Game-based learning in education

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Abstract

This paper will present the activity conducted by ODL Department of University of Bucharest as part of the PROACTIVE: Fostering Teachers’ Creativity through Game-Based Learning project in order to have a rich picture about GBL in educational scenarios. For this step there were organized three focus groups with participants from Romanian universities (professors and associate professors).

The PROACTIVE project mainly tackles creativity mediated by game-based learning. It is based on embedding creativity into active learning approaches, such as creative problem solving, discovery, learning by doing, experiential learning, critical thinking, with teachers co-designing 2D or 3D learning games.

Keywords: ICT, focus group, game base learning, EU projects, creativity

1. PROACTIVE project: Fostering Teachers’ Creativity through Game-Based Learning.

Proactive is a European project (Project Number: 505469-LLP-1-2009-1-ES-KA3-KA3MP), which started in January 2009. The project’s length is 36 months. The project consortium comprises of six partners (five universities: University of Barcelona – Spain, Sapienza Università di Roma – Italy, Università di Napoli Federico II – Italy, Universidad Complutense de Madrid – Spain, University of Bucharest - Romania and Centre for Advanced Software Technology Limited -SME- which has strong connection with Bangor University).

The aim of the PROACTIVE project is to create learning contexts in which teachers can foster their creativity in designing their owned game-based learning scenarios, by using two games editors (Eutopia and < e-Adventure >). Traditionally, teachers and trainers used in their practice one sole dominant learning paradigm (i.e. instructional or participative), thus limiting their creative potential.

Recent studies instead show that in natural situations learners combine simultaneously five metaphors for learning: Imitation, Participation, Acquisition, Exercising, and Discovery. Also, game-based learning (GBL) supports creativity and inquiry-based learning processes. PROACTIVE claims that if it is true that we teach how we were taught we can claim that we also learn as we were taught. PROACTIVE will

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create learning contexts where teachers of Comenius, Erasmus and Leonardo sub-programmes can apply creativity in designing their own GBL scenarios using digital tools.

Within training workshops, teachers will use two game editors: a free of charge 3D virtual environment allowing collaborative interaction of the learners; and an Open Source framework for implementing 2D user-centred adaptable scenarios. PROACTIVE will adapt the five metaphors in the tools, in order to foster creativity and support the flexibility of the teachers in designing their learning sessions in 18 pilot sites covering different areas and levels in four countries.

The main objectives of PROACTIVE are:
1. To stimulate the creativity of trainers working in LLP sub-programmes, developing a conceptual framework for integrating different learning metaphors;
2. To introduce innovative ICT-based experiences in teaching and training practice, adapting and enhancing the game editors, integrating five learning metaphors;
3. To implement co-design creativity sessions and pilot sites for addressing school, university and vocational education scenarios;
4. To validate the proposed approach as a means of learning and evaluate its impact on teachers’ creativity and students’ outcomes.

PROACTIVE will produce Guidelines on Creativity Enhanced by GBL and disseminate a database of learning games and related active learning culture within EU education.

2. Game based learning in education

When using computer games, and games in general, for educational purposes several aspects of the learning process are supported: learners are encouraged to combine knowledge from different areas to choose a solution or to make a decision at a certain point, learners can test how the outcome of the game changes based on their decisions and actions, learners are encouraged to contact other team members and discuss and negotiate subsequent steps, thus improving, among other things, their social skills.

Most researchers conceptualize learning as a multidimensional construct of learning skills, cognitive learning outcomes, such as procedural, declarative and strategic knowledge, and attitudes. The game based learning model is used in formal education very successfully, in particular, in military, medicine, physical, etc. training.

Game-based learning has been widely adopted for children's learning. Pedagogically highly valued products are on the market and have a proven success in the improvement of learning as well as in children's acceptance. Recently, game based learning has also been proposed for adult education.

Modern technology needs employees proficient in effective communication, teamwork, project management and other soft skills such as responsibility, creativity, micro-entrepreneurship, corporate culture, etc. Game-base learning is an approach to tackle the above issues.

PROACTIVE project promotes a new approach to learning, aiming to increase the quality of lifelong learning, involving three LLP sectors (school education, higher education and vocational education). The game-based approach, using creative learning scenarios is expected to boost the learners’ performance and educational outcomes.

PROACTIVE will study the potential for boosting teachers' creativity with the help of innovative ICT technologies, thus aiming to improve the attractiveness of the learning scenarios for students. The implementation will be based on well defined pedagogical approaches in order to guarantee high quality of the educational methods. PROACTIVE will put extensive efforts for evaluating various aspects of the proposed game-based approach, including accessibility, attractiveness and learning outcomes.

In the PROACTIVE project learning scenarios will be developed, that can be built into web-assisted education, either in face-to-face or online learning, at school or on the workplace. This increases accessibility and promotes gender, race and age equality. Besides, the game-based approach promotes active learning. It has been demonstrated that for certain target groups (e.g. school students) increases personal fulfillment and leads to higher performance. We will evaluate these issues involving wider target groups.
In order to identify project’s potential in developing educational games, in this phase of the project were organized several focus groups with teachers, trainers and professors according to an initial project plan. In the following section we will present the results of the focus group conducted by Romanian team.

2.1. Focus group

The aim of focus groups was:

- Explore participants’ interest/employment of ICT tools in their teaching approach
- Explore participants’ knowledge about user-centered design
- Explore participants’ point of view in relation to learning metaphors and their adaptation to their teaching approach
- Explore participants’ interest in the editors employment in their teaching approach

In this focus group were mixed people who already use games for educational purposes and those who don’t or even are not use the computer. A very important component of the focus group discussions were the five metaphors of learning: Imitation, Participation, Acquisition, Exercising, and Discovery.

2.1.1. Learning metaphors

Most of the participants recognized the five metaphors in their current teaching/learning process, admitting that some of the metaphors are used more than others depending on the student’s characteristics, discipline, type of lessons (course, laboratory, seminar, experiments), context factors (number of students, place). Also they have to switch between different metaphors during a course, depending on addressed theme.

Participants noticed that in formal learning, the acquisition metaphor it is used very often in university lecture because this is the easiest way to transmit information. Students will accumulate more information, outside the school if they are motivated, and professor can stimulate student’s curiosity in a specific matter. Unfortunately the current constrains regarding the curricula and the number of disciplines and small amount of hours per discipline does not allow implementing a modern conception about learning.

Learning through discovery is applicable especially in sciences and with visible results in other fields such as: math, history, literature, business.

Learning through imitation it depends by the measure in which the subject is directly stimulated to produce imitative reactions. In university this learning metaphor is applicable only in a very short area because students already created their own learning type.

2.1.2. ICT in learning

If few years ago teachers’ experience in using computers was limited nowadays we can talk about creativity in using ICT. Participants from the focus groups have an experience in using computers; some of them, depending on the subject are introducing computers in lessons.

Starting from the first focus group in which the computer was used only as a Power Point presentation tool, in the second and third focus group the use of ICT is much more present. We had professors which developed their own tool for teaching/learning, presenting application in order to sustain the theoretical concepts.

Some of the professors are still searching for the best way of using computers in teaching/learning. Most of them tried to use the computer in student advantage, especially in technological subjects. “Virtual classrooms” is already a very well known concept, already applicable for students and teachers.

There are many examples with online platforms in which students are enrolled and administrated by the professors. Students use the resources offered by this platforms (Moodle, Dokeos, UniBUC portal): communication tools, online interactive courses, online evaluation.

PROACTIVE stimulates teachers' creativity by facilitating them to design new learning scenarios and digital games to innovate their pedagogical practices.
2.1.3. SWOT analysis on GBL

For a common understanding about educational games in the focus group a SWOT analysis was elaborated with the participants. The result of this activity is presented in the figure below and resumes professor’s opinion in GBL mater.

<table>
<thead>
<tr>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
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<tbody>
<tr>
<td><strong>Professor’s perspective</strong></td>
<td><strong>Insufficient time for teaching</strong></td>
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<tr>
<td>Creativity development</td>
<td>Inadequate curricula</td>
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<tr>
<td>Knowledge construction</td>
<td>Lack of technical support</td>
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<tr>
<td>Being proactive</td>
<td>Rigidity of educational system</td>
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<tr>
<td>Immediate application of theory</td>
<td>Not finding the adequate software</td>
</tr>
<tr>
<td><strong>Student’s perspective</strong></td>
<td><strong>Games became a source of fun instead of learning (students are not able to differentiate game as exercise from game as entertainment)</strong></td>
</tr>
<tr>
<td>Students become focused on the subject</td>
<td>Students do not see the benefits of the game</td>
</tr>
<tr>
<td>Attractiveness, involvement, efficiency</td>
<td>Changing the learning style (resistance to new teaching approach)</td>
</tr>
<tr>
<td>Active participation of the student</td>
<td><strong>OPPORTUNITIES</strong></td>
</tr>
<tr>
<td>Student has an active role</td>
<td><strong>THREATS</strong></td>
</tr>
<tr>
<td><strong>Professor’s perspective</strong></td>
<td><strong>Incompatibility between software and hardware</strong></td>
</tr>
<tr>
<td>Software development</td>
<td>Continuous update of the software version</td>
</tr>
<tr>
<td>Reducing the cost of didactical materials (in case of simulation programs)</td>
<td>Divagation from the subject</td>
</tr>
<tr>
<td>Engaging pedagogical approach</td>
<td>Risk of not accomplishing the lesson’s objectives</td>
</tr>
<tr>
<td><strong>Student’s perspective</strong></td>
<td><strong>Losing interest</strong></td>
</tr>
<tr>
<td>Results multiplication</td>
<td>Need for adaptation to new learning tool</td>
</tr>
<tr>
<td>Using the experiences in real life</td>
<td>Students are more concerned about the graphics of the game than the educational purpose</td>
</tr>
<tr>
<td>Changing student’s perceptions about learning</td>
<td>Individualized learning</td>
</tr>
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Reasons for not using the games in classes are: absence of adequate games for their subjects, the fear that the game does not serve the purpose of learning and the lack of skills and resources in order to develop such games.

2.1.4. Creativity

Participants developed the idea that there is very important the moment and way to introduce games in lessons and the purpose of game in educational scenario.

The role of the teacher is to design the learning scenario, accomplish the lesson’s objectives and add value to the knowledge transmitted to the student. Moreover the teacher must identify the suitable game in order to obtain interest, curiosity in finding results, involvement from the student side.

They stated that computer can help the student to individualize its learning process, promoting and helping self studying.

Some of the participants developed very simple games (Toondoo games), using existing platforms. They tested these games on pupils first and realized that is not enough in order to have an impact on them. For these games to be attractive they noticed that in the first place games should be more interactive, with a user friendly interface, to bring novelty, originality, value and social utility and a large applicability, to have different levels of difficulties and on time feedback.

Other participants use simulation platforms and they have to create all the time new scenarios for the classes. Even if we speak about the changing parameters, the way in which problems are solved and theories are demonstrated, they let the students to bring their own interpretation on the results.

There is a relation between learning types and type of games. Another problem is to have a balance between learning and games.

2.1.5. Game editors

Professors have shown interest on the two platforms, finding similarities between their own games or simulations and these tools. The idea of creating their own games is attractive but there are some obstacles related to: time, relevance, abilities, training, current initiatives. The idea of creating a game is workable but they stated that the part of creating a complex scenario is difficult; maybe it will be more efficient if they could work in teams. Knowing the fact that usually students experienced different type of games, with high level of difficulty they will have expectation regarding new experiences.

2D game editor (e-Adventure) it could be successful used in different subjects: chemistry, physics, biology, logical themes, mathematical models.

3D platform (Eutopia) can help in creating games about: counseling, conflict mediation, communication, personal development, foreign languages.

After the presentation some of the participants wanted to explore more deeply the facilities offered by the platforms. That’s why, in order to meet their wishes we created on the e-Adventure platform an account. We transmitted this information and they had the opportunity to test the existing games.

2.1.6. Focus group conclusions

This focus groups allowed us to explore more deeply a subject that it is new (as concept) in universities. Giving the specificity of the university programs some of the results were as we anticipated, some were new. It is a strong relation between learning tradition, participant’s age, field of study and their openness to new.

One of the advantages from university educational system is that the professor can decide the curricula for his/her discipline(s). In real situation it is a little bit complicated because this must have the management approval. Because of reducing the number of years for study (through Bologna process) the number of disciplines remained unchanged this having the main effect in reducing the number of hours per discipline.

Most of the participants are familiar with the learning metaphors and GBL, even if they have not thought about this in terms of concepts. They stated that they are interested to learn more about GBL from other discussion partners and not from the literature.
People that use GBL in their current practices are very enthusiastic in sharing their experience and use their creativity for new scenarios. But all are agreeing that if they will be in the position of creating new games it will be easier to work in teams and not individual and specific trainings are needed, in order to be creative through different game scenarios.

3. Conclusion

PROACTIVE project directly addresses educators' creativity in learning by introducing game-based scenario design, by increased visualization and challenged thinking.

The consortium will study the impact of such tools on both teachers and trainers’ pedagogical creativity. Furthermore, games promote active learner involvement through exploration, experimentation, competition and cooperation, key aspects of the entrepreneurial spirit.

This project will facilitate integration of new technologies in learning process; will support participants’ activities in order to create their own games and stimulate students’ involvement in learning. In Romania GBL learning is still a new concept

PROACTIVE is centered on the development of innovative ICT-based practice specifically addressing the LLP. Within the planned creativity training sessions and pilot sites implementation the teamwork and the target group participants will develop innovative educational game-based scenarios and learning content.

The tools for creating such educational scenarios will foster continuous innovation in the pedagogical practices of educators from all LPP sub-programs. The innovative character of PROACTIVE emerges from the introduction of a new pedagogical approach to learning (creativity and flexibility through the 5 metaphors model) through the implementation of new ICT-based tools (2D and 3D virtual environments) and an innovative methodology (game-based learning). This approach is new, and is based on previous research done by the partnership.

The solution offered by PROACTIVE for innovating learning activities builds on previously developed tools for creating educational games (locally developed in Italy and Spain), and adds new value by fostering creative active performance in teachers and trainers. The value is given by the potential for them to build their own learning environments with a sound pedagogical approach that can be used for a varied type of learning contents, according the users’ educational needs. For users, this will give them more learning opportunities in terms of developing transversal competencies as self-regulation, informational skills, co-operation, problem-solving, and creativity.

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