

DEVELOP CREATIVE COMPETENCY FOR STUDENTS THROUGH EXPERIENTIAL LEARNING ACTIVITIES FOR BIOLOGY GRADE 6

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Abstract: Creativity is the ability to create new ideas, new products in research and in life; it is the ability that people use to solve problem most effectively. Developing creative competency for students is an important task in high school. In this article, based on the definition, structure of creative competency and the relationship between creative competency and experiential learning, we present a measure to develop creative competency for students in teaching biology grade 6 through experiential learning activities.

Keywords: Creativity, creative competency, experience, experiential learning.

1. INTRODUCTION

In the General Education Program (July 2017), creative competency is defined as a general competency that subjects and classes from primary school, secondary school and high school are directed to form and develop for students. Depending on the characteristics of each subject, there are many measures to develop creative competency for learners such as: teachers require students to ask questions; teachers design tasks for students to solve problems in order to develop creative competency; Especially, teacher should organize students' learning via experiential learning activities, in which students apply their own experiences to solve tasks and also develop creative competency.

Kolb (1984), Linda and Carol (1994), Andresen, Boud and Cohen, 1995), Clark and White (2010), consider experimental learning is a theory of learning and learner's development, which emphasizes the learning process derived from experience. According to Kolb (1994), "*Learning is the process whereby knowledge is created through the transformation of experience*" [1; p. 38]. Experiential learning helps students to learn actively by feeling themselves, learning through collaboration, sharing experiences and values, learning attach to life and real practicing.

2. CONTENT

2.1. Definition of competency

According to Weinert (OECD, 2001, p. 45): "*competence is interpreted as a roughly specialised system of abilities, proficiencies, or skills that are necessary or sufficient to reach a specific goal*" [2].

Rogers (1996) states that: "*Competency is the set of skills that affect the contents in an available situation in order to solve a problem*" [3; p. 15].

2.2. Definition of creativity

According to the Vietnamese dictionary:

- i) Creativity: creates new material or spiritual values.
- ii) Creativity is the discovery of a new, new solution, unconstrained, dependence on what is already there [4; p. 847].

Guilford (1999) considered creativity as a process of resolving problems, since every situation requires an individual's creative thinking. In the face of a problem, human capital their experience to combine them into new structures, and with this new form of experience, the problem is solved [5].

For Woodward (2015), creativity is the realization of an idea that is not the result of a clear logical process [6].

2.3. Creative Competency

For Tran (2013): "*Creative competency is the ability to create new value of a person based on the combination of the unique qualities of that person*" [7].

Huynh (2009) argued that "*Creative competency is the ability to create new thing or new way to solve problem of people*" [8].

From the study of the authors' point of view, we suggest the student's definition as follows: *Creative competency is the ability of students to ask creative problematic questions, to propose ideas and solutions to solve problems creatively (novel, unique); execute solving problem creatively (flexible, responsive, effective), report result creatively (content, form, style) and assess result creatively.*

2.4. Criteria for creativity competency

Guilford (1976) discussed the creative personality and modeled it. He said that the creative personality must have a combination of the following

characteristics and states: fluency, flexibility, elaboration, originality, sensitivity and redefinition [9].

According to Benn (2008), people with creative competency, reformers and inventors have some characteristics such as: They are always looking for ways to do effectively, they are the breakers of the model, to find new solutions, new ways of doing things, they discover curiosity (always questioning why), they create ideas (new ideas, unique), and they dare action [10].

According to Nguyen (2011) [11], the creative competency expressions of students are: Proposing new hypothesis which is more concise to a familiar problem, self-made and implemented plan to achieve ideas from a problem, proposing different methods and apply knowledge, available skills to the reality to propose solutions to the problems. In addition, redesigning the experimental model, teaching materials to make the original model more reasonable, making use of the existing ones to replace the creation of new but still meets the requirements, detecting and analyzing the hypotheses and properly evaluating the problem, proposing and implementing a new and non-predetermined available rules.

From the synthesis of the authors' opinions on the expressions of the creative competency and the structure of the creative competency, we define the present of creative competency of students following five elements: (1) Ask questions creatively, (2) Propose the solutions to solve problems creatively, (3) Perform problem solving creatively, (4) Present and report results creatively, (5) Propose new ideas and apply learning results creatively.

(1) Ask creative questions

For Grazer and Fishan (2016): "Life is not about finding the answers but asking questions which create innovative and creative thinking, out of ideas interesting" [12].

Based on Michako (2016)'s creative questionnaire development [13], we suggest some questions to investigate: Why this problem needs to be solved? Which benefits does it bring? Is there anything you do not know? What information do you have? Is the information complete? Can the problem be separated into different problems? How are they related? What is the unchanging aspect of the problem? Have you seen this before? Do you know any issues related to it? Can you use the old method? Can you talk about the problem? What is the most / worst / best situation can you imagine?

(2) Propose the solutions to solve problems creatively

In order to have innovative solutions, students need to be able to see objects and problems from different angles so that they can find solutions to a problem.

Also based on Michako's research [13], we suggest some questions to find a solution: Can you solve the whole problem? Or do you only solve just a part of the problem? How would you like the solution? Can you imagine it? How many parts of the unknown do you know? Do you use all information? Have you considered all the important points? How many ways have you tried? Can you guess the solution intuitively? Can you check the results? What to do? How do you do it? Where should it be done? When? Who should do it? Who will be responsible for each job? Can you apply this to other FRF?

(3) Perform problem solving creatively

Expression of students who could solve problem creatively: Having the ability to combine many available experiences, mental activities combined with different tools and methods to solve problems. They know timely adjustments and flexible solutions when encountered. They also have ability to apply available knowledge to new situations when conditions change. It is possible to adopt a new, unique approach that is not affected by previous experiences.

(4) Present and report results creatively

Content presented should be in accordance with topics, which contains much information and is easy to understand. Presentation is clear, concise, logical, scientific, unique, and novel. The speech is inspirational. The presenter uses body language and interacts effectively.

(5) Propose new ideas and apply learning results creatively

The presenter has ability to find associations and new relationships. From then on, a completely new and unique idea is put into real life.

Box of ideas describe morphology box method of Fritz Zwicky. It's an automatic way of combining the "parameters" of a challenge into a new one (parameters here are characteristics, factors, variables or aspects of the challenge). You will choose the number and nature of the parameters for the challenge. It is important to create the parameters and then enumerate the variations of the parameters. Given the combinations of variations of parameters, you can create new ideas [13].

2.5. Experiential learning

2.5.1. The concept of experiential learning

According to the Vietnamese dictionary: experience is undergoing and experiencing [4, p. 1020].

The experiential process will contain the “try on” and “false” elements. Experience brings people variable knowledge. It is the process to accumulate, to help people form their own experience, their own living, and form the quality and ability.

According to educational scientists, the experience is the objective persistence that affects the human senses, create the senses, the perceptions, the symbols, people can feel it and feel it clearly, make deep impression, draw lessons, apply to real life, form the attitude of value [14].

For us, experiential learning is a learner who performs the task of learning independently or actively participates via the processes of questioning the problem, performing the task, product reports, assessing and debating.

2.5.2. Experiential learning model of David Kolb

According to Kolb, learning progresses through the following four phases [1]:

1. Concrete Experience: Learners are ready for the new experience through the implementation of concrete and practical activities. Concrete experience when derived from practical situations will be more attractive to students and creates excitement and emotions for learners.

2. Reflective Observation: Learners test, study from previous experience through a variety of approaches to obtain the data as well as feelings and feelings; and the next is to find the cause, the nature of the problem comes from, what is the relationship? It can be seen that the process of thinking is from low to high (cause, relationship); and concretized by paying the following questions: What did you do? What happened? Have seen / felt / heard what? What are the most difficult / easy? Why? What is the cause?

3. Abstract Conceptualization: The learner analyzes, integrates, and generalizes new facts and ideas acquired in the previous two phases of experiential learning and reflection into theories / models. This phase is the highest level of the process of reflection when it comes to concepts; this process is called high-level thinking. In addition, the knowledge of “procedures, instructions for implementation” is also beginning to emerge from this phase until the next phase, after the knowledge of “abstract concepts” is formed.

4. Active Experimentation: In this phase, along with the previous phase, the learner applies the knowledge

learned into the new situation or planning the next learning cycle. This phase helps students recognize the value of knowledge and to apply knowledge to decision making and problem solving. The questions for this stage are: How can one apply the knowledge learned in a new situation? How will you act in the future? ... (Bolan 2003; Kolb 1984; Svinicki and Dixon 1987).

2.5.3. Design of experimental learning phases

To design the phases of experiential learning, teachers need to analyze the topic of teaching, the content characteristics of the subject knowledge to determine the appropriate types of activities. Next, it is necessary to define the necessary contents for the activities such as:

- Participants: teachers / students / other subjects.
- Preparation: learning materials, learning tools.
- Time to organize learning activities, places to organize learning activities.
- Means used in the process of organizing learning activities.

Design of experiential learning

Applying the experiential learning model of David Kolb (1984), we design the 4 phases of experiential learning as follows:

- *Warming up:* Teachers make situation which have problem, they are close to real life, related to learning content to stimulate curiosity and to excite students.

Students ask questions related to the problem. Questions are recorded by the groups (at the end of the topic they can be used to evaluate the learning process).

- *Concrete experience:* Students experience the creation, and then occupy the knowledge in the process of performing assigned tasks. Teacher clearly identify the individual / group / class experience, provide instruction with or without guidance.

- *Present, discuss the result of experience:* Students will share and discuss their results after the experience, students present their products, their activities (knowledge gained, feelings, experiences).

It is the process of sharing, discussing, analyzing the results of experience, finding the cause, the nature of the problem, and finding the relationship between them. The more active the experience, the more abundant the experience, the more students approach the problem from more aspects.

- *Conclude and generalize knowledge:* Teacher and students summarize the learning process,

perform tasks and then teacher and students conclude and generalize knowledge.

- *Apply knowledge*: Apply the knowledge gained from experience, solve new problems.

2.5.4. The relationship between experiential learning and development creative competency

Creative competency development through experiential learning

Experiential phase	Creative learning development through experiential learning	Creative competency
Concrete experience	Students participate in the experience, perform assigned tasks, and solve problems. In the course of the experience, there are always new situations, new problems to be solved, students ask questions, propose alternatives, new solutions to solve the problem of creation.	Ask creative questions. Design a problem-solving plan.
Present, discuss experiential results	Students present their product, the process of group activity (knowledge gained, feelings, experience). Each student, each group has different approaches, problem solving in a different way, the presentation of the experience of each individual / group is also very rich, have their own style, unique.	Report research results creatively.
Conclude, generalize knowledge	Students conclude, generalize knowledge and lessons learned.	Evaluate result creatively.
Apply	Students use their knowledge and experience to solve new problems (conditions, conditions change).	Solve the problem creatively. Suggest new ideas.

2.6. Develop creative competency through experimental learning in teaching Biology 6

Teaching Topic: Conservation of plant diversity

- Participants: Biology teachers, head teacher, some parents of students, staff of Xuan Thuy National Park.

- Location: Xuan Thuy National Park.

Through experiential learning, students learn from their own experience, and ask questions about the problem; independent generalizations, generalize knowledge, and apply knowledge in a positive way. The experiential learning is the foundation of creativity.

- Document: Document of Xuan Thuy National Park.

- Learning equipment: pen, paper for writing, writing report, crayon, scissors, tape, glue, camera, research tools etc.

Experimental learning phases

- *Warming up*

Activities of teachers	Activities of students
<ul style="list-style-type: none"> - Teacher asks: If one day there were no plants on Earth, what would happen? - Teacher and students develop the idea of the project: "Let's serve as researchers of plant diversity, learn about the reality, causes, consequences and propose solutions to protect the plant diversity in Xuan Thuy National Park. - Teachers and students plan the project implementation. Identify tasks to be done during project implementation 	<ul style="list-style-type: none"> - Students raise questions: Are people contributing to reducing plant diversity? If that really happened, why did this happen? If the diversity of plants decreases, what will happen? What can we do to protect plant diversity? - Students discuss to develop project ideas, project planning. <ol style="list-style-type: none"> (1) Study on plant diversity decline in Xuan Thuy National Park. (2) Determine the cause of plant diversity decline. (3) Identify the consequences of plant diversity decline (4) Proposed measures to limit the decline of plant diversity.

- *Concrete experience*

Activities	Activities of teachers	Activities of students
Planting Day	<ul style="list-style-type: none"> - Teacher asks: What role does green play in our lives? What is the role of the plants in the National Park? - Teacher generalizes the role of trees, promotes the movement of planting trees (encourage students to plant trees at home, village roads, schools...). - Teacher and staff of the National Park instruct students to plant trees in the garden. 	<ul style="list-style-type: none"> - Show the role of trees - The role of trees in national parks: preserve many precious genes and biodiversity, and protect the sea. - Under the guidance of garden staff, teachers, students practice planting trees (digging holes, placing trees, cultivating soil, watering) and attaching souvenir names of groups in trees.

Visiting and studying Xuan Thuy National Park	<ul style="list-style-type: none"> - Grouping according to preferences or tasks, each group consists of 4-6 students and do the task of studying the National Park with contents group activity guide). 	<ul style="list-style-type: none"> - Visiting the National Park, visiting the museum at the National Park. - Students carry out research tasks assigned: <ul style="list-style-type: none"> (1) Compulsory content for all groups: + Learn about plant diversity in Xuan Thuy National Park; + Learn about the status of plant diversity reduction in Xuan Thuy National Park; + Propose solutions to limit the decline of plant diversity. (2) Optional group research content: + History of the National Park; + Natural geography in the National Park; + The work of the staff at the National Park; + The work of the people related to the National Park; + Group of reporters: filming, photography, writing newspaper. - How to proceed: + Interview with staff at the NP, interviews with local people; + Observe, record, analyze, synthesize information, read documents about the National Park; + Film, take photographs, and write reports.
Competition: Garbage collection and recycling: "Gift from nature"	<ul style="list-style-type: none"> - Teacher divides groups, and shows the rules. - Teacher provides crayons, paper, adhesive tape, glue, scissors, etc. - Teacher organizes students to present about their products. - Teacher comments and evaluates students' products. 	<ul style="list-style-type: none"> - Students collect waste. - Students give ideas for their products from the garbage collected. - Students finish their products. - Representatives of each group present their product. - The other groups discuss and ask questions - Invite teachers, parents, friends to visit and buy products. The proceeds will be donated to the environmental protection fund for the children management.

- *Present, discuss the result of experience:*
 + Students report the results of Xuan Thuy National Park; + Students share their experiences after the experiential learning: What interests me most and what is not happy to participate in experiential learning? What experience did you get?

- *Conclusion, generalizing knowledge:* + Students listen to plant diversity of Xuan Thuy National Park (lecture by the manager of Xuan Thuy National Park); + Record, re-system knowledge by using diagrams.

- *Application:* Re-educate by mind map. Teacher ask some questions: 1) What would you do if you were a National Park staff in order to raise awareness about the diversity of TV in the park in particular and in the whole country? 2) What if I was one of the recyclables today? What will you tell people? Students propose ideas to raise awareness about plants diversity; do role play about the garbage to send messages to people.

- *Experimental results:* In the process of experimental learning, teachers create favorable conditions, encourage students to ask questions to study problems, propose new solutions, ideas, directly participate in the experiential learning, students are encouraged to express different ideas, unique, novel. Many students have been more active, there are expressions of creative competency:

- Students are willing to take the task, participate in the experiential learning, actively communicate with the group members, discuss with the teacher about problems in the process of experiential learning.

- During experiential learning process, students express the spirit of cooperation, teamwork, and show the responsibility. At the same time, there is a constant discussion if students are not satisfied with the suggestions of other members of the group.

- Students have demonstrated creativity in the process of performing the duties of the Native. Most of the exercises need to create products from the practice. Students have unique products, novelties, showing the individual style of individual/group.

- Teachers learn positive feedback about the types of experiential learning designed. Teachers believe that the types of experiential learning are designed to be valuable, and if used properly in accordance with local conditions, the school will develop the creative competency for students. However, the teachers also reflect some activities, and the design requirements are difficult, only suitable for students who are quite good and active. In some activities, the requirements are too easy and not really necessary. In addition, the teachers also mention the difficulties in organizing the experiential learning (condition of facilities, time, content, how to manage and assess students ...). The above feedback is very valuable to us, on that basis we continue to review and adjust for better and better use of the experiential learning.

After the implement period, teachers who teach experiential learning have proposed to continue using the designed experiential learning (adjusted and supplemented) to teach Biology 6 in the following years. This partly demonstrates the effectiveness and

applicability of the experiential learning that the topic has built into the practice of teaching biology grade 6 in secondary school today.

Here are some pictures/figures of taken at Xuan Thuy National Park. This is the first competition on waste recycling and the cause of biodiversity loss.



3. CONCLUSION

Through experiential learning activities, students are involved in all learning activities in a positive way. Based on their own experience and cooperation with friends with teachers and others, students have formed,

gained knowledge, skills and experience, solved effective learning problems, and proposed new ideas in the learning process. Thus, learning through experiential learning is a best condition to develop creative competency for students.

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