

# APPLYING WEBQUEST METHOD IN GENERAL INFORMATION TECHNOLOGY COURSE TO IMPROVE PROBLEM SOLVING ABILITY FOR STUDENTS AT THE UNIVERSITY OF AGRICULTURE AND FORESTRY - THAI NGUYEN UNIVERSITY

Dinh Thi Thanh Uyen<sup>1</sup>

<sup>1</sup> Thai Nguyen University of Agriculture and Forestry, Thai Nguyen University, Vietnam

## ABSTRACT

*Developing problem-solving ability of learners is identified as an important task in teaching in general and teaching introductory informatics in particular. To develop problem-solving ability for learners, it is necessary to use many different measures through different subjects. In this article, we present the WebQuest method in teaching project-based learning of introductory informatics, we hope to improve problem-solving ability for students at Thai Nguyen University of Agriculture and Forestry.*

**Keywords:** *WebQuest, Project-based learning, problem-solving skills, information technology course*

## 1. INTRODUCTION

In the current trend of artificial intelligence technology and digital transformation, global education has undergone a strong and profound change in scope, curriculum and training forms. Educational innovation in general, and university education innovation in particular, is an inevitable global trend. In order to improve the quality of training in the new era, educational institutions have researched, deployed and applied many new solutions. In particular, innovation in teaching methods is still considered a key solution.

WebQuest is a new teaching method, built on the basis of new teaching tools such as information technology and the Internet. Through WebQuest, learners independently perform a task on a complex topic, associated with practical situations. Basic information about the topic is accessed from linked pages (Internetlinks) selected by the teacher in advance. Through WebQuest, students proactively approach the lesson topic and learning tasks, plan to follow the suggested process by reading and processing online information from the link address provided by the teacher, and self-assess according to available criteria. Applying WebQuest in project-based teaching helps learners improve their self-study and research abilities; at the same time, helps learners acquire many other necessary soft skills such as: Communication skills, teamwork skills, etc. That is the reason we choose this method in teaching the General Informatics course at the University of Agriculture and Forestry - Thai Nguyen University.

## 2. RESEARCH CONTENT

### 2.1. Problem solving ability

There are many studies that have proposed the concept of ability according to [1] classifying ability into the category of activities when considering: "Ability is the mobilization of a synthesis of knowledge, skills and other personal attributes such as interest, belief, will... to perform a type of work in a certain context". Ability is divided into many different types, in which problem-solving ability is one of the general abilities, the foundation for all human activities in life and professional work. This is a very important ability, demonstrating the ability of an individual (when working alone or working in a group) to think about a situation and find solutions to a certain

problem. According to [2], the general structure of problem-solving ability is described as a combination of 4 component ability: Professional ability, methodological ability, social ability (including the following abilities: communication ability, cooperation ability), individual ability (including the following ability: self-study ability, creativity ability, self-management ability). These are necessary abilities that need to be formed and developed for students to meet the requirements of the training process as well as the actual career after graduation.

## 2.2. Project-based learning

Project-based learning is a teaching method in which learners, under the guidance of teachers, solve a complex learning task on their own, combining theory and practice, with the main form of work being in groups. Groups determine their own goals, plan and implement the project, participate in checking the implementation process and evaluating the results. The results are products that can be introduced and presented. The nature of project-based learning is a method of organizing teaching that focuses on learners. Learners actively acquire knowledge and skills through solving a situational exercise associated with practice. Learning activities in project-based learning are designed to closely follow the curriculum and interdisciplinary knowledge to create opportunities for learners to acquire integrated knowledge and creatively apply it to real life. The project-based learning process includes 5 steps: 1) Develop ideas, choose topics and determine the purpose of the project; 2) Develop a project implementation plan; 3) Implement the project; 4) Collect results and present project products; 5) Evaluate the project.[3]

## 2.3. WebQuest teaching method

There are many different definitions and descriptions of WebQuest. In a narrow sense, WebQuest is understood as a teaching method. In a broad sense, WebQuest is understood as a model, a perspective on teaching using the Internet. WebQuest is also the teaching content unit itself built to use this method and is a WebQuest page posted online. When calling WebQuest a teaching method, it is necessary to understand that it is a complex method, in which different specific methods can be used.

As a teaching method, WebQuest is understood as a teaching method in which learners independently perform a task in a group on a complex topic, associated with practical situations. Basic information about the topic is accessed from linked pages (Internetlinks) selected by the teacher in advance. Learning is research and discovery-oriented, with learning outcomes presented and evaluated by learners [4].

## 2.4. WebQuest design process for project-based learning for students

To implement this teaching method, teachers need to build a website called WebQuest. We propose a 6-step process for designing a project-based learning WebQuest as follows:

- Step 1. Select and introduce the topic: Choose a topic that is suitable for the curriculum, oriented towards practical life, interesting and large enough to search for documents on the Internet.
- Step 2. Determine the goals: It is necessary to clearly define the goals and requirements to be achieved in implementing the WebQuest. The requirements must be appropriate and achievable by students.
- Step 3: Develop the task: To achieve the purpose of the learning activity, students need to solve a meaningful and suitable task or problem. The learning task is the central component of the WebQuest. The task must be oriented to the student's activities, avoid tasks that are purely review and reproduction
- Step 4. Find learning resources: Choose a topic that is suitable for the general education program, oriented to practical life, interesting and large enough to search for documents on the Internet.
- Step 5. Implement WebQuest: Students perform learning tasks in the project based on instructions and resources on WebQuest. Teachers are only consultants and supporters.
- Step 6. Evaluation: Design evaluation forms with clear criteria; conduct self-evaluation, peer evaluation and expert (teacher) evaluation, thereby drawing experience after the lesson.

## 2.5. Applying WebQuest in teaching General Informatics subject

General Informatics is a compulsory basic course for students of all majors at Thai Nguyen University of Agriculture and Forestry. In addition to ensuring learning requirements like other subjects, students need to meet the requirements of the school's Informatics output standards according to Circular 03 of the Ministry of Information and Communications. According to the training program framework for the 2024-2025 school year, the Introduction to Informatics course is built with 2 credits (1 theoretical credit, 1 practical credit). The program content of the course is divided into 4 chapters, including 3 theoretical chapters: Basic knowledge of computers and computer networks, basic computer use, basic Internet use and 1 chapter of practice of basic applications: Word and Excel.

### 2.5.1. Build a WebQuest

We use Google Sites to build WebQuests for projects. For each learning project, there will be a WebQuest page consisting of 6 parts: Introduction, Task, Process, Documents, Evaluation and Conclusion as shown below:

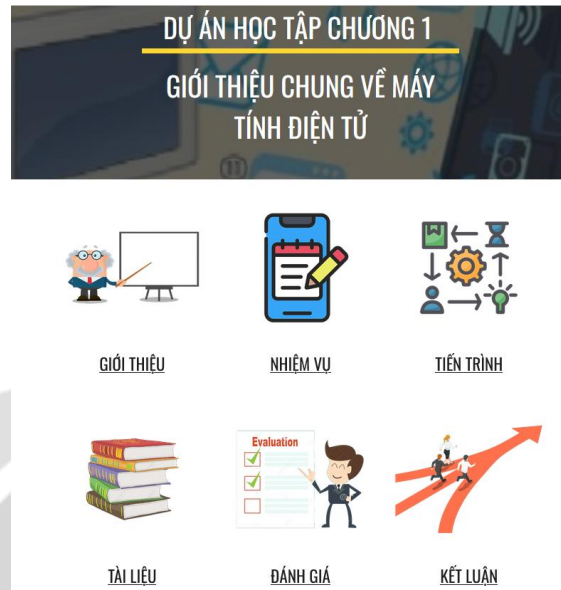


Fig 1: WebQuest page interface of the learning project

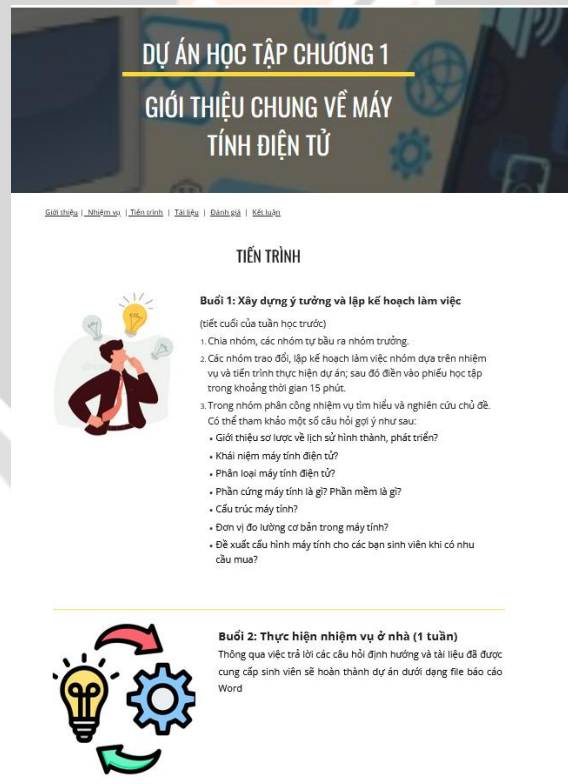


Fig 2: Student task progress on WebQuest

**2.5.2. Designing a project-based learning plan using WebQuest**

In this section, we design a teaching plan for the project “Electronic Computer”, which belongs to the first theoretical chapter of the General Informatics course.

I. Objectives

1. Knowledge, skills, attitudes

a) Knowledge

Help students understand basic knowledge about computers such as hardware, software, basic measurement units, safety rules when using computers, ...

b) Skills

Help students with skills such as using computers to look up, analyze, and synthesize documents; independent work skills, teamwork skills, report writing and presentation skills.

c) Attitude

- Comply with the rules of class
- Be serious when participating in group activities
- Have a cooperative and positive spirit when working in groups

2. Ability development orientation

- Self-study ability, cooperation ability (in group activities)
- ICT ability: Accessing and exploiting WebQuest, searching on the Internet, ...

II. Teaching aids

Electronic lectures, projectors, laptops

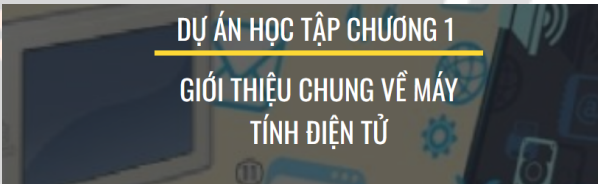

III. Teaching methods


Teaching method according to WebQuest, combined with project-based teaching

IV. Teaching process

1. Stabilizing the organization and checking class attendance
2. Checking students' lesson preparation
3. Discussing new lesson content

**Table 1:** Teaching progress

Teacher – Student Activities	Content
<p>Activity 1. Introducing the learning project and making a plan for implementation (last lesson of the previous week)</p>	
<p>- Teacher: Presents the situation and introduces the learning project to students. Instructs students to access the WebQuest page via the link: <a href="https://sites.google.com/view/webquest-thdc/ch%C6%B0%C6%A1ng-1/c1-daht1">https://sites.google.com/view/webquest-thdc/ch%C6%B0%C6%A1ng-1/c1-daht1</a></p> <p>- Students: Divide into groups. Each group elects a group leader.</p> <p>- Students: Groups discuss and make a group work plan based on the tasks and progress of the project; then fill in the study sheet. The teacher approves and comments on the group work plan to ensure the overall plan of the whole class.</p> <p>- Teacher: After the discussion time, the teacher presents the overall progress of the project for the whole class</p>	<p>Situation:</p>  <p><a href="#">Giới thiệu</a>   <a href="#">Nội dung</a>   <a href="#">Tiền trình</a>   <a href="#">Tài liệu</a>   <a href="#">Đánh giá</a>   <a href="#">Kết luận</a></p> <p style="text-align: center;"><b>GIỚI THIỆU</b></p> <p>Máy tính đóng một vai trò cực kỳ quan trọng trong cuộc sống hiện đại, đặt ra những ảnh hưởng sâu rộng trong cả lĩnh vực công việc và học tập. Trong môi trường làm việc, máy tính không chỉ là công cụ hỗ trợ, mà còn là người bạn đồng hành đáng tin cậy của con người. Khả năng xử lý thông tin chính xác và tốc độ nhanh chóng của máy tính mang lại sự hiệu quả, giúp tiết kiệm thời gian và nỗ lực của người sử dụng. Ngoài ra, ở khía cạnh học tập, máy tính không chỉ giúp người học truy cập dễ dàng đến các tài liệu học tập trực tuyến, mà còn tạo ra những trải nghiệm học tập đa dạng và phong phú. Việc học tập không còn chỉ là sự liên kết với sách giáo trình mà còn là sự kết hợp linh hoạt với các nguồn thông tin trực tuyến, giúp mở rộng kiến thức và nâng cao kỹ năng của học sinh. Chính vì vậy, sự hiểu biết của con người về máy tính là vô cùng cần thiết.</p> <p>Có hai bạn sinh viên năm thứ nhất, bạn Quang là sinh viên khoa Chăn nuôi thú y của trường Đại học Nông Lâm và Việt Anh là sinh viên khoa Truyền thông đa phương tiện của trường Đại học CNTT&amp;TT. Cả hai bạn đều đang có nhu cầu mua máy tính phù hợp với việc học tập của mình, với vai trò là một người có hiểu biết về máy tính em hãy đưa ra một văn bản đầy đủ về cấu tạo, vai trò, chức năng của các thành phần cơ bản của máy tính, từ đó đưa ra được những gợi ý phù hợp với nhu cầu của từng bạn nhé!</p>  <p>Study sheet: Work plan. Session 1: Develop project ideas, work plan. Session 2: Students do homework, through answering guiding questions and provided documents, students will complete the project in the form of a Word report file</p>

	<p>Session 3: Present the project. Discussion between groups and teachers. Evaluation according to evaluation criteria.</p>
<p><b>Activity 2. Carry out tasks (1 week outside of class hours)</b></p>	
<p>- Teacher: Give the groups a set of questions related to the learning project and ask the groups to research on their own based on the reference materials that the teacher has provided links to.</p> <p>- Students: Each group conducts research on reference materials from the learning materials provided by the teacher (students can also search for documents from other sources) then compile the report document using Word software</p>	
<p><b>Activity 3. Report on learning project products</b></p>	
<p>- The teacher distributes peer assessment forms and guides students in evaluating their group's products.</p> <p>- Organize students to report on their products and ask open-ended questions. Encourage groups to ask each other questions. Each group presents its products and answers questions within a maximum of 15 minutes.</p> <p>- Comment on each group's products.</p>	<p>- Groups present their products, report on project results, and answer questions from the teacher and other groups.</p> <p>- Take notes of the teacher's notes and corrections to improve the group's products.</p> <p>- Evaluate the products of your groups based on the evaluation form agreed upon in the previous session</p>
<p><b>Activity 4. Summary and lessons learned</b></p>	
<p>- Summarize knowledge from the learning project.</p>	<p>- Groups submit their products and evaluation forms to</p>



Draw experience for the next project learning sessions.	the teacher. The scores from the peer evaluation process and the teacher's evaluation will be averaged and become the score of the presenting group.
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### 3. CONCLUSIONS

The article presented an overview of problem-solving ability, applying WebQuest to project-based learning to develop ability; simulating a learning project used in the General Informatics course at the University of Agriculture and Forestry - Thai Nguyen University. Through initial evaluation forms, it has been shown that the use of WebQuest in project-based learning has contributed to helping students promote positivity, proactively acquire knowledge and develop necessary skills and abilities.

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