, thermal energy, and solar energy (related to the Physics subject) to the Basic of nature in elementary school, increasing the duration of the module on teaching nature and society in primary schools. On the students’ side, there is a desire to have more supplementary activities to help them develop their teaching capacity in science.

3.3.3. General remarks and proposing solutions

Although HVU is one of the prestigious training institutions providing the labor market of Phu Tho province and neighboring provinces with good quality primary education bachelor’s human resources in which has received many compliments for its level of response the requirements of general education. The primary school teacher training at Hung Vuong University also reveals some limitations. As follow:

- The content of the modules supporting natural science knowledge is incomplete.
- Lacking supporting knowledge about sound, light, heat, thermal energy, and solar energy.
- The amount of time spent on methods of teaching nature and society in elementary schools is quite few (only 1 credit fo the teaching nature section).
- Regular pedagogical training activities only focus on teaching Mathematics and Vietnamese language.
- Students’ self-study activities have not received enough attention.
From the above limitations, we propose the following solutions:

Firstly, pay more attention to adjusting the content of subjects to provide a foundation of Natural Science competency for teachers to ensure knowledge coverage of the Science subject in elementary during the annual review and adjustment of the curriculum.

Secondly, increase the time for the course on Teaching Methods of Nature and Social Sciences in elementary schools as well as spend more time on fostering Science teaching capacity in the regular pedagogical training course.

Thirdly, pay more attention to students’ self-study activities in the process of teaching supporting subjects to contribute to the formation and development of students’ Science teaching capacity by building self-study guide documents and exchange forums, …

4. Conclusions

STC is a necessary competency for elementary school teachers. Our study has proposed a structure of Science teaching capacity with 7 components as a basis to evaluate which competency elements the current General Education curriculum has formed and developed for students. The research results have also shown the advantages and limitations stemming from the PEP and training activities to foster students’ STC. From there, we have proposed several solutions to improve the PEP and corresponding training activities at HVU. Regularly reviewing the program, as well as improving training activities is expected to help Primary education students after graduation be able to perform well in the 2018 General education program in general and teach Science subject well in particular.

References


Tóm tắt


Từ khóa: Năng lực dạy học, năng lực dạy học môn Khoa học, giáo dục tiểu học, chương trình đào tạo.