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# **Enhancing ICT-embedded competences for final year teacher education students using a Project-based Learning (PjBL) method: A case study of at the Faculty of Education, Vietnam National University, Hanoi**

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## **1. Abstract**

This study examines the context of using ICT in 2 classes of 4<sup>th</sup> year students in Faculty of Education, **Vietnam National University** (VNU). This action research study is focused on the new way of implementing and enhancing ICT skill training with combination of Project-based learning methods. Despite their weak ICT skills, after 15 weeks (one course) they demonstrated the self-confidence of using ICT in lesson and teaching portfolio designing, as well as in teaching activities. It has been shown the idea that “why/how we use ICT skill in teaching-learning process?” is more important than which set of ICT skill we provide students.

## **2. Introduction**

Nowadays applying ICT in teaching is ever necessary and pressing. It has become one of the obligatory requirements for teachers with the announcement “2008 – 2009 is the ICT year in schools and universities in Vietnam” (Instruction of planning 2008-2009, MOET). The Faculty of Education (VNU) has a “3+1” teacher education model (they learn fundamental sciences for three years in universities of VNU, teaching skills for one year in the Faculty). Although in the program for teacher education in VNU students have subject specialized on computer skills (3 credits) in the first year, skills at using ICT in teaching obtained by students from the subject is fairly low. This limit is caused by these main reasons that follow:

- ICT skills are taught separately (ICT as an independent subject);
- Students’ awareness and activeness in integrating ICT in learning process is still low;
- Learning tasks and used-in-university teaching methods do not encourage students in using ICT (Ineffective teaching methods: lectures, presentation of factual knowledge, rote memorization, little use of homework, not much faculty-student interaction; Student learning is passive (listening memorized information on exams) [8, pp: 20-22]; and
- Material facilities are lower than required etc.

For these reasons it is necessary to suggest a new approach for developing subject teaching in accordance with integrating, practicing, and enhancing ICT skills through using ICT-based teaching methods and implementing learning tasks.

The purpose of this study was to define the new approaches in enhancing ICT skills for students in teacher education. ICT skills could not be enhanced only

separately (as before) but might better be integrated into new a form and method of learning with motivated and inspirational activities for learners. This means that central focus is how to help students to develop teaching competences using embedded ICT techniques by the way of authentic task in project-based learning method (PjBL). Also, such strategies will also model active learning practices for would-be teachers.

The complex of teaching ICT-embedded competences in PjBL should be developed as follows:

- Building learning resources preparation competence (C<sub>1</sub>);
- Content presenting (delivering) competence (C<sub>2</sub>); and
- Assessment competence (C<sub>3</sub>).

The set of ICT skills which will be developed is:

- Using searching tools (U<sub>1</sub>): Internet (e-mail) and search engine;
- Using presenting tools (U<sub>2</sub>): Word-processing, MS PowerPoint with integrating Multimedia, Publisher etc.; and
- Using social sharing tools (U<sub>3</sub>): e-mail, Moodle platform.

### **3. Research questions:**

This study attempted to find out the answer for the following research questions:

- How ICT skill training can be integrated with Project-based learning using the (PjBL) method?
- How do students improve ICT skills by the way of PjBL?
- How PjBL, using embedded ICT can create a new effective learning environment?

### **4. Approaches and methods of study:**

This study was conducted using the PjBL method with using ICT skill training content for two groups of 4<sup>th</sup> year student teachers (N=94) in History and Vietnamese-Literature education, Faculty of Education, VNU). The course was named Teaching-learning Methodology and Technology, two credits (total of 30 credit hours over 15 weeks).

#### ***Approaches***

The following approaches were planned:

- A delivery system: to improve the lesson preparation, lesson content design, teaching portfolio design and creating learning resources with using multimedia;
- A set of ICT skills: to enhance competences of using ICT for students in teaching-learning process and inside/outside classroom activities (preparation, actualization, practice, assessment and evaluation); and
- A catalyst for a new form and environment of teaching-learning: to apply the PjBL method, learner-centered approaches and competence-based learning (CBL) with Authentic task (assessment).

#### ***Methods***

A questionnaire with 15 items around ICT skills and teaching competencies, non-traditional forms of teaching and expectations was delivered to 94 students in teacher History and Vietnamese-Literature education classes;. Interviews were undertaken systematically for sharing different concepts and tendencies with students and colleagues, also with secondary education teachers. Observation and records from these observation of classes provided consistent feedback for keeping the learners' progress during their different learning tasks (including authentic tasks)A diary (classroom journal) was used for record keeping of the students' learning progress and feedback from the two classes over the 15 weeks.

## 5. Review of Literature

*Students who enter school are communicative, curious, creative, and capable of learning many things. They have proved this already by mastering a mother tongue, physical motion, complicated games, and many other life skills. However, we believe that the traditional school of the 20th century, which is still very much with us, diminishes these abilities over the period of learning. We need a new kind of school for the 21<sup>st</sup> century* (UNESCO, 2005, p. 20).

Peter Van Gils (2003) in his report which investigated lower- and upper-secondary school concerning ICT use in Vietnam provided a new vision of ICT role in education. The key elements were:

- ICT play dual role and function in learning process: as a learning object and tools;
- ICT as facilitator for creating effective learning environment; and
- ICT as open social and communication tools between teacher, learner and educational manager.

He also suggested a new platform for effective use of ICT in schools, including kindergarten, primary and secondary, in the North Vietnam. Especially, this study concerns the new role of teachers and students in terms of students' learning and social responsibilities. Gils (2003) emphasized that the learning responsibility must be transformed to learner to (1) construct new knowledge for themselves, (2) design learning plans, (3) create reflective activities, (4) communicate and share with others etc. All elements of this new responsibility have to be "deeply" embedded in ICT learning environment (Peter Van Gils, 2003).

Gils (2003) also proposed a new way of teaching (facilitating students' learning) that was in stark contrast to custom and practice (traditional teacher-centred) in Vietnamese schools by the way of reducing inside class time and providing more authentic learning interdisciplinary tasks with PjBL method ICT-embedded skills and environment. He stated an important understanding for teacher educators in Vietnam especially including those in ICT teacher education.

In this context with the similar idea, Tan Seng Chee (2003) stated the new role of teacher in ICT context: teacher as presenter, teacher as facilitator and teacher as designer. With new concept of using ICT teachers could then create rapid opportunities for breaking the barriers of time and space, making learning more motivating and inspirational, flexible and wide accessible.

All learner and teacher activities are constructed in this research process followed the behavioral theory of learning proposed by B.F. Skinner (1976), which suggested:

- If stimulus and response are constructed the right way, they may lead students to success and skills;
- Students remember and respond, practice with changing in overt behavior, skills due to conditioning (authentic task and assessment/self-/co-/peer-assessment); and
- The teacher plays the role of designer, presenter, facilitator and assessor.

The main principles for learning mode were:

- Less direct instruction, more guided inquiry and discovery learning for students;
- Encouraging more social communication (pair and group work);
- Providing common information tools for individual constructive tools based on students needs and competence; and
- Maximum instruction for individual competence to construct new knowledge. (See Figure 1 below.)

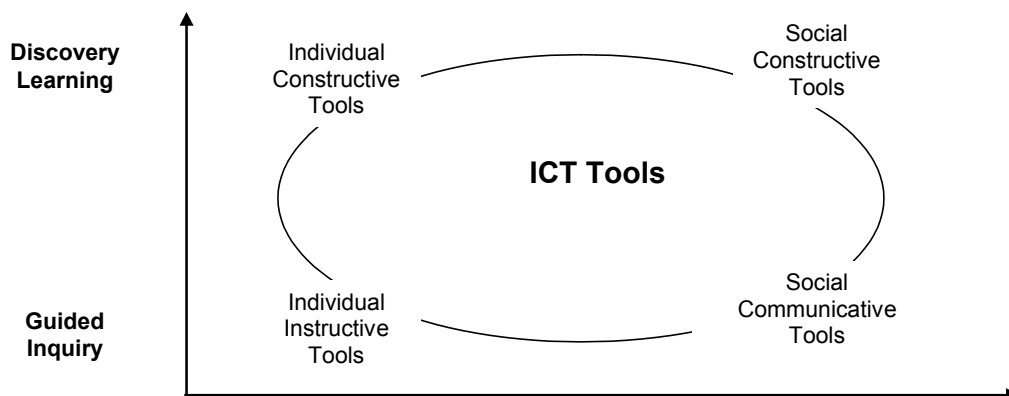


Figure 1: The Mode of learning with ICT

In this study the NETS-2008 (National Educational Technology Standards) developed by the International Society for Technology in Education (ISTE 2008) for teachers and students also are used as a guide to investigate new implementation opportunities in teaching process in our case

<http://www.iste.org/AM/Template.cfm?Section=NETS>). Based on these standards a different learning task (including authentic) are created for students toward to three course competencies (C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub>).

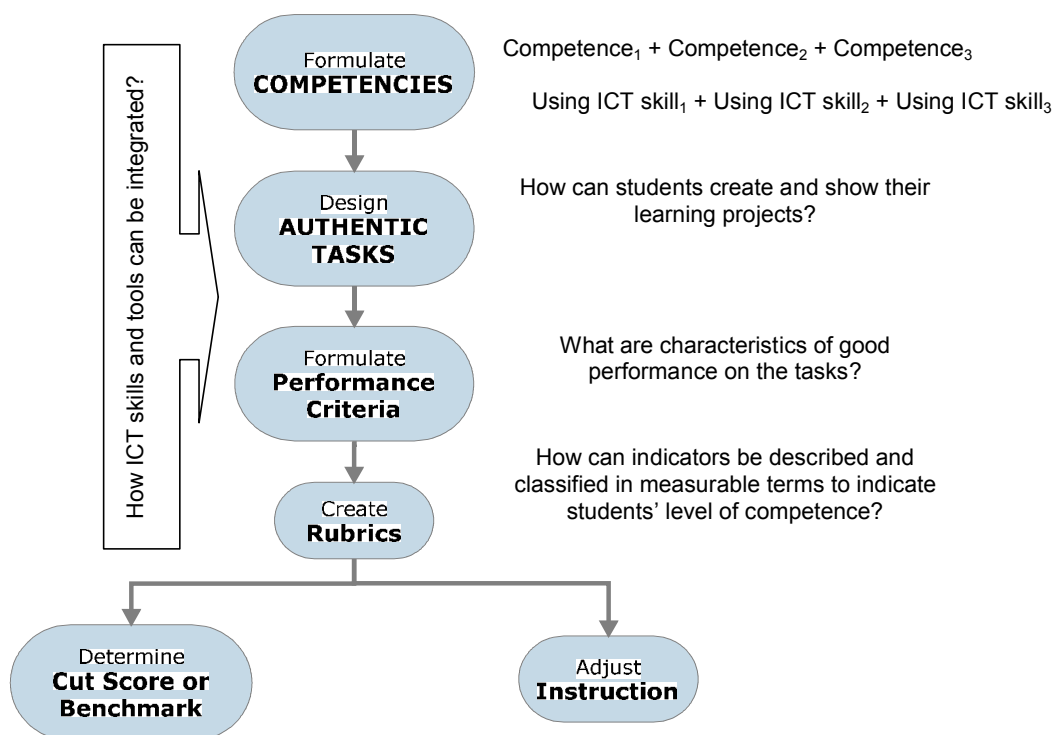
Furthermore, in 2008 Hanoi Department of Education and Training (DOET) investigated teachers' use of ICT skills, that is, their use of computer, Internet, MS Office in designing and delivering lesson in 60 lower-and upper secondary schools in Hanoi. The survey found that although all schools in Hanoi have a connection with Internet only 32% of teachers use it, Then, 18% of teachers used the internet for creating learning material and instructional content and only 12% for ICT skills in designing lesson (including full e-lesson and partly integrating ICT elements into traditional lesson). Only 27% of surveyed teachers said that they felt self-confident when using ICT skills in teaching process (using Projector, Smart Board and computer in classroom).

We understand that the relevance of subject-matter will be meaningful and strengthened by integrating in each course “knowledge motivation and acquisition” and “knowledge application” (based on Skinner theory and Davis Technology Acceptance Model). The transformation of knowledge acquired into the “ability/competence to apply” is an explicitly chosen objective in each course at Faculty of Education, VNU, Hanoi.

In education and learning literature there are multiple definitions of student learning outcomes, objectives, skills, competencies, and so on. In this study, there is the use of the NPEC work group's definition of competency: “a combination of skills, abilities, and knowledge needed to perform a specific task” (U.S. Department of Education, 2001, p. 1). Thus, it could be re-stated as: “competency” is the capability to choose and use (apply) an integrated combination of knowledge, skills and attitudes with the intention to realize a task in a certain context. Personal characteristics such as motivation, self-confidence, and other life skills also are part of that context.

Regarding the idea of the authentic assessment task, Wiggins (1993) stated its purpose as involving engaging and worthy problems or questions of importance, in which students must use knowledge to fashion performances effectively and creatively. The tasks are either replicas of, or analogous to, the kinds of problems faced by adult citizens and consumers or professionals in the field" (Wiggins, 1993, p. 229).

Figure 2: Scheme of work for developing ICT skills with authentic assessment



So, it is clear that our 4<sup>th</sup> year teacher education students have different reasons and ways to develop ICT skills. And to be knowledgeable, able to apply and be skilled is an explicitly chosen objective of this course and the key to effective using ICT in their teaching process in the future. The following formulation restates this as an equation:

**Competence based Learning + Authentic Task + ICT skills = New Success**

## 6. Situational Analysis

The study highlighted a number of issues regarding to students' use of ICT in and/or out class time, their requirements in term of attitude and motivation. The baseline data indicated:

- ICT as a separate subject in teacher training programs is still seen as an extra and add-on rather than integrated and needed for teaching skills. "Teaching ICT" is as separated content;

- Students obtain only separate ICT skills, but they cannot apply the ICT skills for their learning because they have not motivation in using ICT for implementing their tasks and assignments, they also simply practice the ICT skills they have learned;
- Most students have Internet and email-using skills but use them only for entertainment, they do not know how to use these skills in order to search information and build learning resources;
- Students have no access to ICT presenting tools;
- Students are not fully aware of integration ICT in their learning, they are also not given ICT instructions and ICT-applying principles in their learning;
- They are fairly weak at group-work skills as well as sharing information;
- Although classes equipped computers are not available, students always can use other cheap resources out of class time (around 15 US cents per hour for using computer and accessing internet in dormitory computer rooms and Net-café).

### **7. Planning: Data collection and analysis**

In order to carry out the research we gave questionnaires for 94 students in 2 classes of Teaching-learning Methodology and Technology and surveyed their ICT skill background. The questionnaires were distributed 2two times: at the beginning of, and after finishing, the above course.

The purposes of the questioners were:

- Survey students' ICT knowledge and ICT use ability,
- Survey the frequency of using tools researching and exploiting learning resources,
- Measure the level of ICT skills acquired by students after the course.

In this study the ICT-embedded competencies are based following Technology Acceptance Model – TAM (Davis, 1989) withh six hypothesis of using, accepting ICT:

- H1: Perceived ease of use is positively related to perceived usefulness
- H2: Perceived ease of use is positively related to attitude toward using
- H3: Perceived usefulness is positively related to attitude toward using
- H4: Perceived usefulness is positively related to intention to use
- H5: Attitude toward using is positively related to intention to use
- H6: Intention to use is positively related to actual use

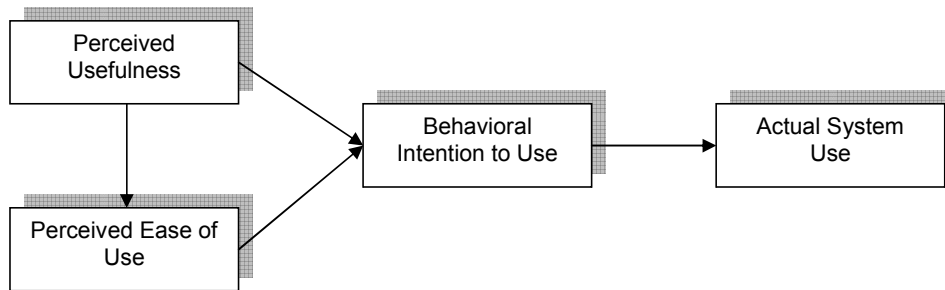


Figure 3: TAM Model . (Adopted from Davis et.al., 1989)

The survey results demonstrate:

- Most students know functions of Microsoft Office (Word, Excel, PowerPoint), and other tools such as e-mail, Internet, Chat and Window Media Player, but they often use them with low frequency and mainly for entertainment like exchanging e-letters with friends, reading e-newspapers, listening music and so forth;
- Students do not realize the integration function of the mentioned tools in learning;
- Students do not see themselves as competent at using the tools; and
- Some students do not spend much time for using them at all.

Figure 4: Mean score for students' self report using ICT skills in teaching-learning process before the class began

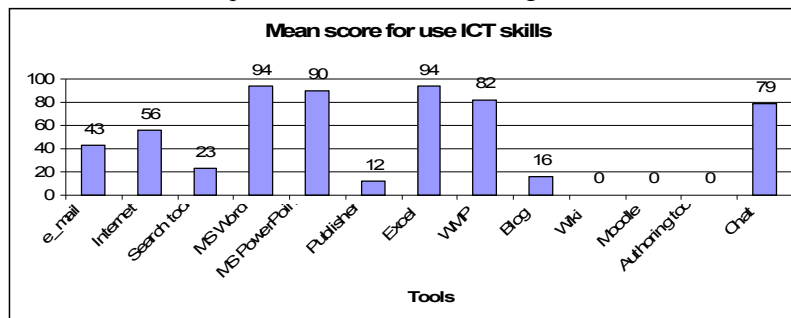
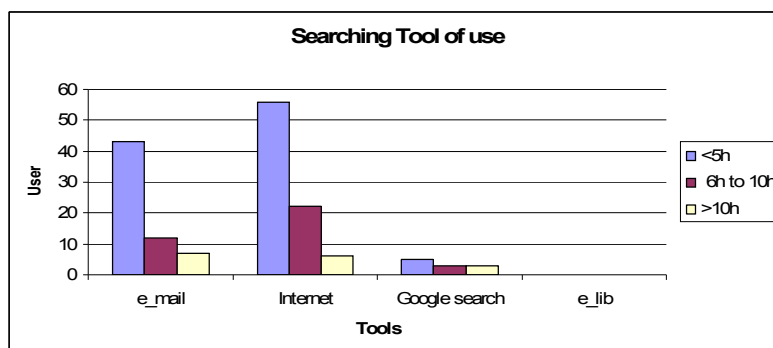


Figure 5: The frequency of students' self report using searching tools by students before the class began



Analyzing the above mentioned results leads to some requirements for ICT skill teaching as follows:

- Ensure that the main ICT tools are directly applied in a teaching-learning process;
- It is necessary to integrate ICT skills with concrete tasks such as lesson preparation, content presentation and other classroom activities in learning process organization;
- Technical help should be available when students need it;
- It is essential not to teach “pure” ICT operations or techniques but “content of using ICT”.

## 8. Study description

During the Teaching-learning Methodology and Technology course (lasting 15 weeks), ICT skills should be integrated in teaching-learning and implementing students' assignments (authentic task).

Students in each class are divided into learning groups (class history education and literature education has 5 and 6 groups, respectively). At the end of the course each group of students has to use ICT skills to design a Learning Project and eventually complete a Teaching Portfolio as a whole (relating to designing and practicing learning process outcomes). The Teaching Portfolio consists of product sets as follow:

- Learning resource folder;
- Lesson plan folder;
- Presenting folder; and
- Assessment folder.

During developing the course, students are trained in techniques to use Word processing, MS PowerPoint, Publisher, Search Engine Tools (Google), using Internet (Web 2.0), e-mail and sharing tools in Moodle, audio/video editing tools, Multimedia tools. Students are taught about PjBL method for secondary education. They also can use materials supported by Intel Teach Program, Partner in

Learning Program (Microsoft) containing different instructions for using ICT in teaching, checklist, worksheets and rubric for assessment. Each group should be responsible for one learning Project consistent with either the secondary education program in History and Vietnamese and Literature. Examples would be organizing a conference about local history, TV Games-show, Advertising Campaign for a new Tour, Exhibition on life of famous writer, design E-book about life and career of famous writer or poet etc. In this learning process they have to use media tools for designing different presentations, making posters, pictures or videoclips, websites, preparing worksheets, assessments tools, sharing experiences etc. and for oral presenting and learning competitions.

During carrying out the project, students in each group cast each other for parts, suggest the idea and tasks for the project by themselves, find suitable ICT tools for designing products, research materials, practice presentation techniques supported by technology. In the project ICT skills are used as much as possible. Members in the learning group support each other in order to enhance ICT as well as to shape and develop ICT skills for use in learning, share experiences in using ICT, and require ICT help from their teachers.

During the first period of eight credit hours (in two weeks) the teacher introduced ICT skills to students and let them practice these skills directly. According to the questions or requirements about ICT raised by student groups, the teacher organized short-term training or gives instructions through e-mail and Moodle. The teacher supports improving ICT for students on basic of their concrete requirements and particular products that are being completed by them. The teacher shares time with students for consultation based on real need of learner with concrete tasks, questions and suggestions from them.

ICT skills use in education is taught by designing correlative ICT skills support card/worksheet (SC). The technique support cards are in both hardcopy and softcopy (sharing file in class e-mail or/and Moodle platform). The structure of each SC consists of four parts; these are instruction, task, idea to apply and feedback. If a student has some questions, s/he can fill the SC and send it back to the teacher.

To pass the course successfully student has to complete the required products (see Table 1). The products have to be packaged for a CD. Different groups of students present and introduce their products before the rest of the class. The group's work is assessed according to three requirements as follow:

- The productivity of each group (the quality and content of Teaching Portfolio);
- The group's ability to use ICT in designing the Teaching Portfolio; and
- Presenting their products.

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<b>Final Product</b>	<b>Content</b>	<b>Format</b>	<b>Tools</b>
Learning Resource Folder	<ul style="list-style-type: none"> <li>- All needed resource for Teacher relating project topic</li> <li>- All needed resource for pupils relating project topic</li> <li>- Project proposal</li> <li>- Task Checklist for group members</li> <li>- Poster</li> <li>- Other: Invitation recommendation letter, scenario etc.</li> </ul>	<ul style="list-style-type: none"> <li>- Printed</li> <li>- Digital</li> <li>- Photo</li> <li>- Video clip</li> <li>- Audio file</li> <li>- Web</li> </ul>	<ul style="list-style-type: none"> <li>- MS Word</li> <li>- MS PowerPoint</li> <li>- MS Publisher</li> <li>- Web 2.0</li> <li>- Window Media Player</li> <li>- Authoring Tools: VCD Cutter, Proshow Gold 2.0 software</li> </ul>
Lesson Plan Folder	<ul style="list-style-type: none"> <li>- Teaching plan</li> <li>- Description for each activities</li> <li>- Lesson plan with PjBL</li> </ul>	<ul style="list-style-type: none"> <li>- Printed</li> <li>- Digital</li> <li>- Web</li> </ul>	<ul style="list-style-type: none"> <li>- MS Word</li> <li>- MS PowerPoint</li> <li>- Moodle</li> <li>- Camera</li> </ul>
Presenting Folder	<ul style="list-style-type: none"> <li>- Presentation products</li> <li>- Set of posters</li> <li>- Set of accessories</li> </ul>	<ul style="list-style-type: none"> <li>- Printed</li> <li>- Digital</li> <li>- Web</li> </ul>	<ul style="list-style-type: none"> <li>- MS Word</li> <li>- MS PowerPoint</li> <li>- MS Publisher</li> <li>- Web 2.0</li> <li>- Window Media Player</li> <li>- Authoring Tools: VCD Cutter, Proshow Gold 2.0 software</li> </ul>
Assessment Folder	<ul style="list-style-type: none"> <li>- Rubric</li> <li>- Protocol</li> <li>- Checklist</li> <li>- Report</li> <li>- Record score</li> </ul>	<ul style="list-style-type: none"> <li>- Printed</li> <li>- Digital</li> <li>- Web</li> </ul>	<ul style="list-style-type: none"> <li>- MS Word</li> <li>- MS PowerPoint</li> <li>- Moodle</li> </ul>
Group Project Presentation	<ul style="list-style-type: none"> <li>- Presentation: structure and techniques</li> <li>- Communication skills</li> <li>- Competence of integration using ICT techniques</li> </ul>	<ul style="list-style-type: none"> <li>- Performance</li> <li>- Individual and group activities</li> </ul>	<ul style="list-style-type: none"> <li>- MS Word</li> <li>- MS PowerPoint</li> <li>- MS Publisher</li> <li>- Web 2.0</li> <li>- LCD Projector</li> </ul>

Table 1: Learning task instruction

Assessment is carried out openly and directly during lesson time through the teacher's assessment and self-/pair-/co-assessment. A very good Teaching Portfolio will be put also forward to Intel Teach Program (Intel Education Vietnam) for awarding Certificate of Completion Course on the Effective Use of Technology in Subject Teaching and Qualification as Teacher Educator under The Intel® Teach Program.

## 9. A summary of findings

The results of study showed that:

- The groups of students were interested in learning “content of using ICT” in learning process. There were various ICT use ideas. Students asked many questions about ICT skills relating to teaching developing ideas (totally 502 questions were posted during ten weeks of learning). Teacher became their real guider and facilitator.
- The communicative process was developed appropriately and effectively. Allocating and implementing task passed under close control. Each member had chances to promote their learning competence and own experiences.
- The set of ICT skills and techniques is less important than the need, priorities, motivation and new idea of its using during doing authentic task process.
- The use of ICT really forces new learning environment: non-traditional form of learning, non-linear learning process, more outside classroom activities (students spent about more than two extra-class hours per day averagely; group work time was obviously increasing outside class; more questions towards learning program from students etc.).
- Despite of different level of acquired ICT skills, students feel confident and enjoyable with learning task: the final product show became a real festival competition in both two classes.
- The best way of enhancing ICT skills for students is making “content of using ICT” reasonable, motivated and creative with authentic task (assessment).
- Learning process creates new opportunities for self-/pair-/peer-assessment: students could control and manage their progress step by step (by various Rubrics).
- Multiple subject content in secondary program (in this case there are History and Vietnamese-Literature) can be taught by the way of Project-based Learning method with integration ICT.

## **10. Discussion**

On the basis of analyzing the study’s questions and results it can be concluded that teaching ICT skills is fairly “easier” than teaching “ICT skills in teaching” because ICT skills must be integrated into teaching skills according to the teaching principles. The difficulty (or should be paradox) in process of enhancing ICT skills for future teachers is how to ensure them access to technical support and at the same time how to ensure that they do not feel becoming technical specialist themselves at all.

Acquired ICT skills for teacher-students are only primary condition and first step in the way of learning to teach. The pivotal mechanism of enhancing ICT skills for future teacher must be:

- *How to design ICT based lesson?*
- *How to realize ICT based lesson (learning activities and materials)?*
- *How to assess and evaluate ICT based lesson?*

## **11. Conclusions**

Once again, the study showed new challenges for teachers as designer, presenter, facilitator, assessor, and overall reflective practitioner. This small-scaled research also could provide for faculty initiatives of enhancing ICT skills by the way of using competence-based learning for students, creating non-traditional learning environment for authentic task and creativeness for them. One of the greatest overriding lessons learned from this study is to provide sufficient amounts of professional competences and authentic tasks to activate creative “learning space”. Of course in this “space” we always can “fill up” the ICT skills and idea of its using. In the words of one 4<sup>th</sup> year student (class of History education): “*Bài tập môn này khó quá nhưng em vẫn chấp nhận khó khăn một cách rất thoải mái*” (*learning tasks of this course really are challenging but I felt ‘fully comfortable unpleasantness’ to do it*”).

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- <http://www2.umassd.edu/swpi/DesignInCS/cednotes.html>

#### **Appendixes**

1. Learners' needs questionnaire
2. Rubric of assessment
3. ICT support card

