Challengelt: A new learning style for the Net Gen

CHRISTOPHE TOURET

EMBRY-RIDDLE AERONAUTICAL UNIVERSITY

GRADUATE RESEARCH PROPOSAL

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<tr>
<td>Student</td>
<td>Mr. Christophe Touret</td>
<td></td>
</tr>
<tr>
<td>GRP Advisor</td>
<td>Dr. Shafagh Jafer</td>
<td></td>
</tr>
<tr>
<td>MSE Coordinator / Department Chair</td>
<td>Dr. Remzi Seker</td>
<td></td>
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ABSTRACT

Students of Net Gen are immersed in a digital and interactive environment including social networks and instant messaging. On the other hand, the serious games market is blooming, and current study demonstrates that gaming has real pedagogic potential which is still unexploited. However, despite the waves of new technologies, the educational system has remained mostly intact, and has not provided the student with digital entertaining environments. This research work is proposing ChallengeIt, an innovative approach that integrate in the classroom an interactive game-based environment that use challenges. ChallengeIt is seeking to respond to Net Gen expectations by providing an environment similar to what they are used to with popular mobile applications of nowadays. As an assessment, ChallengeIt will be used in an undergraduate Software Engineering course in Fall 2014. ChallengeIt aims that students will getting more involved in class activities, and they will be more likely to persist far in excess of the primary imposed requirements.

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1. INTRODUCTION

Up-coming generations of students are real digital natives, technology is part of their everyday life, and they are immersed in interactive environments using social networks or instant messaging applications. Indeed, current study suggests that Net Gen students are more likely to engage digital interaction than to interact with other students or the instructor when in a face-to-face learning environments. [1]

However, despite the waves of new technologies, the educational system remain mostly intact and does not provide the expected technologies in the classroom. Besides, nowadays, it is simple to enhance education with digital interaction for Net Gen’s students because most of them own suitable devices. [2]

In parallel, current study shows that digital gaming has largely unrealized pedagogical potentials [1]. Indeed, game-based-learning forces student to take an active approach to learn with rapid feedback and clear consequences leading to higher engagement and improved learning [3].

Games are environments specifically designed for players to experience interactively through play, and serious games are games designed for serious purposes [4]. The French ministry of education and research distinguished five categories of serious games considering their purposes [5], namely:

- Advergaming, which refers to advertising,
- Edutainment, which refers to educating,
- Edumarket game, which refers to educating to a market,
- Engaged game, which refers to denouncing political issues,
- Training and simulation, which refers to training to a task or simulating virtually a real phenomenon for analysis.

Serious games seems to be a promising approach for these purposes, and in fact, the serious game market is blooming with an impressive growth. According to a study from the Audiovisual and Telecommunication Institute of Europe (IDATE), world Serious Game market, which was worth 2 billion dollars in 2010, will worth 14 billion in 2015. [6]

It seems that the educational systems pending for new learning styles integrating technology and the spirit of gaming into the classroom.

In this research work, the goal is to propose an innovative approach for enhancing student-learning experience by incorporating a teacher-monitored technology into the classroom, so that lectures would evolve from the one channel communication of “hearing” into a fun, immersive and interactive learning environment. To respond to that goal, ChallengeIt will be conceived, a mobile application solution based on the concept of challenging the user.

ChallengeIt aims at responding to the following main concerns:

- Enhancing student’s involvement and motivation by using a game-based environment.
- Providing a learning style suited to Net Gen’s students by making them use their everyday mobile device in a similar way of what they are used to.
- Allowing communication with a variety of format including photos and videos.
- Keeping the class interactions under the control of the teacher.
- Being general so that it is the suitable for all kind of classroom context.
- Being simple, affordable and easy to set up.
- Motivating the students to persist far in excess of any externally imposed requirements by using challenges.  

1 It is being part of the ideal learning [1].
Providing feedbacks via the interactive environment.
Allowing real life problems to become students’ challenges.

The main contributions of the research work will be the proposal of a new approach for integrating an interactive and entertaining environment in the classroom, and an assessment of it by doing a case of study in an actual classroom. The assumptions of that research work are that the student will be motivated by an interactive environment in the classroom similar to what is used to in his everyday life, and that the gaming aspect based on challenges will enhance his motivation and involvement in the class subject for working in excess of the course’s primary requirements.

2. STATE OF THE ART
This part is briefly reviewing different attempts for integrating digital technologies in the classroom. It is not made to be exhaustive but simply for understanding what are the different approaches available today and what are their limits. Three categories were investigated: edutainment games, mobile apps, and interactive tools in the classroom.

1. EDUTAINMENT GAMES IN THE CLASSROOM
This subsection is considering two edutainment games to be integrated in the classroom: “Innov8” and “Kids and Cookies”.

- Innov8 by IBM is a serious game that simulates a business environment to illustrate how Business Process Management (BPM) could be used in the professional world [7]
- Kids and Cookies is an interactive game designed for elementary students. The game is an interactive way of introducing number concepts. Users simulate sharing cookies while investigating the concepts of rational numbers and division [8]

Edutainment games address specific subjects and they incorporate the specific knowledge that the user should learn on the subject. The serious games being as complex as the subject they are addressing, their development could become easily limited financially, especially for high level and complex courses. Lastly, in the two examples previously presented, the teacher as no control upon the interactions.

2. INTERACTIVE CLASSROOM TOOLS
Microsoft conceived an interactive classroom, which is a PowerPoint, and OneNote add-in that allows the teacher to insert customized classroom polls and notes into his presentation in real-time. [9]

However, this proprietary tool is not containing any gaming or entertaining aspect, and is not suitable for student’s mobile devices. Other interactive tools for classroom like interactive board also remain purely academic and does not contain an entertaining aspect.

3. APPS IN THE CLASSROOM:
The success of mobile application in Education can be proved by their number, for example, App Store is recording 65,000 apps for education. Apps in the classroom are usually either simple serious game specific to a subject, or utility apps that are used as a learning tool. Serious games have specific knowledge incorporated into the app, and allows the student to study or to train for a specific subject. Utility apps can help the student

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during classroom like Moment Diary, which is private diary that assists the student to collect learning contents. [10]

4. CONCLUSION ON THE LITERATURE:

From the attempts of integrating digital technologies in the classroom that were reviewed, it seems that the current entertaining approaches are trying to replace the teacher for a specific training more than to provide an interactive environment. On the other hand, interactive tools are remaining utilitarian and academic, and are not considering the advantages of the game approach. Furthermore, it seems that the more complex is the learning subject, the more complex and expensive the solution is to be developed.

3. PROJECT REQUIREMENTS

1. PROJECT VISION

OVERALL DESCRIPTION

The underlying project, namely ChallengeIt, proposes an innovative approach based on challenges for creating an interactive game-based application to integrate in the classroom. ChallengeIt is harnessing the power of challenges with an interactive mobile application. As current study explained, educators should use challenges in a serious gaming context to improve learning. [11] However, oppositely to usual serious games, ChallengeIt will not contain any incorporated knowledge. Our contribution resides in establishing a teacher-monitored interactive platform that emanates a challenging dynamic for the student.

For ensuring its success and acceptance upon students, the application will incorporate a similar ergonomic navigation that the popular apps like SnapChat and Facebook Messenger, but with its own particular look. A rich variety of format is available to participant member for the interacting including the use of multimedia. As it is necessary in a game, there is a winner, one for each challenge made and the total score of each student should exposed, so that student can enhance their motivation with the competition aspect of the game. With ChallengeIt, the class changes into a game. In parallel, it is a tool for the student to collect and record their works and feedbacks in one environment.

Separately, in high-level classes, external actors might use ChallengeIt for suggesting their own challenges to the students. In that way, problems of the real world might become the challenges of the students. Concretely, ChallengeIt will be a communication app that students can download on their Android device. Each game may correspond to a class but also to a group. For each game is required a master that control the game and players that play the game. The user could navigate between different frames:

- one frame will show a list of all the ChallengeIt games of the user in which he is playing on,
- one frame will show a list of all the ChallengeIt games of the user in which he is the master of,
- one frame will allow the user to create a message by either taking a picture/video, sharing a file or writing text,
- one frame will allow the user to access/edit settings and his profile information,
- one frame will allow the user to find other users and add them as “friend”.

By clicking on a ChallengeIt game in the first frame, the user can access the current and past challenges of the selected game as well as the score accumulated. The second frame will be used for creating a challenge or for responding to one. In the case of a challenge creation, the user shall add time and score points to the message.

2 In agreement with the students. The application will exposed the rank of the agreed students only.
If the challenge is created by someone else than the teacher, the teacher should approve the challenge in order to be broadcasted. At the end of the semester, the score of the student could be used for attributing a participation grade or extra-credits.

**Environment**

It was decided to implement *ChallengeIt* on Android because Google Play is today the most widely used mobile platform and it is the most accessible considering the lower cost of certain Android devices.

**Top-level requirements**

This is exposing the main top-level requirements. *ChallengeIt* aiming at having a game aspect, it has *user*\(^3\), i.e. a person using the application, and a *master*, which has specific rights, i.e. the teacher. A *player* is a user that is playing a game, i.e. following a classroom. The system shall:

- Allow the player to suggest a challenge to the master.
- Allow the master to weight a challenge with points.
- Allow the master to affect a time constraint to a challenge that disable challenges’ responses after which.
- Allow the master to broadcast a challenge to players of a game using video, photo, file or text.
- Allow a player to submit response to a challenge using video, photo, file or text.
- Allow the master to provide score feedback to each submitted response.
- Record each submissions.
- Allow the master to access to every submissions.
- Allow the user to access the challenges’ informations in which he is involved.
- Allow public challenge in which all players’ submissions are accessible by the player of the class.
- Allow private challenge in which all players’ submissions are not accessible by the other player of the class.
- Expose the winner name of a challenge.
- Expose the rank and current scores of the public players.
- Allow a user to be a private or a public player

**Stakeholder**

Educational institutions

**Users**

- Professor
- Students
- External Challenger

**Constraints**

Student privacy laws

Human subject

\(^3\) A user could be a student or an external person accepted by the master that want to challenge a class.
2. Functional Requirements – Use Case Mode

Use case context diagram

When the master is associated with a use already associated with the user, it means that the master has specific rights. For example, the master can access, modify and delete content of the game.

Use case fully dressed

UC1. Create a game
1. User creates a game and becomes the master.
2. Master adds a name to the game.
3. [Optional] Master adds a description to the game.

UC2. Manager players

Extends UC1
1. Master adds users to the game.  

Extensions:
1.a Master delete players from the game.

UC3. Make a message

If requested by the user do step 1 and 2.

---

4 They become players of the underlying game
1. User goes on the message creation frame
2. User writes a text
3. User attaches a file
4. User add video, a photo or a voice record
   While user does not validate the media, restart step 4.

**UC4. Make a challenge**

Extends UC4.

If the user is a master, skip step 1
1. Submit the message to the master
2. Master adds time
3. Master adds score

**UC5. Edit a challenge**

1. Master can modifies the time, the score and the message of a challenge.

**UC6. Broadcast Challenge**

1. Master broadcasts a challenge to the game’s players.

**UC7. Respond to a challenge**

1. User responds to a challenge
2. User makes a message

**UC8. Rate a response**

1. Master rates a player response.

**UC9. Create profile**

1. User adds a username
2. User adds a password
3. User confirms the password
   While the two passwords do not match, redo steps 2 and 3.
4. User adds an email address.
   If wanted by the user
5. [Optional] User adds a picture profile

**UC10. Edit profile**

1. User modifies the username, password, email address or picture profile.

**UC11. Delete profile**

1. User deletes its profile.

**UC12. Access game**

1. Player accesses the list of challenge of its games.
2. Player clicks on a game.
3. Player accesses the challenges and player rank of the game.
UC13. Edit game
1. Master can manage players, edit/delete challenges and change game’s name/description.
2. Master clicks on a game.
3. Master accesses the challenges and player rank of the game.

UC14. Manage players
1. Master add or delete players of the game.

UC15. Access user profile
1. A user accesses the profile of another user

UC16. Access challenge
Extends UC13.
1. Player a clicks on a challenge.
2. Player accesses the challenge’s message, time and score.

UC17. Leave a game
1. Player leaves a game

UC18. Delete a game
1. Master deletes a game

 NON-FUNCTIONAL REQUIREMENTS

 GLOSSARY

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<th>Term</th>
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<tr>
<td>User</td>
<td>A person that is using the application</td>
</tr>
<tr>
<td>Master</td>
<td>A user with specific rights that allow him to monitor the game</td>
</tr>
<tr>
<td>Player</td>
<td>A user that is playing a specific game. A user become a new player for each new party he started.</td>
</tr>
<tr>
<td>Message creation frame</td>
<td>A frame that allows the user to create a message.</td>
</tr>
<tr>
<td>Message</td>
<td>A message can be a text and/or attached files and/or a media. A media is a either a photo, a video or a voice record.</td>
</tr>
<tr>
<td>Profile frame</td>
<td>A frame that allow the user to manage his profile.</td>
</tr>
<tr>
<td>Profile</td>
<td>Set of attributes characterizing and identifying a user.</td>
</tr>
<tr>
<td>Games frame</td>
<td>A frame that display in a list all the games the user is currently playing at.</td>
</tr>
<tr>
<td>Rating</td>
<td>An assessment of the player submission by attributing a “grade” with a number of stars between zero to five.</td>
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 4. FUNCTIONAL ANALYSIS AND DESIGN
1. **Analysis Domain Model**

In the scheme below is exposed the different conceptual objects and their relations.

![Figure 1 Domain Model Diagram](image)

2. **Story Boards**

A new user should sign in into the application via his google account. Because the Google account can be retrieve using android permission, the user should just allow us to access his Google account. Being signer in, the user when entering into the application, can access five different fragments from the main activity as shown in the following figure.

![Figure 2 Main Activity Fragments' Navigation](image)

**Message Creation**
In the same way of popular apps like Instagram or Snapchat, Challengelt was conceived to be a message-oriented app. The user create his message and then decide what he wants to do with it. One of the main innovation of Challengelt is its new way of creating messages. It was specially conceived to allow the user to enjoy the variety of media offered by the mobile devices combined with the usual functionalities of the email system. Thus, the message creation is composed of two parts:

- A media fragment, in which users can take a picture, a video or a voice record.
- An email fragment, in which users can write text, and attach files.

By opening the app, the user is directed into the initial mode (a) where he can start recording a media or swipe down the dashed T for accessing to the email part. By swiping the email part up and down with the dashed T button (or the dashed square button) the user can go thought different modes : the full text mode, and if he has already had recorded a media, the full media mode (b) or the dual mode (d). Every part of the message are editable so that the user can validate the message only when he is satisfied of it. The validation is done when he decides to make the message into a challenge or into a response of a challenge by clicking on the appropriate left button of the action bar.

(a) Initial Mode  (b) Full Media mode  (c) Full Mail mode  (d) Dual mode

Figure 3 Create Message Modes
GAME

A user can either play to a game or master it. He can thus access to two different list: the list of the games he is mastering and the list of the game he is playing. From each of these lists, he can access to the challenge list of the game selected.

Figure 4 Games and challenges lists

As the picture (a) of the figure 4 shows, a game item contains the title and a short description of a challenge, the player name of the user for the game, the actual score of the game (in green), the number of challenge current available and the total score that the user can earn by doing these challenges.

As the picture (b) of the figure 4 shows, a game contains a list of the player ordered in function of their score. Then another fragment contains a list of the challenges ordered so that the most recent challenges are first. A challenge item contains the title challenge, a short description, the number of day left to complete the challenge, the score value of the challenge and a thumbnail of the media. If the challenge was completed, a picture of the winner is displayed instead of the media thumbnail, and when clicking on the item, the user can see the winning message response.

For all other main functionalities or navigation among the views, see the figure 5.
Figure 5 Navigation among the game part

**CREATE GAME**
As shown in the pictures on the right, the user can easily create a game by setting up some basic settings of the game and by selecting player among his friends.

**EDIT PROFILE AND SETTINGS**

As shown in the pictures on the right, the user can easily edit his profile and settings by changing his picture, by changing his username or by changing settings related to the app.
5. Design Model

High level diagram

For each technology used: explain the technology and say how I use it in the project, justification

Presentation
Why this choice?
How is it used in the project

1. Google App Engine

- Client endpoint easily generated for the different client platform.
- Maintainability and reliability supported by Google
- We pay what we use only

2. Datastore

Datastore is a highly scalable and highly reliable database that Google offers for App Engine. It is a NoSQL database and it differs from traditional relational database in many ways. It is a less structured database that the RDB but much offer different advantages:

- Scalability
  - Automated sharding (Bigtable)
- Reliability
  - Replication (Bigtable)
  - Transaction (Megastore)
- Performance
  - Reduced lock granularity and co-location of data. [1]

There is no tables but kinds containing not rows but entities that have not fields but properties. Every entities are associated with a unique key, which make their research possible.

How to make query

Bigtable, which is the underlying structure of the Datastore where the object are store does not support query because there is no column to go through. All entities (rows) of a kind (table) can only be search on a key. In order to make queries, the Datastore use in Index Table for properties on which the query should be possible.

There is then a trade-off between a RDB and the Datastore because if we want to allow all kind of queries, there is a need to build multiple index table. Because these index tables can by term take a lot of space if we want to allow a large amount of different queries, the cost of the Datastore can be higher than the one of a RDB.

Cloud Endpoint
Offer a REST API.
- Api explorer
- Many endpoint API can coexist
- Auth 2.0 built-in

Glossary of terms

6. Assessment and Results
Cases and scenarios about how the project will be used at the end.

7. Discussion and Conclusion

8. Future work

9. References


