Feeling at Home form the First Day: Using Mobile Location-Based Games for Welcoming New Students

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Abstract: New students' orientation events in Higher Education typically focus on information delivery (rules, duties, procedures, etc). Consequently, new students might feel overwhelmed, lonely and anonymous. Our study describes an attempt to take advantage of the mobile technology available to all for conducting an active orientation event that addresses students' needs for safety and belonging and focuses on their emotional experience rather than on information delivery. The main activity during the event was a "treasure hunt" game played throughout the campus, using students' personal smartphones. The game was developed with Treasure-HIT, an authoring system that enables the design of location based games and activities operated by mobile devices. At the end of the first day of their studies (a week after the orientation event) students who participated in the event and students who did not, described their feelings regarding the new beginning. The psychological wellbeing of the students who participated in the orientation event seemed to be markedly higher that those who did not: they felt more at home, with a better sense of orientation in the campus and a sense of belonging, having already formed friendships. The findings suggest that team location-based games supported by mobile technology may efficiently support the adjustment and socialization of new students. The paper further describes the scaling-up potential of Treasure-HIT based orientation activities as manifested in spontaneous self-directed adoption of the system for supporting similar events conducted in schools.

Keywords: treasure hunt, location based game, mobile learning, orientation, scaling-up

1. Introduction

Orientation programs in higher education are meant to facilitate students' transition from previous settings (e.g. high school, workplace) to the academic culture (Upcraft and Farnsworth, 1984; Ward-Roof, 2010). Initial induction programs are of particular importance since they set the tone and build students' expectations for consequent orientation and socialization processes (Shobrook, 2003). First meetings and organizational introduction events typically focus on the delivery of information and on technical and procedural contents. Students typically feel anonymous and isolated during such events, experiencing an overload of information.

Yet, in recent years some organizations recognize the flaws of 'information-only' introductions and try to create events that are highly emotional and experiential (Tyler, 1998; Lines, 2011). Being experiential, such events are memorable (Buchanan, 2007) and might even reduce turnover (Hacker, 2004). Similarly, some Universities and Colleges realize that besides providing information, induction to higher education should address students' needs, particularly those related to psychological security and a sense of belonging (Billing, 1997; Carter and McNeill, 1998; Maslow, 1954).

An example of such a 'student centered' induction approach is reported by Poblete et al. (2006) who describe the orientation program at the school of engineering in the University of Chile. The activity took place during two days, a week before the beginning of the semester. The new students participated in a series of challenging activities which encouraged them to get to know one another, become familiar with the campus, and get a better notion of the challenges they will be facing as engineers. The impact of this experience was assessed by a questionnaire administrated after the induction. Participants' replies (80% of the cohort) were compared to non-participants (20% of the

cohort) and to second year students which did not participate a year before in an induction event. The comparison revealed a positive impact of the induction experience on participants' well-being, their sense of belonging, closer relationships among peers, and trust on the school of engineering's commitment to teaching.

The recent availability of advanced mobile technology offers new opportunities for extending instructional activities beyond the traditional boundaries of the classroom (Giemza, Verheyen and Hoppe, 2012; Sébastien and Audrey, 2011) and attempts to adapt them to different kinds of outdoor and indoor spaces (Kukulska-Hulme and Traxler, 2005; Sung et al., 2010). Several studies suggested taking advantage of this technology for coping with the challenge of supporting the orientation of new students arriving to an unfamiliar campus.

Curran and Huang (2008) describe an attempt to assist overseas students' induction to campus using mobile technology for providing web based multilingual information about locations and services that may be useful to students who do not master the local language. In this study the mobile technology was offered on demand, only as an information platform.

Coping with the goal of actually engaging participants in an activity strongly suggests using a gamification approach. Schwabe and Göth, (2005) designed a gaming supplement for the traditional orientation rally, a fun event intended to get to know the university and its surroundings. The rally led all participants through relevant sites in the campus with several tasks to carry out at certain spots. The MobileGame added to the rally was operated with small handheld computers provided by the university. The students played a 'hunting and hiding' game against each other, individually or in small groups. Fitz-Walter, Tjondronegoro, and Wyeth (2012) describe an effort to design a mobile application, based on gamification principles, that was meant to deal with students' reports (derived from previous orientation events) of feelings lost, having trouble meeting new friends and finding what services and events are available on campus. The gaming element was based on achievements: the players gained scores by completing challenges such as finding locations, answering informational questions about campus services and facilities, adding phone numbers of new friends and checking-in to relevant events. The scores for each set of challenges were presented on a leaderboard and students who completed a set could enter a draw for prizes *(*iPad 2 and gift vouchers). The game was conducted during a period a four weeks including the orientation week. Challenges could be updated and changed in the application during the game period using a web-based Content Management System.

The mobile games described in these studies were based on dedicated environments especially designed and developed for supporting orientation on new students in the specific campuses. Our goal was to explore the possibility to adapt a generic game approach and system for supporting students' activities during orientation events, in order to enable easy adoption by any institution.

One of the classical approaches to location-based learning is Treasure Hunt type games. In such games, participants are challenged to identify specific sites according to clues and to physically reach these sites. Additional activities could be assigned at the sites as a condition to advance in the game. Mobile technology can provide direct support for such games by tracking participants' locations in real time, presenting the game clues in various multimedia formats, enactment of pre-planned interactive activities related to the sites, collecting and sharing digital information contributed by the participants, communication among participants and between them and the game's instructor, and controlling the activity by the game manager. Various types of mobile treasure hunt environments were developed in order to create such games for different purposes (Spikol and Milrad, 2008; Hooper and Rettberg, 2011).

In this study we used the Treasure-HIT system (Kohen-Vacs, Ronen and Cohen, 2012) for creating and enacting a mobile game for welcoming new students, while taking advantage of the personal mobile technology (smartphones) available to all. In the following sections we shall briefly introduce the Treasure-HIT system, describe the design of a Welcome game and its implementation with students and present the results of the evaluation study. We shall then describe the first phases of the scaling-up of this approach as it is adopted by system users in other institutions.

2. Designing a Mobile Game with Treasure-HIT

Treasure-HIT (Kohen-Vacs, Ronen and Cohen, 2012) is a system designed to enable teachers to easily create educational location-based games operated via mobile devices. The system includes two components: an authoring web environment for creating and controlling the game and the players'

application used by the participants for game enactment. The application is currently available for IPhones and Android.

In a game created with Treasure-HIT the players (teams or individuals) are challenged to identify specific sites (stations) according to clues provided by the game creator and to physically reach these locations. When arriving to a station, the players have to complete a series of tasks. The clues directing to the next station will appear only upon completion of all tasks. The game mechanism automatically discourages random guessing while repeated incorrect answers to the same task will result in a delay penalty.

A game may include any number of outdoor and indoor stations. The interface for defining a station is shown in Figure 1.

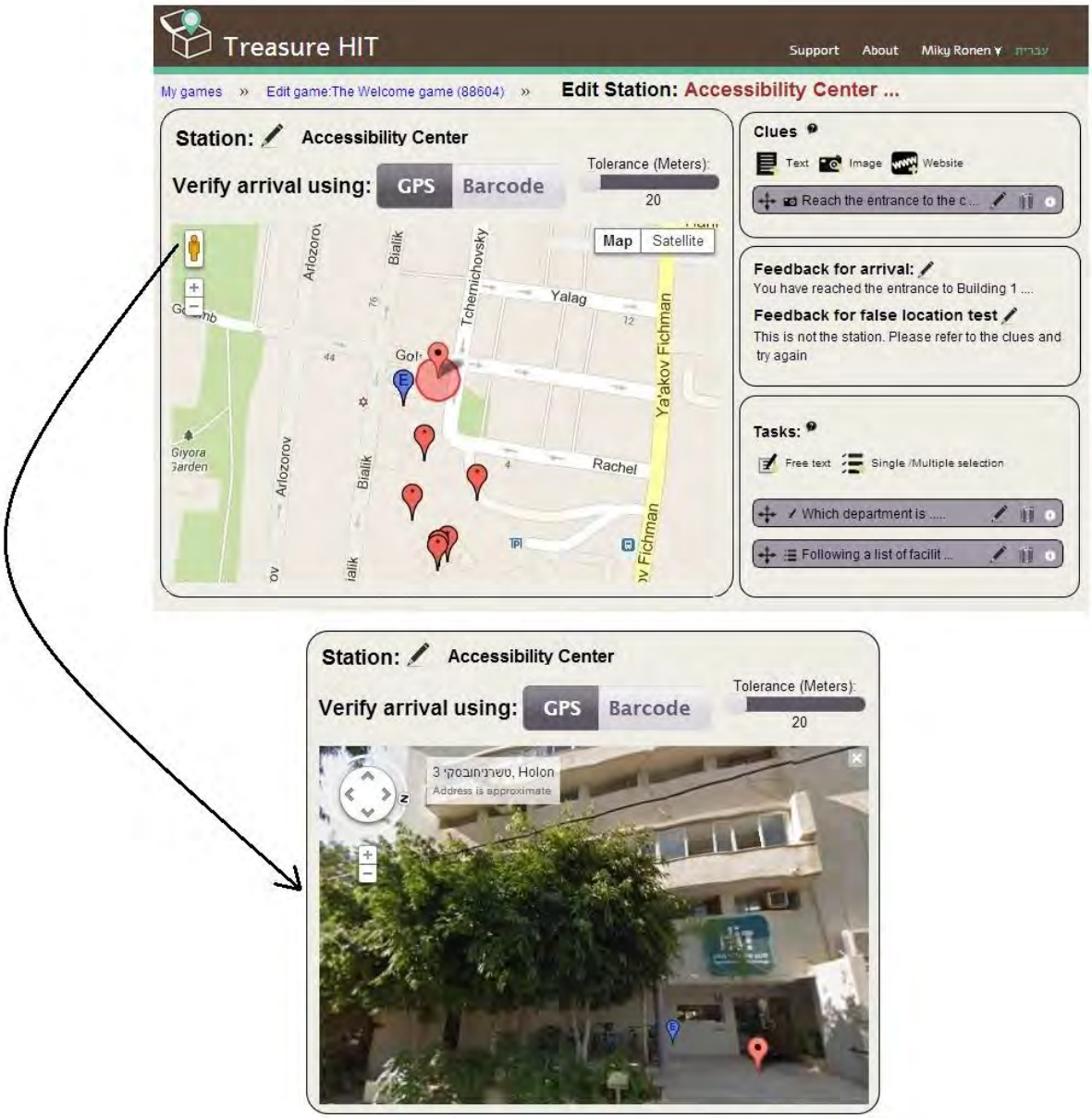

Figure 1. The author interface for defining a station – an example from the Welcome game.

This interface allows the author to control all the information and actions related to the station:

- The type of arrival confirmation. Arrival to outdoor stations would be confirmed by activating the device's GPS. The Barcode option is available for defining indoor stations. The Barcode is automatically created by the system to be placed on site.
- The clues that will direct players to the station presented as a combination of any type of media (text, picture, movie clip or link to website).

- The location of the station. The location of an outdoor station is set via a simple web interface that embeds Google Maps API by positioning the marker on the map. Further position refinement could be achieved using Google StreetView API, when available (lower part of Figure 1). The author can control the minimal required distance from the site (Tolerance) in order to accommodate to the limitations of the GPS technology.
- The feedback provided upon arrival to the station.

The tasks to be performed at the station, presented as multiple choice or open questions, or as activities to be performed that will result in receiving a confirmation code.

The game creator can define the sequence of the stations as identical to all players or as different, with a common end station. In the case of different sequences, the order of the stations presented to each team would be automatically determined by the system to provide paths with similar lengths. More advance setting allow the game creator to allot only part of the stations to each team, for example, in a game that includes 20 stations each team would be directed only to 7 of them. This option is useful for designing games that are played simultaneously by a large number of teams, in order to minimize the chance that teams would arrive to the same station at the same time.

3. The Welcome Game

The orientation event was conducted one week before the beginning of the 2014 academic year. 41 of the 70 new students that enrolled to an undergraduate program in "Instructional Technologies" attended the event. The event started by presenting the Welcome game as a competition between teams. The participants were asked to form groups of 3-4 then take several minutes for an initial personal introduction within the group and define a name for their team. One member in each group was instructed to install the Treasure-HIT application on his smartphone and the groups started playing.

The game included eight stations spread throughout the campus (Fig. 1), four located outdoors and four indoors. The order of stations assigned to each group was different while all shared the same ending point near the lecture hall where game results were presented.

At each station the team was presented with a set of tasks aimed to familiarize them with specific facilities and services provided at this site, especially focusing on aspects relevant to new students (Fig. 2). In order to complete the tasks the participants had to examine the physical location, to look for specific information published on site or online. Some of the tasks did not have straight forward answers and the team members had to discuss the options and to apply their judgment.

One of the challenges we faced was identifying the most relevant content for new students. In order to cope with this challenge we have involved the second year cohort and asked them to propose locations and issues that would be especially relevant for "newcomers". Many of the 20 proposals suggested by the sophomores were indeed used in the final version of the game.

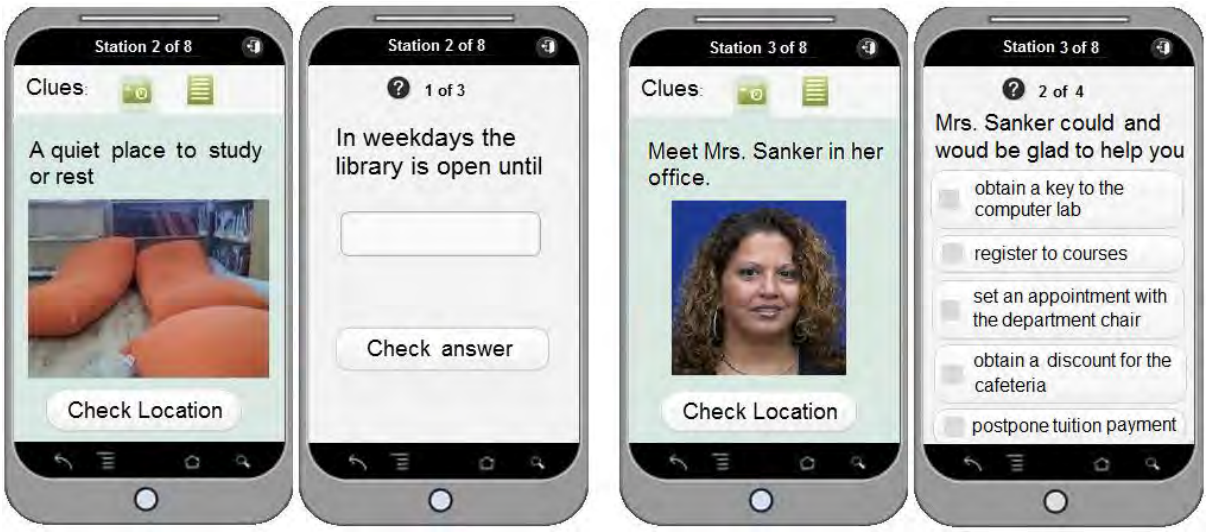

Figure 2. Examples of clues directing to stations and of simple tasks presented at the stations.

4. Results and Analysis

This section summarizes the evaluation study aimed to assess the efficacy of the mobile game, as the first stage of introducing students to their new environment. The evaluation was based on:

- The game records saved in the system's database.
- Reports provided by six observers. Three of the observers accompanied sample teams during the whole game and the others documented the activity occurring at specific stations.
- Data collected by questionnaires filled in by all freshmen at the end of the first school day.
- Sample interviews with students.

The observers reported that the participants were highly engaged in the game and tried all possible strategies in order to identify the locations and successfully complete the tasks, including approaching staff in offices and other students in the campus. Lively discussions were held on issues that were addressed by some of the tasks (Figure 3).

Figure 3. Students playing the Welcome game.

Ten of the eleven groups that started the game completed it in about 40-50 minutes. The game results (Figure 4) were presented to the participants at as part of a short summary session of the event.

Results Wellcome Game (29.9.2013)

#	Team	Start	Stations	Time	Location Err.	Content Err.
1	Mebulbalim	18:17	8	00:46:02	1	4
2	Girl power	18:21	8	00:47:15	2	6
3	Tipulit	18:21	8	00:49:26	0	8
4	Habanot	18:10	8	00:49:02	9	3
5	Bazmanshela	18:18	8	00:42:25	4	7
6	Hamushpaim	18:15	8	00:54:51	7	4
7	Milkis	18:17	8	00:43:05	2	11
8	Segal	18:24	8	00:49:25	9	1
9	Blimaam	18:17	8	00:55:52	4	5
10	Hatlemim	18:16	8	00:49:10	7	14
11	No name	18:20	6	-----	7	5

Figure 4. The game results

At the end of the first school day (a week after the orientation event) all 70 first year students filled in a questionnaire expressing their feelings as new students. The students were asked to grade their level of acquaintance with peers, familiarity with the environment, sense of belonging and level of anxiety on a 1-9 scale.

A significant correlation was found between the reported sense of belonging and the level of acquaintance with peers ($R=0.5$, $p<0.01$) and the familiarity with the campus environment ($R=0.45$, $p<0.05$).

40% of the students in new cohort did not attend the orientation event and have not participated in the game. Fig. 5 present the comparison between the reported feelings of the students who participated in the game and those who did not.

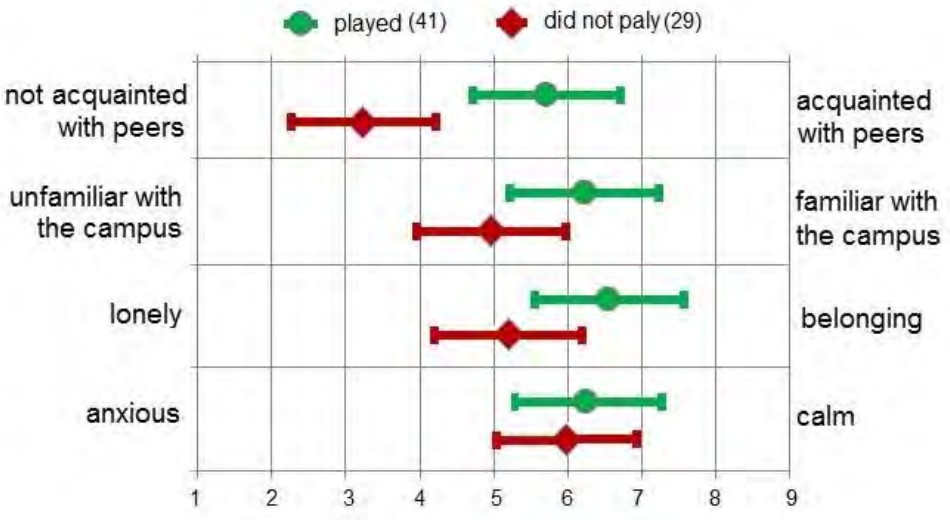

Figure 5. Students' reported feelings at the first day

The findings (Table 1) clearly indicate that the students who participated in the game felt more familiar with the campus environment and more acquainted with their new peers, therefore less lonely with a higher sense of belonging.

Table 1. Analysis of differences in students' feelings

Feeling	***t (df=68)***	***Sig. (2-tailed)***
Anxious - Calm	.520	nsd
Lonely - Belonging	3.56	.001
Unfamiliar - Familiar with the campus	2.53	.014
Not acquainted - Acquainted with peers	5.01	0.000006

In addition, the students who took part in the orientation event were also asked to reflect on the game they have experienced a week ago. The questionnaire was anonymous but the students were asked to specify the name of their game team. Only 3 of the 41 students could not remember the name of their team. The students reported that the game was enjoyable, relevant and useful, helped them get familiar with the campus and with their new peers (Figure 6).

The social impact of the game was also clearly evident in the way the students' were seated in lecture hall at the end of the first school day. More than 60% of the students who participated in the orientation event were seated next to one of their team members in the game.

In the open part of the questionnaire students were asked if any of the information they have been exposed to during the game was memorable or surprising. Students mentioned specific details that they have learned during the activity about places in the campus, services and facilities that they have been exposed to. The aspect that was mentioned as surprising by many was the very fact that the event was conducted as a game: "*We did not expect such a thing, but a boring lecture ...*"

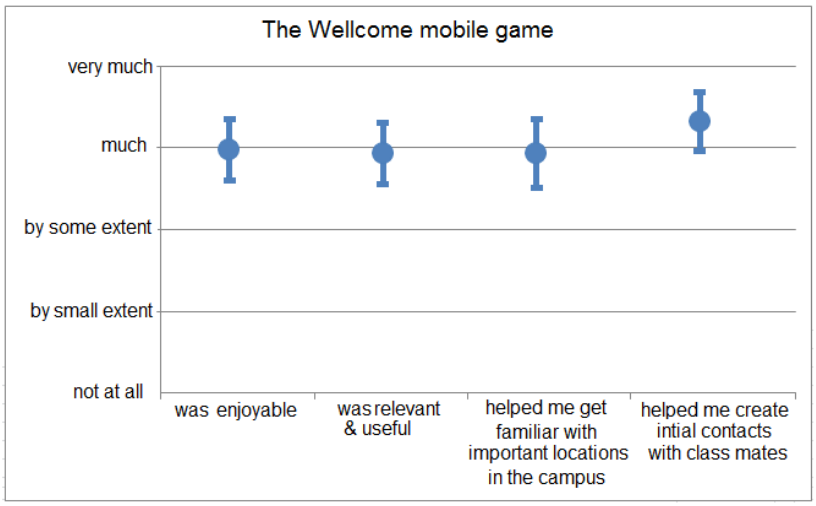

Figure 6. Students' evaluation of the game (N=41)

As described at the beginning of this section, the game results were presented to the participants at the end of the game. Since the students acted quite competitively during the game and the presentation of the results seemed to be very meaningful for them, it was interesting to check whether the personal evaluation of the game was related to their success represented by the relative ranking of their team. The analysis of students' responses indeed revealed that students whose team has achieved a higher ranking evaluated the game as more enjoyable ($R = 0.36$, $p = 0.027$).

The findings confirm that even a relatively short mobile location-based game can have a meaningful positive impact on new students' feeling of belonging, and to support their "feeling at home" from the first day. We intend to use updated versions of this game in future orientation events of our department and to support other departments and institutions in developing their own games.

5. Mobile Welcome Games - Anyone Can Adopt and Adapt

The Treasure-HIT environment was originally designed to enable teachers to easily create mobile games that would support location-based learning conducted outdoors and indoors. The system is already used by a growing community of teachers representing a variety of disciplines.

After exposing the model of the Welcome game described in the previous sections to the community of Treasure-HIT users, we are witnessing a trend of adopting this approach for conducting orientation events in schools. The mobile location based games are designed independently by the school team and adapted to the specific needs of institution and of the target audience of the event. Orientation events in elementary schools involve parents and kids while at junior-high level and higher, the activity is usually addressed only to the new students. Some schools piloted the game they have developed as a team formation activity for the school staff. These initiatives suggest that when a useful tool such as Treasure-HIT meets a relevant need (i.e., meaningful and experiential orientation events) spontaneous and self-directed scaling-up might occur.

An "extreme" version of such a game was recently conducted in an elementary school (Figure 7). In this case, the goal was not only to familiarize parents and kids with the school environment and facilities but also to fully support the whole process of registration to the next school year.

The clues directed teams of parents and kids to 9 stations, located indoors and outdoors throughout the school. At each station they were presented with simple tasks introducing the function and facilities offered at the site or the staff member responsible of the site. For some stations the task included activities required for the registrations process: At the school secretariat the parents enrolled their kids, the computer lad was used to fill in the necessary forms and the arts lab to prepare the kid's photos for the school records.

Figure 7. A Welcome game in an elementary school – parents and kids.

According to the school principal: "*The idea was not only to acquaint parents and kids with the school environment but to also transform a rather boring bureaucratic process performed individually to a playful and social event. All parents and kids enjoyed the event and even parents that were already familiar with the school reported that they have learned new things about the place during the game*".

6. Concluding Remarks

Experiences of beginnings and endings, in many cases, leave a lasting imprint in our memories (Strongman & Kemp, 1991). Memories of entering first grade, attending college, our first job, our first love, are among the strongest and most accessible autobiographical memories we dispose. Universities and other organizations have an opportunity to influence people joining them, at a relatively rare moment, where they are quite receptive, in a state of emotional arousal, with a need to get away from feelings of loneliness, disorientation, and anonymity.

Location-based games, that take advantage of the mobile technology available to all, have the potential of rapidly creating a sense of inter-group cohesiveness, acquaintance with the physical environment and with organizational functions and key persons. As a result, such activities can effect participants' psychological wellbeing and ensure a smoother beginning in a new place.

Authoring environments like the Treasure-HIT support easy creation and enactment of such activities. However, the activities should be carefully designed. It is crucial to identify the locations and organizational functions that are particularly relevant to the participants and to be selective in presenting contents in order to avoid information overload. The tasks should help expose participants to critical information, and at the same time, maintain a high level of motivation by being challenging and sophisticated.

Indeed, from an instructional design perspective designing an effective game involves using motivational strategies such as obtaining optimal levels of challenge and curiosity, collaborations and competition (e.g., Lepper & Malone, 1987). However, treasure hunt games seem to involve additional psychological aspects. Similar to hide and seek games (e.g. Vollmer, 2009), part of the excitement of playing the game might be related to 'finding concealed stuff' – which might be associated to psychological themes of separation and reunion. In addition, treasure hunt games might have the flavor of quest-tales or coming-of-age stories where the protagonist has to be smart and resourceful and handle a set of challenges in order to complete an important task (e.g., Bettelheim, 1976). In other words, the Treasure-HIT environment is but a tool. The quality of the game, like any other pedagogical quest, depends on the designer's ingenuity and his intuitions regarding the target audience's needs and desires.

Our future efforts will focus on refining the Treasure-HIT authoring system by adding the ability to perform 'social tasks' and providing documented guidance to users for developing their own welcome games.

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