AUDITING THE SUSTAINABILITY OF PUBLIC SPACES

LEARNING FOR SUSTAINABILITY

A HANDBOOK FOR THE ASPIS LEARNING TOOLS

SERIOUS GAME
STAR RATING TOOL
MEMORY GAME

ISBN 78-960-6676-18-5

BY
THE ASPIS PARTNERSHIP

www.aspis-learn.eu

Education and Culture DG
Lifelong Learning Programme

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The present handbook provides guidelines for the best possible educational use of the ASPIS learning tools in the context of both formal and informal education. The main target group is teachers of secondary and tertiary education and learning facilitators/trainers of informal and non-formal education settings aiming to provide support and ideas for the effective and creative use of the ASPIS learning tools. The tools are aimed to be used by four different audiences, namely secondary school students, university students, professional architects-planners and related practitioners and NGOs that are in direct contact with the general public – users of public open spaces.

The ASPIS learning tools are available online at www.aspis-learn.eu free of charge for non-commercial educational use. They include:

- The Sustainability Serious Game
- The Star Rating Tool
- The Memory Game

These learning tools were developed jointly by the ASPIS partners:

1. PRISMA-Centre for Development Studies (project Coordinator – GR)
2. University of Valencia (ES)
3. West Hungarian Research Institute - Centre for Regional Studies of the Hungarian Academy of Sciences (HU)
4. Széchenyi István University (HU)
5. Serious Games Institute – Coventry University (UK)
6. Hogeschool voor Wetenschap & Kunst, School of Architecture Sint-Lucas (BE)
7. Imaginary srl (IT)
8. Estonian University of Life Sciences, Institute of Agricultural and Environmental Sciences, Department of Landscape Architecture (EE)
9. 3rd Directorate of Secondary Education of Athens (GR)
10. Hellenic Ornithological Society – Birdlife (GR)

We wish to thank all the organizations and individuals who participated in the piloting of the ASPIS learning tools, enabling us to improve the performance of the tools and adapt them better to the needs of the users in seven European countries.

This publication has been prepared by the Serious Games Institute – Coventry University, with the contribution and input from all ASPIS partners.

Published in Athens by PRISMA-Centre for Development Studies,
Empedocleous 17, GR 11635, prisma@prismanet.gr
December 2012

ISBN 78-960-6676-18-5

This project has been funded with the support of the European Commission, Lifelong Learning Programme, Key Activity 3, ICT.

This publication reflects the views of the authors only and the Commission cannot be held responsible for the use of the information contained therein

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Preface

The mission of the ASPIS project is to stimulate dialogue between urban citizens and professional architects-planners, with a focus on the sustainability of public open spaces. To achieve this aim, innovative IT tools and methods have been developed, including games-based learning and web 2.0 technologies.

The current handbook focuses on the educational aspects of the games, providing an introduction to the learning principles that guided the development of the learning tools and a set of practical guidelines to enhance the use of the learning tools by teachers and architects-planners within an educational content. The tools are: a memory game, a Star Rating Tool, and a sustainability serious game.

Introduction

ASPIS is a 3-year European project, running from 2009 to 2012, co-funded by the Lifelong Learning Programme. The project involves 7 EU countries and 10 organisations including universities, planning and IT consultancies, research institutes and local authorities. It builds on the results of an earlier project (PICT-Planning Inclusion of Clients Through Technology) and addresses professional architects, planners, citizens and students, striving to achieve 3 main goals:

- Promote learning for public participation in urban planning.
- Increase awareness on the sustainability of public open spaces.
- Stimulate dialogue between urban citizens and professional architects- planners with a focus on sustainability issues.

For these purposes ASPIS proposes a Game-based Learning (GBL) methodology, complemented by other interactive communication/internet-based tools, aiming to encourage "learning by-doing" through simulation, negotiation and role-playing.

The learning products which have been developed within the context of this project address professional architects-planners as much as individuals or groups of citizens and have also been designed to be introduced in school and university curricula, making learning more attractive and relevant to real life situations. The ASPIS learning tools encourage critical thinking and raise awareness on sustainable development and the use of negotiation strategies through role playing activities and interactive communication, preparing both citizens and professionals for active public participation in urban planning. The learning process is therefore central to this effort, in establishing a common understanding of the concept of sustainability and its criteria, and in making people aware of what is at stake when public open spaces are planned and designed.

1. Blended learning

Blended learning refers to learning approaches that combine traditional face to face delivery with online or other electronic based material such us wikis, forums, blogs, serious games etc. However, blended learning is not simply the addition of ICT tools to traditional learning methods as technology alone cannot provide effective and efficient solutions for teaching and learning. Solid instructional design and pedagogical approaches must be used in conjunction with blended learning in order to achieve success. Therefore, blended learning is about integrating the strength of traditional teaching methods with those provided by new technologies resulting in a range of learning spaces where students can interact and construct knowledge in a creative, motivational and modern way.

We live in a digital age when most people, especially the young ones, have not known life without the internet and consider technology to be an integral part of their lives and their learning experience. Therefore, their need to benefit from technology has become of vital

importance and they have an expectation of a range of instructional methods and media to be used during the learning process. Research shows, however, that the role of the teacher or instructor remains fundamental. There is no evidence that learners are able or indeed willing to learn without teachers, no matter how well designed the materials may be. The fundamental role of the teacher, tutor or facilitator in the learning process has not changed but the mode of operation has (Mason, 1998).

The ASPIS learning tools have been designed for use in a blended learning environment. The role of the teachers, tutors or facilitators remains central and they are responsible for the correct use of the tools. The development of the tools has also been based on game-based and experiential learning principles, the theoretical underpinning of which will be discussed over the next two sections.

2. Game-based learning (GBL)

Learning is primarily a process that leads to a change in behaviour or understanding, rather than a quantitative increase in knowledge or storing of information that can be reproduced. Learning is about internalisation (Nonaka, 1991), i.e. about making sense or abstracting meaning, about being able to relate parts of the subject matter to each other and to the real world. Several methods and approaches to this type of learning exist (e.g. collaborative, cooperative, contextual, discovery-based, problem-based etc.), each with its strengths and weaknesses, which can make it more (or sometimes less) suitable for application to specific settings.

Over the past few years, due to the widespread use of commercial games, the domain of games-based learning has received increasing attention. However, until very recently, strategies for supporting the more efficacious methods of learning with games were uncertain. Research showed that tutors were unsure which games to use, in which context to use them and how they could be evaluated and validated (de Freitas & Oliver, 2006). Work emerging from these studies led to the development of conceptual frameworks that were then used to test game-based learning. In particular, the four dimensional framework highlighting the learner's four dimensions, the pedagogies used, the representation of the game itself and the context, allowed researchers to evaluate serious games and to investigate the metrics and measures which could be used both to validate game-based learning and to support the design of the learning process.

Studies that compared traditional learning methods and game-based learning (Jarvis & de Freitas, 2009) found significant differences, resulting in favour of game-based learning something which has been confirmed by studies in the US (e.g. Mautone et al., 2008). Empirical studies explored the efficacy of game-based learning, providing greater support for developing effective games for learning, and addressing user expectations of high fidelity games and 'immersive experiences' (de Freitas & Neumann, 2009).

Some of the main strengths of game-based learning include increasing the motivation of learners and the ability to provide personalised approaches which can be modelled for individual users and user groups. However, studies have demonstrated the importance of games as tools for supporting socially based learning, or social interactive learning (e.g. de Freitas & Neumann, 2009; de Freitas et al., 2009).

The benefits of using game-based learning effectively are considerable, but as studies have shown its use is most effective with learners who generally enjoy learning through games (de Freitas, 2006; de Freitas et al., 2006). Therefore, its most effective uses may need to be differentiated according to learners' specific needs and requirements (e.g. according to learning level, competencies and skills) in addition to the use of game-based learning in a blended learning environment. Motivation is a key aspect of effective learning, but such motivation needs to be sustained through assistive methods such as feedback, reflection and active involvement, in order for effective learning to take place (Jarvis & de Freitas, 2009). Game-based learning offers a particular strength with respect to motivating users. In addition, game-based learning offers the potential to integrate different cognitive tools, such as discussion forums, bulletin boards and concept mapping software. Furthermore, this type of learning promotes collaborative learning.

Games in general, and in particular serious games, have the ability to reach demographics which are normally unresponsive to traditional teaching methods. Alongside targeted pedagogic and instructional design, game-based learning has the potential to deliver solutions in a wide range of applications. One such application is building awareness on the importance of sustainability, wherein the ASPIS project aims to provide knowledge on the different aspects of sustainable design and its basic principles regarding public open spaces. Research has also shown that computer games can assist players to acquire certain cognitive abilities and skills and improve understanding in topics (Aguilera & Mendiz, 2003; Becta, 2006; Jenkins et al., 2003). When playing games, players have to manage multiple inputs and objectives at the same time, different resources, and to make instant decisions. Players are also required to complete a number of specific tasks to win. People who play such video games exhibit and even increase what is called 'fluid intelligence' (Perez, 2010) which is closely associated with problem solving (Cattell, 1987).

Modern game-based learning approaches commonly build on applications that have defined learning outcomes and are designed to promote active participation and interaction, balancing the subject matter with the game play, in order to enhance the ability of the learner to retain and apply the knowledge gained to the real world. They often exploit narratives, storylines, visual elements and other features common to recreational games, such as scoring and social networking in order to motivate and engage players in a learning activity. Serious Games (SGs) have learning goals and structure, but in addition are adaptive, interactive and most importantly provide enjoyment, pleasure, motivation, ego gratification (through competition and wining) and emotion, in order to achieve learner engagement and involvement. Games create simulated environments that facilitate immersion, allowing learners to explore alternative approaches to situations virtually, in order to directly experience the practical and emotional consequences of their actions, rather than wondering "what would happen if ...?"

Through these approaches, game-based learning allows learners to indirectly experience the real world and develop their awareness of consequentiality through doing and experiencing. For example, serious games can combine a wide range of different kinds of inputs and outputs for understanding complex social issues like poverty or immigration. This requires adopting multiple viewpoints and scenarios to analyse cause and effect. Serious games provide an environment for active, critical learning, allowing users to explore skills, methods, and concepts rapidly within a safe experiential environment designed with behavioural learning components. The potential learning outcomes include changes in participants' behaviour, knowledge, skills, attitudes, and/or levels of functioning. The ASPIS serious game does exactly that by offering the learner the opportunity to explore a virtual park, identify problems and potential solutions while learning about the importance of sustainable design of public open spaces and its different aspects and implications in everyday life.

In the context of formal education, game-based learning is considered an "effective way of reaching students who haven't responded to conventional teaching methods", and a way to "get gifted students to apply critical-thinking, problem-solving, and other higher-level skills to subjects they already know" (Prensky, 2001). Furthermore, it is important that learning is congruent to the lifestyle of the learner for effective learning to take place. Games usually match this prerequisite since the majority of young people spend at least some of their time playing games.

Game-based learning encourages players to first learn about the environment of the game and then learn about the subject matter taught through gameplay. From a pedagogy perspective, well designed games have different learning theories integrated in the design and take advantage of their characteristics. These pedagogic approaches include Problem-Based Learning (PBL), as well as contextual and experiential learning models.

The following section explains the concept of experiential learning or role-playing which is the second major learning methodology that has influenced the development of the ASPIS sustainability serious game.

3. Experiential learning in games (Role playing)

The use of role-playing offers a range of different benefits. Its ability to induce participants to quick understanding has the potential to transform theoretical concepts into experiences. According to van Ments (1983), role-playing is "a type of communication". It is a form of communication that is based on simulation rather than reality, (Northcott, 2002) and it is "one particular type of simulation that focuses attention on the interaction of people with one another" (van Ments, 1983). Sogorno (2004, p. 356) brings together the concepts of role and role-playing, and provides the following definition: "a learning activity in which participants act out a set of defined role behaviours or position with a view to acquiring desired experiences. A role-playing scenario could be mimicking, demonstrative or illustrative of specific concepts, problems or situations." In the ASPIS serious game the player takes on the role of an architecture student who assists his brother by researching and developing a plan to regenerate a communal open space (park).

Although the central concept of an 'immersive learning experience' is a common one, researchers have interpreted and analysed this notion in different ways. With respect to learning theory, the idea of learning as an experience is a well researched one; in particular, constructivist work by Kolb (1984) points to the negotiation between concrete experience and abstract conceptualisation as at the centre of the learning process.

Building upon this notion, an interesting split occurs in Kolb's model when considering simulations, and in particular the use of virtual worlds, as learning environments such as the one used in ASPIS. A common example given in exploratory learning is that of a child burning their hand on a stove – the child performs an action (touching the stove), reflects (that it was painful), learns (that touching the stove causes pain), and ultimately experiments (to understand the relationship between the stove being on and the feeling of heat). Visualising this model results in a disconnection between action and reflection – instead of a physical feeling of pain, the child sees their avatar experience pain, which is significantly harder to classify as a positive or negative outcome. It is within this disconnect that game-based elements may have a particular strength, since they reinforce the definition of scenario outcomes as positive or negative. In the above example, if by touching the stove the child's character loses a 'life', then immediate negative reinforcement may occur (Pappa et al., 2011).

This assumption is reinforced by evidence suggesting that the neutral processes triggered in gaming closely mirror those involved in learning (Koepp et al., 1998). If this is the case, then the role of game elements within an experiential process can be described as providing the framework around which positive and negative reinforcement occur, by providing tangible incentives for positive behaviour and penalising the player for deviating from the

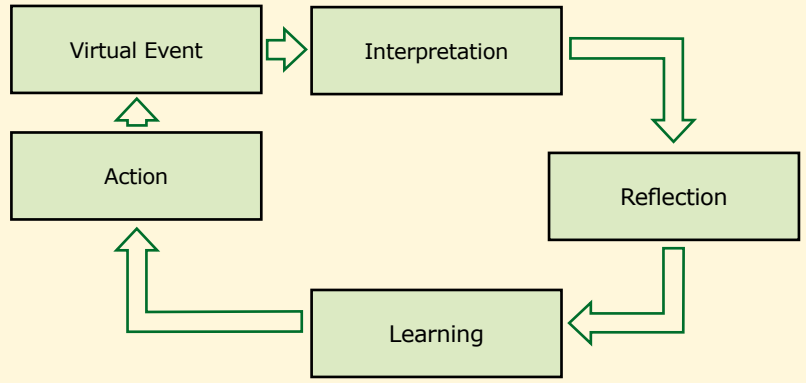

Figure 1: Experiential learning in a virtual world (cited from: Pappa et al., 2011)

learning requirements. These incentives and penalties are common to recreational gaming; rewards can be in the form of 'unlocking' new audiovisual content, leaderboards, or even positive feedback, whilst penalties are commonly observed as the obligatory repetition of scenarios. This in itself can serve as a motivator, as a time-based incarnation of sunk cost (Soman, 2001).

Underpinning the reflection process, feedback is a central part of experiential learning and has often been highlighted as a key design concern (Jarvis & de Freitas, 2009). Increasing the frequency and decreasing the complexity of feedback was shown to have a positive effect on learning transfer, suggesting that frequent 'bite-size' elements of feedback can work well in experientially-oriented serious games. Although each type of simulation and e-learning environment has a specific role in experiential learning, most studies support the need for feedback either during or immediately following a task; this may vary depending on the objectives and the learner's prior experience. There are also findings that show that repetition is essential in learning and in maintaining skills, and that individual learning curves will vary (Issenberg et al., 2005).

4. Informal Learning

Although this handbook has been primarily designed for formal learning, there is a clear need for raising awareness among informal learning providers who may use the handbook in their own (informal learning) context. This section therefore provides an overview of the principles and methods underlying the delivery of informal learning. Informal learning has been closely linked to adult education and has been the subject of numerous publications and theories. A seminal theory is Knowles' "adragogy" (1984, 2005). With this term Knowles wishes to emphasise the differences in the way adults and young people learn. Knowles states that adults approach learning via problem-solving and learn best when the topic is of immediate value to them. Adults need to be sure of the purpose of learning and prefer to learn experientially. As adults have many previous experiences and different reasons for participating in an educational activity, their expectations of a learning environment and associated roles vary widely. Adults, generally, benefit the most from active participation in the learning process and by being given opportunities to process their own experiences through reflection, analysis and critical examination. Instructors and experts are therefore seen more as mediators and facilitators than as lecturers or teachers.

Adults can also be seen as **self-directed learners**. We all have different experiences, and we know different things. Learning styles differ and each adult has his or her way to learn best. On the whole, however, adults are able to seek solutions to their problems, using their previous experience and knowledge to this end; and they see things in broader perspectives. These are skills that people develop growing up and which all adults use – including when learning is involved! This implies that much learning is self-directed. Self-directedness is not, however, the same as acting alone; other people (participants, facilitators, speakers) involved in the learning process are seen as supporters and peers to reflect on ideas with.

They also act as mirrors that give us feedback and help us to stay on track.

Discussing **learning as a process** implies that learning takes time and effort; it involves gathering and processing information and transforming it into knowledge and understanding. Moreover, learning is a comprehensive experience which combines reasoning, emotions, imagination, intuition and experiences. *Studying is a special learning process.* While studying we set goals for ourselves and our learning and concentrate on selected themes. Part of this process is that we learn by handling the tasks and problems we come across in everyday life. **Learning by doing** emphasises that when we act, we use our individual personalities, knowledge and capacities to a fuller extent. For learning by doing to be effective, however, it needs to be combined with reflection. So, learning by doing encourages us to experiment, seek different approaches, make new assumptions, try to find different solutions to the problems at hand, and to reason, reflect on and evaluate our experiences. That way we can continuously construct our knowledge and experiences.

This process is also motivating and fun! It is a social activity which one does best with others, where everybody can learn and share their learning experiences. We should not forget that human beings are social by nature and work best when they can solve problems together, set goals together and try to achieve them together. However, this does not necessarily mean that any group of people will work together efficiently and harmoniously. In fact, even when everyone in a group seems to be in agreement about the common tasks and goals, there may be still serious problems in their capacity to work as a team! The idea of working and learning together, sharing experiences, and making the best out of our various backgrounds and knowledge, is central in informal learning. For this to be successful, we need to be aware that there are particular kinds of challenges, which have to do with the group setting itself. This is what **group dynamics** is about.

Since the 1990s informal education has become widely accepted and integrated as part of school systems. Contemporary researchers have recognised the importance of the social aspect of learning and have drawn attention to the learning that takes place outside formal education and training settings (Eraut 2010). Informal learning is usually intentional but not highly structured. Examples may include the use of ICT for initiating self-directed learning, mentoring, coaching, and performance planning for identifying and reviewing learning needs. An important feature of informal learning is motivation, an essential factor of learning. Marsick and Volpe (1999) concluded that informal learning can be:

- Integrated with daily routines.
- Triggered by an internal or external jolt.
- It is not highly conscious.
- It is haphazard and influenced by chance.
- It is an inductive process of reflection and action.

In order for informal learning to be effective, several commentators have focused on the specific roles that an adult educator and learners should take within such an informal learning setting. For example, adult educators should provide a structure within which learning opportunities and action planning are highlighted. In the context of collaborating

with citizens and local businesses, a facilitator could set up a plan for encouraging citizens and owners of local businesses to use the ASPIS learning tools as means of providing ideas and solutions for improving local parks. Facilitators or adult educators can also help local citizens and small business owners to examine the validity of socially constructed viewpoints and thereby help them to be more proactive in learning how to use the ASPIS tools for developing, using and sustaining ideas for improving public open spaces. It is evident that when people learn in collaboration with 'experts' within groups, workplaces, or in other social settings their interpretation of a situation and consequent actions are influenced by the social and cultural norms of others. Experiences of public participation in the design and development of sustainable public open spaces may also fit into this category. That is, the structures through which citizens and local visitors collaborate with professional planners, architects, engineers and local authorities may be characterised by non-formal approaches to learning and teaching. In addition, the co-creating processes and the resulting knowledge may be socially valued as formal knowledge (Bradburne 2001).

At the same time we need to recognise the growing number of digital experiences that may be explored through the use of the Internet. There is a wide range of tools that can be used through the mediation of the Web: from online forums, blogs and chat rooms, to multiplayer games and government funded communities such as Culture Online[1], PowerUp[2], My Sustainability House Game[3] and the Great Green Web[4]. These examples are all in the public domain and are largely produced with the formal curriculum in mind, although they portray aspects of informal learning such as collaboration, motivation and self-directed learning. By incorporating ICT to promote informal learning, the ASPIS project aims to strengthen public participation in the development of public open spaces and landscapes through the use of the ASPIS games and evaluation tools.

A central key theme, as already discussed, relates to the role of the teacher in informal learning settings. When we perceive learning outside of school, there is a tendency to assume that the teacher is absent or that there is minimal contribution from them. However, the teacher's role is likely to be of paramount importance in informal learning. Certain principles and approaches applied in formal learning can also be initiated in informal settings. For example, Vygotsky's idea of **scaffolded cognitive development** may be applied where the teacher assumes the role of the more experienced peer or **facilitator** that coaches the student to acquire certain skills. This facilitation of the learning experience has been explored as part of the notion of the 'Zone of Proximal Development' which can be described as the difference between what an individual can achieve on their own, and what an individual is able to achieve in collaboration with 'expert' help, whether through an expert person or other resource. This emphasis on the role of the teacher as facilitator helps peers to understand the phenomenon in question in a progressively structured way. This also offers an analysis of the approach used in designing the ASPIS sustainability game in terms of initialising scaffolding mechanisms from the game itself. The Sustainability Serious Game in particular includes certain affordances that may scaffold inexperienced users to learn about sustainability. Furthermore from an informal learning perspective it is interesting to consider how non-teaching experts (e.g. students, peers, subject-domain professionals) might engage as teachers.

Experiential learning, as described previously, may be transferred from a formal to a non-formal learning setting with its associated principle of "learning by doing" or "learning through play". Certain ideas and features such as play, feedback, structuring and simulating are already integrated in all of the ASPIS learning tools and are used to show the experiential learning nature of the tools. The role of learners, on the other hand, may draw attention to self-direction and to the principle of "learners as teachers" where learners are able to design their own learning considering the design of personalised learning activities, assessment strategies and learning goals that suit their own needs and learning aspirations. A learner as a teacher approach could also be developed on the basis of communities of practice (Lave and Wenger 1991). The attention here is to peers or groups of learners with an explicit focus on creating networks for communally resolving real-world problems. This "web of knowledge" ecology where people connect and share ideas and resources constitutes a holistic interpretation of the networked learning approach (Goodyear 2002).

Drawing to some overarching conclusions, the principles and processes that are best suited to informal adult learning bear significant similarities with the everyday realities of professional life, offering a bridge between the target groups of ASPIS and in particular between the professionals and the public, in exploiting learning experiences by mutual learning. For citizens there is a clear educational value in using serious games or other participatory tools (such as the Star Rating Tool) to touch upon fields that have been traditionally considered the "sanctuary" of the professionals; for professional architects and planners, using the ASPIS tools offers a unique opportunity to develop a common language with the public, exploit urban design as an open field for learning and participation by citizens, offering at the same time guidance, support and intervention in the mutual learning experience.

5. Educational considerations

The successful deployment of the ASPIS learning tools by teachers requires certain parameters to be considered. These parameters are preparation, lesson planning, teaching strategies, student grouping, classroom management, assessment, and support resources (Wilson, 2009).

5.1 Preparation

The use of e-Learning materials and serious games in the classroom require adequate preparation for a successful deployment. A holistic approach that addresses technical infrastructure, installation, support resources, professional development and lesson planning covers most of the cases.

1 http://webarchive.nationalarchives.gov.uk/+/http://www.cultureonline.gov.uk/index.html
2 http://learningforsustainability.net/internet/online_games.php
3 http://www.mysusthouse.org/game.html
4 http://go.ucsusa.org/game/

Because such learning tools are still not widely used in education or are treated with mistrust, to get sustained results schools and individuals need to dedicate the time to thoroughly prepare the environment. Games might need extra support and cooperation from IT and support should be available during class time to take away teachers' possible anxiety about the technical aspects of the learning tools (at least at the beginning). Furthermore, teachers, tutors and planners need to understand the various interfaces before they start using the ASPIS learning tools. When teachers understand the interface of the memory game, the Star Rating Tool (SRT) and the sustainability serious game they will be able to help students over this initial hurdle, and this is an important part of getting to the content. Therefore, teachers and users of the ASPIS learning tools will have to be familiar with the interfaces before they start using them.

5.2 Lesson Planning

Teachers, educators and planners who will use the ASPIS learning tools need to realise that while online learning tools and serious games may appear exotic and attractive as a delivery method, lesson planning follows the same core practices used for all instructional resources. Teachers need to understand how the activities connect to the subjects under consideration, what the goals are for the exercise and which students can benefit the most.

The key points that teachers should consider can be summarised as follows (Wilson, 2009):

- Online learning tools and serious games are similar to other supplemental resources.
- Teachers should choose their own path in to the games.
- Provide scaffolding for students.
- Have clear goals and stick to them.
- Treat it like a lab – an opportunity for students to apply, probe and test what they have learned. Amplify existing behaviour.
- Incorporate 21st Century Skills in your objectives.

Online learning tools and serious games are similar to other supplemental resources. Therefore, teachers should plan their lessons as usual, just as they would do with any lesson plan.

Here are three approaches teachers and educators can take:

- Introduce the content then use the game for synthesis and practice.
- Play the game, and then teach the content while referring back to the game.
- Alternate playing with activities that expand on or compliment the game content (Wilson, 2009).

Providing scaffolding for students will allow them to talk about the game issues at a deeper level after experiencing the game. This helps the teacher structure the discussions. The level of difficulty of the content (not the game) determines the amount of scaffolding needed. Walkthroughs and online videos can help teachers who do not have the time or the will to play the game. They can also serve as a great refresher right before a lesson.

Teachers should have clear goals and stick to them. They should make sure they have the structure and support to keep students on task. The game is likely to be so engaging for students that they may have trouble waiting to start playing or putting it away at the end of the class. Due to the individualised nature of the game play, students need to know and understand goals and objectives before they begin, which means that the teacher must have all the activities lined up, with the relevant standards and assessments determined, before play begins.

Link core course content closely to the simulations and structure it into learning modules. Be very clear about which aspects or phases of the game will meet specific standards and what assessments will show that the standards have been met. Simply playing the game is not sufficient; students must produce specific results in the form of reports, tables, graphs and quizzes appropriate to the selected assessment method.

Another way to get the most out of the ASPIS learning tools is to treat the sessions like a lab, hence an opportunity for students to apply, probe and test what they have learned. Use external productivity tools to help teams manage their experience (such as Excel or Word).

Added value in using the ASPIS learning tools can be derived by incorporating 21st Century Skills in your objectives. Such skills can include communication, presentation work in teams etc. Squire (2004) says that such skills required by the game curriculum are more closely aligned with the new economy than the "factory" model of curriculum, which praises following directions, mastering predefined objectives, performance on highly structured tasks and intellectual obedience (Gee et al., 1996).

5.3 Teaching Strategies

The advice here regarding the ASPIS learning tools is to mix game play with discussion, lectures, reading and writing to see the most benefits. Specific to game play, competition and failure are important elements which make the games fun. Teachers need to stay flexible; teachable moments will arise naturally as students engage with the content in a new and fresh way.

Key suggestions

- Incorporate online learning tools and serious games into a blended learning environment.
- The common experience of a game enhances whole class participation.
- Leverage competitive spirit.
- Make failure fun.
- Stay flexible (Wilson, 2009).

Incorporating online learning tools and serious games into a blended learning environment will achieve the best results. Teachers and educators should not abandon what they are already doing to bring games into the mix. Using online resources and serious games in a blended learning environment allows teachers to connect with more learning styles and keep the content fresh.

The common experience of a game enhances whole class participation. It is very difficult to keep every student 100% engaged during the class. One of the compelling aspects of serious games is that everyone can share similar experiences and activities at the same time. This

makes reflective exercises like discussions and essays more powerful and universal and assists towards keeping the students engaged for longer.

Leveraging the competitive spirit among students should also come into play when using the ASPIS serious game. Teachers should not underestimate the power of immediate feedback and competition as students work their way through a serious game. Unlike traditional classroom experiences where the student waits for the teacher's feedback, a game provides constant performance feedback which makes the whole process much more rapid. Making it known that the game provides this type of feedback harnesses one of the distinguishing characteristics of games: competition.

Another element that can be utilised when using games in general and serious games in particular is to make failure fun. Students, having the experience of commercial games, invest a lot of energy in making failure fun because failing is an integral part of the gaming experience. Unlike in formal education, when playing a game you are expected to fail; big game companies often invest heavily in developing hundred of different ways of failing. They make the moment entertaining and memorable as part of encouraging players to keep trying.

Failing within a game takes place in a less judgmental environment than traditional paper and pencil tests, partly because failing until you succeed is part of the whole gamer culture. Teachers and educators should embrace this aspect of the ASPIS learning tools and use failure as a departure point for reflective discussion within the room or within the environment that the session is taking place.

Finally, when teachers apply these tools in their class, they should try to stay flexible. Online tools in general and serious games in particular are a great environment to deliver "last minute" learning. Very often teachable moments arise naturally out of the player's interaction with the game world. Teachers should be able to take these opportunities and use them in ways that address the subject matter needs. This effort can be complemented by including, in their learning resources, different reference list of books, websites, articles, etc. that students can use to expand their knowledge of a topic in which they have developed an interest.

5.4 Student Grouping

Another practical aspect for the successful implementation of the ASPIS learning tools and serious games can be the grouping of the players (although the tools can be used individually). There are pedagogical and practical reasons for having students play in teams of 2–4 rather than alone. Pedagogically, games force collaborative decision making and help develop other 21st Century Skills. Grouping can reduce barriers to learning by teaming proficient gamers with non–gamers. Practically, working in teams lowers the technology footprint needed and it allows students to cover for each other during absences. There are some consensuses on how groups should be formed.

Key suggestions

- The optimal size per group is 2–3 students.
- Grouping forces students to develop collaboration skills.
- Be flexible in how you form groups, but, in general, mix gamers and non–gamers in teams.
- Assign team roles based on student strengths (Wilson, 2009).

An optimal group size is 2–4 students. 2–3 players seems to be the ideal size, but this will depend on the number of accessible computers. The benefit of groups is that they can assist in moving the conversation beyond the game, touching the subject matter at a deeper level. The focus shifts from the game to what is supposed to be learned. However it is recommended not to use more than four people in a group because it will be harder for everybody to work around a computer.

Another aspect regarding the grouping of people is that it allows them to build collaboration skills. Working in teams, students are forced to collaborate even before the game starts. They can divide the work collaboratively to complete the task at hand and they can make decisions in a collaborative way. Flexibility is required when forming groups. Teachers should think about mixing gamers with non-gamers, based on their subject proficiency or even their learning style.

Another important aspect in grouping people is their strengths. Any complex simulation such as the ones included in the ASPIS serious game involves a range of activities. Note taking, research, negotiation and communication with other groups and game strategy are just some examples of roles that different people can fill. Assigning students to a role where their strengths can shine will help them stay engaged.

5.5 Classroom Management

Classroom management when using online learning tools and serious games is very similar to any hands–on activity. An actively involved teacher providing content expertise and focus moves things along. Games appear to be particularly good at encouraging peer tutoring.

Key suggestions:

- An actively involved teacher is essential.
- Games encourage peer–to–peer tutoring.
- Encourage real–time conversations about the game between teams as well as within them (Wilson, 2009).

For the successful use and implementation of the ASPIS learning tools an actively involved teacher is essential. Teachers are the content area experts who can help students make decisions and they are classroom managers who can help teams stay focused on the learning objectives. Therefore, their active involvement is essential for the successful use of the ASPIS learning tools. Teachers need to be the subject matter experts and not the game experts (even though such expertise helps the smooth application of the process). Teachers who have mastered the game should be warned to avoid playing as an equal with the students. It will distract them from the focus on subject matter expertise and may inhibit or discourage students.

Serious games are great in encouraging peer to peer tutoring. The collaborative and competitive aspects of serious games lead naturally to peer tutoring as teams strive to accomplish game objectives. While the teacher is the content expert, student tutors focus

on how to play the game (rules), how to navigate the software (strategies) and how to score points (maths skills) which allows them to be actively involved in the learning process and motivates their engagement at the same time. Also the encouragement of peer tutoring would be much more beneficial than waiting for it to happen.

Finally, encouraging conversations about the game and the subject matter between students and between teams can have a great effect on the successful deployment of the ASPIS learning tools. Giving students a structured time to discuss what they have been doing/ learning in the game can help them better understand the content, the game and how other students are using the learning tools.

5.6 Assessment

Because a game can track and log all actions taken in a game space, there is the potential to conduct extremely sophisticated assessments that go far beyond anything possible with current assessment practices (formative and summative). To date, this remains a promise, rather than a reality.

In fact, given the novelty of game–based learning, many educators remain sceptical about the learning taking place in the game and of any embedded assessments. It is important to provide external validation of the learning that is taking place. Over time, if games deliver as promised, we expect educators to become more comfortable with in–game assessments.

Key suggestions:

- Provide mixed assessment methods, in–game and paper based assessments.
- Game logs, if available, can provide a map to assess decision making.
- Assess 21st Century Skills (Wilson, 2009).

Providing in–game and paper based assessments can track and assess students at a much deeper level in a game than just on paper. Teachers can use mixed methods to maximise effectiveness.

Game logs, if available, can provide a map to assess decision making. Seeing when and how students play the game reveals their thought processes and problem solving strategies. If this information is available to the teacher they can provide access to valuable activities.

Assessing 21st Century Skills can also be another way of assessing the students in much needed skills. Teachers have the opportunity to assess skills that might be difficult to assess during normal delivery since these skills might not be part of the lesson objectives.

5.7 Support Resources

Support resources for the ASPIS learning tools can be an important asset to the successful use of the tools.

Peer–generated content in blogs and discussion boards can be very useful resources. This kind of rapid–response user–created content is particularly useful in a field that is as dynamic as serious games are today. However, teachers should approve these resources before use.

Key suggestions:

- Online content support is most effective because it is seamless with game play.
- Blogs are good sources of information, particularly in an arena that is evolving rapidly.
- Discussion boards can be useful for students, but usage needs to be monitored.
- Resources should allow flexibility in how teachers access content – by lesson or by objective (Wilson, 2009).

Online content support is a very effective support resource because it is seamless with game play. They can be used at the same time as the playing is taking place or according to individual needs. Blogs are also a good source of information, particularly in an arena that is evolving rapidly. Furthermore, discussion boards can be useful for students, but usage needs to be monitored by the teachers or the educators. Fora sometimes can be distractive, however clearly defined behaviour rules can deal with most of these issues.

Finally, resources should allow flexibility in how teachers access content. One of the advantages of online resources is their ability to flexibly present material.

6. Lesson Activities

6.1 Lesson activity 1 (using the Sustainability Serious Game)

Aims

- To raise awareness of current and future sustainable design, its aspects and implications.
- To develop an understanding of the need to consider sustainability when designing open spaces.

Lesson objectives

- To look at how sustainable design can affect the development of public open spaces.
- To research a range of different sustainability areas and applications and learn a little bit about them.
- To understand the complexity and variation of needs that should be considered when designing for sustainability.
- To realise the importance of sustainable design.

Learning outcomes

- All students will be able to play the simulation and comment on how their choices affected the design of the park.
- Most students will be able to understand the different aspects of sustainability.
- Students will learn about the implications of designing sustainable public open spaces.

Total time: One hour

Time	Activity	Suggestions
10 mins	Introduce the activity	Using a PowerPoint presentation, introduce sustainable design including any other relevant terms, and the game. The main activity for the lesson will utilise the simulation developed by the APSIS consortium. Students play the simulation, which introduces the player to the different aspects of sustainable design. The student takes on the role of an architecture student who tries to submit a proposal for the sustainable development of a park. Within the simulation the student assumes the role of Peter, a 23-year-old architecture student, who decides to help his 17-year-old brother Larry in solving his problems. Larry belongs to a group of young skaters who hear about the local authorities' intention to demolish the "skating wall" in their local public park. Seeing their frustration about this plan, Peter seeks the help of his professor McNutty who challenges him to get involved in the redesign of the public park and offers to guide him through a series of short quests leading to the final goal: pitching his idea to the City Council. The game contains eight quests, each of which is presented to the player by professor McNutty in the form of an email screen-shot addressed to Peter. All quests take place in a 3D environment implemented using the Thinking Worlds platform.
40 mins	Game playing	The student is allowed to repeat the process several times as the effects of the game are different in each turn. This way they will be able to analyse and understand the different aspects of sustainability as well as the process of collaborating with others, in our case citizens, for consolidating and assimilating knowledge which then can be transferred to real-world contexts.
10 mins	Discussion	After students have completed the game, organise them into small groups to discuss what they have learned and what they think needs to be done to improve the sustainability of public open spaces. This will link to homework activity.

6.2 Lesson activity 2 (using the Memory Game)

Aims

- To develop an understanding about the different aspects of sustainable design.
- To develop an understanding of the need to consider sustainability when designing public public open spaces.

Lesson objectives

- To research a range of different sustainability terms and applications and learn a little bit about them.
- To understand the complexity and variation of needs that should be considered when designing for sustainability.
- To realise the importance of different aspects of sustainable design.

Learning outcomes

- Most students will be able to understand the different terms and aspects of sustainability.
- Students will learn about the diversity of sustainability applications.

Total time: forty five minutes

Time	Activity	Suggestions
10 mins	Introduce the memory game	Using the memory game introduces different terms relevant to sustainable design and the game itself. This activity can be done in different ways: 1. Allow students to complete the game and then assign some terms for research. 2. Briefly introduce the terms and then allow the students to play the game. The teacher should allocate groups for the game.
15 mins	Allocate terms for research	Students should work in groups to research the allocated terms finding information either online or using text books and prepare a brief presentation.
20 mins	Students present their information	Students present their information to the rest of the class and a brief discussion takes place about each term.

6.3 Lesson activity 3 (using the Memory Game and the Sustainability Serious Game)

Aims

- To raise awareness of current and future sustainable design, its aspects and implications.
- To develop an understanding of the need to consider sustainability when designing public open spaces.

Lesson objectives

- To look at how sustainable design can affect the development of public open spaces.
- To research a range of different sustainability areas and applications and learn a little bit about them.
- To understand the complexity and variation of needs that should be considered when designing for sustainability.
- To realise the importance of sustainable design.

Learning outcomes

- All students will be able to play the simulation and comment on how their choices affected the design of the park.
- Most students will be able to understand the different aspects of sustainability.
- Students will learn about the implications of designing sustainable public open spaces.

Total time: One hour and thirty minutes

Time	Activity	Suggestions
10 mins	Introduce the memory game	Using the memory game introduce different terms relevant to sustainable design and the game itself. This activity can be done in different ways: 1. Allow students to complete the game and then assign some terms for research. 2. Briefly introduce the terms and then allow the students to play the game.
15 mins	Allocate terms for research	Students should work in groups and research the allocated terms finding information either online or using text books and prepare a brief presentation.
20 mins	Students present their information	Students present their information to the rest of the class and a brief discussion takes place about the terms.
10 mins	Introduce the serious game	The sustainability serious game should be introduced. The game contains eight quests, each of which is presented to the player by professor McNutty in the form of an email screen-shot addressed to Peter. All quests take place in a 3D environment implemented using the Thinking Worlds platform. The simulation introduces the player to the different aspects of sustainable design. The student takes on the role of an architecture student who tries to submit a proposal for the sustainable development of a park. Within the simulation the student assuming the role of Peter, a 23-year-old architecture student, who decides to help his 17-year-old brother Larry in solving his problems. Larry belongs to a group of young skaters who hear about the local authorities' intention to demolish the "skating wall" in their public park. Seeing their frustration about this plan, Peter seeks the help of his professor McNutty who challenges him to get involved in the redesign of the public park and offers to guide him through a series of short quests leading to the final goal: pitching his idea to the City Council.
45 mins	Game playing	Combining the learning advantages of both games, the students will be able to retain subject knowledge (through the memory game) and then apply this knowledge into practice (through the sustainability game). This propensity will act as a trigger for the student; the activities performed in the serious game will generate certain interactions that are applicable to the Sustainability Game, which in turn will lead to cognitive effects.
20 mins	Discussion	After students have completed the game, organise them into small groups to discuss what they have learned and what they think needs to be done to improve the sustainability of public open spaces. This will link to homework activity.

6.4 Lesson activity 4 (using the Star Rating Tool)

Aims

- To raise awareness of current and future sustainable design, its aspects and implications.
- To explore the value of different sustainability areas.
- To develop an understanding of the need to consider sustainability when designing public open spaces.

Lesson objectives

- To look at how sustainable design can affect the development of public open spaces.

- To be introduced to different sustainability criteria.
- To learn how to evaluate the sustainability level of public open spaces.
- To understand the complexity and variation of needs that should be considered when designing for sustainability.
- To realise the importance of sustainable design.

Learning outcomes

- All students will be able to use the Star Rating Tool to evaluate the sustainability level of public open spaces.
- Most students will learn about the various sustainability criteria.
- Most students will be able to understand the different aspects of sustainability.
- Students will learn to evaluate the sustainability aspects of public open spaces.

Total time: One hour and thirty minutes

Time	Activity	Suggestions
20 mins	Introduce the activity	Using a PowerPoint presentation, introduce sustainable design including any other relevant terms, and the tool. Introduce the different sustainability criteria.
40 mins	Visit a site (physically or virtually)	The teacher can take the class to the site so students can apply the sustainability criteria and evaluate an open space. Students can make notes so they can enter the data into the Star Rating Tool later or use the tool on site via their laptops or iPads.
20 mins	Introduce the SRT and help the students to use it	The teacher can introduce the Star Rating Tool and demonstrate how it should be used. Students can enter the data into the Star Rating Tool. Students can work either individually or in groups.
10 mins	Discussion	After students have used the Star Rating Tool, organise them into small groups to discuss what they have learned and what they think needs to be done to improve the sustainability of open spaces. This will link to homework activity.

These are just some lesson suggestions from the ASPIS consortium. Teachers, tutors and planners might use the learning tools in different ways to suit their needs. For example the Star Rating Tool can be used after playing the game to evaluate the part based on the sustainability criteria. The Quests may be used independently to suit the needs of the teacher/subject. For example, Quest 6 can be used as an assessment tool independent of the rest of the quests. Finally, the learning tools can also be used for informal learning in students' own time or used as part of homework. For example, students can be given a number of public open spaces and use the Star Rating Tool to evaluate them and write a report or make a presentation based on their findings.

7. Learning packages for different user groups

The ASPIS project partners (EMU, PRISMA/3DASE, SINTLUCAS, UVEG) have designed a series of Learning Packages (LPs) for the four different target groups (e.g. university students, secondary education students, professional architects-planners, and citizens) as a means to help and guide teachers and practitioners to use the ASPIS learning tools (Serious Game, Star Rating tool and Memory Game). Moreover, the learning packages provide best practice examples through describing potential applications, the scenario and its objectives, the target group, the delivery method and guidance for the learning process and evaluation of the learning results. The design of the learning packages was based on a standard template to enable the description, representation, and access to best practice examples. In particular the aim of the Learning Package template' is to:

- Make a range of identified scenarios accessible to interested teachers and practitioners alike.
- Provide guidance and support for using the ASPIS learning tools for different educational purposes and goals.
- Support the wider audience to reuse or repurpose scenarios designed and facilitated by the project partners or to design entirely new scenarios inspired by best practice principles and examples provided from the ASPIS project partners.

7.1 Learning Package 1: University Students

1. Educational Objectives

- Memorising notions or terms.
- Confronting students with design problems and solutions.
- Evaluation of a concrete area and/or set of public open spaces at the beginning of the course and self-evaluation of students' design/planning at the end of the course.
- Promoting academic discourse within planning modules for Masters.
- Promoting out-of-classroom activities to understand differences in planning cultures for design/planning students.

2. Components

Levels / Tools	Memory Game	Serious Game	Star Rating Tool
First year BA	Notions/terms lecture	Notions/terms confronting	
Second Year BA	Notions/terms lecture	Notions/terms confronting	Evaluation of area Evaluation of design
Third year BA	Notions/terms lecture		Evaluation of area Evaluation of design
First year MA	Notions/terms lecture		Academic discourse
Second year MA	Notions/terms lecture		Academic discourse

3. Scenarios

3.1 Scenario: ***Memorising***

Objectives: To absorb and retain key concepts and basic terms of sustainable design/planning.

Target group: BA and MA students of design or planning related subjects.

Delivery method and guidance of learning process:

- Organiser: course teacher
- Setting: formal
- Used Tools: Memory Game
- Methodology: memorising notions or terms before dealing with different design/ planning content at the beginning of the courses
- -Role of the organiser: To introduce the tool and to guide the discussion after its use
- Context of use: computer room
- Delivery method: on-line

Evaluation of the learning results: To discuss the notions or terms in connection to an introductory lecture about sustainable design or planning terms.

3.2 Scenario: ***Confrontation***

Objectives: To construct knowledge resulting from students' interaction with the virtual world.

Target group: First and second year BA students of design or planning related subjects.

Delivery method and guidance of learning process:

- Organiser: course teacher
- Setting: formal
- Used Tools: Serious Game
- Methodology: confronting students with an archetype of a public open space
- Role of the organiser: To introduce the tool, to facilitate the use of the tool and to guide the discussion after its use.
- Context of use: computer room
- Delivery method: on-line

Evaluation of the learning results: To discuss the human actions associated with a simple public open space in a seminar.

3.3 Scenario: ***Evaluating place I***

Objectives: to raise awareness of qualities of public open spaces.

Target group: Second and third year BA students of design or planning related subjects.

Delivery method and guidance of learning process:

- Organiser: course teacher and connected, invited external experts
- Setting: formal
- Used Tools: Star Rating Tool
- Methodology: evaluation of a concrete area at the beginning of a course/project
- Role of the organiser: To introduce the tool, to facilitate the use of the tool and to guide the discussion after its use.
- Context of use: a concrete object or a situation in the neighbourhood of the institution
- Delivery method: on-line or on-site with a hand-out

Evaluation of the learning results: To discuss the sustainability criteria based on the examples of a real area presented in the seminar.

3.4 Scenario: ***Evaluating place II***

Objectives: To improve the design of a concrete public open space.

Target group: Second and third year BA students of design or planning related subjects.

Delivery method and guidance of learning process:

- Organiser: course teacher and invited external experts
- Setting: formal
- Used Tools: Star Rating Tool
- Methodology: evaluation of a design at the end of a course-project
- -Role of the organiser: To introduce the tool, to facilitate the use of the tool and to guide the discussion after its use
- Context of use: the presented design of a specific public open space
- Delivery method: on-line

Evaluation of the learning results: To discuss the sustainability criteria based on examples of different design works presented in the seminar.

3.5 Scenario: ***Academic discourse***

Objectives: To start an academic discourse on planning / design theory.

Target group: First and second year MA students of design or planning related subjects.

Delivery method and guidance of learning process:

- Organiser: course teacher and connected, invited external experts
- Setting: formal
- Used Tools: Star Rating Tool
- Methodology: initiating discussions on the sustainability of different public open spaces
- Role of the organiser: To introduce the tool, to facilitate the use of the tool and to guide the discussion after its use
- Context of use: class room and connected field trips
- Delivery method: on-line or on-site with a hand-out

Evaluation of the learning results: To discuss the sustainability criteria based on the examples of different public open spaces presented in a seminar.

For an overall evaluation, the University Students should use the ASPIS evaluation Questionnaires at the end of each learning block to memorise the actions carried out.

7.2 Learning Package 2: Secondary education students

1. Educational Objectives

- Memorise notions or terms.
- Engage in problem solving situations concerning their local public open spaces.
- Understand the complex concept of sustainability and its components.
- Evaluate public open spaces in their neighbourhood and propose solutions for any problems.
- Promote voluntary work and collaboration.
- Encourage students' sense of citizenship.

2. Components

Students/ courses	Memory Game	Serious Game	Star Rating Tool
Interdisciplinary Projects	Notions / terms	All or part of it (specific missions)	Evaluation of area
Environmental Education	Notions /terms	All or part of it (specific missions)	Evaluation of area
Geography	Notion / terms	All or part of it (specific missions)	Evaluation of area
Biology/Ecology	Notion / terms	All or part of it (specific missions)	Evaluation of area
Mathematics/ Economics	Notion/terms	All or part of it (specific missions)	Evaluation of area
History	Notion/terms	All or part of it (specific missions)	Evaluation of area
Sociology	Notions/terms	All or part of it (specific missions)	Evaluation of area

3. Scenarios

3.1 Scenario: *Memory Game*

This can be used as an introductory session to the Sustainability Game or as an independent tool, which will help teachers explain the concept of sustainability to students and will enable students to understand the multiple dimensions of sustainability and how they are expressed in the framework of public open spaces.

Objectives: Memorise notion of terms.

Target group: Secondary education school students.

Delivery method and guidance of learning process:

- Organiser: School teacher
- Setting: formal
- Used Tools: Memory Game

- Methodology: learn sustainability concepts and methodology
- Role of the organiser: produce some general directions as basic ideas to start with
- Context of use: in the classroom and at home
- Delivery method: on-line

Evaluation of the learning results: Teachers need to use the ASPIS Questionnaires (user satisfaction) without the questions concerning the piloting, in order to ensure the cognitive aspect of the tools.

3.2 Scenario: *Game of Sustainability*

The game has various applications. It can be used independently as a serious game concerning the sustainability of public open spaces, which "guides" the student to get involved in a virtual problem solving situation through a set of tasks. The tasks become increasingly demanding from quest to quest, require an understanding of the concept of sustainability and what this concept translates to in real life situations when it is applied to public open spaces located nearby. The game includes 8 quests. Each of them can be used by teachers of various subjects to teach aspects of sustainability such as citizens' rights, environmental and health issues, history and evolution of public open spaces, finance and economics and local enterprises, consensus building and working for the community on a voluntary basis, etc.

Objectives: Engage students in problem solving situations concerning their local public open spaces; Evaluate the public open space of their neighbourhood and propose solutions to any problems.

Target group: Secondary education school students.

Delivery method and guidance of learning process:

- Organiser: School teacher
- Setting: formal
- Used Tools: Sustainability Game
- Methodology: Use the game in relation to a specific subject to enhance understanding of sustainability.
- Role of the organiser: to facilitate students' efforts to play the game and to make appropriate connections
- Context of use: in the classroom
- Delivery method: blended (both in-class and online)

Evaluation of the learning results: Discuss with the students their understanding of sustainability.

3.3 Scenario: *Star Rating Tool (SRT)*

This tool can also be used in the framework of the game, but it can also be a way of approaching the local public open space and seeing it "through the eyes of sustainability". Especially in situations when students "adopt" or want to change a real and not a virtual public open space (for example their school yard), the tool can be used independently or in combination with the memory game.

Objectives: To engage in problem solving situations concerning their local public open spaces; to promote voluntary work and collaboration.

Target group: Secondary education school students.

Delivery method and guidance of learning process:

- Organiser: School teacher
- Setting: formal
- Used Tools: Star Rating tool
- Methodology: Use the game in conjunction with professional engineers or architects to promote collaborative processes
- Role of the organiser: create a collaborative environment for students to share ideas with professional architects and engineers
- Context of use: in the park
- Delivery method: in the park with the use of Internet enabled laptops

Evaluation of the learning results: Discuss with professionals and teachers ways of further improving parks and public open spaces.

7.3 Learning Package 3: Citizens

1. Educational Objectives

- To make people familiar with notions and concepts relating to sustainability.
- To promote learning about sustainability and raise awareness.
- To stimulate discussion on public open spaces, sustainable design and public participation.
- To introduce citizens to the value and methods of advocacy.
- To enable citizens to evaluate the design and management of urban spaces.

2. Components

Agents/learners	Memory Game	Serious Game	Star Rating Tool
NGO	Education Notions & concepts	Discussion	Awareness rising Petitions Advocating
CSO	Education Notions & concepts	Discussion	eAwareness rising Petitions Advocating
Families	Notions & concepts	Learning by playing	Location evaluation
Citizens	Notions & concepts	Learning by playing	Location evaluation

3. Scenarios

3.1 Scenario: *Advocating*

Environmental NGOs may advocate the sustainability for public open spaces, using the **Star Rating Tool** with citizens in order to raise awareness. The NGO could organise an open session where individuals are invited to come into a computer room and, guided by the NGO representative, analyse a public open space of the city. After completing the questionnaire, a focus group would follow where different perceptions of the same place may be put on the table. The NGO representative would have the opportunity to discuss the criteria defining the sustainability concept with the audience.

*Objective*s: Raising awareness

Target group: Citizens

Delivery method and guidance of learning process:

- Organiser: Environmental NGO's
- Setting: informal
- Used Tools: Star Rating tool
- Methodology: To analyse a public open space of the city
- Role of the organiser: To introduce the tool, to facilitate the use of the tools and to guide the discussion after its use
- Context of use: Computer room
- Delivery method: Face-to-face and online

Evaluation of the learning results: To discuss the criteria which define the sustainability concept with the audience.

3.2 Scenario: *Awareness Raising and public petitions*

Taking advantage of a day related to ecology or sustainability, the NGOs could organise some awareness raising days to talk about sustainability and the qualities of the public open space. It would take place in the NGO's office or in a bigger space that the NGO could rent from a public institution such as the City Council. In that sense, the Memory Game and the Serious Game could be useful with young people. After that, the Star Rating Tool would be used to help them identify good design and problems found in a public open space. Using this information and with the help of the NGO representative, the citizens could propose some solutions or make proposals for the public open space and use these proposals to lobby the local authority through a petition.

Objectives: Raising awareness and acquiring information for public petitions

Target group: Citizens (adults and young people)

Delivery method and guidance of learning process:

- Organiser: Environmental NGO's and other civil society organisations
- Setting: informal
- Used Tools: Memory Game and Sustainability Game for young people and Star Rating Tool for all
- Methodology: To identify good design and problems found in an open space
- Role of the organiser: To introduce the tool, to facilitate the use of the tools and to be an intermedidary transferring the citizens' opinions to public institutions
- Context of use: NGO's office or rented space
- Delivery method: Face-to-face and online

Evaluation of the learning results: To discuss the criteria defining the sustainability concept with the audience. To propose some solutions to existing problems or make proposals for the design of the public open space. To collect information on the opinions of the citizens.

3.3 Scenario: Conferences related to sustainability

When an NGO organises conferences related to the sustainability of public open spaces, the ASPIS tools may become very useful and illustrative for the audience. The three ASPIS tools can be introduced to the public by the environmental NGOs in the conferences, while at the same time they may be used to illustrate and give practical examples when evaluating a public open space, or when defining sustainability concepts, by referring to the criteria developed by the project. The NGOs would demonstrate how the tools work and which of them are good for each field of knowledge transfer: education, public participation, raising awareness. Further to the presentation, a group activity can be suggested by the speaker to take place during the conference, provided the necessary conditions are met, while individual play at home might also be encouraged.

Objectives: To introduce the ASPIS tools

Target group: Citizens involved in the conference

Delivery method and guidance of learning process

- Organiser: Environmental NGOs and other civil society organisations
- Setting: formal
- Used Tools: Memory Game, Sustainability Game and Star Rating Tool
- Methodology: To speak about sustainability and to explain about the three tools
- Role of the organiser: To introduce the tool, to facilitate the use of the tools for knowledge transfer
- Context of use: Conference use
- Delivery method: Face-to-face

Evaluation of the learning results: To discuss the criteria defining the sustainability concept with the audience.

3.4 Scenario: *Families*

Parents or other family members willing to introduce sustainability concepts to the younger family members may use the **Memory Game** for this purpose. The memory game is a very easy tool to use. With illustrative pictures the children will be able to identify and memorise the criteria ASPIS project has defined to determine whether a public open space is sustainable or not. After memorising the concepts, adults would explain to children what these mean and talk to them about the benefits of sustainability.

Once children are familiar with the concepts, they can be introduced to the **Serious Game** where they can practice with the concepts they learnt, since sustainability criteria need to be used to go through the different quests.

Objectives: To introduce sustainability concepts; To have fun playing with the ASPIS tools

Target group: children and teenagers

Delivery method and guidance of learning process

- Organiser: Parents or family members
- Setting: formal
- Used Tools: Memory Game; Serious Game
- Methodology: The tools can be used in different combinations. The specific combinations should be made according to the desired output/input, the timeframe and the participants
- Role of the organiser: To introduce the issue of sustainability, and to demonstrate the tools
- Context of use: Home environment
- Delivery method: Face-to-face and online

Evaluation of the learning results: To explain the benefits of the sustainability game and to discuss the main ideas concerning sustainability.

7.4 Learning Package 4: Architects/urban planners and related professionals

1. Educational Objectives

- To encourage peer to peer learning among professionals on the various aspects of sustainability.
- To promote learning on the issue of public participation by stimulating a dialogue between the professionals and the public.
- To raise awareness among professionals on planning related issues like public participation techniques, volunteering and community empowerment.

2. Components

Agents/learners	Memory Game	Serious Game	Star Rating Tool
Individual architects/ urban planners/other related professionals		Elicit requirements for holding an effective dialogue with citizens	Elicit requirements for improved design, evaluation of plans and ideas Peer to peer learning
Local authorities	Familiarisation with concepts/ terms	Familiarisation with important design and management issues, Discussion	Elicit perceptions Evaluation of public spaces Getting feedback on how citizens and local communities rate a specific public space

3. Scenarios

3.1 Scenario: Individual Professionals (architects/planners/other related practitioners)

The possible use of the tools in their daily design and planning activities focuses on the **Star Rating Tool**. This tool can be used to easily and quickly perform an initial evaluation of the sustainability of a public open space. In this way it could help to provide an insight in the sustainability of a proposed design or existing situation. This insight could help to improve the design of public open spaces. This means that the Stra Rating Tool can provide an initial audit of the sustainability of a public open space. When designing public open spaces it is important to get input and feedback from the end-users. The Star Rating Tool can be used to interact with the end-users and get feedback from the users of a public open space. It could be used to document the users' visions of the space and in doing so generate information for decision makers. It is considered useful that the .xls behind the Star Rating Tool should be made accessible to professionals in the field of planning.

The **Sustainability Game** can be also used by professionals to become familiar with methods of approaching the public, to make use of examples for popularising concepts and practices of sustainable design, and also getting to know a tool that can be used in public participation settings for raising awareness and familiarising audiences with the components of sustainable design.

Objectives: To perform an initial evaluation of a public open space and to become familiar with awareness raising and public participation tools.

Target group: Planning professionals (architects, urban planners, other related practitioners).

Delivery method and guidance of learning process:

- Organiser: Planning professionals (architects, urban planners, other related practitioners)
- Setting: informal
- Used Tools: Star Rating Tool
- Methodology: evaluation of a public open space in sustainability terms; learning to use the sustainability game as a public participation tool
- Role of the organiser: convening the meeting, facilitating the sessions with the public, taking the lead in organising mutual learning among peers
- Context of use: evaluation of a public open space within the professional duties of the planning professional; public participation settings
- Delivery method: on-line use of the Star Rating Tool following a visit to the space or on-site with a hand-out; individual use of the sustainability game

Evaluation of the learning results: To gain insight on how to improve the design of a public open space in terms of sustainability; to gain insight on the use of the serious game in a public participation setting.

3.2 Scenario: Local authorities holding public participation meetings

In the context of a participative process all three learning tools may be used:

The Star Rating Tool can be used to document the views of citizens/ users by asking them to perform an initial evaluation of a public open space. The Serious Game can be used to provide tangible examples of the different ways sustainability is achieved and how citizens can contribute to it. The memory game can be used as an ice-breaker, to familiarise the audience with relevant notions and terms. In all cases the tools can be used to make the citizens and non-professionals understand the complexity of sustainability issues and to increase sensibility on sustainability. The Memory Game, the Serious Game and the Star Rating Tool are useful in making a person think about the sustainability of public open spaces in the sense of an information-sharing tool giving ideas about design or accessibility.

In all cases a facilitated context will enhance the usability and usefulness of the tools. A facilitator (who could well be a professional in charge of open space design in the local authority) can use the tools or the results of applying the tools in a specific context to stimulate a dialogue with the public on design issues and especially sustainable design of the public open space. In doing so, they can reach viable solutions together with the local administration.

Objectives: to gain feedback (visions, views, needs) from citizens in relation to a new design or re-design of a public open space.

Target group: Planning professionals (architects, urban planners, other related practitioners) involved in a dialogue with citizens.

Delivery method and guidance of learning process:

- Organiser: Local authority, planning professionals (architects, urban planners, other related practitioners)
- Setting: informal (local authority meetings, public participation processes, awareness raising events organised by the local authority etc.)
- Used Tools: Star Rating Tool, Serious Game, Memory Game
- Methodology: the users are asked to use the tools to become familiar with sustainability issues; to evaluate the public open space in question; and to express their views and needs as they relate to the proposed (by the planners/architects) new design
- Role of the organiser: convening the meeting and placing a professional architect/ planner in the role of the facilitator; Context of use: Local authority premises, public open spaces, other venues
- Delivery method: Face-to-face and online

Evaluation of the learning results: Quality of feedback from the public/users of public open spaces, active involvement of citizens, constructive dialogue between members of the public and the professionals.

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