

## **Compose “Food Irradiation” Topic to Foster the Competency of Integrating Natural Science Knowledge for Students of Cantho University’s Physics Pedagogy with Webquest\_method**

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**Abstract:** Description integrated science competency of physics education students is important work. Lecturers may be evaluate their students based on level of integrated science competency description table exactly. The paper presents result about structure and expression competency model integration science and give examples of integrated teaching to students through “Food Irradiation” topic to develop their skills and knowledge.

**Key words:** Competency, integrated science, level, Physics education student, general physics.

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### **I. Introduction**

Improve the quality of comprehensive education, attach importance to the application of knowledge into practice, develop creativity, self-study, encourage lifelong learning in students [1] In Vietnam, The new general education program has been implemented since 2019. Whereby, "science" subjects will start to teach to students (grades 4-5) in elementary, junior high school with "natural sciences" subjects (grades 6-9) and elective subjects in natural sciences: physics, chemistry, biology for high school students (grades 10-12) to direct their career.

The teacher should be equipped and develop skill to teach integrated knowledge or coordination, organize interdisciplinary teaching (Minh V. Nguyen, 2015) [2]. The best way to learn and perceive natural phenomena of the real world in science should be based on an effective interdisciplinary teaching [3]. The integrated teaching ability of pedagogical students include the knowledge, skills and attitudes (Bloom, 1956) [4&5], the capacity to integrate scientific knowledge is a core competence of integrated teaching capacity in high school. The steady integration of knowledge helps students develop integrated ideas and the concepts of the environment so that they can compile and teach the subject better integrate in high school.

Integrated teaching to develop higher-order thinking, teaching physics for education student should approach competency. "Method of development is progressive" (Roegiers X., 1992). This means, the assessment must be required at the level [6]. Based on the research for the Bloom's capacity model, we have the given table to describe for the integrating science five level during general physics training, this help for the rating is specified and science.

The process of teaching by webquest has great advantages: Help students understand the content of the lesson, Develop soft skills such as presentations, group work, information processing [7]. Besides, the advantage of the Webquest method is that the learning model is actively saving students time, creating a passion for students, thereby, the application of WebQuest, promote self-learning ability of students when applied to teach under credit programs at universities [8].

Lecturers can organize extracurricular lessons, seminars, teaching the project with topics that are generalizing and interdisciplinary. For example: "The Physics and Chemistry of Substances," "Physics Methods in Natural Sciences," In this way, students will show a synergy between the sciences [9]. According to the Tra H. Do Intergrated training will contribute to enriching, and profound the knowledge of the topic. The achievement of integration and collaboration must be expressed in aggregate. It is the convergence of the knowledge and methods of the subjects (principle of integral) and the efforts of cooperation [10]

From the above analysis, we propose that the ability to integrate students' natural sciences is the ability to explain and study physics, chemistry, biology, and so on, using knowledge and physical methods, laws and theoretical physics, knowledge of the relationship of the content of the natural sciences, meet the ability to expand the content and integrated teaching after graduation.

## II. Literature Review

### 2.1 The Three Domains of Learning

The committee identified three domains of educational activities or learning (Bloom, et al. 1956)[4]

- Cognitive: mental skills (knowledge)
- Affective: growth in feelings or emotional areas (attitude or self)
- Psychomotor: manual or physical skills (skills)

### 2.2 Webquest \_ method

#### 2.2.1 Defining a webquest

A WebQuest is an inquiry-oriented activity in which some or all of the information that learners interact with comes from resources on the internet [7].

#### 2.2.2 Producing a webquest

- An introduction that sets the stage and provides some background information.
- A task that is doable and interesting.
- A set of information sources needed to complete the task.
- A description of the process the learners should go through in accomplishing the task
- A conclusion that brings closure to the quest.

## III. Findings

### 3.1 The integrated science competency of physics education student in teaching general physics show in the table 1

Competence component	Standards
Knowledge	<ul style="list-style-type: none"> <li>- General physics knowledge</li> <li>- Physical research method</li> <li>- Integration science theory</li> </ul>
Skills	<ul style="list-style-type: none"> <li>- Integrated skill in the physics subject</li> <li>- Integrated skill in the science (physics - chemistry and biology)</li> <li>- Study skill groups the general physics of students</li> </ul>
Attitudes	<ul style="list-style-type: none"> <li>- Positive, self-reliant in the study of general physics</li> <li>- Recognizing the importance of knowledge in general physics, the knowledge of integrating the subject and the integration of theoretical knowledge with other sciences to have integrated teaching ability in high school</li> </ul>

Table 1: Description integrated science competency of physics education student in teaching general physics.

### 3.2 Each standard description in 5 level, they are from the lowest level of competency in the figure 1.

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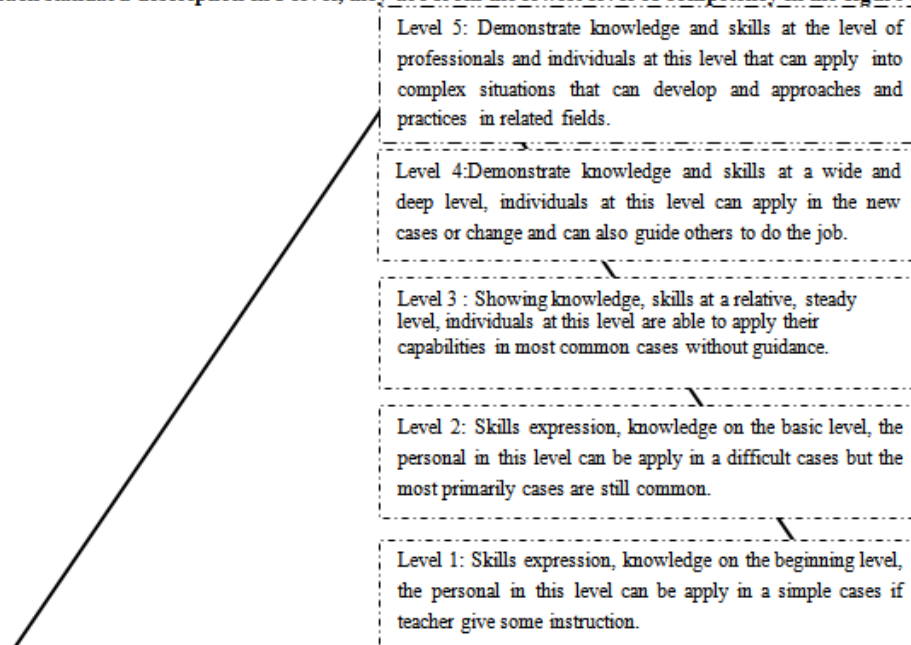


Figure 1: Capacity is described in five levels

Based on Figure 1. We recommend 5 levels of competency in the webquest

Level 1: Completely incapable of fulfilling the requirements of the project

Level 2: Establish a project implementation plan, but with the support of trainers.

Level 3: Self-made project implementation plan but the product from the project has many errors.

Level 4: Self-developed project plans, products from the project, meet the requirements of the trainer.

Level 5: Self-developed project plan, products from the project, products meet the requirements of the trainer, know how to teach other students

### **3.3 The Food Irradiation topic teaching with webquest \_ method**

Website: <https://sites.google.com/a/ctu.edu.vn/food-irradiation/home>

#### **a. Introduction**

Last time, the dragon fruit was "Issue a visa" to the US is a good first step for dragon fruit in particular and Vietnam fruit in general on the way of abroad, infiltrate a difficult market like the US. However, in order to get a "visa" into the US, producers and exporters have to follow strict regulations set by the US Department of Animal and Plant Health Inspection Service (APHIS). One of the regulations is that any fruit imported into this country must go through irradiation processing to ensure the elimination of pests (source: tuoitrenews.vn). So what is food irradiation technology? Today, we will apply some of the lesson content into practice through group activities. They will answer the questions and present them to the class. Each group was divided into 4 students to learn applying gamma rays to food irradiation.

#### **b. The task**

Part A. Overview of food irradiation

i. The purpose of food irradiation?

ii. What are some methods or signs to identify irradiated foods?

iii. Is irradiation causing contaminated food? Does irradiation produce toxic substances for food? Does irradiated food maintain nutritional quality? Why?

Part B. Operation process of the irradiation plant

i. What is the operating procedure of a food irradiation plant?

ii. Why is the radioactive source placed in water?

iii. Radiation acts directly on the DNA part, which determines the genetic property, making it impossible for cells to cleave.

Radiation mediates DNA mutations by inserting or deleting DNA sequences. Name the radiation used to act on AND

iv. Please state the limitations of this method.

v. Tells some other applications of gamma radiation in addition to being used by humans to irradiate food.

Part C. Learn about sources of food irradiation

Suppose we initially have 0.5 mol Cobalt-60 (Co60), knowing that its radioactivity produces two gamma rays with energies: 1.17 MeV and 1.33 MeV, respectively. Calculate the total energy of gamma rays when 0.5 mol Co60 radiates out? With such energy, how many tons of dragon fruit can be irradiated? According to the requirements of US agencies, to disinfect, the average dose irradiated into dragon fruit must be 3 kGy.

c. Information sources

<https://connectusfund.org/7-advantages-and-disadvantages-of-food-irradiation>

[https://en.wikipedia.org/wiki/Food\\_irradiation](https://en.wikipedia.org/wiki/Food_irradiation)

[https://www.youtube.com/watch?v=pe6AKh\\_tLys](https://www.youtube.com/watch?v=pe6AKh_tLys)

d. The process

Create 4 student/group. Request they to the tasks and reports with powerpoint software next week.

#### **e. Conclusion**

Understanding Food Irradiation is an interesting topic because it is related to many disciplines, an interdisciplinary topic, student want to do task in this theme, they must use knowledge from other disciplines together. Although hard work, but certainly this will help students in real life.

## **IV. Conclusions And Recommendations**

In conclusion, this article presents the structure and expressions of integrated science capabilities for students of physical education in CanTho University. Lecturers who compose these topics can provide opportunities for students to develop skills and improve their knowledge of integration, meeting teacher standards after they graduate. The above description is a useful tool for instructors in evaluate the progress of students.

In addition, through the web-based learning activities, students are also trained in self-study, group work and information technology skills.

Integrated teaching process should be done regularly, which can be accomplished by instructors giving students a short essay test after each topic, aiming to assess their integration competence, if passed this test, instructors tasked with continuing with a new topic, and so on.

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## Appendix

a. Introduction Updated 6 minutes ago

Food Irradiation  
a. Introduction  
b. The Task  
c. Information sources  
d. The process  
e. Conclusion  
Sitemap

Last time, the dragon fruit was " Issue a visa" to the US is a good first step for dragon fruit in particular and Vietnam fruit in general on the way of abroad, infiltrate a difficult market like the US. However, in order to get a "visa" into the US, producers and exporters have to follow strict regulations set by the US Department of Animal and Plant Health Inspection Service (APHIS). One of the regulations is that any fruit imported into this country must go through irradiation processing to ensure the elimination of pests (source: tuoitrenews.vn). So what is food irradiation technology? Today, we will apply some of the lesson content into practice through group activities. They will answer the questions and present them to the class. Each group was divided into 4 students to learn applying gamma rays to food irradiation.

Food Irradiation

b. The Task Updated 6 minutes ago

Food Irradiation  
a. Introduction  
b. The Task  
c. Information sources  
d. The process  
e. Conclusion  
Sitemap

Part A. Over view of food irradiation  
a. The purpose of food irradiation?  
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c. Is irradiation causing contaminated food? Does irradiation produce toxic substances for food? Does irradiated food maintain nutritional quality? Why?  
Part B. Operation process of the irradiation plant  
a. What is the operating procedure of a food irradiation plant?  
b. Why is the radioactive source placed in water?  
c. Radiation acts directly on the DNA part, which determines the genetic property, making it impossible for cells to cleave. Radiation mediates DNA mutations by inserting or deleting DNA sequences. Name the radiation used to act on AND  
d. Please state the limitations of this method.  
e. Tells some other applications of gamma radiation in addition to being used by humans to irradiate food.  
Part C. Learn about sources of food irradiation  
Suppose we initially have 0.5 mol Cobalt-60 (Co60), knowing that its radioactivity produces two gamma rays with energies: 1.17 MeV and 1.33 MeV, respectively. Calculate the total energy of gamma rays when 0.5 mol Co60 radiates out? With such energy, how many tons of dragon fruit can be irradiated? According to the requirements of US agencies, to disinfect, the average dose irradiated into dragon fruit must be 3 kGy.

Food Irradiation

## Compose “Food Irradiation” Topic To Foster The Competency Of Integrating Natural Science

The image displays three sequential screenshots of a web-based learning environment titled "Food Irradiation". Each screenshot shows a different section of the course:

- Top Screenshot (c. Information sources):** The main content area lists three URLs: <https://connectustund.org/7-advantages-and-disadvantages-of-food-irradiation>, [https://en.wikipedia.org/wiki/Food\\_irradiation](https://en.wikipedia.org/wiki/Food_irradiation), and [https://www.youtube.com/watch?v=pe6AKh\\_tlys](https://www.youtube.com/watch?v=pe6AKh_tlys). The left sidebar menu highlights "c. Information sources".
- Middle Screenshot (d. The process):** The main content area contains the text "4 student/group and reports with powerpoint software next week." The left sidebar menu highlights "d. The process".
- Bottom Screenshot (e. Conclusion):** The main content area contains the text "Understanding Food Irradiation is an interesting topic because it is related to many disciplines, an interdisciplinary topic, student want to do task in this theme, they must use knowledge from other disciplines together. Although hard work, but certainly this will help students in real life." The left sidebar menu highlights "e. Conclusion".

Each screenshot includes a top navigation bar with the "Food Irradiation" logo, a search bar, and a user profile "tshu@ctu.edu.vn". A sidebar on the left of each page lists the course structure: "Food Irradiation", "a. Introduction", "b. The Task", "c. Information sources", "d. The process", "e. Conclusion", and "Sitemap".

### Demo of website “Food Irradiation” topic

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