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TECHNOLOGY ACCEPTANCE MODELS AND LEARNING MANAGEMENT SYSTEMS: CASE STUDY

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Abstract— Paper presents a preview of different technology acceptance models and their application to e-learning, especially to Learning Management System (LMS). Since LMS plays key role in many e-learning implementations, there is a need to collect a feedback from the users – of their attitudes towards the usage of platform, and make an effort in facilitating better technology acceptance. There are several acceptance models, which may be adapted to be used with LMS, by including the pedagogy component. The survey and questionnaire based on adapted TAM (Technology Acceptance Model) were used in order to research LMS acceptance of students from University of Novi Pazar and, results are analyzed and .

Keywords – E-learning, technology acceptance, LMS, Moodle

1. INTRODUCTION

Spread of information technology dictates many transformations of human society on regular basis. It is questionable which area is affected most, since virtually every segment of mankind is shifted via computerization. Education is no exception, on contrary: terms such as lifelong learning and m-learning are generating on almost daily basis. In the same time the raise of MOOC (Massive Open Online Courses) express the vision the university and companies got in online learning.

Institutions also, for their official needs usually implement some sort of learning management system that facilitates access to learning materials, monitoring students, conducting tests, and reusing learning objects and so on [1].

With so much technology involved in our lives, the user acceptance should be treated in a very engaged manner, with specially developed models and methods and systematic approach. There are several general models of technology acceptance. Also, there are models dedicated to e-learning, as it will be presented. Using these models in investigation of user e-learning acceptance, particularly of LMS, might provide us with valuable feedback, pointing the e-learning paradigm in right direction [2].

Paper is aimed at investigation of LMS acceptance among university students. In the following section the term of LMS and its features are briefly presented, and then the technology acceptance models are analyzed. Finally, the research conducted within student population is presented and the results are discussed.

2. LEARNING MANAGENEMT SYSTEM

There are many e-learning tools and applications available online and many of them are free. As a matter of fact, Internet as whole presents a global learning tool, including all educational sites, especially popular services such as YouTube or Facebook. Students are able to build their own learning environment, mixing various media according to their preferences and this approach is known as personal learning environment (PLE)[3]. PLE brings many possibilities to student, as it provides it with full customization. However, in formal education, institution needs mechanisms of access control, progress and results monitoring and communication. The answer lays in LMS, platforms that embed different education activities and resources inside courses: tests, assignments, forums, documents etc. and enable monitor of every student, facilitate communication and collaboration.

There is a somewhat vague classification of LMS related platforms, introducing LCMS ("C" meaning Content) and VLE (Virtual Learning Environment). However, here the LMS is stated as a platform that enables online courses organization using various resources and integrated communication tools, including options for content generation, student monitoring, access control, collaboration and assessment, as well as administrative functions. There are many LMS available on market and there is a common categorization according to the

software model: proprietary LMS and free/open source LMS. Basic LMS features are given in [4].

2.1 Moodle

Moodle stays for Modular Object Oriented Distance Learning Environment and represents the most popular open source LMS with more than 89000 registered installations worldwide in 241 country [5]. Its open source nature and easiness of use made its way to many education institutions.

Moodle content is organized through courses and every course comprises of various activities and resources such as: forums, wiki pages, chat rooms, assignments, files, links, programmed lessons and so on. Teachers got special rights on courses they teach, so they can model the course according to their preferences and in a way that mostly suit the class needs. Every course may be tailored in its own way. However, available resources are the same and their nature mostly dictates the way the course is used by students (and teachers). Also, the organization of the resources on the course level might affect the usage. Additionally, out of the course scope, there is Moodle general environment in which users logs in, gets general information at the platform level, browse courses, edit profile. These are all common activities one student makes in order of using the LMS - particularly Moodle.

Reusable learning objects are educational "cells", smaller course building blocks that can be used in different courses. They are created according to learning objects specifications (SCORM) and Moodle supports several modes of using standardized learning objects. Learning object may contain whole lesson, multimedia, web-page and virtually any possible learning segment. Key for using learning objects is its metadata: information that describes the learning object.

3. TECHNOLOGY ACCEPTANCE MODELS

As stated previously, e-learning embraces various forms of technology usage, spanning from simple PowerPoint presentation, over using specialized sites such as YouTube, to centralized, dedicated complex platform such as Moodle. Every single technology, no matter how simple or complex it is, is susceptible to acceptance analysis.

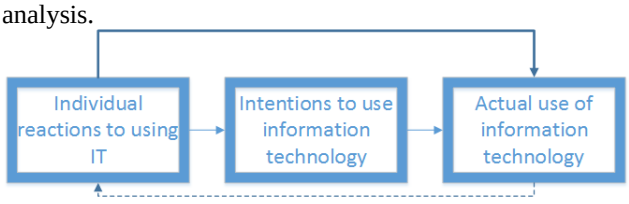

Image 1: Basic concepts of User Acceptance Models

Several models are built in order to describe the relation of user to technology. General concept is given on Image 1.

3.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model is an information systems theory that models users' acceptance and utilization of technology. It is very popular model, made through adaptation of Theory of Reasoned Action (TRA) "specifically tailored for modelling user acceptance of information systems"[6]. The model suggests that when users are presented with a new technology, a number of factors influence their decision about how and when they will use it. Key factors are stated as perceived usefulness and perceived ease of use (Image 2).

Perceived usefulness is defined here as "the degree to which a person believes that using a particular system would enhance his or her job performance.

Perceived ease of use, in contrast, refers to "the degree to which a person believes that using a particular system would be free of effort".

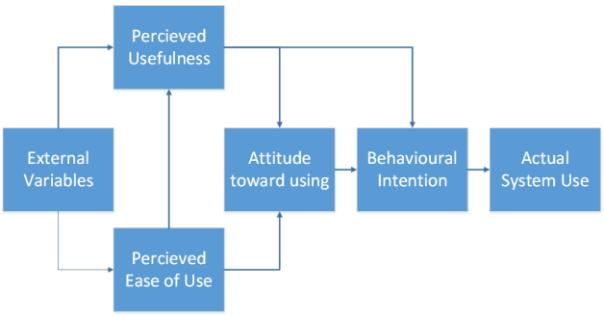

Image 2: TAM concepts

3.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

Venkatesh introduced term of UTAUT, built upon analysis of eight existing theories [7]. The UTAUT's goal is to explain user intentions to use an information system and subsequent usage behavior. The theory holds on four key constructs: 1) performance expectancy, 2) effort expectancy, 3) social influence, and 4) facilitating conditions. The first three direct determines usage intention and behavior, and the fourth the use behavior. Gender, age, experience, and voluntariness of use are posited to moderate the impact of the four key constructs on usage intention and behavior (Image 3).

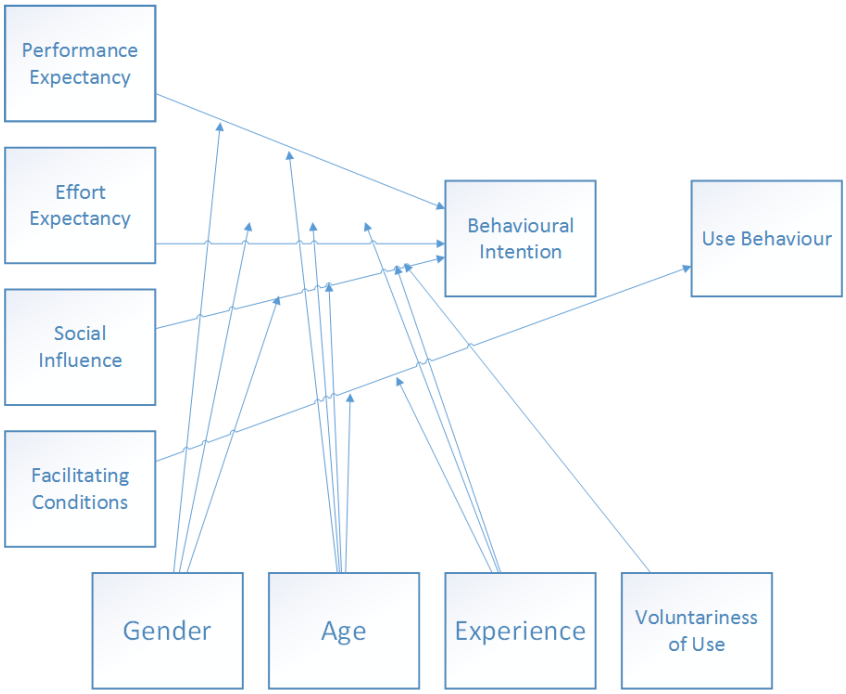

Image 3: UTAUT Research Model

3.3 E-learning Acceptance Model (ELAM)

E-Learning introduces specific issues in matter of user acceptance, such as pedagogy. Therefore, several efforts were made in order of making a specific model UTAUT model has been adapted for technology acceptance research in e-learning, considering both students and teachers, such as[8]. A new model is named E-LAM (E-Learning Acceptance Model)

Conceptual framework is given on Image 4.

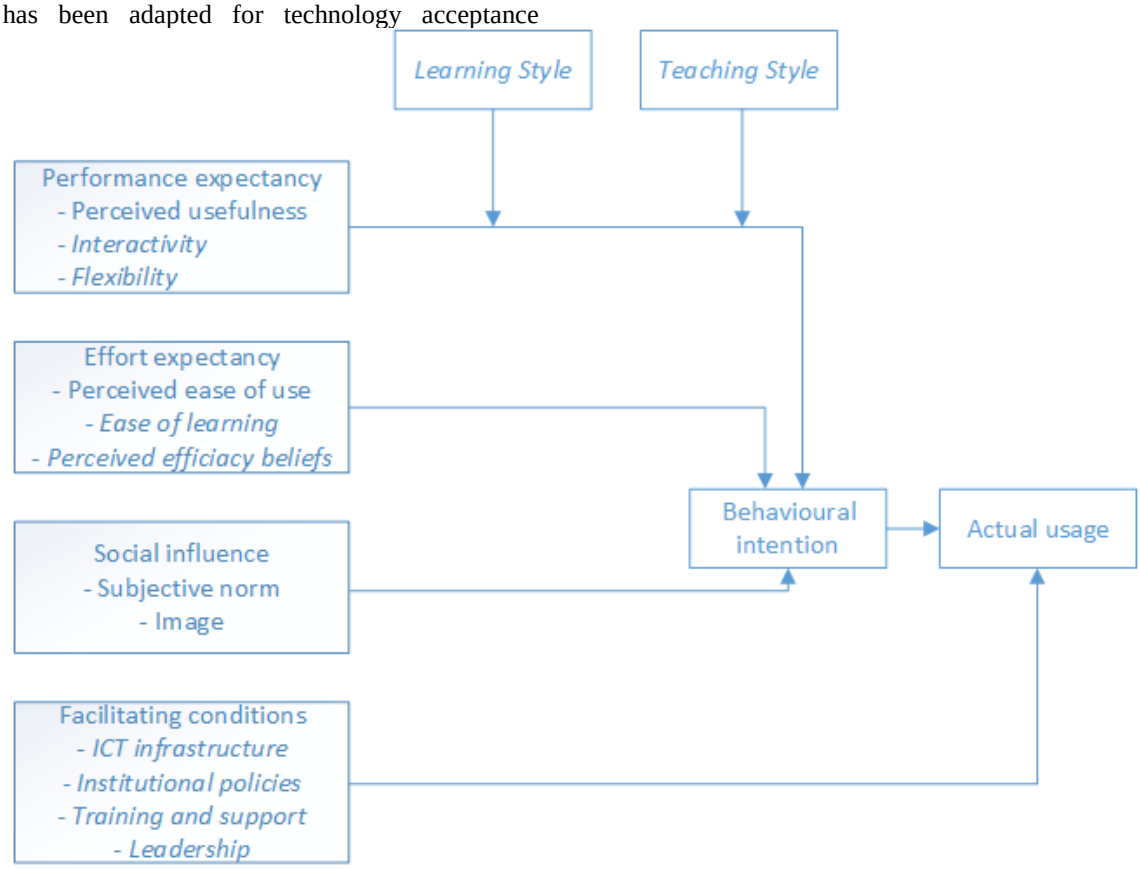

Image 4: ELAM – italic elements are added to original UTAUT

4 THE RESEARCH

The research was non-experimental. The goal was to find out how strong is student's readiness to accept new learning technologies and how much they know about LMS and its usage. Also, a goal was to make an insight into possible differences in acceptance between students who study informatics and the students who study in different fields. A two-part survey was conducted at International University in Novi Pazar. It was based on TAM model with certain adaptations. Population consisted of final year undergraduates of information technology (23 students) and law (8 students). Students had certain experience using Moodle (IT students two courses, Law students one course) . First they filled the closed-questions questionnaire (15 items, based on [9]), and then the 4 item open-ended questionnaire, during their regular classes. Time was limited to 10 minutes per questionnaire. First (main) questionnaire is given in Appendix.

Table 1: Population characteristics.

		IT (%)	Law (%)
Gender	Male	80	60
	Female	20	40
Age	21-22	30	35
	23-24	60	50
	25-26	10	15
Internet experience	None	0	0
	Little	0	5
	Medium	30	70
	Rich	70	25
LMS experience	None	5	40
	Little	25	20
	Medium	45	35
	Rich	25	5
Number of class using LMS (actual school year)	1-2	2	90
	3-8	58	10
	9-21	40	0

The main survey results are given in Appendix.
The second survey part consisted of 4 questions. We quote the most interesting answers.

Are subjects where LMS is used for teaching better?

- I think so, but it depends on design and content harmony.
- No, because a strong knowledge about computers is required prior using LMS.

Do you thing e-learning is more interesting than learning in traditional classrooms?

- It is great to have possibility to learn online, but I think there are to many tasks to be acomplished in this kind of learning.
- I would never trade traditional learning for e-learning because I am a type of person who like listening lectures and be active in classroom

Learning using LMS provides better interactivity with colleagues and teachers.

- I like possibility of contacting teachers and I don't like working in random groups, because the job becomes distributed unfairly at the end.
- There is a problem, still: I cannot meet a colleague in person, to talk and work together.
- Definitely, it reminds me of Facebook.

Learning from home, using digital libraries and attempting tests is LMS advantage.

- I don't believe in online tests. some sort of surveliance should be installed.
- To be honest, I runaway from home to get some rest in class, e-learning would make me stay at home, which is unbearable.

4.1 Survey results analysis

According to the results, the following observations can be made:

- Students do find LMS as general advantage in learning and they are willing to learn more about it.
- Students who are highly involved with IT find using LMS as easy
- There is a substantial difference among acceptance of LMS among IT students and Law students
- Law students in general do not see long-term benefits from LMS, or using it beside their school
- There is a substantial barrier present between students and e-learning (and therefore LMS), caused by lack of traditional and direct methods (classroom communication)
- Elements from social networks are recognized and well accepted in LMS
- Some kind of training would be welcome

5. CONCLUSIONS

Using well known technology acceptance models is a recommended way of getting feedback about e-learning technologies and their usage among students. Existing models can be adapted to embrace additional factors and be finally formulated as a survey.

LMS takes central place in story called e-learning and it highly depends of its acceptance what is going on with e-learning in general. Two categories emerged: technology and pedagogy. It is clear that some sort of training should be made before introducing the LMS in the education system. Although it might be intuitive or similar to Facebook and although students are familiar with Internet applications, still there are novelties and issues that require treatment through trainings and tutorials.

LMS acceptance is coupled with pedagogy and the matter of acceptance does not lay just on certain LMS as itself, but on the pedagogy conducted through the platform: on the course structure and learning materials design. This is matter of instructional design. Teachers (who mostly play instructional designer role) are supposed to be prepared for teaching in learning environment. In that way,

improving the lecturing, the e-learning in general and LMS, as a key part of the package, will be better accepted.

LITERATURE

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Appendix

Table 1: Main questionnaire responses

	Responses A – I strongly agree, B – I agree, C – Cannot decide, D – Disagree, E – I strongly disagree									
	IT students					Law students				
	A	B	C	D	E	A	B	C	D	E
I would find Moodle useful for learning.	7	12	4	0	0	4	1	3	0	0
Using Moodle enables me to accomplish tasks more quickly.	3	4	9	5	0	2	0	1	3	2
Using Moodle for learning increases my productivity on classes.	1	3	11	6	2	0	0	2	1	5
If I use Moodle, I will increase my chances of getting knowledge.	17	4	2	0	0	4	1	3	0	0
My interaction with Moodle is clear and understandable.	18	5	0	0	0	0	4	4	0	0
It would be easy for me to become skillful at using the system.	20	2	1	0	0	2	0	0	5	1
Learning to operate Moodle is easy for me.	19	3	0	0	0	0	2	4	0	2
I do not need additional training for using LMS.	5	3	0	12	3	1	0	0	2	5
Using Moodle is a bad idea.	2	0	5	4	12	0	0	7	1	0
Moodle makes learning more interesting.	20	2	1	0	0	2	0	4	2	0
Working with LMS is fun.	15	6	0	2	0	1	0	7	0	0
I often recommend LMS to others.	5	6	9	2	1	1	1	1	5	0
I intend to use LMS in next 6 months.	6	3	13	0	1	0	1	1	0	6
I plan using LMS in the following semester.	19	2	1	0	0	0	0	1	0	7
I already use LMS for my work.	16	4	1	0	2	0	1	0	1	6

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