

BEHAVIORAL ASPECT OF TEACHING LINEAR PROGRAMMING TECHNIQUES FOR GAMIFICATION OF THE ENGLISH LANGUAGE LEARNING

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***Abstract:** Gamification and implementation of the computer games in education support knowledge and increase children's' attention during a learning process. Teachers, on the other side, usually are just passive users of the Gamification techniques in teaching. There is an evident gap between behavioural aspect of teachers and their adoption of modern technologies and the same aspect on accepting technologies inside children population. This study used quasi experimental approach and constructive qualitative methodology for the analysis of the behavioural aspect and adopting of new technologies learning linear programming techniques to students of the English languages. During the course implementation, students developed tailor modelled games in line with the curriculum for the language teaching adequate for the age, and a level of knowledge of children in the learning group.*

***Keywords:** Gamification, linear programming, behavioural aspect, education*

1. INTRODUCTION

Extensive development of Informational Technologies (ICT), at the end of twentieth and beginning of the twenty-first century, made foundation for implementation of these technologies in every aspect of human endeavors. The beginning of implementation of ICT was closely related with educational institutions and universities, but it was mostly in the domain of the research with limited number of people, with access to raw computational power. Development of the Personal Computers PC changed this paradigm and managed to bring computers into the houses and widen the usage of ICT, not just within the limits of highly professional usage, but also enabled sage for fun. Development of the Internet and mobile computing enabled creation of new social forms, and new and exciting ways in connecting people.

Since children spend more and more time in front of PCs for fun time and spend a huge amount of time in solving video games, the first research were introduced whether we could develop and implement gamification of education and made it closer and adapt to new generations.

This approach developed a new didactical approach to learning, where in many aspects; gamification requires a change of the traditional aspects of learning. Gamification is not a simple implementation of video or computer games as an additional learning or teaching tool. Gamification is a new approach to learning, exercising, repeating and

marking. Gamification uses game mechanics, interactive games (not only computer based), presentations, role playing, game based marking based on previous achievements and adapting learning steps according already achieved scores or markings [1].

Gamification and accepting new technologies was extensively researched in the fields of engineering, mathematics and informatics education. This was rather expected since students and teachers in the specialized schools were the first adopters of new technologies [2-4].

Similar techniques were used in teaching of non-engineering lectures, and term of Computer Assisted Language Learning (CALL) was easily implemented in the curriculums of language learning. The application of new technologies showed an important improvement of learning experience and positive response was received from teachers, students and pupils [5].

Students of foreign languages in the curriculums have lessons in modern technologies and CALL, but there is a missing link and understanding of the processes involved in linear programming, since it is one of the core issues of understanding gamification and game design. Design of the game which needs to be interesting, fun, but education is of the most importance in developing successful gaming environment for teaching [6]. The lack of Mathematical knowledge creates a negative opinion within student population and creates a lack of the initiative to gamification classes. Pupils are on the opposite side. they

use modern technologies as an integrative part of their social environment. Learning of the ICTs and gamification arise as paramount for future educators.

The research we delivered was based on the delivery of the course of linear programming to students of the English Language and Literature, following behavioral aspect toward implementation of gamification of the teaching of the second language, in this instance the English language.

2. CALL IN EXISTING CURRICULUMS FOR EDUCATION OF THE ENGLISH LANGUAGE TEACHERS

Analysis of the curriculum for the students showed they have two courses regarding CALL in education. These two courses cover the basic knowledge of computer based skills, like the usage of word processors, spreadsheet programs, usage of the Internet and presentation programs. The second course covered more advanced issues, like programs for management of eLearning courses (Moodle Package), and professional packages for supporting translation work.

Beside these two courses which provide basic ICT knowledge, CALL approach and implementation of advanced technologies is mentioned during methodical course during 6 classes. But, there is only vague mention of the different technologies which can be implemented during learning and preparation of the teaching material.

The detailed overview of the courses showed the courses are predominantly based on the end user experience. There is no description of the processes or logic which exists in programming. This creates an obstacle to students if they want to use gamification in the future work. There is a clear need to establish environment where these students can acquire the needed knowledge, taking in account their lack of the Mathematical knowledge.

Learning of programming languages can be cumbersome, but during development of ICT, programmers developed a wide range of specialised programming languages adaptable for different applications. The existence of object based programming languages, and especially specialised programming language, adapted to children can create an opportunity for students with the lack of Mathematical knowledge to develop more interactive teaching material. The importance of this package is recognised in Serbia and these packages are now included in curriculums in elementary schools, which create a solid basis for implementation of these packages at tertiary level education.

2. LINEAR PROGRAMMING COURSE FOR ENGLISH TEACHERS

Understanding of the linear programming concept to students was initiated with familiarisation with management tools used in the Software engineering. The main objective for students was to develop their skills in understanding of programme languages and defining: functions of compilers, Syntax and Semantics in programme language. The second aim was to make them familiar with algorithmic approach for problem solving and testing algorithm. The third aim was to train students

how to programme algorithmic steps and how to actually write the programme. And finally, to understand arrays, functions and procedures. Every objective was accomplished by development of the short educational game or animation.

We used Scratch programming language as the implementation tool. This is a visual programming language for creating interactive stories, games and animations. It is developed by MIT media lab and its target group are children. In this way, we could teach teachers to prepare Mathematical games for children, but also, at the same time, they can support interest in children population toward information technologies.

The course was delivered with following objectives and received outputs:

Understanding the concept of programme languages, definitions of functions and compilers, definition of Syntax and Semantics in programme language.

Graphic representation of algorithm

Stages for solving algorithm

Structure of algorithm

Testing algorithm

Algorithmic approach for problem solving and testing of algorithm

Graphic representation of algorithm

Stages for solving algorithm

Structure of algorithm

Testing algorithm

Understanding definition of arrays, functions and procedures

Basic cycle

Organization of cycle

Leaving cycle

Arrays

Functions

Recursive function

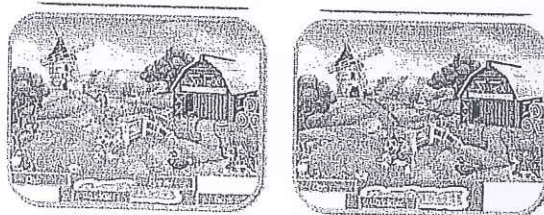


Image 1: The interactive game prepared during the course

3. BEHAVIORAL ASPECT OF THE IMPLEMENTATION OF LINEAR PROGRAMMING IN ENGLISH TEACHING CURRICULUM

The aim of the study was to track changes in students' attitudes towards engineering approach in learning and methodical preparation of material and whether this approach actually induced the change of attitude at the behavioural level.

The study population comprised of students (N = 80) who were in the final year of their Bachelor Studies and at Master Course. Linear programming was implemented during 8 week course, as an addition to the regular classes.

To properly measure this, we used constructive qualitative methodology [7]. This model can be used to measure the attitude of an individual towards a particular object, as a combination of three components: cognitive, affective and behavioural. The cognitive component represents the rational arguments towards the object; the affective component reflects the feelings towards the object; and the behavioural component represents the individual's overall behaviour towards the object. This model is used as the theoretical foundation in many educational studies examining attitudes [8-9]. Our case covered only the behavioural aspect.

The method is based in anonymous questionnaires at the beginning of the first and at the beginning of the final teaching session. In order to supplement information obtained by the questionnaires, semi-structured interviews were held with students before the last course session, the observations focused at the behavioural aspect of students' attitudes towards Constructive Approach in teaching. After completion of interviews and questionnaires, the received answers were within the content were analysed and categorized. The information obtained from at least three different participants, for a single research tool, was included in the analysis as the relevant one.

Since the aim of the research is to establish student's attitude towards linear programming in language learning course,

Students at the beginning of the first session were asked:

"What is your opinion regarding learning programming techniques?"

"What is your opinion on classical, lecture based approach?"

These two questions were defined with two possible outcomes of positive attitude and negative attitude. Positive refers to positive response, while negative represents negative response or lack of response.

The analysis of the findings showed most of the students 67% had positive opinion on lecture based classical approach, while 100% had negative opinion on learning programming skills. Table 1.

Learning	Attitude	
	Classical %	Programming %
Positive	60	0
Non positive	40	100

Table 1: The opinion of students before the course

In the additional questionnaire, they elaborated the main problem was in behavioural level, since the overall opinion was that programming in preparation of teaching material is something which should be within the domain of engineering.

In the final questionnaire, filled out at the beginning of the last session, the students were again asked regarding their attitudes towards different teaching approaches. This time, 90% of students stated positive stance towards learning programming language skills, Table 2.

Learning programming skills	Attitude
	Laboratory %
Positive	90
Non positive	10

Table 2: The opinion of students after the course

In order to provide a deeper insight and find out behavioural change of opinion before and after implementation of the additional course, we needed to repeat these questions in the forms of semi-structured interviews.

Since students had an extensive experience in traditional teaching, the main disadvantages of this approach were evident at the behavioural level. The reasons why traditional teaching does not feel attractive and challenging are based on a rather passive student role in traditional teaching, where students feel more like notifications of results than active teaching subjects. After completing this additional course, the opinion on behavioural level drastically changed, student praised the active role in learning and preparing material. The material developed was also planned as the interactive tool rather than non-active presentation.

Passive participation	90	I do not spend too much time for preparation of class. All needed actions and procedures are prepared in handbooks, books or material presented at classes	Classical approach does not activate students to participate in development of methodical tools.
Active participation	100	During the course, not only I need to create something new, I also needed the support from other students and teachers in order to complete this task.	Learning programming skills improves interest for the course expressed through more active participation.

Table 3: The additional opinion explanation at the behavioural level

5. CONCLUSION

The implementation of ICT in all aspects of learning should not be based on simplification, and education of educators to be just mere end users. Fulfilment of the meaningful technology development in a learning cycle is possible only if we use proper tools and adapt them to teachers in all fields of education. Technology must not be

just extensive used to engineering and informatics courses, we need to incorporate them at all level of curriculum and lesson preparing. We showed this endeavour increased active participation of students and a better opinion of the future implementation of newly developed ICT at the behavioural level.

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