

# Ambient Displays and Game Design Patterns for Social Learning

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**Abstract:** In this paper, we describe a social game we implemented to evaluate various means of learning support. Making use of game design patterns it was possible to implement respective information channels in such a way that we could simulate ubiquitous learning support in an authentic situation. The result is a prototype game in which the participants have to identify a wanted person.

**Keywords:** Ubiquitous Learning, Awareness, Game Based Learning, Game Learning Patterns

## 1. Background

Permanency, accessibility, immediacy, interactivity, situatedness, and adaptability have been identified as the main characteristics for ubiquitous learning environments [2]. Most of these characteristics deal with informational aspects, whereas the major challenge is to enable learners to navigate more efficiently through information and find the right information in any given context [3]. To implement this concept it is essential to keep the learner continuously aware about the learning environment. Thereby several types of awareness can be distinguished [1]: social, task, concept, workspace, knowledge, and context awareness. We suggest utilizing these types to feed information channels in the learning environment contributing to a non-intrusive way of interaction through available ambient displays.

One of the most motivating and versatile ways of doing so is the methodology of serious games (SG) and game design patterns. The discussed channels can technically be realized as game elements, giving clues about the game's storyline or progress of opponents or collaborators. In game design, such elements are formally described as game design patterns. From a technical design point of view the use of such patterns has several advantages supporting reusability and interoperability [4]. A pattern consists of several description fields in which there is information on the pattern itself, its possible combinations with other patterns, its functionality, its consequences and examples. A large repository of game design patterns derived from actual game elements has been compiled by Björk & Holopainen [5].

## 2. Analysis and Design

Social, workspace, and task awareness have been identified as the awareness types. They provide the most support for a social game setting where information is shared and distributed across different contexts.

Social awareness reflects how the other participants are progressing in comparison to the individual progress; we decided to implement this with a competition pattern. Competition can be a social concept especially when competing teams are formed. In a more fuzzy sense competition also would have a social dimension because it draws attention and creates a “motto” for social interaction. According to [5] competition is “the struggle between players or against the game system to achieve a certain goal where the performance of the players can be measured at least relatively”.

Workspace awareness facilitates different types of resources supporting ubiquitous learning in a shared workspace. These resources are fed into the system and visualized using a various displays. Game elements in this case can be realized using the Clues and Gain Information pattern. The clues pattern is described in [5] as “the game elements that give the players information about how the goals of the game can be reached”. The Gain Information pattern is described as “the goal of performing actions in the game in order to be able to receive information or make deductions”.

Task awareness supports the learner by facilitating and indicating the accomplishment of goals. Applying a goal pattern thus extends the abstract task into a concrete set of actions the participants can choose from for reaching a goal, i.e. accomplishing the task. Being aware of the progress in accomplishing the task, individually or socially, creates an additional clue with respect to keeping up a certain momentum of motivation, which is supported by the score pattern, where score “is the numerical representation of the player's success in the game, often not only representing the success but also defining it” [5].

## 3. Methodology and Implementation

Based on the previous analysis and the elaborated research questions a technical design has been implemented covering different design dimensions for the selected awareness types. A main point of interest was how the implementation got assimilated and perceived in a social setting simulating a ubiquitous learning environment. Furthermore the implications for its usage in a game based learning scenario were assessed experimentally. On day one, the information clues were given via email only, on day two they were given only with information displays, and on day three we used both channels.

The scenario selected for application of the game was at a seminar-style international meeting of PhD students of educational technology and a set of renowned instructors drawn from around Europe [6]. Initially ascertained user data was used to display clues on screens installed in the main lecture room (workspace environment), and in the entrance respectively cafeteria (personal and social environment). The data was grouped according to the different environments: “professional” information was displayed in the workspace environment, “personal” and “social” information was displayed in the personal and social environment.

The following rules were given to the participants: The game was played in several rounds. At the beginning of each round one of the participants was selected as Mr. X by random. Periodically the participants received three hints about the wanted person. These hints described Mr. X in person as well as his/her social and professional life. The task was to gather information about fellow participants. The participants were prompted to vote for the person they suspected to be Mr. X. They were allowed to change their mind anytime and

vote again as long as the current round was open. The round closed once more than 50% of all participants voted for the right person OR the wanted person was not identified after giving five times three hints. After each round Mr. X was revealed. The score was allocated accordingly and could be found in an online high score list. If Mr. X was not revealed by the participants Mr. X had won the game. Everybody who voted for the right Mr. X got 100 points, everybody who voted for the wrong person got -50 points, Mr. X him/herself got 200 points if not revealed, and -100 points were the punishment for not voting at all.

The game was technically implemented by making use of the Google Application Engine [7] and the Adobe FLEX framework [8], facilitating the FLAR toolkit [9].

#### 4. Results

The effectiveness of the game with respect to the prospective benefit for social interaction was monitored in two ways: the user activity (system logs) and the user response to a feedback questionnaire at the end of the event. The results of the user monitoring were that a strong influence was measurable for task awareness, where workspace and social awareness ranked lower. In the questionnaire it turned out that most of the participants had the impression that the game rather helped fostering social interaction not because of specific mechanisms like “personal” or “professional” information clues, but simply by the fact that there was a game being played. From a critical point of view the game in its current form and limited time frame has not proven to significantly enhance social collaboration. Due to the overall rising user activity it could, however, be theorized that a growing social bond between the participants indeed has led to a higher incentive to play the game together, and not the other way round. Besides the evaluation of data and feedback we could notice that people would in fact talk about the game in a cheerful way suspecting each other to be Mr. X. Finding ways how to implement all three awareness types in a more efficient way will be a matter of our attention in future research.

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