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Published in:

2019 IEEE 19th International Conference on Advanced Learning Technologies (ICALT)

DOI:

[10.1109/ICALT.2019.00027](https://doi.org/10.1109/ICALT.2019.00027)

Publication date:

2019

License:

Unspecified

Document Version:

Accepted author manuscript

[Link to publication](#)

Citation for published version (APA):

De Troyer, O., Maushagen, J., Lindberg, R., Muls, J., Signer, B., & Lombaerts, K. (2019). A Playful Mobile Digital Environment to Tackle School Burnout using Micro Learning, Persuasion & Gamification: Design Approach & Architecture. In *2019 IEEE 19th International Conference on Advanced Learning Technologies (ICALT)* (pp. 81-83). IEEE Computer Society. <https://doi.org/10.1109/ICALT.2019.00027>

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A Playful Mobile Digital Environment to Tackle School Burnout using Micro Learning, Persuasion & Gamification

Design Approach & Architecture

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Abstract— School burnout refers to exhaustion at school combined with a cynical and detached attitude towards school. It often precedes Early School Leave (ESL), which has great impact on the socioeconomic situation of a person. Numerous local programs exist to deal with school burnout and prevent ESL, but they are all very labor-intensive. To come to a less labor-intensive solution, we proposed an ICT solution. The goal was to create an engaging software environment that youngsters would use voluntarily and that could re-engage them in learning. We developed a so-called playful digital environment, called TICKLE. It allows youngsters to collect digital cards by performing associated challenges in their surroundings. The challenges are small activities intended to reactivate the youngster for learning. Persuasive principles and gamification are used to motivate the youngsters to use the tool. In this paper, we discuss the design decisions that have been taken as well as the main components of the tool.

Keywords- school burnout, unconscious learning, playful environment, persuasion, mobile, location-based, personalization

I. INTRODUCTION

School burnout refers to exhaustion at school, a cynical and detached attitude towards the school, and feelings of inadequacy as a student [1]. It often precedes school dropout, also named Early School Leave (ESL) [2]. Early school leavers only qualify for jobs with lower earnings, which has great impact on their socioeconomic situation [3]. Therefore, the issue is high on the political agenda. Europe 2020 aims for reducing ESL to less than 10% [4]. Although Belgium has already met the 2020 target (in 2016, Belgium's ESL average was 8.8%), ESL remains high in the Brussels Region.

Within the Brussels Region, numerous programs exist concerning school burnout and ESL [5], ranging from offering customized training projects and individual coaching, over time-out trajectories aiming to bring the student back into the classroom. Although valuable, these projects are very labor-intensive. To come to a less labor-intensive solution, in particular to deal with school burnout, we started a research project with the objective to develop software usable to reactivate and re-motivate youngsters suffering from school burnout. We developed a mobile digital environment that should stimulate youngsters to explore their environment in a meaningful and playful way.

To keep youngsters engaged, persuasive techniques and gamification are used. Note that the goal is not to replace school learning activities, but to reactivate students and increase their self-esteem.

In this paper, we motivate the main design decisions and principles used for achieving our goal. We also explain the main components of the system, as well as future work.

II. DESIGN DECISIONS

Literature studies were performed to investigate the state of the art related to the different aspects of the project. We investigated studies on computer and media use among youngsters in Flanders and Brussels, studies on school burnout and ESL, as well as on motivation and persuasive strategies as we want to stimulate the youngsters to keep using the software for a long period to induce behavioral change. The full reports can be found online: [6], [7], and [8]. Here is a summary of the main findings:

1) Computer and Media Use among Youngsters:

Youngsters appear to have good general computer skills and experience with the Internet. They also regularly share their own material online. They exhibit a clear preference for smartphones and are using them daily; tablets are used less. Therefore, we decided to adopt **smartphones**. The Internet is well spread and most youngsters do have access, moreover the availability of the Internet is only increasing. Therefore, we opted for an **Internet-based application**.

2) Early School Leave (ESL) & School Burnout:

ESL is a complex problem. A large variety of factors can play a role: the youngsters' macro and micro environment, and individual characteristics. None of these factors are conclusive for explaining school burnout and ESL and therefore programs should rely on a wide body of information. For this reason, we will include an **elaborated user profile** to adjust to the situation and the individual.

3) Persuasion:

Fogg's Behavioral Model [9] and Nir Eyal's Hook Model [10] are frameworks on persuasion and behavioral change.

Fogg's Model offers three factors that determine whether a person will perform a certain behavior or not: *motivation*, *ability*, and *trigger*. Motivation can be distilled to three pairs of core motivators: pleasure and pain; hope and fear; and social acceptance and social rejection [9]. Ability relates to

the available resources, e.g. available time and money; required physical effort and brain cycles (i.e. cognitive strain); social deviance; and non-routine (i.e. unfamiliar) behavior. The trigger is the element that sparks, facilitates or signals the target behavior. Triggers are most powerful when they are provided at the right place and at the right time. This last observation is an argument in favor of **keeping track of the youngsters' performance and activities**. This model also indicates that ability is important. Therefore we should **carefully adapt the activities to the ability of a youngster**.

The Hook Model [10] presents a practical approach to build new habits or behavior. Ideally, that new behavior becomes an automatic response to a situational cue or trigger. Unfortunately, changing long-term user habits is hard, since old habits die hard while new habits quickly dissipate. Therefore, the Hook Model proposes a cycle through which the user must repeatedly move to gradually develop new neural pathways, i.e. internal triggers. A single cycle starts with a *trigger*, either external or internal. First, external triggers (similar to Fogg's triggers) are used to stimulate the user to perform an action. Internal triggers should gradually develop as the user move through multiple iterations of the cycle. They represent a mental association between the new behavior and specific thoughts, emotions, or existing habits. As such, they align with Fogg's core motivators. When these triggers have effect, the new behavior becomes a habit.

Every trigger should be followed by an *action* from the user. In accordance with Fogg, Eyal argues that actions can only be triggered if the user possesses sufficient motivation and abilities to perform the action.

The next phase in the cycle is the *reward* phase. Rewards are used to reinforce the user's motivation for repeating the action in the next cycle. Eyal stresses the importance of *variable* rewards to avoid that the effect of the reward fades away because of predictability.

The last phase of the cycle is the *investment*. Investment includes everything that the users voluntarily supply to the system: commitments by means of time and effort (e.g. to acquire skills), data (e.g. preferences, content), social capital (e.g. friends, followers, reputation), or even money or virtual assets. The purpose is to increase the likelihood of the next pass through the cycle. The more a user invests in a system, the less likely it is that (s)he will stop using the system.

According to Cialdini [11], persuasive techniques take advantage of our tendency to use shortcuts to respond to social situations. This tendency is embedded deep into our brain as a solution to the multitude of social interactions in which we must engage with our limited resources. Therefore, it is often hard to resist persuasive techniques. We found many different principles, such as reciprocity, commitment and consistency, social comparison and social proof, similarity or liking, authority, and scarcity. In the last years, it is recognized that a "one size fits all" approach does not work in persuasion. Different authors studied the effect of different persuasive principles in relation to e.g. differences in personality [12], [13], gender and age [14], and culture [15]. These findings are another justification for **an elaborated user profile**.

III. DESIGN PRINCIPLES

In this section, we describe and motivate the main principles selected for the design of our solution.

1) *Mobile 2.0, Unconscious & Micro Learning*:

Through the use of mobile devices and social software, youngsters access, create and share content based on their own interests and those of their social networks [16]. This trend is called Mobile 2.0, and refers to the integration of Web 2.0 services (collaboration, communication and user-generated content) with mobile technology. It allows people to connect and create communities based on shared motives and common interests. These social, informal experiences are very often the foundation of learning [17]. Given our target audience, any form of school-related learning should be avoided because this will trigger negative emotions. Therefore, we aim for a form of **unconscious learning** [18] and **Mobile 2.0** seems to be perfect for this.

Furthermore, we follow the principle of **micro learning** [19], where learning takes place with small chunks of learning content and flexible technologies enabling easy and 'on the move' access. This approach fits the characteristics of our youngsters and will make it easier to realize our goal.

2) *Playful Environment*

A playful learning environment (PLE) refers to *a technology-enriched play and learning environment that blends indoor and outdoor spaces to create a playground for exploration, narration and imagination of information and knowledge* [20]. The general goal is to advance the learner's activity, self-directedness and curiosity by offering challenges and problems that take into account the individual characteristics of the learner. This concept is very suitable for our purpose. Therefore, we aim for a digital environment that acts as a **playful interface to the manifold information available in the environment of the youngster** and use these as a basis for unconscious learning.

Related to playfulness is the concept of gamification, which refers to the use of game elements in a non-game context in order to encourage and motivate users [21]. Because motivation is important for inducing change behavior, we will also apply **gamification**.

3) *Personalized Approach*

As pointed out, a "one size fits all" approach will not work. Therefore, a **personalized approach** will be applied, meaning that what will be offered, how and when, will be adapted to the needs of the individual user and will dynamically respond to the user's behavior.

IV. TICKLE: MAIN MODULES

The main component of TICKLE is the **Playful Environment**. This is a mobile location-based application composed of a **Cards module** and a **Diary**. The Cards module displays a (geographical) map on which cards are marked (see Figure 1 - left) that the youngster can collect by performing the associated challenges when (s)he is nearby. Note that in the beginning and depending on the characteristics of the youngster, the challenges can be quite simple (e.g. taking a picture) in order to not demotivate the youngster, but more advanced activities are possible, like

performing a quiz or a small game. By collecting cards the youngsters can gather points that can be used to obtain rewards (variable). This card collection phase actually spans the action, reward and investment phase of the Hook cycle and will be preceded by the trigger phase taken care by the **Notifier** that will give the right triggers at the right moment. The **Matcher** is used to propose cards to the youngster. Both do this based on the user's profile and the user's activities.



Figure 1. Left: Geographical map view; Right: Example Card

In the **Diary**, the youngster can see his/her achievements and compare them with the achievements of peers (persuasive principle of social comparison). This Diary also implements the investment principle of the Hook Model.

TICKLE further provides an authoring environment for creating cards (**Card Editor**) and one for maintaining the users' profiles and inspecting their progress (**User Manager**). Creating cards is based on templates and external learning authoring tools can be used for creating more advanced challenges like quizzes, or time line exercises. Currently, the BookWidgets tool [22] is integrated for this purpose. The User Manager allows professionals in the ELS domain to fill out and maintain the youngsters' profiles. Also the activities performed by the youngsters, as well as the collected cards can be consulted through this module.

V. CONCLUSIONS & FUTURE WORK

We propose a playful environment to tackle school burnout, called TICKLE. It is a mobile, location-based application that offers youngsters an interactive environment in which they can explore their surroundings by performing small challenges and in this way learn in an unconscious way. We justified the design decisions taken, the principles used and discussed the main components of the system.

A functional prototype is available and different pilot evaluations have been performed. A longitudinal evaluation is being prepared. We also plan to allow youngsters to create cards themselves. This will contribute to the investments made by the youngsters but also to the fact that youngsters like to share their own materials online.

ACKNOWLEDGMENT

This project is supported by a FEDER/EFRO grant.

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