

FINANCIAL MATHEMATICS IN *e*-LEARNING ENVIRONMENT¹

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Abstract

The article introduces the implementation of the Content and Language Integrated Learning in the course of Financial and Actuarial Mathematics, which is supported by the e-learning system called *eTask*. The paper outlines some of the advantages and contributions of this mutual connection of three elements (applied mathematics, foreign language and the e-learning environment) helping to improve the quality of the teaching and learning process.

Keywords

CLIL, e-learning, financial mathematics, digital competence

Introduction

In recent years, a very rapid development of new technologies has been taking part in our society. One and probably the most noticeable field of the development influencing general public is the development of information and communication technologies (ITC). The Internet and the use of computers play more and more important role in everyday life and this process puts more emphasis on the digital literacy of today's society. *Digital literacy is, using the words of the European Commission, one of the essential skills and competences needed to take an active part in the knowledge society and the new media culture. Digital literacy concentrates on the acquisition of capabilities and skills related to new technologies which are required in a growing number of daily life activities. Digital literacy also relates to media literacy and social competence, as they have in common objectives such as active citizenship and the responsible use of ICT.* For this reason, the educational sphere cannot stay aside, as the need of the digital literacy is the most topical for students of all levels, but in the first place for higher education level.

The teachers of the Department of Applied Mathematics and Informatics (KMI) at the Faculty of Agriculture of the University of South Bohemia in České Budějovice (ZF JU) are fully aware of this development and therefore their attention is drawn towards any possibility of providing a sufficient environment for the students of the faculty to obtain the required skills and competence in the field of the digital literacy. The support of the literacy takes place not only within the courses that are devoted to informatics but also in courses of applied mathematics. One of such possibilities is the use of *e*-learning environment where the Internet and new multimedia are used to improve the quality of learning.

e-learning System *eTask*

e-learning is used in several courses administrated by KMI and its implementation goes on in the system called *eTask* which has been developed at the department for this purpose. This system offers their participants new possibilities in the teaching and learning process. At the same time, it enables the students registered in particular courses to deal with the tasks prepared by their teachers from everywhere where the Internet is accessible. The system has been developed in the environment for creating dynamic-web applications called Zope (in the framework of OpenSource project) with utilisation of other standard tools (for example HTML etc.) and it presents an environment which can be accessed only by teachers and

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students enrolled in a particular course supported by this system. Data protection is secured with a password. The eTask system allows the teachers to insert tasks of various multimedia qualities (plain text, audio and video-tasks can be used within the system), which is of a great significance in today's ITC society. The students pick up the task and work on them for a certain time and then they insert their solutions back to the system to be checked by the teachers. The tasks can be assigned for each of the students at once or each of them can receive a different one. The communication between the students and their teachers works on the same principle.

The screenshot shows the eTask system interface for the course 'Financial and Actuarial Mathematics' (FPMAT-A) at Jihočeská univerzita v Českých Budějovicích. The interface includes a navigation menu, a course map, and a table of enrolled students with their task completion status.

Students (View / Edit)	T01	T02	T03	T04	T05	T06	T07
AIZNEROVÁ Lucie	1t	1t	1t	1c	1	1t	1c
BÁTOVÁ Jarmila	1t	1c	1	1	1	0	1
ČERNÁ Stanislava	1t	1c	1	1	1t	0	1
CHOCHOLATÝ Viktor	1	1c	0	1	1	1	1t
DIBALOVÁ Marcela	1c	1c	1c	1	1	1t	1
DUCHKOVÁ Eva	1t	1c	1c	1c	1t	0	1c
DVOŘÁKOVÁ Aneta	1t	1c	0	1	1	1t	1
eTask student Anonym	1t	0	0	0	0	0	0
HLAVNICKÁ Lukáš	1t	1c	1c	1	1c	1	1
JANOUSKOVÁ Alena	1t	1c	1t	1	1	1t	1
KANKOVÁ Eva	1t	1c	1c	1	1	1	1
KONSINA Natalja	1t	1c	1	0	1	1t	1t
KUČERA Kamil	0	1t	0	1t	1t	1t	1
LÍVOVÁ Marcela	1t	1t	1t	0	1	1	1
MALÍKOVÁ Tereza	1t	1t	1t	1t	1t	1t	1c
MATOUŠEK Petr	1	1t	1	1	1	1	1
NOVÁKOVÁ Ivana	1t	1c	1c	1	1t	1	1
PÁNEK Adam	1	1c	1c	1	1c	1t	1
SANDA Ondřej	1t	1c	1t	1t	1t	1t	1c
Sídlo Daniel	1	1c	0	1c	1c	0	0
SPETOVÁ Helena	1t	1c	1c	1c	1c	1t	1
ŠTEGEROVÁ Petra	1t	1c	1t	1t	1t	1t	1t
TŮMOVÁ Ria	1t	1t	1t	1t	1t	1t	1
VOSTA Zdeněk	1t	1c	1	1	1	0	1
VUTJANOKOVÁ Renata	1t	1t	1t	1t	1t	1t	1

Figure 1. List of enrolled students and their task table. Red boxes indicating that a particular student has not been dealing with the given task yet, green boxes indicating the opposite.

Content and Language Integrated Learning (CLIL)

Emphasis of today's society is not put only on the digital literacy but there is clear evidence of stressing general knowledge of foreign languages. There are many ways and possibilities to support foreign language teaching and learning, but one of them, which is more and more often used at secondary and university level, is Content and Language Integrated Learning approach.

CLIL has recently been adopted by various European researchers and agencies as a generic term. It encompasses many different forms of learning context in which a language carries a special role alongside the learning of any specific subject or content. CLIL refers to any learning context in which content and language are integrated in order to fulfil specified educational aims. Thus, it could be used to refer to a classroom in which a foreign language teacher instructs learners on non-language subject content in a foreign language. Equally, it

may apply to a situation in which a subject teacher uses an additional language, to a greater or lesser extent, as the medium of instruction in any specific lesson (Langé 2002).

In today's united Europe, there is a really crucial need for foreign language proficiency. No wonder that important European institutions like the Council of Europe (CoE) support and prefer alternative approaches to language teaching. CLIL is among them. The recommendation of CoE is to "*promote widespread plurilingualism by encouraging the use of foreign languages in the teaching of non-linguistic subjects (for example history, geography, mathematics) and create favourable conditions for such teaching.*

Financial and Actuarial Mathematics

This year, students attending the course of Financial and Actuarial Mathematics were offered to undertake this course either in Czech or in the English language. The English version is one possibility of CLIL teaching and as it makes heightened demands on the students, the *eTask* system was chosen to support the teaching and learning process going in the course.

The students' task was to deal with several problems of diverse character. Some of the problems were assigned as plain text files or text and picture files (containing for example graphs), the other were audio files. These audio files play a very important role in the learning process. In CLIL teaching, it is important to give the students undertaking it a sufficient space for listening of spoken language (provided by native speakers) to enable them to acquire good listening and pronunciation skills. The *eTask* system offers its facilities to fulfil the mentioned requirement.

The audio-files (closely connected with financial mathematics) can be played repeatedly so the students can listen to them until they understand the content or when practising their pronunciation they get it right. The content of the files is, for example, a conversation of two girls (one English, one American) talking about their bank accounts. The task for the students is to find out to decide which of the accounts is more profitable for its holder. The student's answer to some of the task is required to be also in the format of an audio-file. It can be, for instance, preparing an oral substantiation of the answer to a particular problem or an oral invitation for their presentation concerning financial products. The oral responds offer the tutors the same advantages. The tutors can listen to the audio-answers made by the students also several times; make notes concerning the grammar, used vocabulary, pronunciation and the correctness of the answer.

As it has been mentioned above, one part of the requirements to successfully complete the course is to make required text, audio or video files, to work effectively with the Internet, to process downloaded multimedia etc., all performed in English. That assumes certain knowledge and skills of the students that can be used later on in real life situation and students' future jobs after the graduation from the faculty and which increases their professional credit.

The screenshot shows a web browser window displaying the 'Task Solution' page for the course 'FPMAT-A Financial and Actuarial Mathematics'. The user is logged in as 'sulista'. The page features a navigation menu on the left with links to 'Home', 'Print', 'Help', and 'PC-lab'. The main content area includes a header for the course, a section for the task 'Effective annual interest rate' (2004/03/16 - 2004/04/08), and an audio player for a 'conversation'. Below the audio player, the student's solution is displayed: 'Solution of student: CHOCHOLATÝ Viktor'. A 'Co-operation' section indicates the student earned 1 point. Another audio player for 'answer.mp3' is provided for the student's response. The page footer includes a 'Powered by ZOPE' logo and a copyright notice for 2003 by Josef Milota, Václav Nýdl, and Webmaster: milota@jcu.cz.

Figure 2. One of the given task. This task has an audio- assignment (conversation between two girls about their bank accounts) and students are asked to produce an audio answer, explaining which of the accounts offers better condition for its clients.

Interactive WEB Page

Another feature, closely connected to computer-based learning, is a support of the course by an interactive webpage (<http://www2.zf.jcu.cz/~sulista/fam/>), where students can find all the necessary information they need for a successful undertaking of the course. The pages are structured into several parts (main page, week pages, dictionary etc.). The most important are the week pages where the necessary vocabulary (with an audio record) is presented together with theoretical background and self-correction exercises. This provides the students a sufficient source for their home study and enables them to listen as many times as needed to the presented vocabulary.

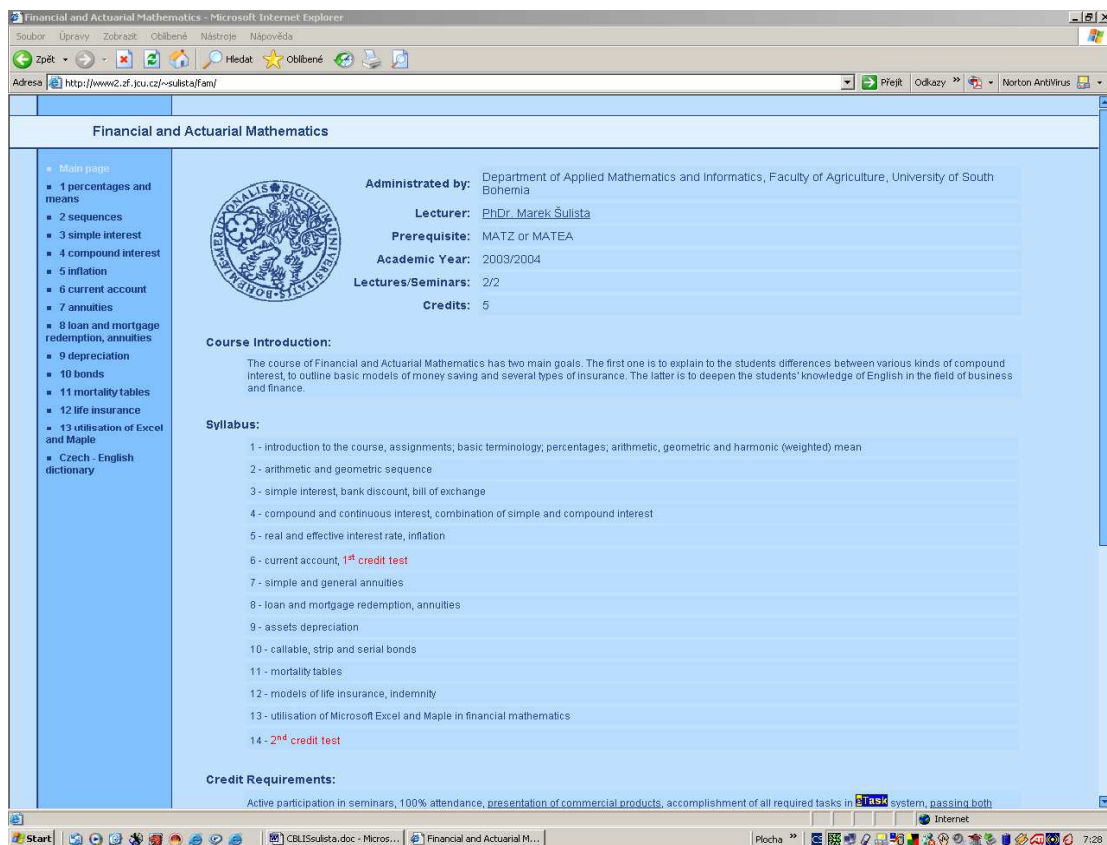


Figure 3. Financial and Actuarial Mathematics main web page.

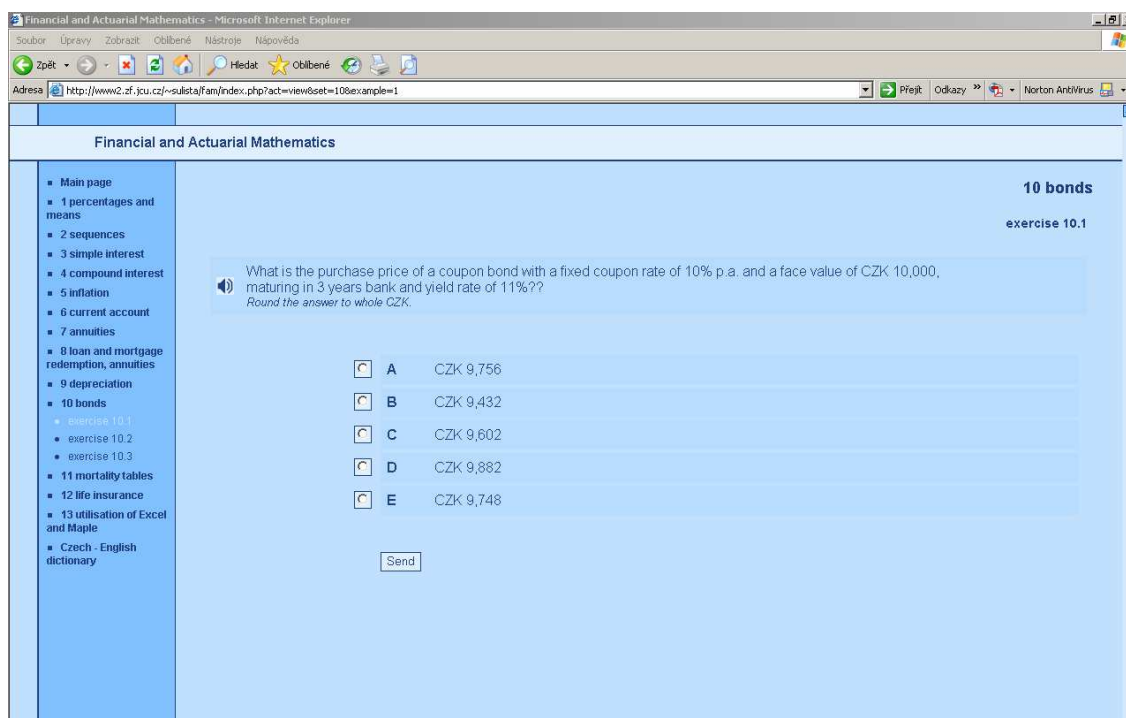


Figure 4. One of the self-correction exercises.

Conclusion

Teaching the course of Financial and Actuarial Mathematics in the presented way seems to be beneficial for both the teachers and students as it leads to their professional development. The students are forced in a way to use English as a communication tool and use computers and skills closely linked with the digital literacy to meet the requirements of the course. The usage of their knowledge and skills in the course life seems to be effective and appreciated by the students themselves. There is a hope to continue with such teaching and integrated as many courses as possible each year.

References

1. Pavesi, M. et al.: Insegnare in una lingua straniera. Milan: M.I.U.R., 2001.
2. Langé, G.: TIE-CLIL Professional Development Course. Milan: M.I.U.R., 2002.
3. <http://www.fu-berlin.de/elc/bulletin/7/en/shiels.html> [cit. 20.10.2004]

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