BADGES AS A COMPLEMENTARY ASSESSMENT AT SECONDARY SCHOOLS

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Abstract
Students’ weak motivation to learn is the challenge of education at our secondary schools. Teachers often struggle with this problem by employing new technologies and methods in their teaching. Gamification, which means using game design elements in non-game contexts, seems to be more and more popular method. Several recent studies showed successful use of gamification also in educational process. One of the most straightforward-implementable game design elements is a virtual reward – a badge.

In this paper, we present the research aimed at the evaluation of students’ satisfaction with using badges at school and their willingness to work in order to get badges. Study was conducted at two secondary schools in informatics classes, where badges were used as a complementary assessment. The outcomes of our research showed that badges are attractive for students and students tend to be more active in lessons if they have a possibility to earn this virtual reward.

Keywords: Motivation, assessment, gamification, badges.

1 INTRODUCTION

Present educational theories along with integration of digital technologies into education not only bring about new educational perspectives and methods, but also offer numbers of new tools applicable in the teaching, learning, evaluating, as well as in motivating students.

A new motivational technique increasingly appearing in educational environment integrates game-design elements (such as game mechanisms, aesthetics and game thinking) into education. This approach called gamification [1] is based on the assumption that most of young people has close attachment to the computer games, so the game elements employed in education will have motivational effect on them [2].

One of the game mechanisms used in non-game contexts is awarding a virtual reward [3], that could be a certificate or a special degree. When used e.g. in companies, it does not mean the increase in wage, responsibility or management powers of employees but it could imply improvement of their status. An analogue to awarding employees virtual rewards is rewarding students with badges at school.

More than one year ago we started to explore the opportunities to introduce badges in the classes at high school aiming to reveal their potential in boosting students’ engagement and motivation to learn. We designed a set of badges and instructed an external teacher to incorporate them in the teaching as a complementary assessment tool.

In the end of half-year we surveyed the data obtained from the questionnaire for students and from the interview with the teacher. The outcomes were both positive and negative that could be partially attributed to the weak teacher’s motivation to use badges.

After redesigning the badge set and adjusting the awarding rules we extended our research also to another high school. The results from this second phase of the research showed that the new methodology together with well-motivated teachers helped to engage students in earning badges and in more active participating in learning activities. In this paper we summarize our experience from first two phases of our research.

2 BACKGROUND AND RELATED WORK

In order to understand the topic, we need to consider more than the badges itself. In this part we introduce related work from the field of motivation and gamification. In the end of the section we focus on badges used at school.
2.1 Intrinsic and Extrinsic Motivation

According to Wlodkowski [4], the word motivation is used to describe processes that can (a) arouse and instigate behaviour; (b) give direction and purpose to behaviour; (c) continue to allow behaviour to persist; (d) lead to choosing or preferring a particular behaviour. In his work he also disproved the myth that making students learn by punishing them or threatening them is more important than having them motivated to learn.

Although learning depends on many factors, motivation is an essential condition. According to Ray [5], effective teacher helps students to develop attitudes and goals that will sustain a long-term involvement, therefore motivation should not be measured strictly as achievement. “Motivation is important, because it contributes to achievement, but it is also important itself as an outcome.”

Concerning motivation it is important to differentiate between its two main types – extrinsic and intrinsic one. Extrinsic motivation is influenced by external factors. According to Boyd [6] it basically means doing an activity for an external reward or just to avoid negative consequences (e.g. a pupil studies just to get a good grade, participates in a sport activity to win a reward, or cleans a locker to avoid rebuke [7]). On the other hand, intrinsic motivation is driven by internal factors, which means doing certain activity for enjoyment or simply for finding it interesting [6] (e.g. a pupil participates in a sport activity because they find it enjoyable, solves a word puzzle for fun, or plays a game because it is exciting for them [7]). Boyd [6] claims that intrinsically motivated people are more likely to invest more time in an activity and become more successful in it.

Although the intrinsic motivation seems to be more important, extrinsic motivation also should not be underestimated. It can be very useful when used properly. However, one has to be careful while trying to motivate somebody (pupils in particular) with external rewards, since factors strengthening extrinsic motivation can have negative influence on the intrinsic one especially in cases of high intrinsic motivation and also when a reward is given just for doing a task regardless of the performance. But as Cherry [7] stated, an unexpected reward does not have an influence on intrinsic motivation. In addition, it can have a positive effect in case it is used as an evaluation or feedback allowing pupils to compare with each other.

In many cases, people do not have an internal need to devote themselves to a certain activity, which is when extrinsic motivation can be used (e.g. to stimulate an interest in a subject at school, to acquire new knowledge or skills which can lead to an increase in intrinsic motivation, to give feedback letting pupils know if their performance met given criteria). Therefore, the extrinsic motivation has its importance particularly in the school environment.

2.2 Gamification

The term, "gamification" was defined by Deterding et al. [1] in 2011 as the use of game design elements in non-game contexts. Game – contrary to play – is characterized by explicit rule systems and a competition or a strife of the actors in those systems towards discrete goals or outcomes. Gamification can be also defined by means of the outcome, as in the work of Huotari and Hamari [8]: it is "a process of enhancing a service with affordances for gameful experiences in order to support user’s overall value creation". This definition highlights the role of gamification in invoking the same experiences as games do.

Recently, a number of scientific papers appear dealing with gamification and its influence [9], [10], [11].

In the literature review of empirical studies of gamification made by Hamari et al. [12] it was found out that the most of the reviewed papers reported positive results for some of the motivational affordances of the gamification implementations studied and only few studies found all of the tests positive. Some of them showed that gamification can depend on several factors, such as the motivation of users or the nature of the gamified system and that it can provide positive effects dependent on the context in which the gamification is being implemented as well as on the users using it.

Study conducted by Mekler et al. [13] showed that implementation of points, levels, and leaderboards significantly increased performance, but did not affected perceived autonomy, competence or intrinsic motivation. It is suggested in the study that these game elements act as progress indicators, they are able to guide and enhance user’s performance and that their implementation can promote specific user’s behaviour in non-game context.
A research conducted in MOOC (Massive Online Open Course) [14] investigated the potential of gamification with social game elements, because among the factors reportedly contributing to the high drop off rates are lack of motivation, feelings of isolation, and lack of interactivity in MOOCs. Students in the experiment showed an increase of 25% in retention period and 23% higher average scores after adding game elements. Social game elements amplified this effect even more significantly – students in these conditions showed an increase of 50% in retention period and 40% higher average test scores.

According to a systematic mapping of gamification applied to education conducted by de Souza et al. [15], most studies focus on investigating how can gamification be used to motivate students, improve their skills, and maximize learning. Although some of them did not specify clearly which educational level their approaches should be incorporated in, none of the selected studies described gamification approaches whose target audience was high school, which is our area of interest.

2.3 Badges at School

Use of badges in educational activities at school is rather straightforward. Students are awarded a symbolic prize for solved tasks, achieved knowledge, skills or other success similarly to getting a grade or a certificate nowadays. The award symbol – a badge – can be then made accessible to the others, to let them know about the badge-owner’s knowledge or skills. Badges can be implemented rather simply using the students list at the notice board in the classroom where the teacher pins assigned badges in the form of pictures representing the respective activity.

Nowadays, when digital technologies count for an inherent part of our everyday life and they also penetrate more and more into education, digital badges become the preferred form of badges used within the evaluation. A digital badge is a visual representation of the student’s performance which certifies their skills and abilities and it is accessible online. It could be implemented simply by a picture or it can contain metadata – information explaining in details what the owner learned, including the description of assignment and possibly a link to the result of their work [16].

In the study conducted by Abramovich et al. [17] authors used digital badges within an intelligent-tutor system for teaching applied mathematics to middle-school students. Findings of the research indicate that badge earning could be driven by learner motivations and that systems with badges could have a positive effect on learner motivations. How the learners were earning badges was different across learners with different levels of prior knowledge. Different badge types also affected different learner motivations. It is highly recommended to consider students’ skills and motivations in the process of developing badge system for them.

Gibson et al. [18] emphasize possibility to use badges as an alternative credentialing system. They state that badges can involve students in using online learning programs, skillbuilding applications (e.g. simSchool1), serious games (e.g. Games for Health2) and other formal and informal resources (e.g. Stack Overflow3, Khan Academy4, etc.).

As it was shown in the article [19] about Khan Academy, if badges are not used in each course in the same way, students tend to consider activities rewarded with badges more important than activities without badge rewards.

Anderson et al. [20] studied different ways of displaying badges in MOOCs and their outcomes in student behaviour. They stated that even small differences in presenting earned badges in profile caused significant changes in students attitude towards course activities.

Study conducted by Filsacker et al. [21] investigated the effects of external rewards on fifth graders’ motivation, engagement and learning while playing a feedback-rich educational game. Students in experimental group could earn badges in the game and display them both in the game and on the wall-board. According to the results, the external rewards did not undermine students’ motivation and they did not foster disciplinary engagement. On the other hand, students in the reward condition showed significantly larger gains in conceptual understanding and non-significantly larger gains in achievement.

1 http://www.simschool.org/
2 https://gamesforhealth.org/
3 http://stackoverflow.com/
4 https://www.khanacademy.org/
3 RESEARCH

Our research of badges in education started in the second half of the school year 2014/2015 when we employed badges into informatics classes at high school.

In Slovakia, assessment in secondary education is regulated by law and methodical instructions [22], which state that students have to be assessed by 5 possible grades, which vary in the scale from "insufficient" to "excellent". Although teachers are allowed to use another assessment systems, there must be these grades in the students' report cards.

Moreover, according to the former methodical instructions, students at informatics classes are assessed mainly for their acquired competences and skills and not for how they work there. Therefore we introduced badges as an additional assessment and decided to evaluate also those aspects of learning that are usually not assessed in our school system. Badges evaluating knowledge were supplemented by badges evaluating students' behaviour during the learning process. While using badges designed this way we wanted to explore if this visualized and persistent feedback could motivate students to work more at school. Additionally, we believed that even students with poor school results are able to gain these badges, therefore they can experience success, which can motivate them too.

3.1 First Phase Methodology

During the first phase of the research two groups of students in the third year of study (age 17) were involved, while two remaining groups were taken as control groups. In total, 23 out of 47 students were given possibility to earn badges. All four groups were taught by the same teacher who was only an external member of the research team.

In this phase, 8 types of badges were used to award students: three badges for the knowledge evaluation – homework, test and thematic unit/topic; and other five badges for the behaviour evaluation that included badges for activeness, creativity, help, self-activity and the badge for innovation. Every badge was assigned one or two evaluation points according to pre-defined particular criteria; one in case of behavior evaluating badges and homework badge, and two in case of the other two badges. The aim of the students was to gain as many evaluation points as possible since several top collectors were promised to get a special reward in the end of the half year. The type of the reward was not announced beforehand. However, it had nothing to do with the regular assessment, thus badges had no impact on students' grades.

Students were rewarded with badges during the classes. Right after fulfilling the criteria, each student was informed in front of their classmates which badge they were given and for what activity. This way we aimed to allow the students to compare their results with each other and boost natural competitiveness in the group.

3.2 First Phase Results

After the school year was over, students were put in order according to the number of points and badges they gathered. Several of them – the best badge collectors – were awarded with special reward, which was actually sweets of different kinds (the more points the student gained, the bigger reward they were given). Students claimed their surprise and also satisfaction with the reward. In the end of this phase, students were asked to complete the questionnaire aiming to survey students’ attitude to badges and their opinion about the badges role in teaching. From the questionnaire outcomes we learned that badges were interesting for students and accepted by them as a complementary assessment as well. On the other hand, several students declared that they were not adequately informed about all badges they have earned, since badges were not visualized anywhere.

In the end of this phase, students were asked to complete the questionnaire aiming to survey students’ attitude to badges and their opinion about the badges role in teaching. From the questionnaire outcomes we learned that badges were interesting for students and accepted by them as a complementary assessment as well. On the other hand, several students declared that they were not adequately informed about all badges they have earned, since badges were not visualized anywhere.

After evaluation of data from the survey, an interview with the teacher was also carried out. We were surprised to find that he was probably not motivated to use badges in his teaching to those extent that we assumed he was. In our opinion this caused the insufficient promoting badges to students and resulted in rare rewarding students with badges as well.

We also examined students’ grades and compared them with their grades in the previous half year to indicate possible improvement. According to the results of this examination, average learning outcomes of students in all groups improved compared to their previous average grades. Improvement
was bigger in experimental groups than in control groups, which may be partially caused by the badges use.

Based on our findings in this phase of the research, we decided to introduce several changes. First, we involved the teacher closely in research team and motivated him to largely integrate badges in his teaching. He was better instructed in how to promote badges to students and how to notify them promptly about every newly gained badge. Further, the necessity of badges visualization was pointed out, thus they are accessible to all classmates. The last essential adjustment was in redesigning current badge set and the rules for awarding students for the earned badges. Also the rewards system was changed from rewarding students who occupy top positions to rewarding students who have earned certain types and amount of badges.

3.3 Design of the Badge Set

Prior to the second phase of the research, rules for couple badges used in the first phase were changed and several of new badges were added. This way the badge set was extended to 14 badges. Two more badges were added on demand of the teacher right after the beginning of the second phase. Our current badge set comprises three groups as described in details in the following text.

3.3.1 Behaviour Evaluating Badges

The set of badges designed for behaviour evaluating (shown in the first row of the Fig. 1) was adjusted and extended to 8 as follows:

- **Help** – for helping other students (e.g. if they find a bug in a friend’s program)
- **Teamwork** – for good handling the work in teams (students do not argue, they collaborate to complete a joint task)
- **Activity** – for active work at the lessons (student answers questions, pays attention, etc.)
- **Creativity** – if student’s product is better-looking, more complex, innovative compared to what was demanded (e.g. if student programmed new methods that were not assigned)
- **Expert** – for perfect knowledge of the lesson topic before the actual lesson or working in more professional software tool than it is taught (e.g. variables are to be taught in the lesson but this student can already use them in their programs)
- **Independence** – if student is able to work independently (they do not need help neither from the teacher nor from the schoolmates)
- **Progress** – if student improved their knowledge significantly at the lesson (they realized something very important or joined previously obtained information into a more complex one)
- **Punctuality** – for completing all of the homework on time

Students can earn one badge of each type per lesson or for one piece of work, only exception is Punctuality, which could be earned only once in the half-year.

3.3.2 Knowledge Evaluating Badges

To make the set of badges information-rich, we decided to evaluate also students’ outstanding educational results. Knowledge evaluating badges were designed as follows:

- **Homework** – badge awarded for bonus homework or bonus part of the regular homework. The solution had to be submitted on time.
- **Test** – badge awarded for earning at least 95% from test or at least 20% more compared to the last test. This means that students are able to gain this badge also for improving their results even if they are not the best.
3.3.3 Other Badges

Further, we decided to add a few more badges, which can be used if a student does something to improve their knowledge what is usually not assessed by evaluating points or a grade. We believe that noticing and admiring these aspects can also make students experience success and boost their attention at the lessons. We added five badges in this category:

- **Neat code** – for refined, optimal program. Although it is not usual to assess this ability by grades at this educational level, we consider it important. In our opinion, it is useful for students to think about this aspect of programming as well.

- **Correcting error** – for correcting teacher’s error in study materials or at the lesson.

- **Interesting fact** – for presentation of an interesting fact or current news from the field of informatics which is not a part of the curriculum.

- **Question** – for asking a question that will help the others to understand the topic better after answering it. (added on request of the teacher after beginning of the second phase)

- **Answer** – for answering an unusual, odd or tough question. (added on request of the teacher after beginning of the second phase)

Each of these badges can be earned for one piece of work / one situation. However, it is not supposed to be too easy to earn these badges.

3.4 Awarding Students for Earned Badges

The preliminary research results showed also the students’ suggestions to know about the type of reward for badges in advance and to link the reward with grading. In the second phase, we took these suggestions into account and changed the reward settings in three points. Firstly, we decided to announce the type of the reward to students beforehand. Secondly, we suggested two types of rewards, one of them related to the grading to a certain extent.

The reward of the first type was the possibility to get a better grade either by getting a chance to repeat one of the big tests (each of them makes about 30% of the overall grade) or by getting two more percent to the final grade. It is up to student which possibility they use.

Since we need to motivate also excellent students, who do not need to improve their final grade, we proposed the second type of the reward: an interesting IT excursion, e.g. visiting computer-game-making company together with the possibility to serve as a game tester.

Last change in awarding students was changing the rules in a way that student was able to gain a reward after they collected certain types and amount of badges, so that everyone was able to get a reward regardless of their peers performance.

3.5 Second Phase Methodology

Starting from the next school year we extended our research and involved also another high school in it. In each of these schools there was one teacher who employed badges into the teaching. At the first
school (S1), badges were used in four groups of third-year students (age 17), who had one informatics lesson per week and in one group of fifth-year students (age 19), who had four informatics lessons per week. There were 39 third-year students and 12 fifth-year students in these groups. At the second school (S2), three first-year students (age 15) groups and two second-year students (age 16) groups were involved. All of them had two informatics lessons per week. The number of participating students in first year and second year was 30 and 21, respectively.

Now both teachers were more motivated to use badges in their teaching and better instructed regarding the set of badges and the rules of using them. Again, students were rewarded with badges during the classes and immediately informed about every earned badge. Contrary to the previous phase, all badges gained by students were also shown on teachers’ own web pages together with students’ names and short descriptions of the tasks the badges were assigned for. The teacher of school S1 used also the wall board with paper badges together with the web page.

While the rules for awarding students with badges were the same at both schools, each teacher prepared their own criteria for gaining the special reward in the end of the half-year. At both schools, it was much easier to gain the first type of reward (G – the opportunity to improve the overall grade) than the second one (E – the excursion). Unlike in the previous phase, to obtain a reward students were not supposed to collect the highest number of random badges but to be awarded at least certain number of particular badges. The detailed own criteria (how many badges of which types) were set in cooperation with every teacher according to their experience, the topics taught, overall number of tests and homework planned, year of the study, etc.

### Table 1. Types and quantity of badges required to get the rewards.

<table>
<thead>
<tr>
<th>Type of badge</th>
<th>S1G</th>
<th>S2G</th>
<th>S1E</th>
<th>S2E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Behaviour (except for Activity)</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Behaviour (including Activity)</td>
<td>2</td>
<td>9</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Interesting fact</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Homework</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Test</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Neat code</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Topic</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

The Table 1. represents the badges required for gaining the rewards. First column is the type of the badge, second column (S1G) says how many badges need students of the first school to get the G-reward, in the third column (S2G) there is the count of the badges needed for the G-reward in the second school. Column S1E shows the badges required for getting the E-reward in the first school and respectively S2E shows badges needed for the E-reward in the second school. In here, behaviour badges are: Help, Teamwork, Activity, Creativity, Expert, Independence, Progress, Punctuality and also Correcting error.

### 4 RESULTS

The second phase of the research brought more results. During this half-year we regularly attended classroom teaching in several groups of school S1 to make a participant observation. We also periodically conducted short interviews with the teacher of these students every day after her teaching. Since one of the research goals was to find out the attitude of students to using badges in their informatics classes, we surveyed their opinions in a questionnaire in the end of this phase. Additionally, after this half-year was over, we conducted in-depth interviews with both our teachers as well.

From the data obtained, we can assume that teachers were motivated to reward their students with badges and students were motivated to earn badges as well. There were groups where students
competed for the badges – they compared the number of gained badges to each other and tried to have the most badges in the group. Some students were asking for the badge claiming they have deserved it, and it was also usual that a student drew the teacher’s attention to another student who should gain the badge.

The questionnaire was completed by 71 students, out of which 24 students were from the school S1 and 47 students were from the school S2.

One of the questions checked whether the students liked badges and why. At the school S1, 20 students reported badges to be a positive change, three students perceived badges as neutral and one student did not like the badges. According to the questionnaire, this student wanted to participate in the excursion but one badge was missing in his collection. From the positive answers, 11 students claimed that they perceived badges as motivation, for three students badges themselves were reward and appreciation of their skills and behaviour, three students liked the opportunity to gain the award and two of the students had another reason to like the badges. Only one student concentrated on the competition aspect of using badges.

At the school S2, there were 40 positive answers and 7 neutral or negative. 14 students reported that badges were motivational, 3 students wanted to earn badges because of the award they could gain. Unexpected but great result is that 9 students felt that the badge is appreciation, encouragement or recognition of their skills and only one student liked badges due to competition with classmates. Two students thought that badges were interesting and 11 students claimed they liked badges but did not mention a reason or the reason was not in the previous categories. Regarding the neutral and negative answers, one student did not feel badges as motivating enough, three students perceived the assessment with badges as pointless and three students reported no change in their perception of the lessons after using badges.

Further in the questionnaire, we tried to find out whether badges helped to boost the activity of students. At the school S1, 16 students claimed to work more to get badges, of which 7 students aimed for activity badge, 3 students tried to look for interesting facts and 6 students claimed to do something else because they wanted to obtain badges, two of them reported more than one activity done. At this school only 7 students declared they did not aim for any badge during the half-year.

At the school S2, only 11 students claimed not to do any activity for badges and 36 students tried to gain a badge by additional work. 6 of these students performed more than one task in order to get a badge, 12 of them tried to find an interesting fact, 5 students claimed to do optional homework for a badge, 5 students were active, two of them formatted or optimized their codes and 6 of them performed other actions to earn a badge.

Students’ willingness to work harder in order to earn badges was cross-checked also with the help of teachers. In the in-depth interviews, they were asked to express their opinion about this question. Both teachers shared the view that their students have worked more diligently in lessons, because they tried to earn badges. The participatory observation at one of the schools confirmed this statement – students appeared to be engaged in the informatics lessons and they also seemed to be working for badges.

Rewarding students with badges brought additional work to teachers. For instance, the teacher from the school S1 repeatedly mentioned a difficulty of rewarding students for their behaviour in the beginning of this phase. In the course of the year she explained that she needed to pay more attention to students’ behaviour during the teaching to be able to reward it. She would think about the behaviour of her students anyway, but she would have more time for it if she did not use the badges. However, she expressed her readiness to use badges also in the future, because in her opinion “it is something new, a positive change and it seems to be motivational for students”.

5 CONCLUSIONS

In our research, we focused on gamification in secondary school informatics classes, in particular on motivational effect of badges used as a complementary assessment. We proposed a set of badges together with a methodology of their employment in informatics classes. Both badges and methodology were designed and adjusted during two iterations and tested at two grammar schools. Results of participatory observation showed that students not only accepted badges as a new form of feedback and motivation, but also take them for a reward itself. They often compared their collections
of badges, competed in earning them, were asking for the badge after fulfilling some criteria and also urge the teacher to award another student a badge for their performance.

The findings of the first badges iteration showed improved students learning outcomes in informatics classes that could be at least partially related to rewarding students with badges. However, not all of students expressed their enthusiasm for this virtual award. Therefore, in the second phase we focused more on motivating them (e.g. through well-motivated teachers) and on improving their attitude to badges.

Students' opinion about badges was surveyed in a questionnaire, from which the following results were drawn. Nearly 85% of students perceive badges as a positive factor in the informatics classes. Most of them find badges motivational (35.21%), interpretem them as a reward or appreciation (16.9%), like the possibility to gain a special award for badges (8.45%), etc. Only a few students perceived badges neutral (8.45%) and even less of them (7.04%) did not like the badges.

Students answered also the question which activities they were willing to do or how they changed their behaviour in order to earn badges. More than 74% of students reported their changed behaviour or some additional activities done because of this award. They were searching for interesting facts in IT world (21.43%), were more active at lessons (17.14%), did optional homework (8.57%), optimized their programming codes (2.86%), etc. Only 25.71% students did not intentionally changed their behaviour for a badge.

We consider these results successful because they clearly show that badges, when properly used, can be attractive for students and students tend to be more active in lessons if they have a possibility to earn this virtual reward. Moreover, a number of students viewed a badge more as a sign of appreciation than as a medium for competition. Students demanding a badge for their peers is a usual scene, so we believe that badges do not harm pleasant atmosphere in classes.

In the next phase of the research we are focusing on improving badges visualization. We are working on incorporating badges into our learning management system using a standard allowing to share them anywhere on the Internet. We hope that including ability to show the badges to the world can make them even more motivating. We are also monitoring the groups from the previous research to determine the outcomes of the badges on student long-term motivation.

REFERENCES


