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Editorial

Cost-Effectiveness

Donald G. Perrin

In these times of dwindling budgets for education, the word cost-effectiveness has come up many times. Like the gasoline engine, we have "maxed-out" the efficiency of the traditional system. Teachers are variables, students are variables. The probability is that, unless we can clone our top performing teachers and students, performance will stay close to the present levels. Schools are under fire for being inefficient, and they are asked to produce more with less and less resources.

Alternative methods of teaching and learning are receiving close attention. Some cost more because basic technology is required, but they produce more. Those that cost less invariably produce less. Alternative methods that are not teacher driven are resisted by unions that fear technology will replace teachers. Parents and politicians are concerned because they do not want teachers replaced by machines. Education is in the deadlock of the kind that led to the demise of the United States automobile industry as we know it. Why did it fail? Because Japanese manufacturers had a better business model – a model proposed by Edward Deming from the United States.

Medical services in the United States are also under fire for rapidly rising costs and inefficient operation. Here the power struggle is between doctors, pharmaceutical companies, government, members of the public that pay for services, and persons excluded from the system because of pre-existing conditions or inability to pay high health-care premiums. The fact that thirteen industrialized countries provide universal healthcare at a basic level is obscured by arguments about government inefficiencies and poor service.

The problems of U.S. education, health-care, and the automobile industry are the same – unwillingness to change. The automobile industry had a solution offered to them and rejected it. Similar examples exist where Kodak rejected xerography and the Swiss watch industry rejected LCD watches. Education, for the most part, still believes that face-to-face contact between teachers and students is the mark of a quality education. Health-care has the same affinity for the doctor-patient relationship.

Students have changed and the world has changed. Students are better informed and better educated than our predecessors. Many learned from television, from parents and teachers, and from direct experience. They already know "what is the global society and how do we succeed in this world?"

In the medical model, informed patients can make basic healthcare decisions without a doctor, yet they are denied even basic prescriptions without a visit to a doctor's office. Similarly, educated adults can make decisions about curriculum-and-courses and teaching-and-learning that are appropriate for their professional development. They can research, organize and develop their own knowledge and skills. They need the professor to motivate them and be a guide, advisor, facilitator and evaluator, and they need their professor or advisor to ensure that "what is right for them" meets the standards and criteria for their certificate or degree. And if a student needs additional assistance or tutoring, they want to know "where is 24 X 7 help available?"

The pages of this journal and many others are filled with research and solutions that potentially solve today's educational problems. However, if we are not well informed, and if we are not willing to change, the *status quo* will continue to degenerate and today's problems and many more will be with us for a very long time.

Editor's Note: Open and flexible learning via the Internet provide educational opportunities for underserved populations and an alternative source of education and training to fit the complex lifestyles of adult learners. This paper discusses key aspects of design and production to ensure relevant and high-quality learning outcomes. The research goal is to evaluate content quality in management education.

Quality in E-Learning Management Education: The Content Dimension-Factor-Area

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Spain

Introduction

A set of activities which tend to be grouped and implemented together by the same firms is called a "mode of innovation". One involves some form of new-to-market innovation linked to the generation of technology (in-house R&D and patenting). The second involves process modernising and includes, alongside staff training, the use of embedded technologies (acquisitions of machinery, equipment and software). The third is wider innovation, which clusters organisational and marketing-related innovation strategies.

The ability to create, distribute and exploit knowledge is increasingly central to maintaining competitive advantage. Investment in knowledge, defined as public and private spending on higher education, expenditure on research and development (R&D) and investment in software. Improving our knowledge of innovation in firms is crucial for designing innovation policies (OECD, 2008). Knowledge is increasing at such a rate that it becomes obsolete ever more quickly. This is especially true in technical fields. For example, the technical knowledge acquired by students in their first year at university will become obsolete by the time they finish their degree [Davis and Botkins, 1994]. This makes it necessary to analyze knowledge management and the various learning models that support the knowledge operations. Due to this, individual and organizational learning is becoming an increasingly critical success factor because of the need to create flexible structures and strategies that can manage constant change [Dodgson, 1993; Peters y Waterman, 1982; Kanter, 1989; Senge, 1990].

It is imperative to find new learning methods to fulfill new knowledge environmental demands in management education. Advances in information and communications technologies are bringing major changes in teaching and learning methods [Alavi, 1994; Webster and Hackley, 1997]. The incremental transformation model, which served adequately for several decades [Ives and Jarvenpaa, 1996] is no longer enough to cope with new organizational and social learning demands. E-learning emerges as keystone to cope with new conditions.

We can define e-learning as the appropriate application of the any Information and Communication Technology, with special emphasis on the Internet, to support the delivery of learning, skills and knowledge in a holistic approach not limited to any particular courses, technologies, or infrastructures. E-learning has many implications in management education, such as:

- It must find new systems of training-learning where interactivity and bi-directional information will carry more weight.
- Knowledge must be accessible to more people, which will lead to a virtual learning based on multimedia technologies.
- It is necessary to develop customized training programs and, as far as possible, adapted to each need.

Therefore, any person, at any time, virtually anywhere, at any pace will be able to undertake the educational tasks necessary to develop the competences he/she requires. This is the aim of e-learning. This implies a change in the paradigm of education, its concept and administration:

OLD PARADIGM	NEW PARADIGM
Education is the end	Performance is the end
The course is only available when it is taught	The course is available when needed (just in time)
The classroom is always necessary	The training can occur anywhere
Education is the same for all the students and is taught at the same pace	Education is customized and adapted to each student
The trainer is the "boss"	The student is the "boss"
The contents are regularly updated	The contents are updated every day
Explanations are based on reference models	Explanations are adapted to the individual needs of the students

Within this view, the core products of e-learning are technology, services and content (Henry, 2001). Technology includes all ICT[1] including hardware, software and communications that support an e-learning process. Services include strategy and design of your overall e-learning program. And content is the wide range of materials available to the learner. To assure quality in e-learning management education, we should take into account all dimensions. The e-learning methodologies will combine appropriately all dimensions. In this paper, we focus just on the content. Content is a critical variable. In many occasions, traditional learning contents such as Word or PowerPoint files, are considered as content just because they are on an e-learning technological platform. Are these quality contents for e-learning? The aim of this paper is to define a methodology to assure that an e-learning content has reached a standard quality level.

Content Quality: The Creation Process

In order to guarantee quality in any content developed based on ICT, we should distinguish two main phases:

- The creation process before the content is going to be used
- The mechanism to assure that the content, after it has been used, has reached a standard quality level.

We begin analyzing the content creation process. Any process should follow these stages:

1. **Identification of training demands or gaps**. In the case of higher education, it is also necessary to add the potential "knowledge" it generates (leadership in research or education, specialized publications). In this sense, priority medium/long-term content contexts are necessary either because they are identified as unavoidable or desirable or because the institution has developed a potential worth organizing and exploiting.

[1] Information and Communications Technology

2. **Acquisition**. This stage implies "acquiring" and producing contents. In a first stage, the process can be "manual" or automated with on-the-shelf specialized tools or by customizing databases. This is an intensive managerial task (contracts, technical and academic requirements of the materials, exploitation of intellectual property rights).
3. **Production of digital contents**. It covers three main areas: (1) the didactic design inherent to the content that structures it as a material suitable for online training activities; (2) the digital treatment of information: selection of the general format and architecture of the hypermedia: html, dhtml, pdf, flash; (Internet, intranet, CD-ROM, e-mail distribution); (3) the selection of the format of the media (mp3, video streaming, images, animations, etc), application of templates, supporting materials: self-evaluation, glossaries, etc. Note that it is necessary to develop a graphic environment (interface) as intuitive, friendly and simple as possible to facilitate the access to the resources and materials.
4. **Organization**. Once we have identified, acquired and produced the contents, and considering that they must be as versatile and adjustable to different training programs as possible, we must "tag" or "catalogue" each unit of knowledge according to the variables chosen. Some obvious variables are: author, year of publication, duration, workload; target audience (potential user); prerequisites (a given level of knowledge, diploma or degree). The "tagging" process will allow us to generate "knowledge banks" that will subsequently facilitate the identification and search of materials useful to structure training programs of different nature, educational intensity and duration.
5. **Publication**. It implies making available to the (internal or external) public detailed and varied information on the materials available.
6. **Distribution.** This stage is on the borderline between Knowledge Management and Learning Management. So long as previous stages have been undertaken according to some quality patterns and controls adjusted to the objective of developing virtual learning materials, we should have a large bank of digitalized knowledge suitable for online education. This can be arranged as a system or platform designed to distribute, update, monitor and control the training activities of the students in a given context: the Internet.

The process described presents the transformation of information into knowledge. The following stage implies using this knowledge to stimulate a process of efficient learning.

1. The aim of e-learning is to enable people to learn, allowing them to control the training process, studying when they need it, at the request of the student and with a high level of retention and applicability.
2. The problem arises when there is a high rate of abandonment in e-learning, when disoriented students are discouraged by a number of issues such as the lack of incentives to learn, problems with technology and poor design of the materials. In principle, students have a clear incentive in higher education (i.e., get a degree), although the following errors must be avoided:
3. The lack of relationships among the students; the trainer must try to make the students feel as human beings instead of as software robots.
4. Technological problems; it is necessary to watch issues such as the download times of the documents, incompatibilities, networks, links, etc.
5. The belief that the course can be studied anywhere provided that there is a computer.
6. A poor design of the course. Most of the training is not appealing enough and trainers are not prepared to give this kind of courses.

Therefore, higher education institutions are key pieces in the process of production and dissemination of knowledge and will use e-learning to add more value for their students, while providing a more flexible learning. The learning methods proposed in this model imply changes in the definition of the contents and subjects to be studied, as well as in the attitudes and cognitive mechanisms implemented.

Quality Management In E-Learning

Any virtual business model must be based on a new and comprehensive strategy. Therefore, this strategy cannot be confined to some information on the enterprise accompanied by a marketing action: it is necessary to create a new business model with a process of continuous and synchronic feedback that integrates in the new environment a number of related aspects and factors (logistics, production, marketing, human resources, finances, etc.). In the context of online education, we find a similar situation: "traditional" patterns and procedures cannot be accommodated into the new environment, as they need the so-called innovative educational models, a comprehensive strategy both from a managerial and a technical/methodological point of view. The aim is to adjust the objectives (which indeed are the not very different from the traditional ones, that is, make the students learn) to the new circumstances of the technological advances and changes in the habits and ways of working.

But this new conception of the educational space implies a large number of technical, educational and managerial resources that must be homogenized and revised to ensure that the resulting product meets high quality standards. We think that it is necessary to review the main areas and processes where quality management can and must be paramount.

Quality management in e-learning: fields of action

As a Europe-wide study by Massy (2002) highlighted, the main elements of quality perceived by the users are "a smooth running" and "clear explicit principles of pedagogical design adequate to the students, their needs and context". This study also mentioned that 61% of the interviewees (teaching staff and trainers) gave a "bad mark" to e-learning and qualified it as "bad" or "poor".

Within the context of quality management, these aspects can be integrated into three different fields of action: first, those related to the technical quality of the materials and the virtual environment where the learning-teaching process takes place; second, the processes of administration of the autonomous and virtual users; and finally, the management of quality in the technical-educational design that must be implemented both in the production of the didactic materials (Knowledge Management) and in the process of the online learning process (Learning Management). This aspect is essential to our proposal and thus will be analyzed in more detail in the following pages. Then, we will describe, briefly, the two first fields of action within the context of quality management in online education.

Quality management in e-learning: technical issues

According to Horton (2000), the technical requirements necessary to design and set up an interface increase the feeling of complexity among its users. Therefore, use of the recommended browser and the possible extensions necessary to display multimedia elements can be insuperable barriers for unskilled users or for those who are not particularly keen on technology. Sometimes, students spend more time learning how to use the tools of the course or looking for a solution to technical problems than studying the subject itself. The broken promises of 24:7 learning as a consequence of failures in the servers or problems of configuration of the Internet accesses damage the confidence of the students. Over and above the innovative state of this changing technology, it is necessary to adjust the internet and computer standards of virtual training programs to the minimum and most easily accessible standard for the users. The provision of a

system to help, solve problems and give general information to the students on the telephone seems to be absolutely necessary nowadays.

For Brandon (1997), "the guarantee of the technical quality of online training courses requires a systematic process of revision of each link on the screen in order to detect bugs and problems of referral or execution of the commands that must be reported to the relevant technical staff. Obviously, this refers not only to internal or external hyperlinks, but also to more general issues that imply testing a number of versions of different browsers, operative systems and hardware requirements.

Quality management in e-learning: administrative and customer service issues

Online education occurs in a context unfavorable to learning. The advantages of tele-education is terms of time and space flexibility conflict with the physical context where it is developed: the house or workplace can cause many lapses of concentration due to the freedom of movement and the variety of activities the student can perform at the same time. This real context is always linked to the virtual one, as the Internet can also invite the student to "surf" out of the training program. All these aspects (related to the environment of the learning process and some technical issues) must be taken into account to determine the process necessary to manage quality.

Quality management in e-learning: technical-educational design issues

One of the determining factors of quality in the transformation of knowledge and training products is the educational design. We refer to a whole set of factors that provide the adequate pedagogical and didactic consistency whereby the products are not simple electronic texts but materials properly supported from a temporal point of view, with a balance between learning resources, study aids, activities, distributed academic resources and capable of developing efficient systems of self-assessment. This can be justified in two ways: on the one hand, the attitude of the students who do not understand the arrangement (in terms of learning) necessary to develop an optimal virtual education. This is the result of years of education based on a model focused on the contents (or on the teacher!) that have created an urgent need of "guidance". On the other hand, and as a logical consequence of all the previous issues, there is a majority profile of online teachers insensible to the need to give some autonomy to the students and develop programs closer to the programmed training than to the exploitation of their autonomy and self-training capacity.

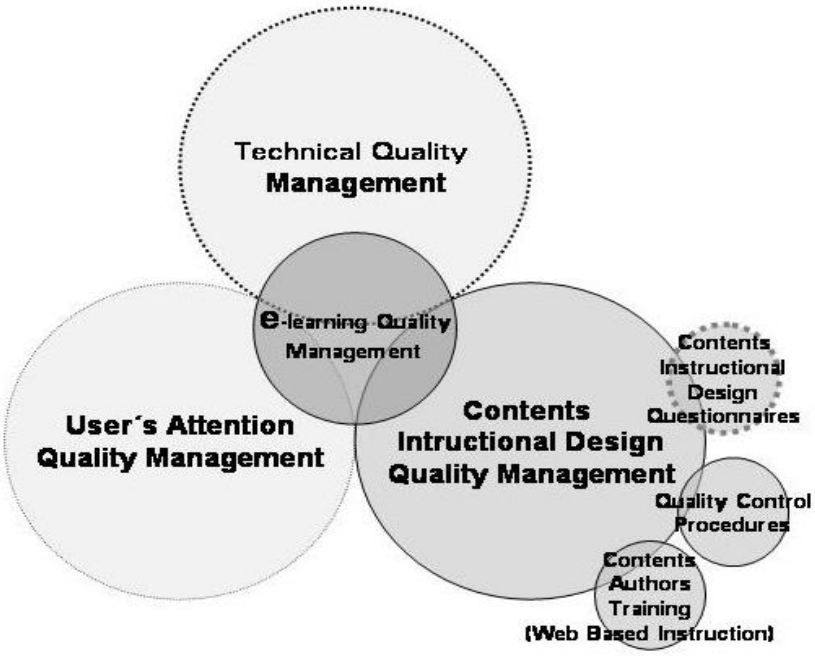
Therefore, online education requires an educational design and production of specific materials adequate to the environment, considering that in the first stages of any traditional training process, the teacher can always adjust the objectives of the course to the real situation of the students (in terms of prior knowledge). Of course, this is more complex and difficult in online education. Besides, the adequate use of the e-mail, forums, mailing lists, etc. as reference and customization tools increases significantly the work of the tutor. The absence of personal contact causes an increased demand of attention on the part of the students. This demand seems to decrease after the third edition of a program or course, as the tutor solves the problems beforehand and anticipates mort of the questions of the students. The crux of the matter might be an inadequate educational approach in the materials of the course that many times are a mere electronic version of conventional materials. The design of didactic materials particularly focused on the virtual environment can imply an investment four (4) times higher when compared to traditional materials.

The increased commitment to educational activities is transferred to the final user; the lack of immediate and spontaneous feedback, body language, tone, arrangement of the classroom and other elements of a "physical" traditional training, implies that they must be offset, in part, by an increased workload imposed on the student (estimated from 20 to 40 %) and "intense" communication activities: online discussions, resolution of problems in (virtual) groups or

individually and communicative actions to enrich the informative channels of the group or the tutor. All this implies that the training of the trainer must be continuous, progressive and up-to-date, which is a fact to be included in expenditure schemes and estimations.

In this sense, there are two elements that might help to ensure the quality of the materials; on the one hand, the production of "Quality Control Materials" with the information necessary to design adequate resources (Piskurich, 2000). There are several examples of suppliers of online training courses that have developed this kind of initiatives among their contributors of training materials (FUR, 2000). On the other hand, there needs to be production of different scales and tools useful to assess with coherence, consistency and comprehensiveness the technical-educational quality of the materials (that is, their adequacy to the environment) provided to the students.

Here is a graphic summarizing the key concepts developed so far. These concepts are also the guidelines to approach our study.



Within the range of possibilities to manage quality in e-learning, we have chosen the analysis of the technical-educational quality of the didactic materials, as we consider that this is the key element of this kind of training and the comprehensive perception on the part of the user. A particular proposal for the tool chosen and its justification are described in the following section.

As Dobbs (2003) said, online training is "thirsty for quality" nowadays.

Evaluation Scale for Virtual University Courses: Structure And Validation Of The Contents

The scale we describe in this paper has undergone different stages during the elaboration and validation process and accommodates varied input in this final version.

It is a simple Likert range scale extremely useful for the subsequent analysis of the results. Apart from classifying the participants, it includes a constant unit where the difference between the values in the scale is significant. It allows the expert evaluator to express the degree or agreement or any other kind of intensity level for each item in the scale. (Aldrich, 1999, 1996; Barbero, 1993; Chang, 1994; Likert, 1932, López, 1989).

First, and from a theoretical point of view adequate to our object of study, we will try to identify the dimensions that compose the features and basic elements of a virtual university education of quality. We will identify and select the mort relevant descriptors and try to ensure the validity of their content within the contextual framework of our study (that is, we will check to which extent each category represents the features and elements it purports to represent in our research field). To this aim, in a second stage of the process, we will collect the opinions of experts in order to ensure an increased didactic and content validity of the tool proposed.

These experts received the draft version of the scale together with a validation test where they had to assess the following issues:

1. the clarity of the instructions;
2. the accuracy of the questions;
3. the possibility of adding or removing any element;
4. a comprehensive assessment, from bad (1) to excellent (5), of the different items covered (dimensions, variables and questions).

As it can be seen in Table 1, the final scale applied revolves around 3 main dimensions. These dimensions gather a number of variables that can be assessed and on which we will base our criteria to evaluate the course. In this sense, and in order to assess all the variables classified, we have adopted a Likert scale with an open field for the experts to enter their feedback on each element of the evaluation (see Annex 1).

Table 1
Structure and levels of the scale used to evaluate virtual university courses (created by the authors)

DIMENSIONS	VARIABLES	QUESTIONS IN THE SCALE
PLANNING	• Formulation of objectives	1
	• Structure of the contents	8
	• Methodological consistency	2
	• Evaluation of the learning	10
ADMINISTRATION OF THE COURSE	• Course guide	3
	• Use of the platform	4, 5.
	• Flexibility of the program	6
COMPREHENSIVE VIEW	• Fundamental unity	7
	• Innovation	9, 11
	• Further possibilities	12

As it can be seen in the Table above, the variables considered in the scale can be classified in three main groups according to their aim:

a. Planning variables:

They gather the pedagogical elements necessary to organize efficient education processes at any level. The first part of the scale includes questions referred to each variable considered in this category:

- ✓ Formulation of objectives: The objectives are the knowledge the students are expected to acquire; this knowledge will be evaluated at a given moment (Doménech, 1999). In this context, properly defined objectives cannot be ambiguous and must describe clearly and accurately the tasks to be performed by the students (thus, they determine the type and quality of the learning produced).
- ✓ Structure of the contents: In order to ensure the quality of the course, it is necessary to select and structure its contents in terms of learning dynamics. Therefore, the initial structure of the contents is determined by educational criteria such as:
  - **Sequence**: Going from simple to complex things. It is assumed that the trainer must take into account the background capacities and prior knowledge of students.
  - **Relation**: The initial introduction of the contents (index, roadmap, etc.) must provide a comprehensive picture of the learning process to make the students understand clearly and accurately its continuity and progress. Furthermore, the contents should be structured in an interrelated way, and furthermore, the arrangement of the contents must promote connections or links with other contents of related courses.
- ✓ **Methodological consistency:** The methodology basically depends on the didactic objectives set and the nature of the course. Thus, the objectives-contents will suggest appropriate strategies to enable the students to attain the expected results. Nevertheless, the methodology must be aimed at the dynamization and autonomous development of the students rather than at a mere transfer of information (Zabalza, 2002).
- ✓ **Evaluation of the learning:** Note that it is necessary to use varied evaluation tools instead of a single procedure or resource. The variety of evaluation resources enriches and stimulates the quality of the learning. The resources chosen and used to register data on quality will depend on the objective to be evaluated (memorized knowledge, understanding, application, synthesis…), on the approach selected for the evaluation (formative, cumulative…), on the time when it is used (at the beginning, in the middle or at the end of the course), as well as on the relevance and nature of the selected contents.

b. Variables of administration:

They include several variables linked to the teaching activity implemented in the course:

- ✓ **Course guide**: To fulfill its "guiding role" during the process of teaching and learning, it must be realistic (focused on the prior knowledge of the students, resources and time available, etc.), clear, precise, efficient, understandable and challenging.
- ✓ **Use of the platform:** It refers to the "academic profitability" of the resources hosted by the system of tele-education: use of tools, configuration, adaptation and customization of the sections available and exploitation by the users.
- ✓ **Flexibility of the program:** The basic plan of the trainer must foresee and implement any necessary adjustments without detriment to the basic unity of the program.

c. Product variables (comprehensive view):

This group includes the variables related to the pedagogical product (formal appearance, innovation and appeal of the course) and its medium/long-term potential. A comprehensive view can bring to light some neglected aspects that might be a source of concern or issues that might be improved even if they do not any particular problem to implement the course.

- ✓ **Fundamental unity:** It refers to the general image of the course from a double perspective: the formal image (graphic design, uniformity of color, protocols used, etc.), and the conceptual image (meaning of the icons, value of the glossary, navigability, etc.).
- ✓ **Innovation:** It refers to the capacity to develop new learning experiences and arrange creative structures of knowledge using the resources of the platform (multimedia/hypermedia) or complementary tools of the author (Light&Light, 1997).
- ✓ **Further possibilities:** The aim is to collect data on the chances of promoting the medium/long-term technical-educational development of the program or the different types of training contents.

Conclusions

E-Learning is an emerging method in management education. The growing importance of new methods make imperative to transform learning methodologies, but quality indicators for measuring new learning techniques are not very much developed. We define a method to measure quality content, taking into consideration that technology, services, and the whole integration through e-learning methodologies are the final factors to determine the quality of any e-learning process in management education. The Assessment Test created by the taskforce must be administered by an external observer (an expert on this particular learning system) for its correct administration. On the other hand, and in order to collect the information necessary to evaluate the course, this expert will have to analyze each item in the encored test using his/her own professional experiences as a starting point. Therefore, particular attention should be paid to the didactic principles of the design and development of the Study Guide, as well as to the tools used, the relevance of the pedagogical resources implemented in the virtual classroom and the integration of the "physical" didactic part of the learning process. According to the criteria set to evaluate the course as a whole, the maximum score that can be obtained in the test is 26 points[2].

Based on a very useful example, from the scores of 30 subjects taught in a mixed model in the University of La Rioja, it can be concluded that 50% of them have obtained at least one half of the points (that is, at least 13 out of 26). Some of the more relevant data obtained in the evaluation have to do with the level of quality acquired by the education system and to measures or proposals derived from the analysis aimed at improving education on a regular basis. We see clearly that this method is an appropriate tool for our research goal: to evaluate content quality in management education.

[2] In the questions where the maximum grade is 1 point, the answer 0 will give 0 points until question 5, which will give 1 point. In the questions where the maximum grade is 0.5 point, the answer 0 will give 0 points until question 5, which will give 0.5 points. In the yes/no questions, "yes" will give 1 point and "no" will give 0 points.

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Appendix 1:
Procedure to Control the Quality of the Materials: Mixed On-Line Model

Indicators:

A. Study guide

B. Complete sets of tools: learning, evaluation and communication

C. Integration of other resources in the classroom

D. Impact of the integration on the "physical" part of the learning

E. Period where it will be implemented

A. Study guide:

Workload per course: 15 minutes.

Does the course have a study guide?

YES		NO	

Remarks: _____

If yes;

1	2	3	4	5

1. It is adequate.
2. The course does not have a study guide.
3. The course has a study guide but it does not follow the model, it is a Word or PDF file that, nevertheless, covers all the sections.
4. It follows the model sent to the teachers and all the sections are completed (**Appendix II**)

Remarks: _____

3. How would you define the pedagogical quality of the "course guide"?

1	2	3	4	5

1. Bad
3. Poor
5. Excellent

Remarks: _____

B. Complete sets of tools: learning, evaluation and communication:

Workload per course: 45 minutes**.**

Learning

Contents

4. Are the contents appropriate for the course?

1	2	3	4	5

Remarks: _____

5. Is the structure of the contents that of an on-line course?

1	2	3	4	5

1. The subject does not have contents.

3. The contents are schemes subsequently developed in the classroom.

5. The contents have the structure of an on-line course, with objectives, work methodology, text, summary and bibliography.

Remarks: _____

6. Are the contents completed with interactive elements: links, animations, references to web sites, pictures, etc?

1	2	3	4	5

1. Never

3. Sometimes

5. Many times/always

Remarks: _____

Glossary

7. Is there a glossary?

YES		NO	

Remarks: _____

8. If there is a glossary, is it included in the tool itself rather than as a separate document within the module?

YES		NO	

Remarks: _____

9. Are the definitions in the glossary clear and properly structured?, do they solve potential doubts about particular terms?

YES		NO	

Remarks: _____

Assessment

Self-assessment

10. Are there self-assessment questions?

YES		NO	

Remarks: _____

11. Are self-assessment questions included in each section rather than as separate documents within the modules?

YES		NO	

Remarks: _____

12. Are there enough self-assessment questions? (at least 7 questions per module)

YES		NO	

Remarks: _____

13. Are self-assessment questions structured by modules, with a set of questions per module?

1	2	3	4	5

1. There are self-assessment questions but they are integrated in the module and do not have their own structure, that is, they are no typical self-assessment forms.

3. There are some questions referred to particular modules, but they are unstructured.

5. Each module has its own self-assessment questions in separate self-assessment forms

Remarks: _____

Activities

14. Does the module include adequate activities proposed by the teacher?

YES		NO	

Remarks: _____

15. If the module includes activities, do they develop the contents of the module?

1	2	3	4	5

1. The activities are distributed within the module rather than in separate sections.

3. The activities have their own sections, but they are distributed in a confusing way, one does not know what module or chapter they refer to.

5. The activities have their own sections, which are clearly and properly distributed.

Remarks: _____

Communication

16. Intensity of use of the communication resources in the platform

1	2	3	4	5

1. Bad

3. Poor

5. Excellent

Remarks: _____

17. Adequate use of the e-mail

1	2	3	4	5

1. The e-mail is never used.

3. The e-mail is rarely used.

5. The e-mail is adequately used of the e-mail to go over doubts and the points discussed in the classroom.

Remarks: _____

18. Adequate use of the forum

1	2	3	4	5

1. The forum is never used.

3. The forum is rarely used and, sometimes,
it is used as a tool to exchange views on issues out of the scope of the subject.

5. The forum is adequately used to clear up doubts and the points discussed in the classroom.

Remarks: _____

19. Level of autonomy and flexibility of the program

1	2	3	4	5

Remarks: _____

Workload per course: 0.5 hours.

20. General image of the virtual course (*icons*: are they understandable?, what do they mean?, where do they take?; *uniformity of color*: is color uniform?, is there a clear pattern?; *navigability*, etc.)

1	2	3	4	5

Remarks: _____

Workload per course: 0.5 hours.

21. Level of structure of the learning contents: index and roadmap.

1	2	3	4	5

Remarks: _____

Workload per course: 0.5 hours per credit.

22. Level of innovation of the contents: multimedia/hypermedia.

1	2	3	4	5

Remarks: _____

Workload per course: 0.5 hours per credit.

23. Intensity of use of the evaluation resources in the platform.

1	2	3	4	5

Remarks: _____

Workload per course: 0.5 hours per credit.

24. Intensity of use of complementary tools (for instance, tools of the author)

1	2	3	4	5

Remarks: _____

Workload per course: 0.5 hours per credit.

25. Technical-educational potential or medium/long-term possibilities of extending the contents

1	2	3	4	5

Remarks: _____

Workload per course: 0.5 hours per credit.

Appendix II
Study Guide Of The Course

	Study guide of the course
COURSE	
Title of the course:	
Description:	
Prerequisites:	
General objectives:	
Coordinator:	
Counselor:	
Methodology	
Description:	
Content Index	
Schedule:	
Evaluation criteria:	
Basic bibliography:	
Links:	

Editor's Note: Instant Messaging (IM) and social networks have potential value for education. As internet functions are extended to cell phones, IM has become a ubiquitous and widely used communication tool in frequent use, typically many times each day. This platform provides a plethora of opportunities for learning language and other social-communication skills.

Exploring the Potential Use of Instant Messaging in English Learning

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Taiwan

Abstract

Owing to its easy access and user-friendly interfaces, the worldwide popularity of Instant Messaging (IM) has grown significantly in recent years. This study proposed that IM can be used as a modern learning tool for enhancing English communication. The current study investigated university students' perceptions of the use of instant messaging (IM) in their English learning. The study also discussed the potential usability and efficiency of the proposed application. A survey instrument was developed to achieve the described objective. One hundred and eighty-two Taiwanese university students completed the survey. Five statistical analysis methods including descriptive statistics, factor analysis, T-test, analysis of variance (ANOVA), and path analysis were performed to test the hypotheses of the study. This study concluded that the implementation of IM in English learning is feasible due to students' interest in English learning and their familiarity with IM. The implementation of IM in English learning may be valuable to non-English speaking countries. Future studies should employ an experimental design to investigate whether implementing IM would enhance students' English fluency.

*Keywords***:** Instructional technology; Educational technology; Distance learning; Synchronous learning; Computer assisted language learning (CALL); Online learning; Computer-mediated communication; Networked learning; Cooperative/collaborative learning; Interactive learning environments; Higher education; English as a foreign language (EFL)

Introduction

As a global language in the interconnected world, English has a critical role in international communication. With its immensely widespread adoption as the language of choice, English is used for a greater variety of purposes than ever before. A dominant language in Internet communication, English now rules both business and cyberspace (Singh, Pandian, & Kell, 2002). In virtually all parts of the world, it is used extensively for business management, technology development, scientific advancement, and academic improvement. The increased use of English is especially significant among Taiwanese university students. In an effort to enhance Taiwanese university students' competitiveness in the global market, it is essential to raise their English communication ability by the most effective means.

Taiwanese university students typically feel nervous when communicating with foreigners in English. The main reason is that the students feel a lack of confidence in their English communication ability. Huang and van Naerssen (1987) reported that Taiwanese university students' memorization strategies were clearly influenced by traditional Chinese reverence for knowledge and wisdom, as reflected in books and the practice of memorizing this wisdom as a way to gain language proficiency. This is also a major reason that Chinese students tend to lose the habit of learning English through communication. Moreover, most universities in Taiwan offer virtually no English courses beyond the freshman year. Although it may be possible to provide an additional number of language courses, there is a lack of qualified instructors for these courses.

Tori-Williams (2004) pointed out that most foreign language education has focused on the acquisition of grammar and vocabulary until recent times, even though communication has been indicated as one of the five goals identified in today's foreign language classroom. The present study made the assumption that communication is an important component of English learning. It was assumed that students' English ability could be enhanced through regular communication. This study considered that if Taiwanese university students can frequently communicate with other English speakers anytime and anywhere, they would realize significant enhancements in their English communication ability.

An advantageous approach to realize the abovementioned idea is through the use of advanced online communication. Online communication can be considered valuable for practicing English communication due to the easy access and the user-friendly interface of the latest instant messaging programs. Moreover, online learning technology has the benefit of reducing anxiety of language learners by providing them an autonomous learning environment. Online learning may also improve language learners' attitudes toward the language (Kongrith, 2005). At any rate, computer-mediated communication holds great promise for the learning and synchronized practice of English (Warschauer, Turbee, & Roberts, 1996; Warschauer, 2001). Chen (2005) advocated that introduction of computer-mediated communication into EFL learning can provide learners more authentic input and more opportunities to participate in the target sociocultural contexts. This context may well promote linguistic and also pragmatic knowledge. Motivation, learner autonomy, social equality, and identity can also be encouraged through the use of computer-mediated communication inside and outside of the classroom.

According to the survey conducted by the Taiwan Network Information Center, TWNIC (2005), the percentage of the Taiwanese population that are Internet users was 60.25% (13.8 million) at the end of December 2004, while about 53.78% (10.31 million) of residents in Taiwan aged 12 and above had experience in using broadband. As broadband Internet connections become more prevalent in Taiwan, the use of Instant Messenger (IM) becomes increasingly popular at the same time. IM software such as AOL Instant Messenger (AIM), ICQ, MSN Messenger, and Yahoo! Messenger have attracted millions of daily users in recent years (Chatterjee, Abhichandani, Haiqing, TuIu, & Jongbok, 2005). The International Data Corporation indicated that IM users would exceed 300 million users in 2005 (Mingail, 2001).

Instant Messaging (IM) is intended to be synchronous written communication that is different from Email. IM traces its roots to single-line, person-to-person communications facilities built into mainframe computer operating systems (Cunningham, 2003). IM users can select other users to list in their buddy list. When users log onto IM, they can glance around to see if any of their contacts are logged onto the network. Then, users can decide if they would engage in a chat with their contacts. IM provides the ability to not only exchange text messages but also to transfer electronic files and pictures (Cunningham, 2003; Chatterjee, Abhichandani, Haiqing, TuIu, & Jongbok, 2005). IM users often multi-task or use IM with other media; that is to say, they use multiple media at the same time (Cameron & Webster, 2005).

IM has extended the functionality by adding some flavor to the conversations with emoticons. Additionally, real-time voice conversation and videoconferencing are now widely available through the use of IM. IM is vastly popular among university students because IM is an easy way for them to keep in touch with friends. In a very recent study, Sung, Yang, Cheng, and Yang (2006) found IM to be a popular and common interpersonal communication tool among Taiwanese university students. Also, IM is much cheaper than the use of telephones in Taiwan. Students can stay online to chat and not worry about the cost. Increasingly more IM functions are being extended and renewed as the technology develops.

Pauleen and Yoong (2001) used grounded action research consisting of seven members in a virtual team training program. The study found that IM was usually used to support informal conversation in virtual teams. Hard and Ljungstrand (2002) recorded and analyzed IM logs of university students for over 16 months. The results indicated that Webwho (a university system as well as ICQ) was mainly used for supporting collaborative work and for coordinating social activities.

Nicholson (2002) considered IM services useful in providing a tool for social communication in an asynchronous Web-based classroom. Students who took part in the study and used the IM software found it easier to discuss class material. They also found it easier to communicate in a social manner with other students. Furthermore, the students felt that IM services could help with group assignments. Weller, Pegler, and Mason (2005) proposed four major techniques to be used in e-learning courses, including: blogging, audio conferencing, instant messaging, and Harvard's Rotisserie system. They view dialogue in the learning environment as multi-channeled, with particular tools providing usability for specific forms of communication, which are matched to the learning outcomes of any activity or course. In the study, IM proved to be the most popular technique. In general, IM is used for informal discussion, often of a social nature. Nicholson (2002) also found that IM could be implemented in educational environments. Students can make use of PDAs and mobile phones for IM utilization in their higher education experience. Although IM is considered primarily a communication tool, it could also be utilized as a learning style or an augmenting phase in a learning cycle.

It is well established that technology can be successfully integrated to promote better teaching and more learning in the higher education sector (Bates & Poole, 2003). In the context of foreign language classrooms, the use of information technology is proven to be an important aspect for academic language learning (Cummins, 2000). The application of computer-assisted language learning can also help students improve both the quality and quantity of language learned (Tsou, Wang, & Li, 2002). However, there is a scarcity of research specifically regarding foreign language learning based on the use of advanced Internet techniques such as instant messaging.

Following the above-described notions, this study proposed that IM can be used as a modern learning tool for enhancing English communication. The current study investigated university students' perceptions of the use of instant messaging (IM) in their English learning. Results of the study can provide significant insights into the potential use of one of the most widely adopted global communication tools in English learning. The researchers in this study developed a survey questionnaire to achieve the described objectives. The purpose of this study was to explore the potential use of IM on English learning for Taiwanese university students. Through the analytical results, this study may reveal the feasibility of using IM in learning English. Results derived from the study can also indicate the usefulness of IM in enhancing English communication ability.

2. Methodology

With the aim of accomplishing the aforementioned purpose, the following research questions were developed to guide the study:

1. What user habits do Taiwanese university students have when using instant messaging software?
2. To what extent do Taiwanese university students consider it is feasible to incorporate instant messaging software into English learning?
3. What are Taiwanese university students' perceptions of instant messaging as a beneficial tool for English learning?

In the following sections, this study will describe the data collection and analysis procedures, report the findings, and discuss the potential implications of the findings for future research.

2.1 Participants

Participants in the study consisted of 182 students from a selected university. All participating students had completed at least seven years of English classes from high school and university. There were 125 male (68.7%) and 57 female (31.3%) students in the sample.

2.2 Hypotheses

Men and women typically use language differently (Harmer, 2001). Language use and interaction style were found to be gender-related in a study that involved university students in educational online discussion groups (Guiller & Durndell, 2006). In the language learning context, gender has been frequently associated with different strategy use (Oxford, 2001). Significant differences have also been reported to exist in the use of specific language learning strategies between university students of different genders (Green & Oxford, 1995). Therefore, the relationship between gender and perceptions of English learning were tested via the following hypotheses:

H1a: Gender influences the interests of English learning.

H1b: Gender influences the feeling of the necessity of English learning.

H1c: Gender influences the feeling of the usability of applying IM to English learning.

Kubey et al. (2001) found that IM was the most frequently mentioned type of synchronous online communication by focus group participants. Jeong (2002) found that students appreciated not having to wait for answers to questions and appreciated the more informal context of IM communication. The relationships between IM communication and English ability enhancement were thus tested based on the following hypotheses:

H2a: Students consider IM as a practical for the enhancement of English communication ability.

H2b: Students perceive that the incorporation of IM has a positive impact on English communication ability.

2.3 Data collection and analyses

A survey questionnaire was used to evaluate the effects of IM on enhancing English communication ability. Data collection was conducted over a two-week period between May 1st and May 15th, 2006. The students who participated in the survey were informed that the questionnaire was not a test, and that their responses would be used for research purposes only. The instruction part of the survey indicated that participation in the study was strictly on a voluntary basis and students might withdraw at anytime during the process. The students were assured that their confidentiality would be adequately protected.

The questionnaire used a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Students were asked to rate their agreement with each questionnaire item. The survey also included a background section that asked students to provide information about their demographic characteristics, including gender, class level, average computer use per day, frequency of Internet use, and frequency of IM use.

The data analysis process included four steps. First, this study used descriptive statistics, including frequencies, percentages, means, and standard deviation, to obtain demographic information from the background questionnaire. Second, factors analysis was used to uncover relationships among the variables. This allows numerous inter-correlated variables to be condensed into fewer dimensions, called factors. In the context of this research, numerous

questionnaire items were condensed into fewer factors. The following analyses are related to the results of factors analysis. Third, T-test and analysis of variance (ANOVA) was performed to examine the differences in the overall mean. Based on the p-value test (α is equal to 0.05), we can test if the hypotheses in section 2.2 will be significantly rejected or not. Finally, multiple comparisons were used to determine if significant differences exist between demographic characteristics and the survey results. These analysis processes were employed to investigate Taiwanese university students' feeling about using IM to improve English communication ability.

3. Results

3.1 Background analysis of subjects

This study is based on a survey taken by 182 undergraduate students at a selected university in Taiwan. Table 1 summarizes the background of subjects, including gender, class level, average computer use per day, frequency of Internet use, and frequency of IM use. The vast majority of students (97.8%) spent more than one hour on the computer every day. Additionally, 78.1% of students get on the Internet upon turning on the computer. Results of the survey also revealed that 72.5% of students used IM on a daily basis. The described results clearly indicate that most students are familiar with both the Internet and IM. Therefore, to implement IM in teaching and learning activities can be considered valuable.

Table 1
Subjects' Demographic Characteristics

		Class				
		Sophomore	Junior	Senior	Total	(%)
Gender	Male	25	89	11	125	68.7
	Female	10	46	1	57	31.3
Average computer use per day	Time<1 hr	0	4	0	4	2.2
	1<Time≤4 hrs	15	40	6	61	33.5
	4<Time≤8 hrs	14	56	3	73	40.1
	8<Time hrs	6	35	3	44	24.2
Frequency on Internet use	On the Internet upon turning on the computer	29	104	9	142	78.0
	When necessary	1	14	2	17	9.3
	At specific times	5	16	1	22	12.1
	Others	0	1	0	1	0.5
Frequency of IM use	On IM upon being online	26	78	7	111	61.0
	When necessary	7	37	4	48	26.4
	At specific times	2	18	1	21	11.5
	Others	0	2	0	2	1.1

3.2 Factors analysis of questionnaire items

The main applications of factor analytic techniques are: (1) to reduce the number of variables and (2) to detect structure in the relationships between variables, that is to classify variables. Therefore, factor analysis is applied as a data reduction or structure detection method. To draw

out clear elements from the many questions, this survey employed factor analysis before further investigation. Because there are five parts in the questionnaire ,factors analyses were demonstrated , five times in this section (Table 2).

Principal component factor analysis was run to determine the potential groupings of these questionnaire items of "interests of learning English", "the necessity of English learning", "English communication ability", "experience in IM use", and "students' viewpoints of applying IM on English learning". Varimax rotation was used to better account for expected correlations among potential factors. One factor emerged with eigenvalues greater than 1.0. From Cronbach's alpha value, we can find that the reliability of the questionnaire is very high. And based on the analyses of the total variances, we can also conclude that the validity of the questionnaire is sufficiently high.

Table 2
Results of Factors Analysis

Group	Category	Factors	Cronbach's alpha	Total Variances
1	Interests of learning English	1. Interests of learning English	0.92	59.56%
2	Necessity of English learning	1. The necessity of English learning	0.82	68.42%
		2. The importance of English ability	0.78	
		3. The advantages of owning excellent English ability	0.81	
3	English communication ability	1. Interactive ability of English communication	0.87	68.40%
		2. Translation ability	0.86	
4	Experience in IM use	1. Using experiences in IM functions	0.88	68.21%
		2. Social experiences	0.81	
		3. Learning experiences	0.69	
5	Applying IM to English learning	1. Usability of applying IM to English learning	0.95	76.20%
		2. Efficiency of applying IM to English learning	0.91	

3.3 T-test and analysis of variance for principle factors based on subjects' background

This section will describe whether the background variables significantly influence the principle factors or not. There are 11 principle factors in the questionnaire based on results of a factor analysis. From the results shown in Table 3, this study yielded the following results from the T-test and analysis of variance (ANOVA).

Gender significantly influences the interests in learning English. The independent T test was carried out to compare the difference between male and female. Results indicated that females were more interested in learning English than males (T-value = -3.556, significance = 0.000). Gender also significantly influences the feeling of the necessity of English learning. The independent T test was carried out to compare the differences between male and female. Results indicated that females feel that it is more necessary to learn English than males (T-value = -3.101, significance = 0.002). Additionally, the difference in educational backgrounds significantly influences the feeling of the necessity to learn English. The multiple comparisons of Scheffe method was used to compare the difference between different education backgrounds. Results indicated that sophomore students feel more necessity to learn English than junior students (Significance = 0.007). The different frequencies of using instant messaging significantly influence the experiences of using IM functions. The multiple comparisons of Scheffe method were used to compare the different frequencies of IM use. Results indicated that higher frequency users feel more competent than lower frequency users (Significance<0.01). Gender significantly influences the feeling of the usability of applying IM to English learning. The independent T test was carried out to compare the difference between male and female students. Results indicated that more females than males agreed that the use of IM in English learning is usable (T-value = -3.701, significance = 0.000). Finally, the difference in time spent on using the Internet significantly influences the feeling towards the efficiency of applying IM on English learning. The multiple comparisons of Scheffe method was used to compare the different frequencies of IM use. Results indicated that the users who spent more than 4 hours and less than 8 hours mostly feel that it is efficient to use IM on English learning (Significance<0.01).

3.4 Path analysis of applying IM on English learning

The initial model of applying IM to English learning was developed to define the major factors and paths that influence the research concepts. There are five major paths that can be clearly defined to verify the model, including (1) from 'Interests of learning English' to 'Viewpoints of applying IM on English learning; (2) from 'Interests of learning English' through 'Ability of English communication' to 'Viewpoints of applying IM in English learning'; (3) from 'Importance of learning English' to 'Viewpoints of applying IM in English learning'; (4) from 'Importance of learning English' through 'Ability of English communication' to 'Viewpoints of applying IM in English learning'; (5) from 'Experience of IM use' to 'Viewpoints of applying IM in English learning'.

In order to verify and validate the initial model, path analysis was conducted. There are two regression models established using the path analysis. First, it was necessary to define the dependent variables and the independent variables. The dependent variable in the first model is 'Ability in English communication'. And the independent variables included 'Interests in learning English' and 'Importance of learning English'. The dependent variable in the second model is 'Viewpoints of applying IM to English learning'. And the independent variables included 'Interests in learning English', 'Ability in English communication', 'Importance of learning English', and 'Experience in IM use. Second, the regression analyses are shown to verify and validate the initial model. In the first regression model, it was found that 'Interests in learning English' positively and significantly influence 'Ability in English communication'. And in the second regression model, 'Interests of learning English', and 'Experience of IM use' are positively and significantly influence 'Ability of English communication' as illustrated in Figure 1. Figure 1 shows that if students were interested in learning English, they would agree to apply IM in English learning. If they were familiar with using IM, they would also agree to the usability and efficiency of applying IM on English learning. Lastly, if the students were interested in English learning, their English ability would be better than students who were not interested. For the most part, regardless of the students' feeling towards the importance of learning English, they all agreed wit the notion that it is usable and efficient to apply IM to English learning.

Table 3
Analysis of Variance for Principle Factors

	A1	B1	B2	B3	C1	C2	D1	D2	D3	E1	E2
Gender	12.59**	9.97**	4.38*							16.88**	
Education		6.38**									3.20*
Time spent on a computer per day											4.13**
Frequency of using instant messaging		3.304*					13.86**		5.35**		

A1: Interest in learning English; B1: The necessity of English learning; B2: The importance of English fluency; B3: The advantages of possessing excellent English fluency; C1: Interactive ability in English communication; C2: Translation ability; D1: Experiences of using IM functions; D2: Social experiences; D3: Learning experiences; E1: Usability of applying IM in English learning; E2: Efficiency of applying IM in English learning

*: p-value<0.05; **: p-value<0.01

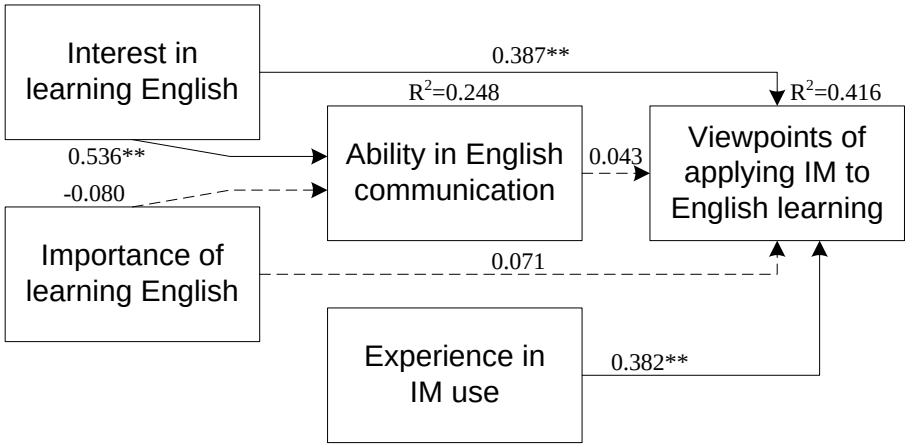

Figure 1. The Model of Applying IM in English Learning
(*: p-value<0.05; **: p-value<0.01)

4. Discussion and Conclusions

The present study examined the implementation of using instant messaging in English learning for Taiwanese university students. Results derived from the survey indicated that most students perceived the potential use of IM on English learning as an intriguing concept. It was also revealed that the students felt it would be usable and efficient to utilize IM in English learning. Findings of this study brought to light that IM can be integrated into innovative instructional design.

Based on the analytic results of the survey, we found that gender, education, time spent on a computer per day, and frequency of using instant messaging were significant variables to the factors which influenced students' viewpoints of applying IM in English learning. From the perspective of gender, this study found that: (1) females were more interested in learning English than males; (2) females feel it is more necessary to learn English than males; (3) females agreed more than males with the notion that the use of IM in English learning is usable.

Survey results also indicated that sophomore students feel that it is more necessary to learn English than junior students. As previously stated, the majority of Taiwanese universities offer virtually no English courses beyond the freshman year. The unfortunate effect of this lack of language courses is that students tend to lose their interest in English learning over time. When considering this negative consequence in conjunction with the assumption that regular communication is crucial in the enhancement of students' English ability, the benefits and sheer convenience of the use of IM in English learning becomes apparent. In addition, not only can the convenient use of IM make up for the lack of English courses offered to the students, it can also provide easy access to English communication practice.

We found that the difference in time spent in using IM significantly influences the feeling towards the efficiency of applying IM on English learning. Results indicated that users who spent more than four hours and less than eight hours on using IM generally feel that it is efficient to use IM in English learning. Sixty-four point three percent (64.3%) of students spent more than four hours on a computer. Thus, we conclude that the majority of students consider applying IM in English learning as an efficient method.

The following results were obtained from the path analysis performed. (1) Students who are interested in learning English would agree with the notion of applying IM on English learning. (2) Students who are familiar with the use of IM would agree to the usability and efficiency of applying IM on English learning. (3) Student with a greater interest in English learning would possess better English ability than their peers. (4) Regardless of the students' feeling toward the importance of learning English, they would agree with the notion that it is usable and efficient to apply IM in English learning.

As a modern communication tool in the global information society, IM can be very helpful and practical for users from all walks of life. For students, it provides them with the valuable opportunity to practice their English with other English speakers instantaneously. It is established that if students can practice their English communication frequently, their English ability will be enhanced. IM technology can even provide multi-channel communication for students to practice English. In general, Taiwanese university students feel a lack of confidence in their English communication, especially speaking ability. IM conversation sessions, like other online communication learning tools, can be conducted in a learner-friendly environment without the pressure of face-to-face communication (Warschauer, 1996a). Besides, there is a significant rise in the use of IM in the corporate setting (Cameron & Webster, 2005). Such a strategic practice may be beneficial for Taiwanese university students to gain the necessary communication skills to face the global market. Students can also acquire technical skills via online communication practice that will be useful in the future.

Limitations of the study need to be considered when interpreting the findings of the present study. First, this study was conducted at one selected university only. Although the results are shown to have high validity and reliability, the results of the study would be more representative if the subjects were sampled from more universities. Second, the concept of utilizing IM on English learning proposed in this study has not been put into practice. Although it is proven usable and efficient as indicated by the findings, it would be worthwhile to put this concept into practice.

Findings in the study led to the conclusion that students who are interested in learning English are more likely to enhance their English communication significantly. We conclude that applying IM in English learning is not only an interesting concept, but also a usable and efficient English learning method. This supports the notion that that the use of computer-mediated communication tools certainly can benefit learning and develop learners' communicative competence to a certain extent (Chen, 2005). In future studies, we can employ an experimental design to investigate whether or not students' English communication can be enhanced by utilizing IM. Furthermore, we can tackle the research from a different perspective by designing another survey questionnaire to elicit the opinions of English instructors. Comments from English instructors can be of high value to the actual implementation of IM on English learning. Instructors' feedbacks can be used to form the strategy to initiate the implementation. Finally, this study concluded that the utilization of IM on English learning is highly feasible for Taiwanese University students. This concept is a constructive value to be initiated at universities in Taiwan. Subsequent investigations will reveal the extent to which IM enhances Taiwanese university students' English communication. This concept holds promise for educational administrators and English instructors in non-English speaking countries.

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Editor's Note: Facebook has won favor as a source of personal information and a way to network with friends and to build or renew friendships. It is principally a social network, but it does interface with professional end educational opportunities. Does this mean it could influence jobs, performance ratings, and course grades? Read on…

To Friend or Not to Friend: Academic Interaction on Facebook

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Keywords: Facebook, faculty, student, academic performance, privacy, Online Social Network (OSNW)

Introduction

The popularity of Online Social-Networking Websites (OSNW) such as *MySpace.com* and *Facebook.com* has grown considerably throughout recent years (Gosling, Gaddis & Vazire, 2007). The use of Internet-based mediums such as blogs, personal websites, and virtual communities by college students has continued to increase in recent years and have impacted how these students communicate with each other in both online and offline contexts (Pempek, Yermolayeva and Calvert, 2009). Recent high school graduates grew up in the digital age and have been labeled "digital natives" because of the ease with which they operate in these virtual worlds and formats (Prensky, 2001).

Sites such as *Facebook* and *MySpace* are accessible to most internet users and anyone with an email address. Users can provide information through creating a 'profile' with the intent of communication with others, meeting new friends and connecting with old friends. In addition to connecting to friends, dating use, career searches, feedback and blogging, users post self-descriptive information.

Facebook is merely four years old, but already boasts of "More than 68 million active users" and "An average of 250,000 new registrations per day since Jan. 2007", (*Facebook*.com website, 2008). We chose *Facebook* due to its organizational structure. Website users designate themselves with a university affiliation along with other personal information such as gender, musical tastes, courses taken, education background, etc. *Facebook* users can also post picture albums that can be shared with other users who are considered 'friends'.

Facebook in Academia

This study examines *Facebook* usage and how students use *it* to engage within the academic realm, including student perceptions of faculty as friends. As OSNWs continue to thrive in today's environment, faculty are increasingly implementing them in the classroom. Some feel this is an invasion of the students' privacy, and have labeled this as a "creepy treehouse" practice (Abel, 2005; Stein, 2008). On the other hand, others feel that it is an intelligent use of current technologies in the classroom. Since the classroom community has substantial impact on the overall collegiate experience, more needs to be learned about this virtual community that serves as an undercurrent communication channel that binds students and faculty. Coupled with student usage of *Facebook* (i.e. hours spent, number of friends, number of groups subscribed to, etc.), is there any relationship between faculty interaction and academic benchmarks such as cumulative GPA?

Literature Review

The popularity of OSNWs such as *MySpace* and *Facebook* has grown considerably in recent years (Gosling, Gaddis & Vazire, 2007). However, any social environment involves personal disclosure, leading to issues of privacy (Acquisti and Gross, 2005; Gemmill and Peterson, 2006; Gross, Acquisti & Heinz, 2005; Kolek & Saunders, 2008; Patil & Kosba, 2005; Tufekci, 2009). As the Pennsylvania State example illustrates, privacy issues persist on OSNWs. Patil and Kobsa (2005) studied the use of privacy controls within awareness systems, and establish that the use of privacy controls in technology is dependent on the knowledge of security features, and the technology itself. Users of *MySpace* were presented security concerns and chose not to enable more privacy settings.

But what do people disclose on OSNWs? Gross, Acquisti and Heinz (2005) examined 4,540 *Facebook* users for the type and amount of information disclosed and found that an overwhelming majority of profiles provide full access, associating the person with their first and last name, picture, birthday, and hometown. More than half provided their current residence. The majority of users provide fully identifiable information although the sites do not require disclosure. The study concluded that few users change the privacy settings and most users seem willing to provide personal information to the public. Kolek and Saunders (2008) also found that a great number of students in their quantitative study disclosed substantial information on their account profiles such as contact information, academic schedules and personal pictures of alcohol consumption. Given the low-privacy settings, high personal disclosure, and college-age, the participants show very little concern over privacy issues in OSNWs (Acquisti and Gross, 2005; Gemmill and Peterson, 2006; Gross, Acquisti & Heinz, 2005; Kolek & Saunders, 2008; Patil & Kosba, 2005; Tufekci, 2009).

Gemmill and Peterson (2006) surveyed student's technology use behavior and habits. Information was gathered regarding the use of email, instant message services, internet for academic and leisure, cell phone use and land-line phone use. The study found that college students obtain social support via cell phones and instant messaging and the use of technology is likely to increase with the advent of social networking technology. The study concluded that technology use surveyed was highest among freshman and lowest in seniors and, in order to avoid academic side effects, users need to address the role of technology within their academic progress.

The world of OSNWs also may have ramifications on the student-teacher relationship both in and outside the classroom, given that OSNWs provides a virtual realm in addition to the pre-existing physical one (Li & Pitts, 2009). Previous research provides some insight into non-academic social exchanges between college teachers and students, finding that academic performance increases with informal interactions (Pascarella and Terenzini, 2005).

The amount of time that undergraduate students invest in OSNWs varies, but studies conclude that *Facebook* is fully integrated in the lives of most undergraduate students. Pempek, Yermolayeva and Calvert (2009) found that undergraduate students invest approximately 30 minutes daily (27.93 on weekdays, 28.44 minutes on weekend days) on *Facebook*, adding this task to their daily routine.

And the time that is invested may not be devoted to academic enhancement. In other words, medians like *Facebook* and other OSNWs are used more for socializing rather than academic usage (Madge, Meek, Wellens & Hooley, 2009). Madge, et al. (2009) surveyed British undergraduates and found that undergraduates were uneasy with academic utilitization of OSNWs.

> There were several activities that the majority of students did *not* use *Facebook* for, such as checking out the profile of a member of university staff (68% said they had never done this). *Facebook* is therefore currently used by students for communicating with other students, not with university staff…Moreover, when respondents were asked if there were any ways they thought *Facebook* could be utilised to enhance teaching and learning at the University, 43% responded negatively, explaining that *Facebook* was a SNS [Social Network Sites], not a tool for academic work (p. 149).

So what are the academic costs of spending a substantial amount of time on OSNWs? To date, research on the academic implementation of *Facebook* or other OSNWs has been limited.

With the seeming ubiquity of *Facebook* and other OSNWs, researchers are beginning to note the viability of their use in the academic arena. An article in *Educause* (2006) suggested, "Any technology that is able to captivate so many students for so much time not only carries implications for how those students view the world but also offers an opportunity for educators to understand the elements of social networking that students find so compelling and to incorporate those elements into teaching and learning." Along the same lines, Cloete, de Villiers, and Roodt (2009) found that most faculty members have not implemented an OSNW as an academic tool, but at the same time, most felt like one could be applied as a tool for academic learning.

One of the biggest concerns in implementing *Facebook* into the classroom is student privacy. Many of the studies about taking the faculty/student relationship online have focused on this specific student concern (Ellison, Steinfield, & Lampe, 2007; Hewitt & Forte, 2006; Mack, Behler, Roberts, & Rimland, 2007). Some students are worried that faculty might form opinions about them based on their online accounts (Abel, 2005). However, students, when presented with the option, did find a beneficial reason to use *Facebook* with faculty. Mazer, Murphy, and Simonds (2007) found that if faculty members have *Facebook* accounts, students are likely to base decisions on whether or not to take a class from someone can be affected by the amount of information disclosed online by the faculty member.

Another area potentially affected by implementing faculty *Facebook* usage in the classroom is faculty/student communication. Sturgeon and Walker (2009) found that students seem to be more willing to communicate with their instructors if they already knew them through *Facebook*. Hewitt and Forte (2006) similarly found that students liked the potential to get to know their professors better, and that Facebook interaction had a positive impact on how they perceived their professors. Additionally, Haspels (2008) found that faculty *Facebook* usage also had a positive effect on the face-to-face faculty/student relationship.

But most importantly, does a faculty/student relationship in *Facebook* have an effect on student performance? Studies have found differing results. Yang and Tang (2003) found that those networks which "consist of relations through which individuals share resources such as information, assistance, and guidance" (p. 96) are "positively related to student performance" (p. 93) both in face to face and online settings. Sturgeon and Walker (2009) found what they termed an "indirect connection between faculty use of Facebook and academic performance" (p. 11). Their findings postulate that because of an increase in faculty/student familiarity, students feel more comfortable and therefore, are able to learn better. However, a preliminary study by Karpinski and Duberstein (2009) showed that students who self-reported spending more time on *Facebook* had lower GPAs than those who spent less time there.

Methods

We constructed a survey instrument to ascertain the behavior, attitudes about and *Facebook* usage as a mechanism to develop a sense of community. Regarding the voyeuristic nature of *Facebook*,

we also included questions over account disclosure and privacy concerns. Our 45-question instrument covered a variety of issues such as privacy issues, faculty interaction on *Facebook* and social interaction tendencies (see Appendix A). In addition, a series of questions are included to assess demographics of the students, which also serve as independent variables.

We hypothesize that students with professors or instructors have a higher self-reported GPA than those who have none listed as friends. In other words, our hypothesis is:

$$\mu_{\text{not\_friend}} - \mu_{\text{prof-friend}} > 0$$

In addition to using descriptive statistics, we analyzed the collected data using T-tests to examine whether any differential between those students who had faculty as a *Facebook* friend and those who did not was statistically significant. In addition to collecting demographic information (i.e., age, gender, ethnic background, selected major, classification, etc.) and selected questions about *Facebook* usage and privacy issues, we asked the respondents how many faculty members they friended on *Facebook.* We coded those who had one or more faculty members as *Facebook* friends as "1" and those who had none as "0".

The institution used in this study is a research university in the central US that serves a student population over 20,000 at its flagship campus. The campus houses approximately 5,900 students: 4,400 of which reside in single student housing and the remaining 1,400 students live in family housing. Our sample is drawn from *Facebook* users residing in on-campus single student housing. A screening question regarding if the student has a *Facebook* account was used to screen out all students who do not have a *Facebook* account. These students were told to skip to the end of the survey and not answer any further questions.

Since this study examines online behavior and interaction, we used Microsoft SharePoint to disseminate the survey to residential life students on December 2008. Data collection continued for three weeks. In light of the recommendations of Dillman (2007), we contacted the participants three times throughout the data collection process. The first contact will occurred at the invitation to participate in the study, and reminder emails were disseminated a week apart afterwards. There were no incentives given to participate in the study. We received a 13 percent response rate to our online survey that was disseminated in the Fall of 2008 to 5,013 residential life students.

Descriptive Statistics

Of the respondents, 49 percent self-reported themselves as freshman, 22 percent as sophomores, 15 percent were juniors, 9 percent as seniors and 8 percent were graduate students. Females constituted the majority of the respondents, 64 percent while 36 percent were males. When looking at ethic backgrounds, 77 percent of the participants were White, 7 percent were American Indians, 6 percent were Hispanic, 6 percent were Asian and 4 percent was were of African American descent.

In regards to community, first, we found that 72 percent of the respondents were active in some student organization while 28 percent reported no affiliation. Of the respondents, 86 students belonged to a Greek organization while 485 students did not. Within the organization community, students are using *Facebook* groups as a viable means of communication. Forty-two percent of respondents use *Facebook* groups to contact organization members, 41 percent by email while 11 percent use phone. The popularity of email among respondents also aligns with recent findings (Boase, et al., 2006, Boase & Wellman & Gulia, 2006; Haythornwaite, 2001; Stern & Dillman, 2006), but *Facebook* is at the very least on par with e-mail as a communication option among students

As for social community participation, a sizeable majority of survey respondents, 84.4 percent, reported to have more than 100 *Facebook* friends while 66.4 percent disclosed that they have

more than 200 *Facebook* friends. Clearly, *Facebook* is an avenue for social community development. At the same time, *Facebook* usage is not merely social. It is also being used to support an academic community.

Thirty percent of respondents reported having a faculty member as a friend on *Facebook*. We also asked about the effect of *Facebook* on professor selection. While 56 percent of respondents reported that they would be more apt to take a professor if they liked his/her profile, 53 percent reported that they would be more apt not to take a professor if they disliked his/her profile. Within the academic community, 88 percent of respondents used email as a primary means to contact their instructor and 12 percent use office hours as a secondary method. This is not surprising when considering email communication increases as one's social ties increase and email's asynchronous and convenient nature (Boase, et al., 2006). For the professor, his/her own social ties increase according to the number of students in a given class. When asked about the secondary method of contacting their instructor or professor, 78 percent of respondents preferred office hours, 14 percent listed email, 6 percent voicemail and 2 percent listed *Facebook* as a means of communication.

The survey instrument also inquired about issues of privacy and disclosure that painted a very interesting picture on *Facebook* usage. When asked whether their *Facebook* profile was private, 74 percent of respondents disclosed that their profiles were private while 26 admitted that their profile was open. In addition, 70 percent reported that they post no residence information on their *Facebook* profile while 22 percent list their residence halls and 9 percent post both their residence hall information and room number. Respondents were less restrictive on access to their photos. Surprisingly, 55 percent of respondents disclosed that they make their photos available to their entire network while 45 percent did not. However, most of the respondents have taken action to restrict access to their profiles. When asked whether they have blocked anyone (i.e., blocked their profile access to a particular person or people) on *Facebook,* 47 percent responded affirmatively while 53 percent have not. Sixty percent of survey respondents reported that they have limited access to certain individuals to their profile (i.e., allowed general access, but limited access to photos, information, etc.) while 40 percent have not. And lastly and most disturbing, a large percentage of respondents (47 percent) have *befriended* people on their *Facebook* profile whom they do not know.

Analysis

When analyzing the data, we found that those students who had professors as *Facebook* friends had a higher self-reported GPA than those who did not. Those with professor or instructors as friends had a GPA of 3.42 as compared to those who did not with a GPA of 3.33.

Table 1
Descriptive Statistics

	N	Mean Cumulative GPA	Standard Deviation	Standard Error
Professor Not Friend	349	3.33	.58	.03
Professor as Friend	179	3.42	.51	.39

Although outside of the purview of this study, we additionally tested a number of variables to see whether there was a correlation with their online activities (i.e., number of self-reported hours spent on *Facebook,* number of self-reported *Facebook* friends and number of self-reported *Facebook* groups joined) and their self-reported GPA. However, after conducting T-tests, none of

the relationships had any statistical significance. However, when testing our hypothesis, we found that the difference of self-reported GPA between those students who had *befriended* an instructor (GPA = 3.42) compared to those who did not (GPA = 3.33) was statistically significant at the .05 level.

Table 2
T-test analysis for cumulative GPA between Two groups of students

Variance	T	Df	Significance
Unequal	1.965	387	.05

Therefore, our analysis reveals that those students who have *befriended* one or more faculty members are more likely to have a higher self-reported GPA than those who have no faculty members listed as friends on *Facebook.* In the next section of our paper, we will discuss the significances of this finding and the results of our descriptive statistics.

Discussion

The discussion of our results is organized into three different sections that paint a rich picture of *Facebook* student usage, disclosure, privacy and faculty/staff interaction. First, we discuss the descriptive findings that involve privacy issues on *Facebook,* analyzing some key issues. Second, the findings involving faculty interaction are also discussed through descriptive statistics and the ANOVA model of our student. Lastly, we provide policy implications and a conclusion at the end of this paper.

Facebook Usage and Privacy

Two observations stand out after examining the survey results, both having a relationship with *Facebook* usage and privacy concerns. First, in terms of privacy, there remain a large percentage of students who maintain their profile open to the public to be 26 percent. Although some studies have lamented over the reasons for this disclosure needs, other studies have concluded that students simply do little to protect their own disclosures in OSNWs (Acquisti and Gross, 2005; Gemmill and Peterson, 2006; Gross, Acquisti & Heinz, 2005; Kolek & Saunders, 2008; Patil & Kosba, 2005; Tufekci, 2009).

However, the survey results may deviate from the literature. Selywn (2009) found that *Facebook* serves as a supplement to pre-existing relationships and student typically do not use it to make friends whom they may not have met in person. However, the results of our survey are mixed. Nearly half of those surveyed conceded that they have *Facebook* friends whom they have never met which conflicts with Selywn article and raises serious safety concerns. However, they generally do not use *Facebook* to make personal connections on a college campus before enrolling. When asked whether those surveyed sought *Facebook* friends at the university before they arrived on campus, only 34 percent admitted so. One explanation could be that students may accumulate unmeet *Facebook* friends through other friends, but not purposely pre-establish a social network on campus prior to arriving.

Faculty/student interaction

With an OSNW that relies on college populations as consumers, it is not surprising that there is faculty and student interaction on *Facebook.* The connection between faculty and student interaction appears to have positive benefits. First, students could benefit from the interaction that comes with communication on *Facebook.* Research has shown that general interaction between

faculty and students increases academic performance (Kuh, Cruce, Shoup, Kinzie & Gonyea, 2008; Carini, Kuh & Klein, 2006; Pascarella & Terenzini, 2005; Kuh, 2001). While most of the literature examines general faculty and student interaction (Carini, Kuh & Klein, 2006; Kuh, 2001), there is some evidence that suggests even informal student interaction provides students with some positive benefit whether it be higher student satisfaction (Kuh & Hu, 2001) or higher educational aspirations or even academic performance (Pascarella, 1980; Pascarella & Terenzini, 2005). Perhaps the same can be said about interaction on OSNWs. Second and more cynically, professors and instructors may be more apt to *befriend the* academically talented or students who perform better in their class as oppose to students who do poorly in class. On the other hand, higher performing students may feel more comfortable with *befriendin*g a faculty member than low-performing students. To further investigate these OSNW interactions, future research can examine who extends friend invitations and why faculty *befriend* some students and not others.

Implications

However, our findings do not suggest that faculty and staff should use *Facebook* as a mechanism for enhancing academic performance or student satisfaction. The literature and the descriptive statistics from this survey recommend otherwise. First, when contacting their instructors or professors, students opt to communicate through email, then office hours. *Facebook* and voice mail are distant thirds and fourths. In addition, only a minority of 30 percent has a professor or instructor listed as a friend. The literature aligns with this finding and suggests that students see OSNWs more for socializing rather than for academic usage (Connell 2009; Madge, Meek, Wellens & Hooley, 2009). In examining whether *Facebook* would be proper median for outreach, Connell (2009) found that a good number of students were not in favor of being *friended* by faculty, possibly seeing it as an intrusion into the student realm.

> Some participants (63 or 17.2 percent) were very open to the idea and said that they would be proactive and invite the library to be their friends if they know about the account. The majority of respondents (211 or 57.5 percent) said that they would not be proactive about it, but if the library friended them, they would accept the friend invitation. Another group of 92 students (25.1 percent) said that they would not add the library as a friend. (p. 31).

This study only illustrates that a relationship does exist between self-reported GPA and *Facebook* friend status with a student. There is certainly no evidence to suggest that faculty should use their *Facebook* account for improved academic performance. Such a proactive approach would likely be met by disappointing results by encroaching on perceived social space. Instead, if faculty were inclined to open their *Facebook* account to students, promoting its availability as a median of communication – that may be a wiser choice than sending invitations to enroll. When examining library outreach efforts through *Facebook,* Connell (2009) warned:

> Therefore, perhaps indiscriminate friending is not a good idea. It is important not to annoy students but rather let them come to the library on their own terms (p. 34).

In all, we must be cognizant that *Facebook* is in fact the realm of the digital native, and students may view any unilateral outreach by faculty or staff as encroachment on their turf and instigate a 'creepy treehouse' effect.

Conclusion

Student usage of OSNWs is prolific and information from the literature, as well as anecdotal evidence, shows that this trend will most certainly continue. Students will continue to utilize web-based social networking as an online communication forum, but mostly for informal, social interaction with other students. Those few students who have professors or instructors as friends

have been found to have higher self-reported GPAs compared to those who don't. Although this relationship was found, much more can be learned about OSNWs, college life and the faculty-student relationship. By conducting this study, the authors sought to shed more light in how OSNWs interconnect with the academic realm.

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Appendix A

1. Do you live on campus?
    a. Yes
    b. No

2. Estimate your family income:
    a. $20,000 or less
    b. $20,001 to $50,000
    c. $50,001 to $100,000
    d. $100,001 or more

3. What types of financial aid do you receive? (pick all that apply):
    a. Stafford
    b. Pell
    c. OHLAP
    d. Private loans
    e. Other state grant
    f. Etc.

4. What best describes your ethnic/racial background?
    a. American Indian or Alaska Native
    b. Asian
    c. Black or African American
    d. Native Hawaiian or Other Pacific Islander
    e. White
    f. Hispanic or Latino

5. Which of the following online social network websites do you use the most?
    a. Facebook
    b. MySpace
    c. Friendster
    d. Ball of Dirt
    e. Other

6. What is your gender?
    a. Male
    b. Female

7. What is your cumulative GPA in college on a 4.0 scale? ____

8. Are you a member of Greek organization?
    a. Yes
    b. No

9. Do you live in Greek housing?
    a. Yes
    b. No

10. Are you a member of a non-Greek student organization?
    a. Yes
    b. No

11. What is your age?
    a. 17-18
    b. 19-20
    c. 21-25
    d. 26 or older

12. What best describes your major?
    a. Education
    b. Humanities
    c. Engineering
    d. Social science
    e. Health/medical
    f. Other

13. What is your classification?
    a. Freshman
    b. Sophomore
    c. Junior
    d. Senior
    e. Graduate student

14. What best describes your political orientation
    a. Very conservative
    b. Conservative
    c. Moderate
    d. Liberal
    e. Very Liberal
    f. Apathetic

15. What is your primary method of contacting your instructor or professor?
    a. By email
    b. By voicemail
    c. By Facebook
    d. By office hours

16. What is your secondary method of contacting your instructor or professor?
    a. By email
    b. By voicemail
    c. By Facebook
    d. By office hours

17. How do you communicate with members of student organization to which you belong?
    a. By email
    b. By Facebook groups
    c. By phone
    d. By flyer
    e. By Other means

18. If you have a Facebook account, how many friends have you added on Facebook? _____

19. What is your primary method of contacting your resident assistant?
    a. By email
    b. By voicemail
    c. By Facebook
    d. By office hours
    e. By instant messaging
    f. By text messaging

20. What is your secondary method of contacting your resident assistant?
    a. By email
    b. By voicemail
    c. By Facebook
    d. By office hours
    e. By instant messaging
    f. By text messaging

Please answer the following questions if you have a Facebook account

21. What residence information do you post on Facebook?
    a. I post no information
    b. Residence hall
    c. Residence hall and room number

22. Do you make your photos public to everyone in your network?
    a. Yes
    b. No

23. How many professors or instructors do you have listed as a friend? _____

24. Do you have your resident assistant, community facilitator or community mentor listed as a friend?
    a. Yes
    b. No

25. Which of these do you feel comfortable posting on Facebook (if you have open access to your pictures)?
    a. Pictures of yourself
    b. Pictures of parties
    c. Pictures of family
    d. Pictures of friends
    e. Pictures of vacation
    f. No open access

26. Is your Facebook profile private?
    a. Yes
    b. No

27. Have you created a group?
    a. Yes
    b. No

28. How many Facebook groups are you a member of? _____

29. Mark as many as apply: how active are you in these groups on Facebook?
    a. Read messages only
    b. Read and post messages
    c. Look at pictures
    d. Post pictures
    e. An administrator of a group

30. Is your mini-feed public or private?
    a. Private
    b. Public

31. Have you blocked anybody?
    a. Yes
    b. No

32. Have you limited anybody's access of your profile on Facebook?
    a. Yes
    b. No

33. How much do you agree with the following statement: Students would be more academically engaged if their professors were on Facebook?
    a. Strongly agree
    b. Somewhat agree
    c. Somewhat disagree
    d. Strongly disagree

34. How many times do you log into Facebook per week on average? _____

35. How many hours do you spend on Facebook per week? _____

36. What best describes your motivation for participating on Facebook (check all that apply):
    a. Making and maintaining college friendships
    b. Maintaining high school friendships
    c. Dating
    d. Random

37. Do you have people listed as friends that you don't know?
    a. Yes
    b. No

38. Would you be more apt to take a professor if you saw their Facebook profile?
    a. Yes
    b. No

39. Would you be more apt not to take a professor if you disliked their Facebook profile?
    a. Yes
    b. No

40. Would you be more apt to take a professor if you liked their Facebook profile?
    a. Yes
    b. No
41. Do you agree or disagree with the following statement: It is appropriate for a staff member to use Facebook to check on the well-being of a student.
    a. Strongly agree
    b. Somewhat agree
    c. Somewhat disagree
    d. Strongly disagree
42. Do you agree or disagree with the following statement: It is appropriate for a staff member to use Facebook for university policy reinforcement.
    a. Strongly agree
    b. Somewhat agree
    c. Somewhat disagree
    d. Strongly disagree
43. Do you agree or disagree with the following statement: I feel connected to campus through Facebook.
    a. Strongly agree
    b. Somewhat agree
    c. Somewhat disagree
    d. Strongly disagree
44. Do you agree or disagree with the following statement: I feel that there is a genuine campus community on Facebook.
    a. Strongly agree
    b. Somewhat agree
    c. Somewhat disagree
    d. Strongly disagree
45. Did you seek Facebook friends at the university before you arrived on campus as a student?
    a. Yes
    b. No

Editor's Note: This is a well researched and timely article about the role of technology in changing the traditional roles of men and women. The author addresses changes occurring in one Mediterranean country, but unequal access to technologies is prevalent worldwide.

Information Technologies and Women

Emine Demiray
Turkey

Abstract:

The purpose of this research is to document the personal gain of women after using information technologies and to determine how, why and how often they use information technologies, which were designed for men, and which are under men's domination.

In the study, after mentioning technology and information technology in general, a literature review will be conducted by examining the studies on women and information technologies.

This study, "Information Technologies and Women" examines the relationship between women and information technologies and how it differs from men's relationship to information technologies. The sample is 1,100 people, 550 are men and 550 are women. A questionnaire with 25 questions was applied in interviews. The questionnaire was practiced upon the questions in the survey "2008 Information Technologies Use of Residents" conducted by the Turkey Statistics Institute. The sample was selected homogeneously among the people using computers and the internet at home, work or in internet cafés who are at least high or junior high school graduates. The participant's ages were between 16 and 65. The selection of participants was made according to their work and marital status. The data of questionnaire was uploaded to a computer and analyzed using SPSS software with cross and frequency charts. The data was evaluated under the main titles of: the profiles of the people who took the questionnaire, use of information technologies, access type, rates of use, frequency of use, purpose of use, and personal gains after use.

At the end of the study, the relationship between information technologies and women and its differences from men were successfully documented and subjected to analysis.

Keywords: Information Technologies, Internet, social gender, woman

Introduction

Femininity and masculinity are main categories in human relations. Everywhere and in every culture, people categorize the person encountered as a man or woman. The perceived normal features of masculinity and femininity and how these features affect individuals, their relationships and society in general change according to time and place (1).

The role of men and women in social life, the field in which they exist, and especially the manipulation of the labor force according to social gender is closely related with how this relationship is socially formed. It is a general belief that men and women have a different relationship with technology. This relationship, which is accepted as universal, begins with the birth of a child and becomes a part of his social identity. This relationship that begins in the family with socialization continues through educational institutions and is reinforced by mass media. For instance, a girl plays with a doll and a boy plays with a toy car. A girl has home economics course at school, while a boy has repair and maintenance course. In ads, while the girl plays with a Barbie, the boy plays in front of a computer. These countless examples reveal that there is a different relation between social gender and technology. While women are considered to be related to the domestic use of technology, men are believed to be the producers of technology (2).

It is a well-known fact that women's opportunities to use recent information technologies are limited compared to men's. Besides, if women use these technologies, they use them in order to do the jobs, which are considered suitable for their feminine roles such as entering data and typing a text. In short, computers are presented as a new model of advanced typewriters for women. In this way, their use of a new technology is restrained. Technologies are not unbiased instruments as they are claimed to be. In contrary, technologies are the instruments that regenerate the dominant social structure and relationships. Women are considered not predisposed nor close to technology. Woman culture and the feminine information produced in this culture are trivialized by dominant sexist ideology. For example, while the subjects of technology history are the contributions of men to the improvement of science and technique, women's relation with these tools and devices is in terms of their domestic work process in daily life. The meaning and usage value women give to these devices is neglected, as well as their original designs and practice. Their genuine designs about cleaning, saving, hiding and protecting are ignored (3). However, the field of information technologies is full of opportunities of self-realization and liberty for women. Information technologies also have the potentials of using them in favor of women. Thus, detecting by whom and for which purposes these recent technologies, (also called new media information and communication technologies or information technologies), are used is important in order to generalize the use of these technologies for women and detect the usage problems and whether there is a gender related difference in usage.

Socialization and Social Gender

Most human behaviors are learned behaviors. Learning certain things in a certain society happens in a formation called the socialization process. The process of learning humanistic behaviors is called socialization (4).

Socialization is the process of individual's learning the rules, norms, attitudes and behaviors of society, acting in line with these learnings, and gaining a personality and individuality in the society. Socialization begins with the birth of an individual and continues through his or her life. Socialization is a learning process. In this process, there is a learner-teacher interaction. The teacher is society and the learner is the individual who goes through the socialization process. (5)

Identity shows the individual's characteristics, which separate him from other individuals. The questions of who is the individual, what are the characteristics and roles of the individual and what can the individual do are all related to the identity. Identity is the expression of an individual's defining and positioning himself. In other words, it reflects how a person defines and positions himself in his own social world. It is a response related to who he is and where he stands. Sexual identity is an important part of one's self. A person's defining him- or her-self as a woman or a man is the inner personal connotation of femininity and masculinity revealed as personality and behavior. The cultural meanings of sexuality are considered as social gender roles. After the children are labeled as a girl and a boy, they start to learn and acquire the cultural meanings of sexuality. Social gender role is a group of expectations which are expected to be fulfilled by individuals (6).

The concept of social gender is based on the behavior patterns learned in a society and men's and women's social form of self expressions. That is, social gender is a cultural concept. It establishes the distinction between man and woman in terms of roles, behaviors, mental and emotional features. It also establishes the beliefs and expectations about how society should be. Social gender is the sum of the differences that were set socially between man and woman and that can change according to time and cultures. The roles and responsibilities of social gender include an intense learning process that takes place in socialization (7).

A new born baby has a biological sex. It does not have a social sex yet. While growing up, society puts a series of behavioral patterns and rules appropriate for his or her gender in front of the child. Certain socialization factors, especially family, media, peer groups and school, embody these expectations and models and creates environments in which the child can own them. In addition to this, various learning mechanisms such as conditioning, training, taking someone as a model, and identification, intervene in this process (8).

We learn most of our behaviors and values from social conditionings and examples. Initially, the examples and models acquired from family and the immediate area form future behaviors and attitudes of individuals. Mostly, the man acquires his shape from, his first male model, the father. Similarly the woman gets hers from the mother, the first female model. Like it or not, the attitudes of our fathers and mothers have rocked our identities and they formed both our sexual roles and our perception of the opposite sex. The conceptual and behavioral expectations of the society from man and woman are quite different. According to the generalized results of the past research, men display sexual roles complying mostly with success, power, autonomy, aggression and self-realization while women display sexual roles on supporting, relationship, help, respect and sacrifice. It has been detected that men mostly displayed behaviors about practical and functional subjects (doing a job to finish a work, autonomy and self-protection). On the other hand, women displayed behaviors about the subjects of expression and relationship (sensitivity to others' needs, supporting and dependency) (9).

Information Technologies

New media has begun to develop by adoption of improvements in computer and information processing to communication technologies after 1970s. Therefore, the new media has been called information and communication technologies (10).

Utilization of the computer has increased especially in the last decade of the 20th century. This increase occurred throughout the world and by enormous expansion of computer usage arenas. Information Technologies is a field which emerged as a result of the improvements in computer power and design. It includes the technology of computer hardware and software that are used to save, transmit and process data. However, today, Information technologies (IT) is not a field that is limited to configuration of software and installation of systems. With a more contemporary look, information technologies have a number of components such as computer hardware, software, networks, communication technologies, work force trained in the field, procedures, and the Internet, Intranet and communication tools. Information technologies have existed for 50 years and they are of utmost importance today (11).

Information Technology comprises all the technologies, including communication and computers, used in gathering, storing, processing, transmitting the information via computers and putting it into service for users. Information technologies are used for all of the information services that are connected to communication and computer services. It helps us do all kind of work in every part of our life and saves us from much drudgery. It gives us the opportunity to have spare time for ourselves. Information technology is related to all other technologies and, as a result, by being used in many different forms, it provides us with the opportunity of an unlimited impact and improvement. Information technologies enable us to reach the information, which is the raw material of information society, at any time and any place. In addition to this, it acts as an intermediary in producing new information. By the help of these technologies, society is being reshaped (12).

The actions, which take place in a virtual arena, such as corresponding via e-mail, chatting on the MSN, searching information on web sites, e-shopping, playing digital games on-line or off-line, using mobile Messenger, I-pod, etc. have become a natural part of our lives. Information

technologies, which are also called the new media, are used and exist in all areas of life: communication between people, commerce, politics, health, career and games etc. (13).

Information Technologies And Women

New information technologies were neither developed by women not they have been used in favor of women. Women's uses of new information technologies are mostly at the level of passive users and consumers of consumption society. When producing a new technologic appliance, an ideal user is decided. The identity of this ideal user is important. The ideal users of the appliances that are considered to be highly prestigious to use are thought to be men. Using these appliances is believed to be in men's interest and skill area, especially in terms of new information technologies. Therefore, the existing inequalities between man and woman are reinforced in the use of new information appliances. A great deal of research related to the use of information technologies by men and woman claims that these technologies maintain and continue the sexism and power relations between man and woman in daily life. Women cannot become free from dominant sexist regime because of the problems they encounter in reaching the technology, and because they are technology illiterate, as well as because of the dominant reflection of patriarchal culture in information technologies (14).

Girls and boys are directed in different ways from the beginning of their lives. Family, school and almost all of the social mechanisms, in which girls take place, trivialize women's experience, produce and design practices of technology by repeating that women are not "close" and "predisposed" to technology and they are "away from it" in many ways. Generally speaking, women represent "predisposed to the nature" and "emotional" and men represent "mind" and "technical-scientific". This categorization is a result of regeneration of patriarchal social gender ideology in every part of society. With the development and spread of information technologies, the ethnic, class, regional and gender inequalities in reaching and using these technologies have created the rich and the poor (15).

The socialization formed by new technologies is not unbiased in terms of gender. Girls- women get little support to internalize these new technologies. There are very few female models and experts related to these new technologies. Economic and time related limitations are the cause for women not to connect with these technologies. The expenses of purchasing and operating these technologies become a bigger burden for women's income compared to men's. Besides, women's have a lot of responsibilities at home and in family and this brings about many limitations in their time and schedule. Most of the women rarely have a personal computer. They share computers with their husbands or fathers. The internalization and use of information technologies are limited for women in terms of place and time (16) (17).

The aim of this study, entitled "Information Technologies and Women" is to detect the position of women in possessing information technologies, which have a patriarchal structure, how they reach these technologies, usage rates, frequency and aim, the personal gains of women as a result of using these technologies and the difference in these gains between men and women. In order to fulfill this aim the subjects of socialization, social gender, information technologies and women were dealt with. After that, in the implementation part, the relation of women with information technologies and the differences in these relations compared to men are examined and the findings are analyzed in findings and discussion part.

Findings and Discussion

In the study titled as "Information Technologies and Women" in which the relationship between women and Information technologies are questioned, the subject group has been composed of 1100 people, 550 women and 550 men between the ages of 16-64 and living in Eskisehir. The

people in the sampling took a questionnaire of 25 questions by interview method and the following results have been acquired. The questionnaire was prepared upon the questions in the survey "2008 Information Technologies Use of Residents" conducted by Turkey Statistics Institute. The sample was selected homogeneously among the people using computers and the internet at home, work or in internet cafés who are at least high or junior high school graduates and between the ages of 16-65. The data of questionnaire was uploaded to a computer by using SPSS software, and analyzed by using cross and frequency charts. The data was evaluated under the main titles of: the profiles of the people who took the questionnaire (IT possession status, duration of IT use, frequency of use and access type) purpose of the Internet and computer use, the web sites they enter, users' relationship with IT, and personal gains after IT use. Under these titles, the sexual differences were analyzed and some suggestions that can be in favor of women are opened to discussion in line with the results.

According to Chart I, 40.9% of the people who were randomly picked as sampling and took the questionnaire are between the ages of 25-34, 20% of them are between 45-54, 17.3% of them are between 16-24 and 35-44, and 4.5% of them are between the ages of 55-64. The rate of the university or college graduates is 73.6% and 26.4% of them are graduates of high school or equivalent. 60.9% of the people are married and 39.1% of them were single. People have a job with a rate of 84.5 and the rate of unemployed people is 15.5%.

Considering the IT possession, all of the women and men who took the questionnaire have cell phones. Women have DVD-VCD players with a rate of 81% while men have the same products with a rate of 80%. 74% of the women and 69% of the men have digital camera. The rate of the women who have own desktop computer is 70%; whereas, the rate of men who have one is 80%. The rate of laptop computer possession is 34% for women and 47% for men. Women own a game console with a rate of 0.7% while men own one with a rate of 16%.

When the question of "who bought your personal computer?" was asked, women responded as "I bought it myself" with a rate of 32.7% and men responded same with a rate of 61.8%. Similarly, 30.9% of the women responded as "My spouse or partner bought it" and the rate was 7.3% for men who gave the same response. The responses for the question "Where do you use your computer most?" were, in the first place, "at work" with a rate of 54.5% for women and 50.9% for men, in the second place, "at home" with a rate of 45.5% for women and 49.1% for men. The rate of those who responded as "at the Internet café" was 12.7% for men and 1.8% for women. The responses for the question of "Where do you use the Internet most?" were "at home" with a rate of 50.9% for women and 66% for men. This was followed by "at work" with a rate of 43.6% for women and 34% for men. The rate of those who responded as "at the Internet café" was 13.2% for men and 3.6% for women.

The responses for the question "How long have you been using your computer?" were "for more than one year" with a rate of 96.4% for women and 94.5% for men. When it comes to the frequency of use, the response was "every day" with a rate of 87.3% for women and 90.9% for men, and "once a week" with a rate of 9.1% for both women and men. Women stated that they have learned their computer skills by trial error method with a rate of 50.9% while men have stated it with a rate of 67.3%. The rate of the participant women who have learned her computer skills at an official course is 20% whereas the rate of men is 10.9%.

Similarly, the rate of the people who have learned their computer skills at an adult learning center is 14.5% for women and 9.1% for men. Lastly, the percentage of the women who have received help from a friend or a relative while learning her computer skills is 12.7% and that of men is 10.9%.

Chart I
The Profiles of The People Who Took the Questionnaire

Profiles	Criteria	Women	Men	TOTAL
Age	16-24	70 **12.7%**	120 **21.8%**	**190** **17.3%**
	25-34	220 **40%**	230 **41.8%**	**450** **40.9%**
	35-44	110 **20%**	80 **14.5%**	**190** **17.3%**
	45-54	140 **25.5%**	80 **14.5%**	**220** **20%**
	55-64	10 **1.8%**	40 **7.3%**	**50** **4.5%**
	TOTAL	**550** **100%**	**550** **100%**	**1100** **100%**
Education Level	High School	80 **13.5%**	210 **38.2%**	**290** **26.4%**
	College-University and above	470 **85.5%**	340 **61.8%**	**810** **73.6%**
	TOTAL	**550** **100%**	**550** **100%**	**1100** **100%**
Marital Status	Married	370 **67.3%**	300 **54.5%**	**670** **60.9%**
	Single	180 **32.7%**	250 **45.5%**	**430** **39.1%**
	TOTAL	**550** **100%**	**550** **100%**	**1100** **100%**
Work Status	Yes	460 **83.6%**	470 **85.5%**	**930** **84.5%**
	No	90 **16.4%**	80 **14.5%**	**170** **15.5%**
	TOTAL	**550** **100%**	**550** **100%**	**1100** **100%**

Chart II
The Purpose of Computer Use

PURPOSE	Women	PURPOSE	Men
Communication (MSN, e-mail, chat)	430 **78.2%**	**Internet (surfing)**	440 **79.9%**
As a part of your job	400 **72.7%**	**Communication (MSN, e-mail, chat)**	420 **76.3%**
Research	390 **71%**	**Work**	340 **61.7%**
Internet (surfing)	350 **63.7%**	**Playing Games**	300 **54.4%**
Typing	260 **47.3%**	**Research**	280 **50.9%**
Playing games	200 **36.4%**	**Listening to Music**	210 **38.3%**
Listening to Music	150 **31%**	**Watching Movies**	160 **29.1%**
Watching Movies	140 **23.7%**	**Typing**	90 **16.4%**

*The sum of the columns is not equal to a hundred percent as more than one item can be checked.

According to Chart II, Among the people who took the questionnaire, women defined their purpose of using computer as communication (MSN, e-mail, chat) with the rate of 78.2%, as a part of their job with the rate of 72.2%, doing research with a rate of 71%, surfing on the Internet with the rate of 63.7% and typing with the rate of 47.3%. Men defined their purpose of using computer as surfing on the net with a rate of 79.9%, communication (MSN, e-mail, chat) with a rate of 76.3%, as a part of their job with a rate of 61.7%, playing games with the rate of 54.4% and doing research with 50.9%.

According to Chart III, for the statements of "I don't share my computer." and "I cannot take my turn to use computer because of the others at home." which render the use status of the people who took the questionnaire, women and men said "yes" at the same rate. However, for the statement of "I don't have time to use computer at home." they said "yes" with a rate of 17.3% for women and 11.3% for men. As for the possessing the computer at home they said that the computer belongs to them with rate of 36.5% for women and 66% for men. They said "yes" for the statement of "I cannot use the computer at home comfortably as it doesn't belong to me" with a rate of 11.5% for women and 1.9% for men, and for "Using computer is a waste of time" with a rate of 17.3% for women and 22.6% for men, and for "I don't like to use computer at home" with a rate of 19.2% for women and 26.4% for men, and finally for "The computer has an important place at home" with a rate of 57.7% for women and 62.3% for men.

Chart III
Use Status of The People Who Took the Questionnaire

USE STATUS	Women		Men	
	Yes	No	Yes	No
I do not share my computer	110 21.2%	410 78.8%	110 20.8%	420 79.2%
I cannot take my turn to use the computer because of the others at home	40 7.7%	480 92.3%	40 7.5%	490 92.5%
I don't have time to use computer at home	90 17.3%	430 82.7%	60 11.3%	470 88.7%
The computer at home belongs to me	190 36.5%	330 63.5%	350 66%	180 34%
I cannot use the computer at home comfortably as it doesn't belong to me	60 11.5%	460 88.5%	10 1.9%	520 98.1%
Using computer is a waste of time	90 17.3%	430 82.7%	120 22.6%	410 77.4%
I don't like to use computer at home	100 19.2%	420 80.8%	140 26.4%	390 73.6%
The computer has an important place at home	300 57.7%	220 42.3%	330 62.3%	200 37.7%

*30 women and 20 men have computer at home.

* The sum of the columns is not equal to a hundred percent as more than one item can be checked.

According to Chart IV, the top four purposes of men and women for using the Internet are reading newspapers and magazines, sending-receiving e-mail, using the Internet as a source of information and instant messaging. There is not a big difference between men and women in the top four purposes of using the Internet. While the fifth rank for women belongs to researching on health issues, it belongs to downloading and listening to musing for men. Playing games online with other players is in the 11th rank for men with a rate of 10.8%, while it is not one of the purposes of using the Internet for women.

Chart IV
The Purpose of Using The Internet

PURPOSES OF USING THE INTERNET	woman	PURPOSES OF USING THE INTERNET	man
Reading online newspapers and magazines, downloading news	400 72.8%	Reading online newspapers and magazines, downloading news	390 70.8%
Receiving-sending e-mail	390 70.9%	Receiving-sending e-mail	370 67.2%
Using the Internet as a source of information	300 54.5%	Using the Internet as a source of information	220 40%
Instant messaging (MSN, Chat)	250 45.4%	Instant messaging (MSN, Chat)	210 38.1%
Researching on health issues	230 41.8%	Downloading and listening to music	180 32.8%
Video chat via the Internet	150 27.3%	Video chat via the Internet	170 31%
Downloading and listening to music	140 25.4%	Finding information about goods and services	150 27.3%
Finding information about goods and services	100 18.2%	Online banking	130 23.6%
Searching for information about educational activities	100 18.2%	Researching on health issues	100 18.2%
Using travel and accommodation services	80 14.6%	Downloading and updating computer and video games	80 14.6%
Online banking	80 14.6%	Playing games online with other players	60 10.8%
Watching and downloading movie, short movie and video files (except for web TV)	60 10.9%	Using travel and accommodation services	60 10.8%
Looking for and applying to jobs	40 7.2%	Sharing the text or video that you have created yourself with a web site	50 9%
Other information searching and online services	40 7.2%	Searching for information about educational activities	50 9%
Sharing the text or video that you have created yourself with a web site	40 7.2%	Watching and downloading movie, short movie and video files (except for web TV)	30 5.4%
Downloading software	20 3.6%	Looking for and applying to jobs	30 5.4%
Making online phone calls	20 3.6%	Listening to web radio and watching web TV	30 5.4%
Downloading and updating computer and video games	20 3.6%	Other information searching and online services	30 5.4%
Listening to web radio and watching web TV	20 3.6%	Downloading software	20 3.6%
Playing games online with other players	0 0%	Making online phone calls	10 1.8%

*****The sum of the columns is not equal to a hundred percent as more than one item can be checked.

Chart V
Web Sites That People Who Took the Questionnaire Entered

THE WEB SITES	women	THE WEB SITES	men
Search engines	330 60%	Searching engines	350 63.6%
Educational sites	300 54. 5%	The sites of mass media	330 60%
The sites of mass media	290 52.7%	Sports sites	290 52.7%
Health sites	280 50.9%	e-mail sites	220 39.9%
e-mail sites	210 38.2%	The sites containing technical information	210 38.2%
Banking sites	180 32.8%	Game-entertainment sites	190 34.5%
Sites about culture-art	170 30.9%	Educational sites	150 27.3%
Game-entertainment sites	120 21.8%	Banking sites	150 27.3%
Shopping sites	80 14.5%	The sites about culture-art	110 20%
Children sites	70 12.7%	Shopping sites	100 18.2%
Law sites	70 12.7%	Financial sites	60 10.9%
The sites containing technical information	40 7.3%	Asking about dept	50 9.1%
The sites about Turkey	40 7.3%	Health sites	50 9.1%
Sports sites	30 5.5%	The sites about Turkey	30 5.5%
Asking about dept	20 3.6%	Law sites	30 5.5%
The sites about other countries	10 1.8%	Children sites	20 3.6%
Financial sites	0 0%	The sites about other countries	10 1.8%

*The sum of the columns is not equal to a hundred percent as more than one item can be checked.

According to Chart V, when the web sites that the people who took the questionnaire entered were asked, the top five answers of the women were 60% searching engines, 54.5% educational sites, 52.7% the sites of mass media, 50.9% health sites, and 38.2 % e-mail sites. On the other hand, the top five answers of the men were 63.6% searching engines, 60% the sites of mass media, 52.7% sports sites, 39.9% e-mail sites, 38.2% the sites containing technical information. When the goods and services that they ordered or bought via the Internet were questioned, the top two answers of women were book-magazine and educational material, and reservations for

holidays or trips; the third rank belongs to health-beauty and personal care products with a rate of 18.2%. On the other hand, the top three answers of men were electronic tools with 34.6%, additional hardware for computers and video games with a rate of 32.7% and household goods with 27.4%. 47.3% of the women and 45.5% of the women noted that they do not use the Internet for online shopping. For the question "For what purpose do you use the Internet while communicating with the governmental offices and institutions?", the rate of "to get information from their web sites" was 65.5% for women and 54.5% for men. The second was "to fill out and send a form" with a rate of 40% for women and 27.3% for men. The rate of the women's response as "I do not use the Internet while communicating with government offices and institutions" is 29.1% while the rate of men's is 40%.

Chart VI

The Relationship between the People who took the Questionnaire and Information Technologies

RELATIONSHIP WITH INFORMATION TECHNOLOGIES	Women		Men	
	Yes	No	Yes	No
Information technologies hold an important place in my life	420 76.4%	130 23.6%	470 85.5%	80 14.5%
I do not like IT products but I need to use them	220 40%	330 60%	100 18.2%	450 81.8%
I feel myself distant from information technologies	140 25.5%	410 74.5%	50 9.1%	500 90.9%
I hesitate to use IT products	120 21.8%	430 78.2%	40 7.3%	510 92.7%
My IT usage is limited because I do not know enough	220 40%	330 60%	130 23.6%	420 76.4%
I do not hesitate to examine IT products and I seize all of its opportunities	310 56.4%	240 43.6%	440 80%	110 20%
I follow new information technologies closely	210 38.2%	340 61.8%	340 61.8%	210 38.2%
I always buy new IT products	190 34.5%	360 65.5%	270 49.1%	280 50.9%

*The sum of the columns is not equal to a hundred percent as more than one item can be checked.

According to Chart VI, when the relationship between the participants and IT was questioned, they said "yes" for the statement "information technologies hold an important part in my life" with a rate of 76.4% for women and 85.5% for men. For the statement "I do not like IT products but I need to use them", the response was "yes" with a rate 40% for women and 18.2% for men. In addition, the response was "yes" for the statement "I feel myself distant from information technologies" with a rate of 25.5% for women and 9.1% for men. The rate of the "yes" response for the statement "I hesitate to use IT products" was 21.8%for women and 7.3% for men. For the statement "My IT usage is limited because I do not know enough", the response was "yes" with a rate 40% for women and 23.6% for men. The rate of the "yes" response for the statement "I do not hesitate to examine IT products and I seize all of its opportunities" was 56.4%for women and 80% for men. Moreover, the response was "yes" for the statement "I follow new information

technologies closely" with a rate of 38.2% for women and 61.8% for men. And finally, for the statement "I always buy new IT products", the response was "yes" with a rate 34.5% for women and 49.1% for men.

Chart VII

Personal Gains of the Participants after using Computer and the Internet

PERSONAL GAINS	Women		Men	
	Yes	No	Yes	No
It made my life easier	490 89.1%	60 10.9%	470 85.5%	80 14.5%
It saved time	480 87.3%	70 12.7%	470 85.5%	80 14.5%
It enabled me to have a job and profession	110 20%	440 80%	110 20%	440 80%
It was a good free time activity	460 83.6%	90 16.4%	430 78.2%	120 21.8%
It eased my access to information	490 89.1%	60 10.9%	470 85.5%	80 14.5%
It enabled me to communicate	360 65.5%	190 34.5%	270 49.1%	280 50.9%
It had contributions to my education	340 61.8%	210 38.2%	330 60%	220 40%
It enhanced my vocational knowledge	420 76.4%	130 23.6%	350 63.6%	200 36.4%
It made my housework easier	160 29.1%	390 70.9%	80 14.5%	470 85.5%
It helped me find a partner and friends	70 12.7%	480 87.3%	110 20%	440 80%
It improved my communication and language skills	230 41.8%	320 58.2%	300 54.5%	250 45.5%
It helped me know different cultures.	280 50.9%	270 49.1%	330 60%	220 40%

*The sum of the columns is not equal to a hundred percent as more than one item can be checked.

According to Chart VII, when the personal gains of the people were questioned, they said "yes" for the statement "It made my life easier" with a rate of 89.1% for women and 85.5% for men. For the statement "It saved time", the response was "yes" with a rate 87.3% for women and 85.5%% for men. In addition, the response was "yes" for the statement "It enabled me to have a job and profession" with a rate of 20% for both women and men. The rate of the "yes" response for the statement "It was a good free time activity" was 83.6% for women and 78.2% for men. For the statement "It eased my access to information", the response was "yes" with a rate 89.1% for women and 85.5% for men. The rate of the "yes" response for the statement "It enabled me to

communicate" was 65.5% for women and 49.1% for men. Moreover, the response was "yes" for the statement "It had contributions to my education" with a rate of 61.8% for women and 60% for men. For the statement "It enhanced my vocational knowledge", the response was "yes" with a rate 76.4% for women and 63.6% for men. In addition, the response was "yes" for the statement "It made my housework easier" with a rate of 29.1% for women and 14.5% for men. For the statement "It helped me find a partner and friends", the response was "yes" with a rate 12.7% for women and 20% for men. Moreover, the response was "yes" for the statement "It improved my communication and language skills" with a rate of 41.8% for women and 54.5% for men. And finally, for the statement "It helped me know different cultures", the response was "yes" with a rate 50.9% for women and 60% for men.

Conclusion

In the study titled as "Information Technologies and Women" in which the relationship between women and Information technologies are examined, the subject group was composed of 1,100 people, 550 women and 550 men between the ages of 16-64 and living in Eskisehir. The people in the sampling took a questionnaire of 25 questions by interview method and the following results were obtained.

All of the participants who took the questionnaire had cell phones. Other IT products that they mostly possessed were DVD-VCD player, digital camera, desktop computer and laptop computer, respectively. There was no significant difference between men's and women's possession of IT products.

32.7% of the women and 61.8% of the men who took the questionnaire and have a personal computer at home stated that they bought their computer by themselves. However 30.9% of the women and 7.3% of the men noted that their spouses or partners bought their computer. The people in the subject group stated that their primary use of computer is at work, then secondly at home, but they also stated that they use the Internet mostly at home and secondly at work. The people are active users of the internet and computer for more than a year and the frequency of use is "every day" with a rate of 87.3% for women and 90.9 for men. Majority of the participants have specified that they have learned how to use the internet and computer by themselves with the trial and error method. No gender difference was observed about the purchase of the computer except that one of three women has noted that their spouses or partners bought the computer.

Women noted their computer usage as follows: communication (MSN, e-mail, chat), work purposes, research, surfing on the Net and typing. Men's responses include mostly surfing on the Internet, communication (MSN, e-mail, chat), work purposes, playing computer games and research. If compared to the previous researches, these results indicate that women are getting used to information technologies and women started to live together with technology in the workplace or for educational purposes in accordance with their education level. The results also show that they are making up the distance in using IT and this is a positive result in terms of women and their use of communication tools.

Women and men have equally responded as "Yes" to the statements, "I do not share my computer", and "I cannot take my turn to use the computer because of others", that explain participants' computer use status. Women stated that they do not have time to use a computer and that they cannot use the computer comfortably because it does not belong to them more frequently than men. This results show that although women take roles in work life, they still keep their traditional roles at home and they allocate less time for their privacy.

The number of men who own a computer at home is twice that of women's ownership. Even if not everyone has a personal computer, men and women participants all noted that information technologies have a very important part in their lives and that they need to use information

technologies by responding as “yes” with a rate above 50% to the statement “ computer holds an important place at home”. In addition, they responded “yes” with a lower rate to the statements “I do not like using a computer at home” and “I feel sorry for the time I spend on the computer”.

When purposes of women and men to use the Internet were researched, most responses were reading an online newspaper or magazine, sending-reading e-mail, reaching information and instant messaging. There was not a major difference between men and women in terms of these primary purposes. However, according to women, the other purpose of use can be researching on educational and health issues while men listed downloading music and video chat on the Internet as their other purposes. Playing multiplayer games online is not a purpose of use for women, but it has a rate of 10.8% for men among their purposes of internet use. This data denotes that women who attend institutional and work life use the Internet for nearly the same purposes as men and that women have improved themselves. The data also proves that women have showed positive improvement in using information technologies compared to previous research.

The top five websites that women in the sample visit are search engines, educational sites, online media, sites about health issues and e-mail sites. Men, on the other hand, visit mostly search engines, online media, sports, e-mail and sites on technical information, respectively. When the goods and services that they ordered or bought via the Internet were questioned, the top two answers of women were book-magazine and educational material, and reservations for holidays or trips; the third rank belongs to health-beauty and personal care products. On the other hand, the top three answers of men were electronic tools, additional hardware for computers and video games and household goods. No significant difference was noted between men and women in terms of the web sites they entered apart from the fact that women entered educational and health sites and men entered sports sites and web sites that include technical information. This data indicates that the Internet technology maintains and continues the sexism in daily life and the discriminations between men and women as it was revealed in a great deal of previous research on internet usage practice of men and women (18). Other data that supports this idea is that men preferred to buy electronic gadgets, additional computer hardware and video games while women preferred books-magazines and educational materials, online reservations for holidays, health-beauty and personal care products via the Internet.

Considering the relationship between information technologies and the people who took the questionnaire, women stated that information technologies hold an important part in their lives. However, they also state that they do not like IT products but they need to use them, that they feel themselves distant from IT, that they hesitate to use IT products and their use is limited as they do not know enough. This data proves that women’s technology phobia continues. Women’s responding as “yes” and men’s as “no” to the statements like “I do not hesitate to examine IT products and I seize all of its opportunities” and “I follow new information technologies closely and buy new IT products” also supports this idea.

When the personal gains of the people were questioned, no gender difference was noted on the statements like “it made my life easier”, “it saved time”, “it enabled me to have a job and a profession”, “It eased my access to information” and “It had contributions to my education”. However, women said “yes” with a higher rate compared to men for the statements like “It was a good free time activity”, “It enabled me to communicate”, “It enhanced my vocational knowledge” and “It made my housework easier”. On the other hand, men have a higher rate of “yes” for the statements of “it enabled me to find a partner and friends”, “It improved my communication and language skills” and “It helped me know different cultures”. These results points out that women use information technologies, but they cannot get rid of their traditional roles while using them.

When the general findings of the study were evaluated, no obvious difference between men and women was recognized in terms of their age, education level, occupation and marital status. However, it was observed that the use of information technologies increases in accordance with higher education levels and work status of both men and women. In conclusion, it was detected that women value information technologies as an important part of their lives, use them and are gradually catching up with men on IT use, but they still feel hesitation and fear hen using information technologies.

In this case, what women should do is to discover the opportunities that technology offer in a way that go beyond the sex limitations and to use technology to their advantage. In order to achieve this goal, the steps that should be taken may be listed as follows.

- Women's self-esteem in using the new communication technologies such as computer and computer networks should be reinforced and promoted.
- Women's prejudice about "new information technologies are only for men" should be revisited and changed.
- Some educational programs that have the principle of "teaching by doing and using" should be established and practiced for the purpose of increasing women's computer literacy.
- The differences in using new information technologies between men and women should be highlighted and examined.
- The preferences of women related to communication types and tools should be revealed (19).

Women's use of information technology is beneficial for strengthening themselves and for eliminating discrimination. Women can take greater advantage of the opportunities offered by information technologies as they achieve higher levels of education, participate more in the workplace and in public life, move away from their traditional roles, and gain self-confidence. Through education and communication, they can make up for their differences from men in social life an in the professional arena.

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Editor's Note: This paper explains how project-based collaborative learning, supported by computers, can increase the intensity and productivity of learning experiences. It is especially valuable for learning high-level professional knowledge and skills.

Stimulating Collaborative Learning by Doing Study Projects

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Israel

Abstract

The goal of this paper is to provide a computer supported model of a specific project-based collaborative learning environment. The environment stimulates intensive collaborative knowledge construction by students during study projects due to maximization of the number of interactions inside collaborative groups and the presence of a special schedule for performance of project tasks. The Intelligent Tool provides computer support of the model. The tool dynamically forms project-based collaborative learning environment by means of dynamic co-ordination between building of the temporal sequence of groups of project tasks and assigning of collaborative group students for performance of the tasks. Such formation of the environment provides adaptation to dynamically changing project task characteristics and personal knowledge. The tool assists an instructor in evaluation of the outcomes of the collaboration among the students and in measuring course learning efficiency of each student. An opportunity for adaptive computer-mediated management of project-based collaborative learning emerges.

Keywords: project-based collaborative learning, stimulation of collaborative knowledge construction, dynamic formation and evaluation of the collaborative learning environment

1. Introduction

One constructive way to enhance learning is the Project-Based Learning (PBL) model (Thomas John W.**,** 2000; Markham Tom, Jorn Larner, Jason Ravitz, 2003; Han S, Bhattacharya K., 2001). This model organizes learning through involvement of students in a project activity. The results of the projects must be real products.

The PBL model produces a constructive basis for collaboration. Indeed, a common project has a purpose. Students engage in collaborative work on a project in order to achieve this purpose. In such work learners depend on each other. Furthermore, the project produces a real need for interactions between learners since it requires collective work. Therefore, the PBL model must be integrated with the Collaborative Learning model (Roberts Tim S., 2005; Ornstein Allan, Lasley Thomas, 2003; Bransford, J. D., Brown, A. L. & Cocking, R. R. (Eds.), 2000).

Methodology of collaborative learning is based on

- Constructivist theory(Maureen Tam, 2000); constructionism (Han S, Bhattacharya K., 2001) ; distributed constructionism (Resnick M., 1996); shared cognition theory (Hergenhahn B.R., Olson Matthew H., 2004)
- The concepts of community of practice and community of purpose (Coakes Elayne, Clarke Steve, 2006)
- Problem based learning strategy (Schwartz Peter, Mennin Stewart,Webl Graham, 2001)
- Effective strategies for collaborative learning (Ornstein Allan, Lasley Thomas, 2003)

A Project-Based Collaborative Learning (PBCL) model makes it possible for students to acquire high-level professional knowledge. It allows analysis, evaluation, and synthesis. According to the PBCL model, students learn to work collectively through cooperative group work. As a result, students can acquire collaborative skills. Collaborative skills enable students to effectively communicate, manage, and resolve disagreements.

There are many obstacles for instructors and for students to implement a PBCL model (Ellis Timothy J., Hafner William, 2008). The main reason for obstacles is the high complexity of the model. Computer-supported collaborative design (Daradoumis T., Xhafa F., Marques J.M., 2002; Marion G. Ben-Jacob, David S. Levin, Talia K. Ben-Jacob, 2000) is chosen as the core learning activity since it combines all of the essential elements in a natural and effective way. Computer support tools for collaborative learning are being developed (Roberts Tim S., 2005; Stahl Gerry, 2006) to eliminate the obstacles.

The computer support tools for PBCL canbe divided into

- Tools for technological support of PBCL (Roberts Tim S., 2004)
- Tools for forming and managing the PBCL environment (Laffey James, Tupper Thomas, Musser Dale, Wedman John, 1998; Orvis Kara L., Lassiter Andrea L. R., 2008).

Figure 1 shows interdependence of PBCL model with the tools of its computer support.

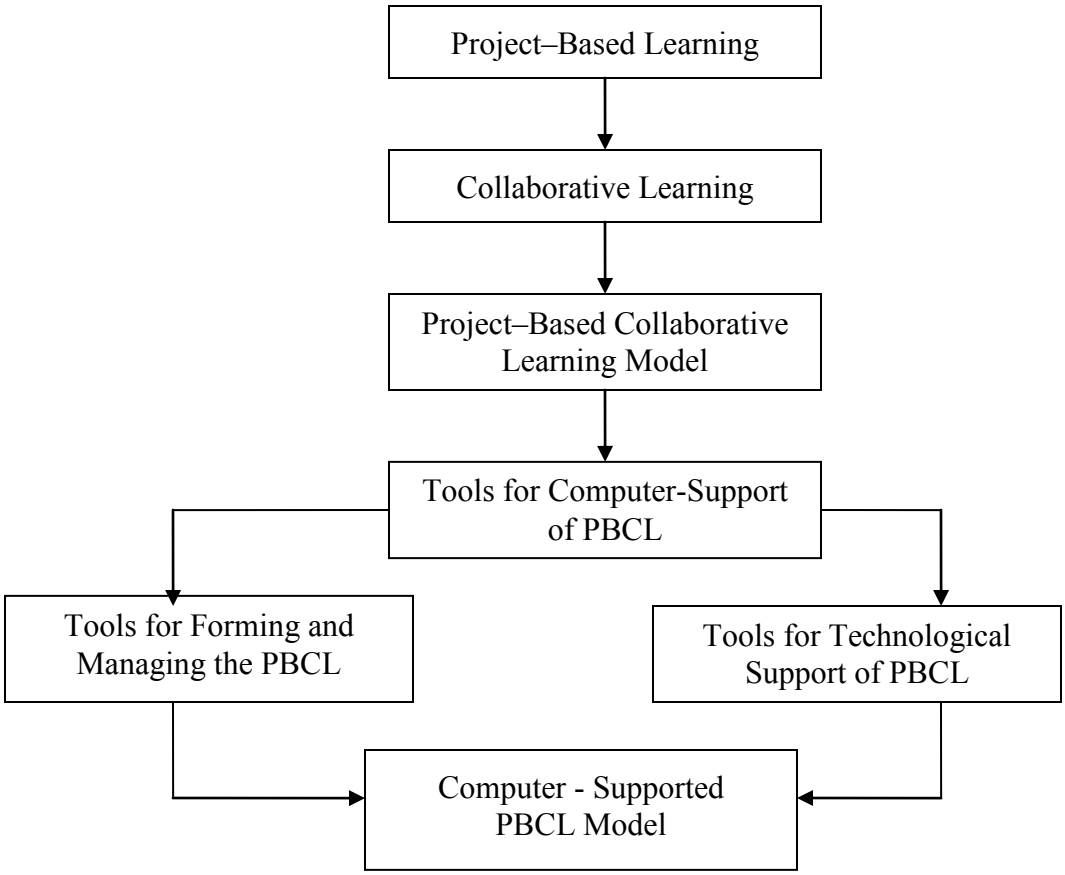

Fig.1. Interdependence of a Project-Based Collaborative Learning Model with Computer Support Tools

The tools for technological support are wide-spread (Roberts Tim S., 2004; Fisher F., Bruhn J., Grasel C., Mandi H., 2002) while the tools for computer-mediated formation and management of PBCL are not sufficiently developed. Lack of such tools is the main reason for limited use of PBCL model in education. Indeed, implementation of PBCL requires dynamic formation of the necessary learning environment. This is difficult work impractical to do by hand because of the high complexity of the model. Therefore, the PBCL model requires the Intelligent Tool in order to realize the dynamic formation of the learning environment.

2. Literature Review

Computer-supported formation of a collaborative learning environment is reviewed in this research. It should realize various requirements for building and organization for the functioning of collaborative learning groups (Graham C.R., Misanchuk M., 2003; Martin Wessner, Hans-Rüdiger Pfister, 2001; Michael Lawrence-Slater, 2006). The requirement for heterogeneous (complementary) or homogeneous (resembling) collaborative learning groups is one of the major requirements.

A new paradigm of learning theory, distributed constructionism is proposed by (Resnick, M., 1996). The four major principles that characterize distributed constructionism were formulated by (Chuen-Tsai Sun, Sunny S. J. Lin, 2001). They are: active learning, learning via simulation, interactive/inter-creative learning, and accumulative learning. They are called ASIA principles. Based on the principles, a method is proposed for formation of collaborative groups that support creative thinking.

An approach to integration of collaborative learning into the learning environment was proposed by (Martin Wessner, Hans-Rüdiger Pfister, 2001). An instructor specifies the collaboration activity (forms collaboration groups) for certain blocks of a web based course. The knowledge about the collaboration context is utilized in order to form appropriate learning groups.

The paper (Michael Lawrence-Slater, 2006) describes formation of the environment for learning an online course. The students formed online groups and successfully completed a collaborative project. In order to achieve this, students posted their interests, their academic majors, email addresses and other information. Such approach makes it easy to form collaborative groups based on an informational profile of each student. However, the difficulty of evaluating "ability to cooperate" is subjective and has to be performed by the students themselves.

Formation of groups in a CSCL environment, according to (Graham C.R., Misanchuk M., 2003) is provided by going through these stages: structuring of learning activities, creation of groups, and facilitation of group interactions. Facilitation of group interactions is accomplished by creation of a learning environment leading to group interactions (Dillenbourg P., 1999).

The work of (Orvis Kara L., Lassiter Andrea L.R., editors, 2008) takes a look at dynamic management of group organization. However, it does not examine organization of group functioning during the tasks of study project stimulating collaborative knowledge construction.

The work of (Ellis Timothy J., Hafner William, 2007) researches the impact of type of control structure on functioning of a collaborative group. The control structure determining the role of a student in a group may vary from an entirely democratic model to an autocratic model. However, an important aspect of functioning of a collaborative group directed to learning stimulation was not examined. This aspect assumes dynamic change of the role of a student in a group depending on his ability to perform project tasks. This ability must be determined as a result of comparison of his personal knowledge and task-relevant knowledge (knowledge necessary to perform a task).

The work of (Daradoumis T., Xhafa F., Marques J.M., 2002) assumes an approach to the creation of a PBCL environment facilitating interaction among students. However, formation of composition and structure of collaborative groups is left to students.

Authors link meeting learning objectives with going through stages of software project development. At that, students perform a dual role as project managers and project workers. Also, an influence of role dynamics on collaborative knowledge construction is not shown. The authors note the necessity for project scheduling. However, they do not suggest a mechanism for a group of students to build a temporal sequence of project tasks and organization of their performance.

The analysis of publications above shows that there is no computer-supported model of the PBCL environment stimulating collaborative knowledge construction by students during performance of study projects.

The model must be built by means of complex accounting for task-relevant knowledge, temporal, and structural project tasks parameters on one hand, and personal knowledge of students on the other.

The model has to provide dynamic co-ordination between formation of the temporal sequence of groups of project tasks and assigning of collaborative groups of students for performance of tasks.

Stimulation of collaborative knowledge construction must be achieved due to maximization of the number of collaborative interactions. Such maximization must be provided by means of creating situations of mutual supplementation of knowledge of students inside groups, and by the presence of a special schedule for performance of project tasks.

3. The Model of Project-Based Collaborative Learning Environment

The aim of this paper is to provide a computer supported model of a specific PBCL environment. The environment must stimulate knowledge construction by students doing study projects. Computer support of the model is realized by the Intelligent Tool.

PBCL environment includes collaborative groups of students and projects performed by the groups.

The collaborative group is characterized by size and composition. Each student has some professional personal knowledge before the start of the group project.

The project is a set of interdependent project tasks. Each task has the following characteristics: task-relevant knowledge; a task deadline; and time to perform a task.

Task-relevant knowledge of all project tasks represents project-relevant knowledge (knowledge necessary to perform a project).

The following conditions are observed in this paper:

- all projects have the same project-relevant knowledge.
- the project should be performed in allocated time period.
- the project should be performed in one collaborative group.
- interactions among students from different collaborative groups are allowed.

The model of the PBCL environment is created for stimulation of collaborative knowledge construction by students during performance of study projects.

It promotes effective study of a subject. The criterion of effective studying is minimal difference between project-relevant knowledge and personal knowledge of each student after the performance of a group project in a given time.

The model of the PBCL environment includes:

- Temporal sequence of groups of project tasks built by means of complex accounting for task-relevant knowledge, temporal and structural project tasks parameters. The tasks in task groups have maximal diversity relative to task-relevant knowledge.
- Collaborative groups of students for performance of the projects. Maximal mutual supplementation of knowledge of students inside a collaborative group working on a project is provided.
- Order of assigning a student of the collaborative group to a task in a task group so that personal knowledge will differ as much as possible from task-relevant knowledge.
- The schemes of possible knowledge construction through intra-group and inter-group interactions among the students.

The environment built according to the model stimulates collaborative knowledge construction. In fact, the original temporal sequence of groups of project tasks provides an opportunity for learning intensification and sets the work schedule of the project performance. Specific order of assigning a student of a collaborative group to a task in a task group maximizes the number of collaborative interactions inside groups. It allows making effective schemes of possible knowledge construction by students due to intra-group and inter-group interactions among the students.

The PBCL environment is formed dynamically by co-ordination between dynamic formation of the temporal sequence of groups of project tasks and dynamic assigning of collaborative group of students for performance of tasks.

Such formation of the PBCL environment provides adaptation to dynamically changing project task characteristics and personal knowledge.

Dynamic formation and evaluation of the PBCL environment is a complicated and difficult process.

Therefore, the Intelligent Tool must to be used to assist an instructor in dynamic formation and evaluation of the learning environment.

4. The Intelligent Tool for Dynamic Formation and Evaluation of the PBCL Environment

The Intelligent Tool assists an instructor in the following activities:

- Formation of the PBCL environment according to the proposed model. Such formation stimulates knowledge construction by students during collaborative performance of course projects.
- Evaluation of outcomes of collaboration among students, and measurement of efficiency of studying a subject by each student.

The Intelligent Tool gains the following information from an instructor:

- Knowledge necessary to complete each of the projects.
- A time period allocated to perform each project, divided into intervals.
- The quantity of projects to be performed.
- A set of interdependent project tasks.

- The parameters for each project task: task-relevant knowledge; completion deadline of a task; time to perform a task.
- The aggregate of students studying the subject.
- The personal knowledge of students before performance of the projects and additional knowledge constructed by the students during the performance of the projects.
- Limitations of collaboration (selection of students who cannot participate in performance of the same project due to parameters other than personal knowledge).

Based on the gathered information the Intelligent Tool performs the following procedures:

Procedure 1: Dynamic formation of the temporal sequence of the task groups

Maximal diversity of tasks relative to task-relevant knowledge should be provided for each task group of the temporal task sequence. In addition, a temporal and a structural coordination should take place during performance of tasks.

Every task group of the project must be completed during the specified time interval. It sets time frames for performance of the project tasks. The algorithm (Tilchin O., 2005) is used to get the required temporal sequence of the task groups.

Procedure 2: Checking the necessary condition for beginning of group projects.

The condition is that knowledge of all the students studying the subject should not be less than the project-relevant knowledge.

Procedure 3: Determination of the size and composition of the collaborative groups

The size of a collaborative group is determined by taking into account the aggregate of the students studying the subject and the quantity of projects that have to be performed. Also, the quantity of students in a collaborative group should not be less than the quantity of unrelated tasks in a task group. This condition provides an opportunity for the simultaneous execution of group tasks.

Composition of a collaborative group for a project is determined by choosing students from the aggregate of students studying the subject according to a necessary condition: maximum mutual supplementation of knowledge of students inside a collaborative group. This condition provides an opportunity for interaction among the students of the collaborative group.

Limitations for collaboration are also taken into account during the formation of collaborative groups.

Procedure 4: Assigning students to perform tasks. Determination of the lack of personal knowledge

The tool assigns students in a collaborative learning group to perform tasks from task groups. This is done by comparing personal knowledge and task-relevant knowledge based on the following condition: knowledge of a student must differ as much as possible from the task-relevant knowledge. This process is done in turn for each task group of the project. It identifies lack of personal knowledge and initiates the maximal need of a student for knowledge necessary to complete the task. As a result, collaborative knowledge construction in a group is stimulated. Lack of personal knowledge is determined based on the order of assigning students by comparing student knowledge with task-relevant knowledge.

Procedure 5: Determination of the schemes of knowledge construction

The scheme represents the order of possible knowledge construction by collaborating students. The knowledge is constructed through intra-group and inter-group interactions among the

students to compensate for the lack of personal knowledge necessary for successful performance of project tasks.

Procedure 6: Evaluation of quality of collaboration and effectiveness of studying a subject by each student

The Intelligent Tool evaluates quality of collaboration among students by comparing personal knowledge of each student before and after collaborative work on the project.

Evaluation of effectiveness of studying a subject by each student is done by comparing his final personal knowledge and project-relevant knowledge.

The final knowledge of a student is determined by combining the personal knowledge before the group project with the additional knowledge constructed by a student during the performance of the group project.

As a result of its work, the Intelligent Tool generates output essential for formation and evaluation of the PBCL environment:

- The temporal sequence of the task groups for each project
- The result of checking of the necessary condition for performance of projects
- The size and composition of the collaborative groups for performance of the projects
- The order in which students are assigned for project tasks
- The schemes of possible knowledge construction by the students
- Evaluations of quality of collaboration and effectiveness of studying a subject by the students

In the presence of changing project task characteristics and personal knowledge the Intelligent Tool forms the renewed temporal sequence of the task groups**,** the order of assigning students to perform their tasks, and the schemes of possible knowledge construction by the students**.**

5. Integration of the PBCL model with the Intelligent Tool

Realization of the proposed PBCL model integrated with the Intelligent Tool is represented by the following activities:

1. Teaching of a subject by means of explanation through a sample project.
2. Determination of sample project relevant knowledge.
3. Performance of exercises by students within a sample project.
4. Determination of personal knowledge of students based on the results of their exercises.
5. The instructor offers students necessary additional exercises if the knowledge of all students studying the subject is less than the project-relevant knowledge.
6. Introduction of limitations for collaboration (selection of students who cannot participate in performance of the same project due to parameters other than personal knowledge).
7. Assignment of a separate project theme for each group (project-relevant knowledge of each project is equal to project-relevant knowledge in a sample project).
8. Dynamic formation of the collaborative learning environment for various projects. In order to do that, an instructor uses the Intelligent Tool described above in part 4.
9. Control of the project process. This action presupposes examination of success and timeliness of performance of project tasks by a group of students.

10. Correction of learning environment.
11. Presentation of projects.
12. Evaluation of personal knowledge of students according to the results of collaborative project work. Evaluation of changes in personal knowledge of students is measured by comparing personal knowledge of students before and after collaborative project work. This action presupposes the use of the Intelligent Tool.

The order (scheme) of cooperation among an instructor, students, and the Intelligent Tool for dynamic formation and evaluation of PBCL environment according to the proposed model is presented in Figure 2.

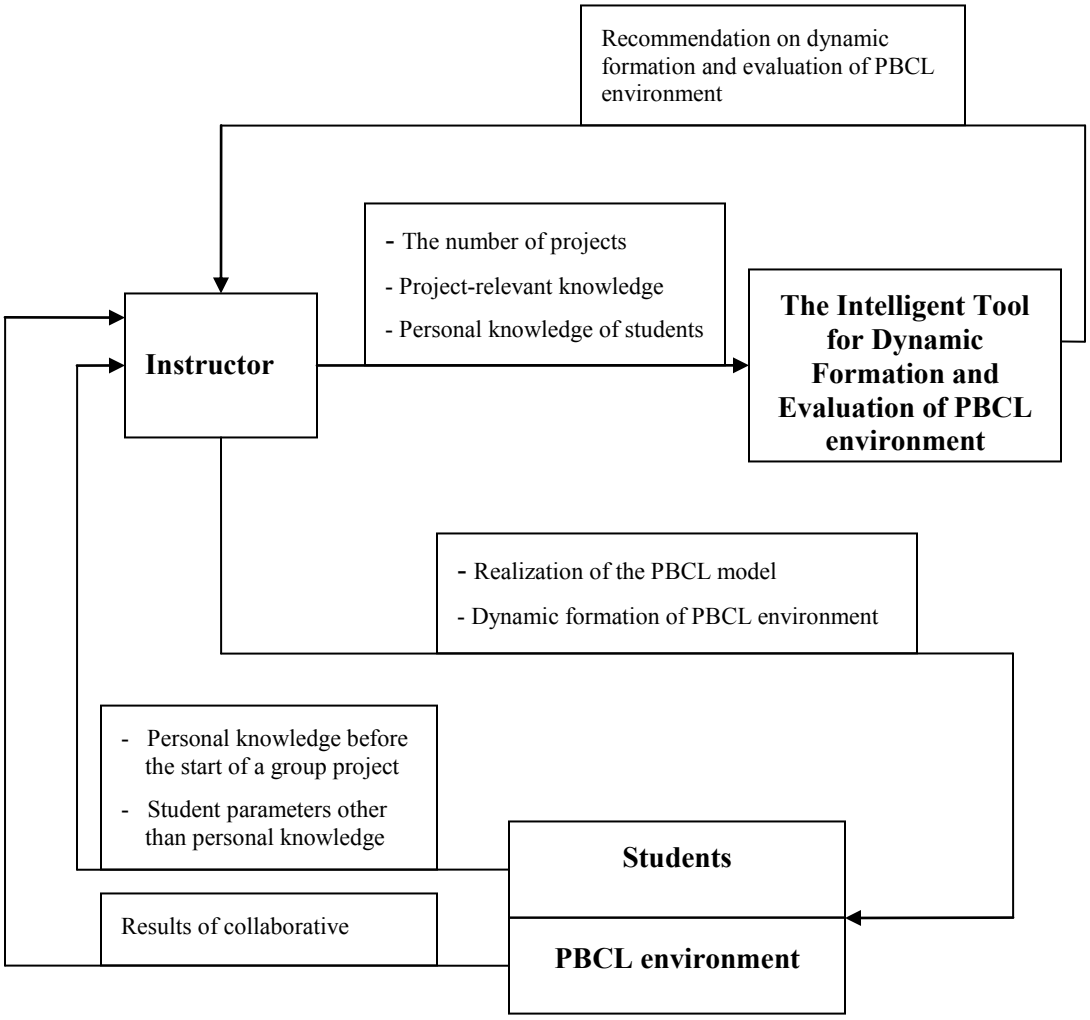

Figure2. The order of cooperation among the instructor, students, and the Intelligent Tool

6. Conclusion

A computer–supported model of the collaborative learning environment stimulating knowledge construction by students during performance of study projects is presented.

The model contains:

- Temporal sequence of groups of project tasks built by complex accounting for task-relevant knowledge, temporal and structural parameters of project tasks
- Collaborative groups of students for performance of projects
- The order of assigning a student of a collaborative group to a task in a task group
- The schemes of possible knowledge construction through intra-group and inter-group interactions among the students.

Stimulation of the knowledge construction by students is provided by the following characteristics of the model: maximal diversity of the tasks in temporal task groups relative to task-relevant knowledge; maximal mutual supplementation of knowledge of students inside a collaborative group; assignment of students in the collaborative group to perform the tasks in a task group in such a way that personal knowledge differs as much as possible from task-relevant knowledge.

The collaborative learning environment forms dynamically according to the model by means of co-ordination between the dynamic formation of groups of project tasks and the dynamic assignment of a collaborative group of students to perform tasks.

Computer support of the model is realized by the Intelligent Tool. The Tool provides: formation of the PBCL environment; adaptation to dynamically changing temporal and structural project task characteristics and personal knowledge; measurement and evaluation of the results of PBCL. Realization of the proposed model integrated with the Intelligent Tool is presented.

Future research will be directed towards expansion of a set of parameters of the PBCL environment, expansion of abilities of the PBCL model, and expansion of the management capabilities of the proposed Intelligent Tool.

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