



Designing Learning Games For Multiple Stakeholders

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Abstract

The design of computer games for learning is a difficult process when a single learner group, with similar ages, backgrounds and abilities, is considered. It becomes far more complex and problematic when there are multiple stakeholders. The Auditing the Sustainability of Public Spaces (ASPIS) project aims to work with three distinct learner groups: school pupils, university students, and work-based professionals. It will use a game-based methodology, complemented with other online interactive and communication tools, to encourage active learning through discovery, negotiation and problem solving. This paper will highlight the issues associated with designing a digital game for multiple stakeholder groups, and explore possible solutions. It will first present and discuss considerations such as age appropriateness of language and game mechanics, differing gaming literacies, motivations and expectations of users, range of contexts of use in both formal and informal settings, and levels of autonomy and independence. Second, the paper will focus on possible ways in which to address the development of learning games for multiple stakeholders, such as the development of different game versions, creations of customisable game platforms, or the use of associated learning activities. Finally, the paper will present the learning methodology adopted by the ASPIS project as a way of meeting the needs of multiple stakeholders, and describe the game that was developed. It will discuss the impact on game design, the challenges encountered, lessons learned from the project, and results of the ongoing evaluation.

1. Introduction

There is a growing body of research evidence that digital games are an effective and engaging way to learn for many. Examples of their use exist in many learning domains, including schools[1], universities[2], adult education[3] and business environments[4]. Computer games can embody principles of constructivist learning, such as provision of a context where learners can develop their own understandings of the world through interaction with the environment, the creation of puzzlement as a stimulus for learning, and a focus for meaningful discussion to test understandings and challenge viewpoints[5]. Computer games can also create opportunities for learners to explore rich and immersive virtual worlds, and provide a place to practise skills that can be transferred to the real world. They create a safe environment in which learners can make mistakes, receive immediate feedback on their actions, and reflect on their experiences.

However, while games can be effective for learning, the creation of games that are also engaging and fun for the players is a non-trivial task. The design of computer games for learning is a difficult process when a single learner group, with similar ages, backgrounds, abilities, and preferences is considered, but it becomes far more complex and problematic when there are multiple potential users, each with different motivations and needs.

The Auditing the Sustainability of Public Spaces (ASPIS) project, co-funded by the EU Lifelong Learning Programme, aims to promote learning for public participation in planning and raise awareness of the sustainability of open public spaces. The project will use a game-based learning methodology, complemented with other online discussion and reflection tools, to encourage active learning through discovery, negotiation and problem-solving, making learning more attractive and relevant to real life situations. The project will create a learning game that meets the needs of three distinct groups of learners: secondary school pupils, university students, and work-based professionals, such as architects or planners.



This paper first describes the range of problems that can occur when designing a single game for multiple stakeholders, as is envisaged in this project, and explores possible solutions. Second, the learning methodology developed by the ASPIS project is presented and discussed.

2. Designing games for multiple stakeholders

Designing games for multiple stakeholders is problematic for a variety of reasons. Players of different ages, professional contexts and levels of expertise have different preferences and perceptions about what is appropriate in terms of game scenarios, visual design, levels and difficulties, game mechanics and language used. For example, the types of plot and characters that appeal to young adults may not be of interest to older people. A second difficulty is differing levels of experience with computer games, and their associated levels of confidence and competence interacting in that environment; this will also influence expectations in terms of what is state-of-the-art and appropriate for learning.

A third problem is the different motivations and expectations of users in terms of the appropriateness of games for learning. Adults and university students will typically be much more strategic and sceptical of game-based learning and will need to be convinced of its value before engaging[6]. The contexts of use may also differ among user groups, so schoolchildren may play games in a classroom, as part of a group, students at home or in a computer lab, and professionals in a workplace, typically as individuals. The context of use, and whether the setting is formal or informal, will also influence the game design. Different learners also have varying levels of autonomy and abilities to work independently and reflect on their learning; in the case of some learners this may need to be actively facilitated by a teacher.

There are a variety of problems associated with designing games for multiple stakeholders, but there are also solutions. Instead of a single game, different variants can be created for each group allowing the games to be more closely tailored to their needs; however this is expensive in terms of development and time-consuming. A second option is to create a 'vanilla' game that aims to cater to the needs of all possible stakeholders; however this type of game typically tries to achieve too much and ends up catering for none of the potential user groups. A third solution is to embed a large amount of customisation so that users can individually tailor it to their needs, or create a game that adapts automatically to the user's needs based on their previous actions. However, there is only a limited amount of customisation that can be carried out in reality (it is difficult to change the game genre, for example), this approach is still expensive in terms of development and can also create an overly complex game.

The ASPIS project took a different approach again with its learning methodology, that of providing a single game supplemented with variety of additional online learning tools that could be used to customise the experience to make it appropriate for each of the different stakeholder groups. A detailed discussion of the approach and how it was implemented follows.

3. The ASPIS learning methodology

In order to design a game that appeals to a number of different stakeholders, the ASPIS project has developed a learning methodology that takes an holistic approach to meeting the learners' needs, using the whole of the learning environment, not simply the game that is at its heart.

The core learner activities in the online environment will be based around the sustainability game, which aims to provide learners with a concrete experience of the range of issues they may face in the real world. This provides learning benefits such as the use of scaffolding to guide learners through increasingly complex challenges, the ability to practice and learn through failure, and opportunities to receive, and act on, feedback embedded into the game processes. The use of a game-based methodology can also provide benefits to learners in terms of motivation and engagement through appropriate goals, rewards and achievements, narrative and playfulness.

The game allows players to explore a fictional environment, move around different locations, interact with objects and talk to characters, in order to complete a series of missions. It is designed to be as age-neutral as possible in terms of storyline, characters, and language. At the end of each mission, whether the player has been successful or not, detailed feedback will be provided, analysing the



decisions made and providing specific links to additional further resources. Intrinsic feedback from characters and a learning companion within the game will also be used to support learning. In addition to the sustainability game, the environment will also present a variety of other opportunities for learning, including:

- **Opportunities for discussion** where learners can interact and collaborate with peers. The types of discussion environments that are appropriate will depend to a great degree on the type of learner and the mechanisms they already use (e.g. *LinkedIn* or *Facebook*).
- **Opportunities for feedback** and chances for learners to assess progress and reflect on their actions. Feedback will be built into the game itself but also through multiple choice quizzes and diagnostic self-assessment activities.
- **Opportunities for evaluation** to apply what is being learned and analyse examples and real-life situations. The 'Sustainability Rating Tool' for Urban Spaces provides a way for learners to make judgements about the application of the sustainability criteria to given spaces, in order to enable discussion and reflection.
- **Opportunities to link to real life** through the use of online case studies that exemplify the learning points encountered in the game and elsewhere in the learning environment.
- **Opportunities for further study** to enable learners to continue study by providing them with links to other materials, books, web sites or online activities that provide them to investigate a topic in greater depth if they wish.
- **Opportunities for supplementary activity** to support both formal classroom-based learning. Each topic will provide teacher guides for suggested face-to-face or online activities that could be used to support and enhance the outcomes of that topic.

The learning needs of school children, university students, and professional architects and planners need to be taken into consideration, and while there may be some overlap of needs among these groups, some will be specific to certain groups. The model of the game as the core of the learning environment, with additional elements, which may be more specifically tailored to different groups, supports this flexibility of use. So while then game and case studies will be, in the most part, generic, different discussion tools will be made available for different user groups, and different versions of the self-assessments, further resources and supplementary activities can be produced as necessary. Some example scenarios of the different ways in which the core game could be adapted to meet the needs of different learner groups are shown below.

School children play a game mission in pairs in a classroom environment, discussing the game play with their partners. At the end of the session the teacher uses a supplementary activity based on one of the cases studies. For homework the pupils are asked to complete a self-assessment activity.

University students play the game in their own time, in preparation for class, and discuss the outcome and feedback using a *Facebook* group beforehand. A case study, coupled with a field study, is used as the basis for a problem-based supplementary seminar activity.

Professionals play the game for ten minutes at work, as an engaging way of introducing a topic. They concentrate on the self-assessment activities to highlight areas where they need to work and use the case studies and further resources to work independently to fill the gaps.

It is not intended that each of the tools available in the learning environment will be equally appealing or appropriate for all learner groups. It is the intention that by providing a rich mixture of tools that can be used by learners in a variety of different ways, and the online environment will create a purposeful place to study, giving learners and teachers the control and information to use the tools in the ways that suit them best. In this way the environment aims to cater for learners with a variety of ages, abilities, learning styles, and motivations for engaging with the tools.

4. Conclusions

Designing a game for different stakeholders is not an easy task, and in some instances it will be more cost-effective and efficient to simply create a different game version for each user group, however, the ASPIS project methodology shows that it is possible to design a game to appeal to multiple stakeholders. A more cost-effective and integrated approach can be achieved by embedding the game



in a learning environment where stakeholder-specific activities, such as discussions, are put around the game rather than in it. As the project develops further and the game and supporting online environment are completed and tested with users, it will be possible to evaluate the effectiveness of the approach for learning.

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