



Fostering creativity in learning  
through digital games

Creative Emotional Reasoning Computational Tools Fostering Co-Creativity in Learning Processes

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# C<sup>2</sup>LEARN SCENARIOS, USE CASES AND USER REQUIREMENTS

C<sup>2</sup>LEARN PROJECT DELIVERABLE NO. D5.1.1

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## Abbreviations used

A) Abbreviated names of the project consortium partners

| Abbreviation  | Explanation                                                  |
|---------------|--------------------------------------------------------------|
| <b>EA</b>     | Ellinogermaniki Agogi, Greece (coordinator)                  |
| <b>UEDIN</b>  | The University Of Edinburgh, UK                              |
| <b>OU</b>     | The Open University, UK                                      |
| <b>NCSR-D</b> | National Centre For Scientific Research "Demokritos", Greece |
| <b>UoM</b>    | Universita ta Malta, Malta                                   |
| <b>SGI</b>    | Serious Games Interactive, Denmark                           |
| <b>BMUKK</b>  | Bundesministerium Für Unterricht, Kunst Und Kultur, Austria  |

B) Other abbreviations in alphabetical order

| Abbreviation              | Explanation                                                                                                                         |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>C<sup>2</sup>Learn</b> | Acronym of the project (full title: Creative Emotional Reasoning Computational Tools Fostering Co-Creativity in Learning Processes) |
| <b>CER</b>                | Creative Emotional Reasoning                                                                                                        |
| <b>DoW</b>                | Description of Work (Annex I of the Grant agreement no. 318480)                                                                     |
| <b>EC</b>                 | European Commission                                                                                                                 |
| <b>FP7</b>                | The Seventh Framework Programme for Research and Technological Development (2007-2013)                                              |
| <b>GBL</b>                | Game-Based Learning                                                                                                                 |

|            |                                                         |
|------------|---------------------------------------------------------|
| <b>ICT</b> | Information and Communications Technologies             |
| <b>M#</b>  | # <sup>th</sup> month of the project (M1=November 2012) |
| <b>TEL</b> | Technology-Enhanced Learning                            |
| <b>WHC</b> | Wise Humanizing Creativity                              |

## Executive summary

### *C<sup>2</sup>Learn at a glance*

C<sup>2</sup>Learn ([www.c2learn.eu](http://www.c2learn.eu)) is a three-year research project supported by the European Commission through the Seventh Framework Programme (FP7), in the theme of Information and Communications Technologies (ICT) and particularly in the area of Technology-Enhanced Learning (TEL) (FP7 grant agreement no 318480). The project started on 1<sup>st</sup> November 2012 with the aim to shed new light on, and propose and test concrete ways in which our current understanding of creativity in education and creative thinking, on the one hand, and technology-enhanced learning tools and digital games, on the other hand, can be fruitfully combined to provide young learners and their teachers with innovative opportunities for creative learning. The project designs an innovative digital gaming and social networking environment incorporating diverse computational tools, the use of which can foster co-creativity in learning processes in the context of both formal and informal educational settings. The C<sup>2</sup>Learn environment is envisioned as an open-world ‘sandbox’ (non-linear) virtual space enabling learners to freely explore ideas, concepts, and the shared knowledge available on the semantic web and the communities that they are part of. This innovation is co-designed, implemented and tested in systematic interaction and exchange with stakeholders following participatory design and participative evaluation principles. This happens in and around school communities covering a learner age spectrum from 10 to 18+ years.

### *About this document*

Deliverable D5.1.1 ‘C<sup>2</sup>Learn Scenarios, Use Cases and User Requirements’ is the first version of a document describing the educational scenarios and use cases that will guide the implementation of creative learning activities in the C<sup>2</sup>Learn pilots, as well as the user requirements elicited. This is an early, intermediate outcome of a continuous process of participatory design involving end user communities, especially students and teachers, from the three implementation country contexts of the project: Austria, Greece, and the UK. The overall aim is to provide input directly from the field into the design of the C<sup>2</sup>Learn innovation, so that the technologies deployed will correspond to the needs, circumstances, expectations and aspirations of the end users.

It should be noted that the present deliverable is appearing in the sixth month of the project, constituting user communities’ first, early voice offered as baseline for the design processes of the project. It will be followed by two further iterations of the ‘C<sup>2</sup>Learn Scenarios, Use Cases and User Requirements’, appearing updated as D5.1.2 in the twelfth, and, in final form, as D5.1.3 in the eighteenth project month.

The present document describes the characteristics of the initial core user communities in each of the three sites, and the community-building and visionary co-design work undertaken in the first six months. In addition, a variety of preliminary scenarios that have emerged through this process are presented in narrative form, complemented by key learning themes, concepts and activities and available information about the constraints of the educational context. Finally, some preliminary user requirements are extracted from this work. The work of each research team is presented separately, following a common section structure to facilitate peruse either by partner site or by dimensions of interest across sites.

## 1 Introduction

The C<sup>2</sup>Learn project aims to provide young learners and their teachers with innovative opportunities for creativity in learning by combining technology-enhanced learning tools and digital games in an open-world virtual space, where learners engage in playful experiences surrounding challenges that invite creative agency and non-linear thinking.

Within the C<sup>2</sup>Learn environment a variety of educational scenarios will be implemented, appropriate for different age groups and educational contexts, serving specified learning objectives, providing links to curriculum or relating more widely to young learners everyday life experiences.

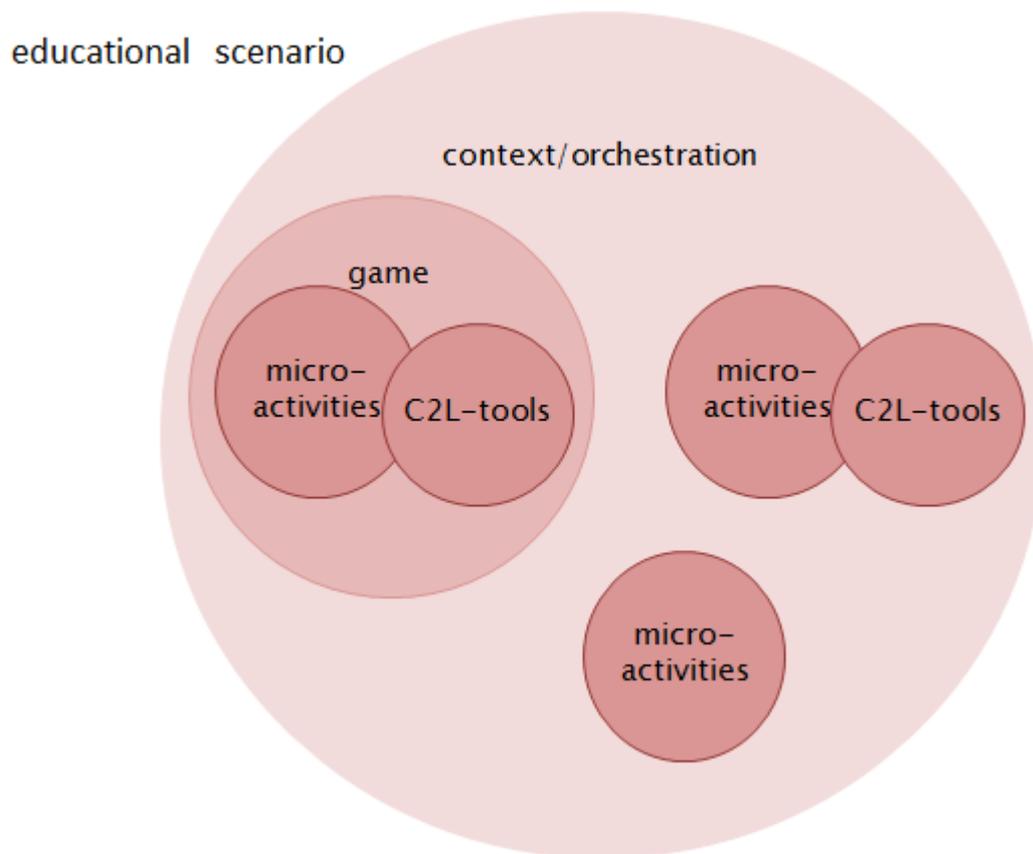
Clearly, such a project has a strong stake in engaging its end-user communities, especially teachers and students, in the design and evaluation of the evolving C<sup>2</sup>Learn environment. In this document we report the activities undertaken in the first six months of the project in the three sites where end-user communities are fashioned around the C<sup>2</sup>Learn project. These activities served the dual aim of inducting user communities to the C<sup>2</sup>Learn philosophy and design process, while at the same time generating useful user input to inform design. The co-design of educational scenarios is central to this participative process.

### 1.1 EDUCATIONAL SCENARIOS IN C<sup>2</sup>LEARN

An educational scenario describes a complex learning enterprise in a specific context. Scenarios are not merely descriptions of user-system interactions in the course of learning. Rather, they describe broader activities of meaningful learning in which an envisioned technological system will be embedded. Figure 1 gives a schematic of how educational scenarios will relate to the C<sup>2</sup>Learn environment.

As this schematic shows, the educational scenario is meant to describe a broader context of orchestration that may involve things such as setting the stage by assigning roles, missions and initial definitions of problems; designating learners into teams; marshalling a variety of resources; delimiting a timeframe; and, eventually, bringing the endeavour to a conclusion. Within the educational scenario, a set of specific activities (which we termed micro-activities) are available to the learners for putting the scenario into action. Such activities can provide more concrete mapping to learning objectives or curriculum content.

Note that an educational scenario can comprise activities that employ the envisioned technological system in various forms and degrees. For example, the schematic shows that a C<sup>2</sup>Learn scenario may comprise activities that take place within the digital game environment using the technology-enhanced learning tools; activities that use the tools independently of the game; and, finally activities that are altogether independent of the C<sup>2</sup>Learn technological environment.



**Figure 1: The whole range of possibilities for an educational scenario to embed the C<sup>2</sup>Learn game and tools**

The co-design of scenarios can serve the purpose of engaging core user communities and inducting them to the C<sup>2</sup>Learn pedagogical approach. Specifically:

- They serve to switch the pedagogical emphasis from the transmission of subject matter to the orchestration of experiences around the subject matter, and thus from teacher activity to student activity. This is particularly important for the transformation of practice in educational systems with teacher-centric traditions.
- They focus attention on making the learning situation meaningful from the point of view of the students, which is often neglected in discussing the curriculum. Curriculum may make sense from the point of view of subject matter experts or teachers, but in practice often fails to convey to the students why this or that exercise, concept or fact is significant, in effect providing students with answers to questions that they do not share and with terms for which they have no corresponding experiences (Gee 2007), in a sense providing ‘a pile of manuals with no games’ (Gee as cited in Rosenberg 2013).
- They provide adequate but flexible structure for sustained learning and reasoning around complex and open problems and a wealth of content (as opposed to the limiting lesson-plan level design on one end and completely open exploration on the other). Especially open-ended environments like the ones being designed in C<sup>2</sup>Learn may be intimidating or appear trivial without scenarios that engage participants with their full potential.
- They can be concrete embodiments of the C<sup>2</sup>Learn theoretical ideas, and thus they can serve for the collaboration of researchers and core user communities, and as exemplars for communicating with a broader population of potential users and other communities of interest (Cooper and Brna 2000, Mor 2011, 2013).

- Finally, and most pertinently for C<sup>2</sup>Learn, scenarios can bridge the ‘frivolous’ play vs. ‘serious’ learning divide, in the direction of defining playful learning (Quinn 2005).

At the same time, scenarios can generate useful user input to inform design (Carroll 2000, Rosson and Carroll 2002, Cooper and Brna 2000). Specifically:

- They avoid technical descriptions and design techniques that exclude the uninitiated from the design process.
- They capture a range of possibilities for meaningful use, enriching conceptions about technological functionalities.
- They embody implicit pedagogical and design claims about functionalities in the context of use.
- They can frame activities for the direct elicitation of user requirements, especially for innovative technological systems.
- They can frame participative, rather than reactive (Scaife and Rogers 1999), user evaluation of evolving technological designs.

Within C<sup>2</sup>Learn, educational scenarios will be developed in several iterations. Their development starts as short narratives illustrating possibilities for the digital game and computational tools that are meaningful to their users, aiming not to be prescriptive but rather to indicate a range of potential directions. Selected scenarios will be creatively and substantively elaborated, critically examined, checked for completeness, until they become an adequate blueprint, for orchestrating the learning activity and for designing related digital tools and environments. The final aim of developing the educational scenarios is to provide the framework for the implementation of concrete, carefully designed and described use cases for the C<sup>2</sup>Learn pilots.

## 1.2 AIMS AND OVERVIEW OF THE WORK REPORTED IN THIS DOCUMENT

In this initial phase of the project and in all three sites where core user communities are engaged in the co-design, implementation and evaluation of the C<sup>2</sup>Learn environment, our efforts have had the following aims:

- To enlist and engage a core community of users that will participate intensively in all C<sup>2</sup>Learn design, implementation and evaluation cycles
- To generate a large number of rudimentary scenario narratives (what we have termed *scenario seeds*), rather than elaborating fully-fledged scenarios, so as to provide the game design and technical teams with a wide range of possibilities to consider
- To formulate preliminary user requirements and record open questions in need of consideration from our user community perspective.

Within this general set of aims, the research team in each of the sites was given leeway to follow the approach more appropriate to its institutional strengths and its relevant expertise.

In this document, we first describe the characteristics of the initial core user communities in each of the three sites and the community building and visionary co-design work undertaken. Then a variety of preliminary scenarios that have emerged through this process are presented in narrative form, complemented by key learning themes, concepts and activities and available information about the constraints of the educational context. Finally some preliminary user requirements are extracted from this work. The work of each research team is presented separately, following a common section structure to facilitate peruse either by partner site or by dimensions of interest across sites.

## 2 C<sup>2</sup>Learn initial user sites and core user communities

Three educational research teams in Greece (EA), United Kingdom (OU) and Austria (BMUKK) are engaged in building core user communities for C<sup>2</sup>Learn.

### 2.1 GREECE, ELLINOGERMANIKI AGOGI (EA)

In Greece, the initial core user communities were formed within the school of Ellinogermaniki Agogi. Specifically, two core groups of teachers, one in the primary and one in the secondary (middle and high) school, were engaged in visionary co-design activities, which are described in the next section. The groups were formed in consultation with school principals, after an initial meeting explaining the goals of the project and reviewing how it fits into the school needs and priorities.

From the outset the primary school group defined a strong curriculum focus on Geography for the 5th and 6th grade (10-11 year old pupils), though cross-curricular connections were explored. The group consists of four 5th and 6th grade classroom teachers and the principal. In addition, a computer teacher has attended one of the meetings and expressed interest in becoming involved and providing support for the project. The work of the primary school group was organized around group meetings with contributions to a shared Moodle space between meetings.

In the primary school of Ellinogermaniki Agogi there is some previous experience with adopting game-based approaches. These usually involve students in creating the games (rules and physical artefacts), and have been linked to diverse areas of the curriculum, from history to nutrition, traffic education and language (the latter through the task of formulating the game rules):

- Mainly knowledge games: board games, puzzles, acrostics, linking games, memory cards, multiple-choice question cards (e.g. Trivial-Pursuit-style games)
- Taboo-style and Monopoly-style board games
- Acquaintance with Ancient Greek games
- The 'box of senses' (closed box which students interact with in order to guess its content based on one or some of their senses)
- Computer-based knowledge games
- Game-like activities with handheld devices (PDAs), e.g. visiting a supermarket to find out information about the nutritional value of the products.

The secondary school group was formed after an open call of interest by the high school principal and brings together teachers from diverse curriculum areas. Specifically the group consists of five teachers and the high school principal, with the following specialties: home economics, biology, mathematics, humanities, astronomy and drama education. The expectation here is that the C<sup>2</sup>Learn environment will serve as a platform for cross-curricular connections. The work of the secondary school group was organized around group meetings and individual consultations with participating teachers.

The participating secondary school teachers did not have previous experience with game-based learning in the strict sense. However most of the teachers registered an interest in C<sup>2</sup>Learn because of their experiences with playful approaches to learning in their respective subject matter, which ranged from occasional experimentation to everyday practice. One participant has experience with writing content for educational games in the branching-story genre. Further, though in our approach we avoided focusing too much on digital games, therefore we didn't share or analyse specific games, the participating secondary teachers brought into the conversation the following game examples in relation to their ideas:

- FRONTIERS: the game allows players to assume either the role of the refugee attempting to cross into the EU or the authorities guarding the border (<http://www.frontiers-game.com/>)
- MOONBASE: the game sets the players in a futuristic lunar settlement assigning them the mission of restoring life support systems after a meteor strike (<http://www.nasa.gov/offices/education/programs/national/ltg/games/moonbasealpha/index.html>)
- SPORE: a game that enables players to create and evolve their own creatures (<http://eu.spore.com/home.cfm?lang=en>)
- INGRESS: an alternate reality game, where two teams compete to 'secure' various areas, by solving challenges associated with various landmarks, public spaces and cultural sites across Europe (<http://www.ingress.com>).

In addition to the teacher community within EA, the interest and availability of other schools to partake in the core community is being explored through the EA R&D Department's network of collaborating schools. Further, we began the process of building a broader community of interest around C<sup>2</sup>Learn consisting of educators and a variety of professional and academic experts in areas of learning, games and youth creativity.

## 2.2 UNITED KINGDOM, OPEN UNIVERSITY (OU)

The OU team brings a special interest in learner voice and participation alongside expertise in creativity in education and gaming literacy and gaming capital. As a result the team has prioritised working with young people alongside their teachers.

The OU team recruited four schools with which to work over a two month period during the early part of 2013. These are community (i.e. state funded) schools known to the team for their interest in both creativity and digital media. Two schools were located in the South West of England and two in the South East of England. Two are primary schools and two are secondary. The age span of pupils involved in the workshops is 10-17<sup>1</sup>.

In total, each school engaged in three one-and-a-half hour workshops, most of which were facilitated by the research team<sup>2</sup>, who travelled across England to facilitate these in communities which included city, suburban and rural contexts.

Ethical clearance for this fieldwork in the following schools<sup>3</sup> was sought from the Open University's Human Research Ethics Committee. In each case written consent to participate was given by each pupil and also their parents. Written consent was also obtained from the teachers involved. In total, 45 young people were involved and six teachers (two being Assistant Heads and three heads of department or senior teachers). The staff and pupils in each site agreed to participate in this first phase; each site is keen to continue to work with the project.

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<sup>1</sup> Although the project spans 10-18, it was impossible to involve 18 year olds who are in their final year of school and under heavy pressure with assessments and examinations.

<sup>2</sup> Two of the twelve workshops were facilitated by participating teachers due to timetabling issues in one instance and unforeseen illness in another.

<sup>3</sup> Pseudonyms

Brownlow Primary (South West England): This is a semi-rural primary school of 420 pupils aged 4-11, set at the edge of a village, with large playing fields and spanning a number of buildings some dating back to Victorian times. This community school serves a semi-rural and rural population and some parts of its community experience economic disadvantage. The percentage of pupils known to be eligible for and claiming free school meals is 8.3%. 98.1% of children at this school have English as their first language. 2.1% of children at the school have a statement of special educational needs, 19.2% of the children have special educational needs without statements. The school encourages collaborative work with pupils at other schools including those at its three partner schools in Holland, Ethiopia and the United States. The school has its own deep space telescope observatory and a TV studio from which it broadcasts its bespoke film material, as well as encouraging the use of an allotment for growing food, made available to the school by a national organisation. Staff at Brownlow Primary are particularly keen to explore how to nurture children's creative and critical thinking and the school has a particular interest in the use of information and communications technology (ICT). The school has therefore formed a number of research partnerships with universities and with software and hardware providers and is sponsored by Microsoft in a number of action research initiatives focusing on the use of digital technology. Children in the upper part of this school follow personalized study paths using digital technology as an entry point and as an integrating medium and context for learning individually, collaboratively and communally. The project team at Brownlow Primary comprised ten pupils aged 10-11 and one teacher who had recently qualified with a strong interest in how digital technologies can foster learning.

St Paul's Secondary (South West England): This is a secondary school of 1230 pupils aged 11-16. Rebuilt as part of a now-ceased programme of Building Schools for the Future in 2007 and formerly two separate single-sex Church schools which merged in the 1980s, it occupies a generous plot of land encompassing outdoor space and a large playing field and a sports hall with a climbing wall. It is located on the outskirts of a city in the South West of England, serving a mix of private and social housing although the percentage of pupils eligible for free school meals is below average at 6%. Reflecting the city in which it is located, few pupils (4%) have English as an additional language. The percentage of pupils with learning difficulties or disabilities is low at 7%. As a Church of England school, pupils and their families are regular churchgoers and as a Christian community, pupils and staff are encouraged to live out their faith. Having said this, the school also reflects all beliefs, valuing equally those with no faith. Indoor facilities include specialist rooms for all subjects, drama studio, video area, science laboratories, computer room and well-equipped library. There are many extracurricular activities and clubs from the arts to sports to community engagement and the combined (armed forces) cadets. The school holds a specialism in modern foreign languages and encourages international links. Staff are also keen to understand what it means to be a 21st century learner and how to provide an exciting and appropriately empowering education. The school has a longstanding interest in pupil voice and participation and also in thinking skills including creativity, and has worked with researchers over a decade to develop both. In this school the OU team worked with ten pupils aged 11-15 and one lead teacher with a background in both pupil leadership and voice as well as how to develop effective learning and thinking skills.

Ridgeway Primary (South East England): This large community primary school for children aged 3-11, occupies a sizeable, well-resourced site with good indoor and outdoor facilities (including a full-sized playing field shared with the neighbouring secondary school) and is situated in an affluent town around thirty miles north of London. It is organised into two parts: the pre-school Foundation Stage Unit for children aged 3-5 (90 children) and the main primary school for children aged 5-11 (262 children). Recognised as outstanding by Ofsted (2006), 98% of 11 year olds having attained level 4 in both English and mathematics for the previous three years. Children in the school with statemented special educational needs (2%) and those eligible for free school meals (10%), are below the national

average. The school has long been committed to creativity, particularly arts-based, and is recognised as offering outstanding music education and has been researched over a number of years for its creative teaching and learning. Children's learning is enhanced by over 90 networked computers with internet access, interactive whiteboards and other digital media. Children actively contribute to the school's website. The school actively holds awards including Eco School, Active Mark award, Healthy Schools and Green Tree. Ten pupils aged 10-11 and one senior teacher, with a creativity in primary education background participated in the C<sup>2</sup>Learn workshops.

Sir Walter Raleigh Secondary (South East England): This 11-18 community secondary school is located in a small town in the South East of England serving 1200 pupils from a mix of social housing and affluent private housing. 6.3% of its pupils are eligible for free school meals and 17.6% of pupils have identified (although not necessarily stated) special educational needs. On a large site encompassing several playing fields it also boasts drama, television and media studios including virtual studios and location filming and recording equipment. This school has three specialisms: science, media arts and being a teaching school (i.e. being involved in the training of new teachers). It offers a wide range of extracurricular activities and maintains links with schools in the United States, France, Germany and Zambia and makes regular study exchanges with staff at a partner school in Denmark. It is focused on sustainability, and has an Education for Sustainable Development plan (commended by the national inspectorate, Ofsted) and a Global Dimension Action Plan. With a powerful interest in digital technology, classrooms are equipped with interactive whiteboards and data projectors linked with teachers' iPads. Multi-media resources and teaching applications are highly valued. The school also provides drama and dance workshops, a cinema with tiered seating, more than 130 Apple Macintosh creative workstations running the latest industry-standard editing and media software and computer-controlled moving lights for school shows. Newly built mathematics classrooms and science laboratories encourage pupils to study in pleasant surroundings with the latest teaching resources and technologies to support them. Each faculty contains a suite of computers and the school's library is available to pupils throughout the day. The school has a strong history of engaging with university researchers on the development of creativity in education and in developing pupil leadership. As a training school it attends closely to staff development, priding itself on its multi-level learning, and it is heavily oversubscribed in terms of pupil intake. In this school the OU team worked with eleven pupils aged 12 – 17 and three teachers, one of these a senior member of staff and two with media and ICT backgrounds respectively; one had recently completed a Masters dissertation on digital games in education.

Informal focus group (South West England): In addition to these four schools, an informal focus group of four gifted and talented pupils aged 13-15 has been consulted in the South West of England. All four are grammar school pupils (state schools which select very able pupils) and have a keen interest in digital games and the future of education.

### 2.3 AUSTRIA, MINISTRY OF EDUCATION (BMUKK)

The current Austrian education policy pushes ahead profound changes in the common teaching practice, switching from teacher-centred and topic-based approaches to student-centred and competence-based didactic principles, supporting individualized approaches for learning. The game-based learning (GBL) approach of the envisioned C<sup>2</sup>Learn environment strongly supports these intentions of the Federal Ministry of Education. These educational tools will foster different key competences of students as well as subject related competences according to the respective scenario.

The department IT/3 of the BMUKK and its responsible project consultants have organized 3 Visionary Workshops in Austria. A core group of teachers and educational experts have been invited, so that

they can act as future multipliers for the C<sup>2</sup>Learn community building and dissemination activities. BMUKK has involved three core groups of teachers, one from lower secondary schools, one from higher secondary schools and one from first year university programs. The different teachers have been introduced to the co-design process of C<sup>2</sup>Learn and furthermore contributed extensively to the development of teaching scenarios. BMUKK also included teachers of a group of young university students, as prospective end-users of the C<sup>2</sup>Learn environment.

Specifically, workshops involved teachers who teach different age groups and subject matters, as shown in Table 1.

**Table 1: Teachers involved in the Austrian workshops and their corresponding learner age groups and subject matters**

| Subject \ Age Group             | 10-12         | 13-15           | 16-18            | Young University Students |
|---------------------------------|---------------|-----------------|------------------|---------------------------|
|                                 | Upper Primary | Lower Secondary | Higher Secondary |                           |
| English                         | X             | X               | X                |                           |
| Italian                         |               | X               | X                |                           |
| Music                           | X             |                 |                  |                           |
| Craft, Design, Technology (CDT) | X             |                 |                  |                           |
| Biology & Ecology               |               | X               | X                |                           |
| Arts                            | X             | X               |                  |                           |
| International Development       |               |                 |                  | X                         |
| Teaching & Learning             |               |                 |                  | X                         |
| Accounting                      |               | X               |                  |                           |

The activities undertaken by each partner in collaboration with their local core user communities are described in more detail in the following section.

### 3 User research activities and outcomes

#### 3.1 GREECE, ELLINOGERMANIKI AGOGI (EA)

In EA, as the R&D Department attached to the school, we were in the position to structure this visionary phase of the C<sup>2</sup>Learn co-design process in recurrent meetings with core groups of teachers building up to a cumulative visionary workshop that brought together the EA core groups with a group of pertinent experts.

##### 3.1.1 GENERATING AND ELABORATING C<sup>2</sup>LEARN SCENARIOS WITH PARTICIPATING TEACHERS

As said above, two core groups of teachers, one in primary school and one in secondary school, were engaged in the C<sup>2</sup>Learn participatory process.

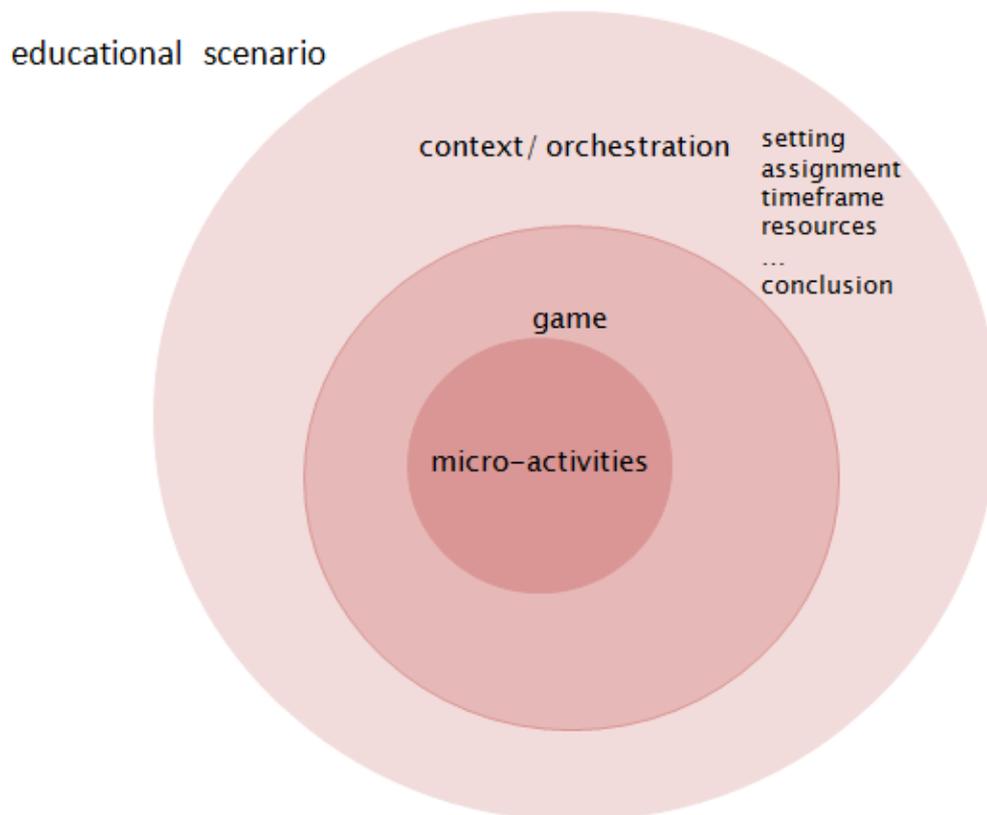
The work of the primary school group was organized around group meetings with contributions to a shared Moodle space between meetings. This process is on-going. So far, from December 2012 through March 2013, we have conducted a total of 7 meetings, ranging from 45 to 90 minutes in duration.

The work of the secondary school group was organized around group meetings with individual consultations and e-mail exchanges between meetings. This process is also on-going. So far, from December 2012 through March 2013, we have conducted a total of 5 group meetings and 9 individual meetings, each approx. 45 minutes in duration.

In initiating this participatory process, we used game-based learning as the entry point to generating educational scenarios within C<sup>2</sup>Learn. Further, we emphasized possible links to the curriculum and to regular learning activities in the school.

In our first meeting, we introduced a set of concepts relating to the design of game-based learning in general and the C<sup>2</sup>Learn goals: complex, open-ended problems; high-challenge/safe failure; identity; playfulness; creative thinking; sustained engagement; collaboration and competition. We asked teachers to ponder what areas in their curriculum might benefit from a game-based learning approach, suggesting that they could consider challenges such as: student engagement and motivation; important, but undervalued subject-matter areas; deep understanding of difficult concepts and systems thinking; empathy; playfulness with subject matter; raising ethical questions and dilemmas related to knowledge. Further, we strongly encouraged teachers to share past and current activities and projects that they could see evolving into game-based educational scenarios.

Subsequently, the core of our work consisted of generating, elaborating and analytically examining scenario ideas, through structured group discussions, oral and written brainstorming activities and short focused written assignments. Early in the process, we introduced a schematic (Figure 2) that shows the three levels that we aimed at in elaborating an educational scenario of game-based learning: the broader learning context, the game itself, and micro-activities within the game tied to creativity and the curriculum.



**Figure 2: A simplified version of the C<sup>2</sup>Learn educational scenario schematic focusing on game-based learning**

The bulk of our work with teachers, both in primary and in secondary school, was applied to generating and elaborating ideas in the middle circle, i.e. about the game elements of the educational scenarios. This was expected, since we emphasized game-based learning from the outset.

Thus, indicatively, of the seven group meetings in the primary school, the first four focused mostly on the creative process of elaborating game elements for target educational scenarios (e.g. roles, missions etc., i.e. the middle circle). The subsequent two meetings focused mostly on the analytic process of curriculum mapping and the elaboration of micro-activities (the inner circle) in the context of these scenarios. Finally, the last meeting was dedicated to introducing theoretical creativity concepts from the C<sup>2</sup>Learn framework and exploring their relevance to elaborating the scenarios. Questions about the context and orchestration of the scenario (the outer circle) were raised by the researchers in every meeting, inducing teachers to consider the decisions that need to be made with respect to contextual parameters and gathering important information about contextual constraints.

Similarly, three of the group meetings with the secondary school teachers focused mostly on the game elements for target educational scenarios (the middle circle); one meeting was dedicated to introducing curriculum mapping and the elaboration of micro-activities (the inner circle), and one meeting to introducing theoretical creativity concepts from the C<sup>2</sup>Learn framework. However, there was a stronger emphasis on curriculum focus and related micro-activities (the inner circle) during individual consultations with teachers, who often shared their prior experience and their ideas of working creatively in their curriculum areas through classroom activities. Finally, questions about the context and orchestration of the scenario (the outer circle) were discussed extensively in the individual consultation with the high school principal, who is part of the secondary school group.

As already noted, our work with the EA core groups is on-going.

Out of our work with the primary school teachers, so far, we have gathered:

- A scenario for game-based learning in Geography, elaborated to include mission, roles, challenges and game entities such as game terrain, characters and their attributes, tools, winning and redeeming points etc.
- Three more variations of scenarios for game-based learning in Geography, developed at a paragraph level, which we term 'scenario seeds'
- A list of Geography curriculum concepts for the students to encounter and use in enacting their game-based scenario
- Some ideas for activities associated with curriculum concepts in the context of their scenario
- Initial requirements for the C<sup>2</sup>Learn environment, based on the elements of the elaborated scenario and on the discussions about the contextual parameters of game-based learning in the school.

Out of our work with the secondary school teachers, so far, we have gathered:

- Several scenario ideas for game-based learning in a variety of subject matter from middle school and high school teachers, developed at a paragraph level (scenario seeds)
- An overview of the curriculum areas that the teachers are interested in, incorporating within game-based learning scenarios
- An overview of courses taught by grade level and other learning activities in the school, where game-based scenarios may be incorporated
- Examples of creative and playful classroom activities in several curriculum areas, which may be developed into micro-activities incorporated in the C<sup>2</sup>Learn scenarios
- Initial requirements for the C<sup>2</sup>Learn environment, based on the discussions about the scenarios, the subject matter, and the contextual parameters of game-based learning in the school.

In addition, an hourly workshop focusing on C<sup>2</sup>Learn, entitled 'Designing Game-based Educational Activities' was presented in the School of Tomorrow Seminar that took place in EA in November 2012. 40 teachers from EA and from other schools attended, whom we intend to involve in the broader C<sup>2</sup>Learn community.

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### 3.1.2 CUMULATIVE VISIONARY WORKSHOP

A milestone event of the visionary phase of the C<sup>2</sup>Learn participatory process in EA was a full day cumulative workshop held on March 27, 2013. In the morning we held an expert focus group session and in the afternoon we brought together the experts with the EA teachers for a joint brainstorming and co-design session.

The expert focus group comprised seven professionals and researchers in the areas of learning, games and youth creativity together with six C<sup>2</sup>Learn researchers (two from EA, three from NSRC-D, and one from UEDIN). The expert focus group session was semi-structured. A list of themes, prepared and sent to the participants in advance, were used to organize the discussion, with enough flexibility to allow substantive threads to be pursued. Thus, as expected, not all themes received equal attention and response. Specifically the following themes were proposed:

- Opportunities and challenges for playing digitally in formal education, in informal learning, and in their intersection

- What makes a successful digital educational game? What are the critical planning decisions? What are the key attributes of good design?
- Digital environments in the school environment: desirable characteristics and technological options
- ‘Power to the people’? Open-world sandbox-type games in the school? Authoring and customization tools for teachers and students?
- Opportunities for cultivating creativity with digital games: game elements that encourage creativity; game elements that discourage creativity; the profile of a creative student, teacher and player.

Participants were asked to engage in an open-ended discussion around each theme and to record key points in the corresponding space of the workbook provided (see Appendix 1). The discussion was also audiotaped.

The afternoon session brought together the expert group with the EA teacher group. The focus of this session was in two areas of interest that were not sufficiently integrated in our work with the teachers thus far. The first area of interest was fostering creativity in education. As noted above, in preparation for this session, the last meeting with participating EA teachers prior to this cumulative visionary workshop was dedicated to introducing creativity concepts. The second area of interest was the C<sup>2</sup>Learn computational tools for supporting creative thinking, which were introduced to participating teacher in this cumulative visionary workshop by the NSRC-D researchers.

Creativity in the classroom was addressed through an individual brainstorming activity using the completion of stems formulated on theoretical ideas from the C<sup>2</sup>Learn framework, such as the 4 Ps and Wise Humanizing Creativity. Participants recorded their responses in the corresponding space of the workbook provided (see Appendix 1).

The C<sup>2</sup>Learn computational tools were the focus of a design activity with paper prototypes, orchestrated by the researchers from NSRC-D. Participants in groups of three, mixed expert and teacher, were engaged in exploring computational aids that foster divergent thinking by developing designs to answer the question: ‘What could be done with such tools in a learning context?’ All groups received paper prototypes of three tools:

- Random word generator: two words per card
- Random image generator: two images per card
- Mind map builder.

The paper prototypes of the random word generator and random image generator were based on the scenario seeds delivered earlier through EA’s work – consisting of cards that combined words and images from different scenario seeds.

In addition each of the groups received a card describing and representing one of the following tools:

- Ask the web: filtered search
- Inspect the web: word cloud
- Cluster the web: word clouds thematically organized.

A third group activity was planned, aiming to integrate insights from the previous two activities in the elaboration of working scenarios from EA, but we decided to omit it due to the time limitations of the workshop.

This workshop provided valuable information that is pertinent to the design of the C<sup>2</sup>Learn digital environment. In addition, it served as an inaugural event for the C<sup>2</sup>Learn community in Greece.

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### 3.1.3 SCENARIOS

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#### 3.1.3.1 EA PRIMARY SCHOOL SCENARIO SEEDS

In our work with the EA primary school teacher group, a main scenario for game-based learning in Geography gained prominence and was elaborated in some detail. Three more variations of scenarios for game-based learning in Geography developed at a paragraph level.

##### Main scenario seed: rescue mission

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There are two teams: the 'lost' team and the 'rescuer' team. There are some means of communication between them, but they are unreliable so communication is sporadic at first, but may improve as a function of advancing in the game. The lost team needs to (a) find ways to survive, and (b) orient themselves, figure out where they are and convey this information to the rescuer team. The rescuer team needs to (a) assist the lost team in figuring out where they are, (b) assist them in their efforts of survival, and (c) devise plans for their rescue.

To achieve their missions the teams need to play with various concepts and their interrelation: weather and climate and how they affect human activity, food chain, orientation, natural phenomena, terrain morphology etc. Moral dilemmas will arise. They also need to do mathematical calculations, such as trying to calculate distance by hours travelled. Specific challenges will require using knowledge of geography, but also of history, maths etc., to find solutions or devise strategies.

Members of each team may assume roles with special competencies (profession, age, strength, environmental sensitivity, moral sensitivity etc.). They also have a choice of initial tools and functions (e.g. compass, library card, vehicles, communication devices...). A camera and the possibility to transmit images between the groups would be a useful tool.

Both competencies and tools/functions can change during the game.

Other options discussed include the following:

- There can be several missions in different terrains (e.g. mountain or desert)
- An element of time-urgency (rescue need to happen before x time runs out) may be introduced
- There may also be more 'low stakes' missions (e.g. trying to meet within a city, finding something lost, etc.) and the scale/complexity of the project may vary
- A random element may be introduced and there may be mathematical formulas available to players in order to calculate how various events interact with their competencies and tools
- There need to be deliberation processes for making decisions that affect each group (e.g. should we burn wood for warmth or use it to construct a boat?). The deliberation however may happen in the classroom.

This scenario has a certain trickiness of combining the game world with the classroom world: i.e. both rescuer and lost teams are daily in the same physical space and can communicate outside the game world.

## Smaller seeds

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Within the same wider area of geography education, there have also been other ideas for scenario concepts that could serve the needs similarly to, or in combination with, the rescue mission scenario. They include the following:

- **Developing an area**

Teams live in different areas and try to develop them. They need to take into consideration morphology, climate etc. Eventually the areas communicate, creating exchange networks. The index of balanced development is complex including many indicators (economic, environmental, cultural, social, personal/subjective).

- **Creating a world**

Constructing a world from scratch: tools for building geography and then installing human settlements in the geography. Alternatively: tools for making changes in the geography (e.g. changing the size of a mountain or a coastline) and observing how it affects other things.

- **Traveling**

A traveling scenario, where by solving various challenges you gain the means to travel further. Planning is also involved in deciding what to use from the options available to you (clothing, gear, transport etc.), taking into consideration the related trade-off (cost, weight-volume, speed) in relation to the external conditions.

In all these scenario seeds, there could be problems of different scale (village/city, area, country, continent).

## Concepts and themes

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As already stated, the primary school group defined from the outset a strong curriculum focus on Geography for the 5th and 6th grade. Geography is seen as a curriculum area that requires new teaching approaches moving away from the traditional paradigm of memorizing geographical facts towards interpreting 'geography' as an understanding of the natural environment and the place human activity has in it; how human activity is shaped by the environment and at the same time shapes it. The possibilities offered by digital media and especially digital gaming for simulation and visualization seem to the teachers as strong elements that can support and enable students' more active involvement with deep content understanding, systems thinking and the development of relevant skills.

What is more, Geography is regarded as more 'peripheral' in the curriculum in comparison to the core subjects (e.g. language, mathematics, etc.), which allows a considerable degree of flexibility and space for innovation (the underlying assumption being that core areas would be less available for experimentation). At the same time, geography offers opportunities of incorporating problems that involve other subject matter such as mathematics and physics, but also history and literacy. The idea of seeing the same geography in different historical periods was also discussed. Thus a geography focus seems appropriate to teachers for hosting digital gaming activities that would encourage a wide-view, cross-curricular approach.

Geography in year 5 focuses on the geographical space of Greece, while year 6 looks at Europe, the World and the Earth in Cosmos. Apart from enabling knowledge of geographical facts and features

(from mountains, plains, rivers, lakes, and seas to fauna and flora, weather and climate, etc.), the subject area also covers concepts relating to culture, society, economy, and development of the places studied. Symbolic representation of space and the purposeful use of such instruments (e.g. maps) play a central role. More widely, the Geography lesson aims to familiarize pupils with interrelations and interdependences existing between places, natural environment, and human influence.

Among the many concepts covered by the curriculum, the team of teachers identified the following areas that would benefit from a game-based approach, as they are either difficult or unattractive to pupils.

- Maps, scale, geographical coordinates
- Orientation in geographical space
- Weather and climate, seasons, climate zones
- Ecosystems, flora and fauna
- Terrain and waters, importance for human life and population distribution
- Economy and environment related concerns: positioning of production activities, regional development, environmental damage
- Geology: earthquakes, volcanoes, corrosion, etc.
- Comprehensively approaching and comparing places (environment, economy, culture...).

An additional curriculum area that could be central to this approach is Social and Citizenship Education, which is taught both in year 5 and in year 6. In year 5, the subject area aims at educating pupils as citizens and members of society, nurturing their mental, emotional, social and moral development. Concepts include being a citizen, rights and obligations, living in a democracy, participating in decision-making. In year 6 the same background is enriched with a clearer emphasis on helping the students develop stances and values, abilities and skills as democratic citizens of Greece, Europe, and the international community, in a rapidly changing world.

### Creative and playful learning activities

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Within the overall scenario seeds, and given the curriculum concepts and themes discussed, the following preliminary ideas for learning activities that could be embedded in the C<sup>2</sup>Learn environment were elaborated:

- Construction of things, such as creation of a map as a tool for recording and organizing the available space. Relevant ideas include:
  - The gradual construction of the map could be the result of the players winning parts of a jigsaw puzzle as they progress (i.e. gradually acquiring parts of one or different maps)
  - Players are given (or maybe win) a map as a tool – however elements are missing (cities, road network, lakes, rivers, etc.). Players add/draw the missing elements as they explore and get to know the area.
- Use of the compass, maps and other orientation instruments by the pupils, aiming at the development of practical geographical skills. Relevant ideas include:
  - Players are given various kinds of maps of the area and need to choose the most appropriate one for the task at hand, e.g. in order to draw the optimal route and make decisions combining different kinds of geographical information.
  - Players use the instruments to locate absolute or relative positions (e.g. their own or their opponents'), or to make decisions on direction, or to provide guidance, etc.

- Calculations and data handling. Relevant ideas include:
  - Weather (temperature, rainfall, etc.) data gathering, analysis and interpretation
  - Calculations related to map scale
  - Calculations of time zone differences and consequences of fast travel.
- Game activity with quizzes and practical problems requiring application of knowledge and critical thinking; for example:
  - Asking students to recognize certain (described, depicted, simulated) conditions and extract useful conclusions; in other words, recognizing the geographical space on the basis of clues: plants and animals I see, weather conditions I experience, human activities I observe, terrain and water characteristics, etc. A variety of this could require locating and placing on the map.
  - Analysing the geographical space in order to make decisions: where to build, which economic activities to develop, what clothing to provide, how to decentralize the economic activity. This can be from simpler decisions to complex critical decision making tasks, involving multiplicity and risk (e.g. deciding on the appropriate place for building a factory: proximity to raw material resources, to the sea, to power plants, to densely populated areas...)
  - Having pupils work with hypothetical conditions; e.g. what if they moved to the north in a given area? What temperatures would they expect to experience? or, what would be the consequences of polar ice melting for a certain city lying by the sea? etc.

## Parameters of the educational context

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### *Time and place available for gaming*

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The subject of Geography is taught in two teaching periods per week, in both years (5th and 6th grade). Hence, in a school year of 36 weeks, Geography is taught for 72 teaching periods.

In addition, Social and Citizenship Education takes one period of the weekly schedule. In a full school year this subject is taught for 36 teaching periods.

In total, then, digital gaming activity anchored on these two subject areas could make use of up to 108 teaching periods per school year, per grade. Of course, given that probably not all of the relevant curriculum can be covered through the gaming activity, in reality the game would make use of a subset of these teaching hours.

A teaching period lasts 45 minutes. Teachers consider that if a gaming activity were to take a whole of a teaching period, of the 45 minutes available only about 30 minutes could be fully dedicated to the gaming activity, the rest required for setting up and closing the session.

The digital gaming activity envisaged is performed at school and not at home. In relation to this, teachers pointed out that access to a computer and internet connection outside the school cannot be considered as self-evident or unproblematic. Therefore they consider it a question of equal opportunity to design a game that can be played by pupils wholly within school hours with the use of school equipment.

Further, children's excessive digital gaming activity at home is often reported as a problem by parents. Requiring additional activity of this kind in the form of 'homework' could raise family concerns.

School activities that could host the digital gaming activity include both 'conventional' classroom work and educational activities in learning settings outside the classroom, such as during field trips and excursions.

#### *Learner groupings and social dynamics*

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The game envisioned strikes a balance between peer competition and collaboration.

Groups are typically set up with members from the same classroom/year division. Experience shows that it is not practical to build groups with students from different classrooms/year divisions. Competition between different classrooms/divisions is not to be encouraged.

Although the general direction is towards developing separate activities for each of the two years (year 5 and year 6) on the basis of the curriculum for each year, teachers do not rule out the possibility of having groups from the two years interacting and collaborating on certain aspects, given that there are curriculum areas they share.

In the primary school of Ellinogermaniki Agogi, the average number of pupils per year (year 5, year 6) is 170, typically divided into 7 classrooms of about 24-25 each.

Three-pupil groups seem to have worked very well in other project-based activities. If all 170 pupils of a year were to participate in the game following a similar pattern, the game would involve up to 56-57 teams per year.

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#### 3.1.3.2 EA SECONDARY SCHOOL SCENARIO SEEDS

In our work with the EA secondary school teachers a variety of scenario seeds were developed in paragraph form, reflecting the variety of subject matter that the participants represent but also exploring cross-curricular connections. Discussions took place as to whether some of these seeds are good candidates for an overarching 'umbrella' scenario where other ideas can be embedded.

#### Scenario Seeds

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- **Civic Education: What life? What Europe? What world?**

Players make decisions on changes to make in the world they live in, which have consequences to (1) the state of their world, and (2) their own quality of life. There are different regions in the game with different characteristics and the players' choices affect their well-being differently. Choices include: environment, research, everyday life, etc., and give rise to ethical dilemmas. There are time periods that mark closing cycles in the game (e.g. 6 months of game-life?) and players can choose either to start the next cycle from the position they have achieved or to replay the previous cycle in order to start at a better position. An important element of such a scenario is engaging students in puzzling over the complicated and often incalculable consequences of decisions, and going beyond the obvious good or bad: for example a potentially deadly uprising vs. social stagnation and keeping a tyrant in place.

- **Biology: Being a genetic engineer**

Players take the role of a genetic engineer who wants to create a genetically modified fruit (e.g. cinnamon tasting apples or something of the sort). The game includes experiments that

take the player through the processes of genetic engineering. However, opposition to the genetic engineering project introduces risks and dilemmas. For example farmers may accept or refuse to introduce the genetically modified variety, may raise concerns about the 'contamination' of other orchards, etc. Different players with different roles may introduce different solutions. Roles may include researchers, pharmaceutical or food industry representatives, consumers, farmers, politicians, priests, philosophers, eco-farming proponents and environmental activists. The players who have the genetic engineer role will try to work on an engineering solution for the containment and control of the genetically modified variety (e.g. introducing a modification that makes them visibly different). Other players will vote to give or refuse permission for the project.

There could be a constant dialog between the microcosm of interventions at the DNA level and the macrocosm of social and environmental impact.

The game could include a voting mechanism for determining if a particular genetic engineering project will be permitted. Players take (or are assigned) a position for or against the project, do the pertinent research and organize campaigns to influence the voting outcome.

This seed dovetails well with the previous one (Civic Education): it can be seen as an example of how dilemmas and projects from different subject matter (in this case, biology) may be part of a broader scenario; it can be used as a problem to flesh out in terms of that broader scenario.

- **Astronomy: Space mission**

Players assume various roles and collaborate for successful space missions: some players are astronauts; others work in the control room and guide them through their mission. There are various missions that include research challenges concerning various celestial bodies and necessitate the use of astronomy concepts. Such a game could encompass several sub-games, depending on player interests. Beyond science, these could touch on social and psychological themes (e.g. life in confinement with a small team of people), moral and religious themes (what goes through an astronaut's mind?), management of resources in a closed system (nutrition, energy sources, preservation and recycling). Possible perspectives include the doctor, the engineer, the pilot, the psychologist, the commander, the saboteur, the priest, the scientist (biologist, chemist, physicist), etc.

- **Evolution**

Every new player starts the game in a newly formed planetary system as a bacterium traveling on a meteorite. There he chooses a planet to install himself and if the right conditions are present it evolves into a multicellular organism, and so on... Various choices made determine the evolutionary course of each player. For example, an important element in evolution is the creation of cell colonies, which implies collaboration. There may be some 'bonus-challenges' that accelerate the evolutionary process. After arriving at the human species, the game clearly gets a lot more difficult and complicated. The game could even extend to the future, anticipating conditions that may hold then. If the 'traveling on a meteorite' part was extended, Astronomy concepts could also be introduced in this context. The player may be given the tools to alter the environmental conditions (or define them from scratch) and thus influence the pace and the complexity of evolution, and resulting an alternate course of evolution, e.g. where life evolves solely within water.

- **An Alternate Reality Game played on school grounds**

Players secure various areas of the school for their teams by accepting and solving challenges associated with various locations on the school grounds: the library, the garden, the canteen, some laboratory, etc. In EA, challenges could be associated with the many art displays across the school. There can be 'treasure hunt' items added to such a game with hidden clues, and collecting such items could have value in the game. An alternative to 'conquering' various locations for competing teams would be: in each location, when solving a challenge or a puzzle, they get to leave a piece of a story, so that the whole school can follow their story as it evolves. The game can also include the staging of short play-acting episodes by students at various key locations.

- **Geography of civilization**

A game that geographically situates important ideas, discoveries and cultural accomplishments: visiting different countries players have to solve challenges associated with ideas, discoveries and cultural accomplishments that originated in that country. There are levels of challenges, with increasing difficulty. In solving the challenges in one country, the players accumulate the points that will eventually allow them to travel somewhere else. Players can use some of their points to take fellow players with them, if they have become stuck in a place. There may be a 'villain' that tries to trap players in a single country and prevent their cultural adventure. Through their travels the players may also get to embody character traits, abilities, or knowledge of specific historical personalities.

- **From myth to game**

Using known myths as an inspiration (for example using the myth of Theseus and the Minotaur in the Labyrinth), the game would incorporate specific challenges or missions taking the structure of the myth (the hero, his object, his obstacles, etc.) and/or using spatial ideas, such as the labyrinth. The myth could be moved to the present or to a fantasy world. Or it may be the space where challenges are set: there may be 12 challenges in the Labyrinth, which map present-day problems to the attributes of the Olympian Gods: e.g. for Poseidon, god of the sea, the challenge could involve problems such as water pollution and overfishing. Alternatively the labyrinth could be seen as a metaphor of a complex life situation to be navigated, e.g. the labyrinth of adolescence, or the labyrinth of school life. An interesting emotive dimension is seeing the myth through the eyes of the antagonists, i.e. the 'villains' and the secondary characters.

- **What if (1)**

Starting from an event that has occurred in reality (e.g. a historical event or a natural disaster), players build the scenario around how it could have played out differently. Each change that they introduce in the actual events leads to new events, questions and unexpected consequences, which trigger new rounds of 'what if' decisions. The goal of the game is to get the most positive outcome possible in the situation. This is another seed which dovetails well with the Civic Education one ('what life, what Europe, what world'). It can also be staged as a scenario of counterfactual historical reasoning, and can make good use of semantic and diagrammatic reasoning tools.

- **What if (2)**

A world, where a very familiar parameter is removed or changed and life has to be organized in this new reality: 'What would living on the earth would be like if it weren't 70% water?' Adding a social dimension to such a scenario might have disturbing ramifications as players would engage in ruthless struggles for survival.

### Creative and playful learning micro-activities

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In the work with the secondary school group, we actively elicited from the participating teachers diverse micro-activities that they had explored or would like to explore in their classrooms and they feel have the potential for playfulness and creativity. These are concrete illustrations of how participating secondary teachers perceive creativity in their respective subject areas of interest. Some of these micro-activities are proposed in the context of the scenario seeds above, while others are broader ideas that could be incorporated in scenario elaborations. Practically, all of them however are scenario-independent, in that they can be incorporated in-game challenges or complementary classroom activities for a variety of scenarios.

The following are indicative activities that engage students playfully with literary texts:

- 'Hacking' a narrative: adding a new character that modifies the development of the storyline in well-known literary texts; rewriting the story, reversing the status, attributes and behaviour of the main characters (e.g. the strong becomes weak, the polite becomes rude, etc.)
- 'Guessing the story' given only parts of the narrative, thus essentially writing a new complete story of one's own; especially, filling in the middle part of a story that goes from a given beginning to a given end
- Writing a story collaboratively in turns
- Exploring poetry at the word level: removing some words from a poem and allowing students to substitute their own; or, removing all adjectives from a poem, giving them separately to the students and allowing them to experiment with using them in different places in the poem
- Disentangling several different texts that are mixed together in a collage: this could be a game played by two teams, each making a collage to challenge the other
- Exploring writers' personal style, through a game of attributing poems or other texts to writers
- Interpreting the texts using other media, for example choosing a music soundtrack for a text, or designing a wardrobe and style for characters in the story
- Developing campaigns within different scenarios – such as for example within the genetic engineering scenario or the civic education scenario – could provide an opportunity for creative writing, the composition of multimodal messages, and dramatic performance.

The following are indicative of playful and creative activities in mathematics; a common thread is seeing familiar mathematical concepts in unexpected light and using them in inventive ways:

- A theoretical problem demonstrating geometric progression: how many times do we need to fold a paper in half in order make a tower that reaches from the earth to the moon? (A variation of this is the game with a geometric progression in the number of grain seeds on a chess-board.)

- Insert any mathematical symbol that you can think of to make each of these equations hold:  
 $1?1?1=6$   
 $2?2?2=6$   
 $3?3?3=6$   
 ...  
 $9?9?9=6$   
 For example:  $2+2+2=6$ ,  $3*3-3=6$ ; the hardest one is  $1!1!1=6$  and exceeds the standard curriculum.
- Constructing a Pythagorean Cup and a mathematical explanation of how it works (A Pythagorean Cup has a contraption in it that makes the entire contents of the cup drain out its bottom if the liquid in it exceeds a certain level.)
- A rectangular area is cut by another rectangular area that it contains (e.g. a field contains a crevice): how can the outside area be divided equally using a single line?
- A puzzle that can be solved by exploring divisibility criteria:

| A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|
|   |   |   |   |   |   |   |   |   |

Put numbers 1, 2, 3, 4, 5, 6, 7, 8, 9 in the cells using each number only once, so that:

A is divisible by 1

AB is divisible by 2

ACB is divisible by 3 and so on.

- A strategy game where two players take turns placing coins on a rectangular table. The player who finds no space to place a coin loses.
- A poetry writing game where a mathematical formula sets constraints for the poem, e.g. number of syllables for each word.
- A puzzle that can only be solved by redefining the problem: e.g. how do you fit ten horses in nine slots? (a challenge to think differently)

|   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|
| T | E | N | H | O | R | S | E | S |
|---|---|---|---|---|---|---|---|---|

- Magic tricks (e.g. guessing colours or numbers) that involve physical artefacts based on mathematics.

Theatre games can inform most of the scenario seeds discussed, for example:

- Evolution can be explored through games of association and sequencing either body motion, such as continuing an image that others have started, evolving an ordinary movement into a new one, assembling into a unified entity; or with speech such as relays of words, phrases, stories etc.
- Space mission can be explored through role playing and improvisation, e.g. packing for the mission, low gravity movement, joint movement in a confined space with imaginary walls; creative writing, such as letters and diaries describing emotions and impressions; imaginative play, such as imagining other worlds etc.
- 'What if' can be explored through games introducing constraints in bodily movement, such as 'what if my limbs were glued together'; imaginative play, such as living in the land of

circles, the land with no chairs, the land where there is no word for 'please'; composing 'what if' songs; competing in a speed game where one group sets a 'what if' challenge and the other has to answer it as fast as possible.

Finally, the following general group activities that can be applied to various situations were proposed by the teachers in the course of discussions:

- I AGREE - I DON'T AGREE corners: students move to the respective corners of the room to show their position on a topic discussed.
- Hand character: on an outline of a hand each student writes the attributes that make up a character.
- Corridor of thought: one student or the teacher moves through a corridor made of the rest of the class, who speak out the player's conflicting thoughts (e.g. arguments for or against a decision) or feelings (e.g. hopes and fears).
- Repository of experiences: a physical area or an area in the digital environment where the students get to share bits of texts or images about their personal experiences of being students; this would be particularly good for high-school students.
- The useless information of the day: a place where students share some information that has come up in their research, study or other school projects that they consider utterly useless but interesting.

The potential of such micro-activities to create game elements that nurture creativity is clear, but requires further elaboration within specific game and learning scenarios.

## Parameters of the educational context

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### *Time and place available for gaming*

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In middle school (three-year lower secondary school, 'Gymnasio'), integrating C<sup>2</sup>Learn as a cross-curricular project seems feasible. The home economics teacher feels that she has a lot of flexibility to try out innovative approaches in her class in the 1st year (1 teaching period per week) and 2nd year (2 teaching periods per week) of middle school. She has experience with doing complex cross-curricular projects, like an ecology project that she did this year. The humanities teacher has civic education and literature courses with the same students. Overall, cross-curricular connections can involve human ecology (home economics), civic education, literature, mathematics, and drama education, making possible considerable class time allocation.

In high school (three-year upper secondary school, 'Lykeio'), the pressure of preparation for the university entry exams restricts both the lesson time available and the leeway for experimenting with new approaches. However, the following possibilities are suggested:

- Two school periods per week allocated to the 'research project' in the 1st and 2nd year of high-school; these are two continuous teaching periods that correspond to 1.5 hours of usable lesson time; both the topic and the approach are open-ended and using a game-based environment either to set the problem or to present the outcomes of research could be considered.
- Informal learning opportunities, such as the time that the students spend on the school bus to and from school, which amounts to 1-2 hours a day would be an ideal time to use; students actually play games on their mobile devices during this time.

- Another informal learning opportunity would be associating the game with educational excursions (5-6 per year), which involve locations with environmental, scientific, archaeological or historical interest; for example, a game that can use clues collected during the excursions throughout the year would be motivating for high school students in relation to the goals of the excursion.

Home use of games as part of schoolwork is generally seen as problematic, as it may interfere with parents' efforts to set boundaries to the internet-surfing and gaming time of their children.

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### 3.1.4 PRELIMINARY DOCUMENTATION OF USER NEEDS AND EXPECTATIONS FROM C<sup>2</sup>LEARN

The statements in this section are gathered from several sources: the group and individual meetings with the teachers in the EA community, implications extracted from the scenarios and scenario seeds advanced in these discussions, and finally the oral and written contributions of teachers and experts during the cumulative visionary workshop.

At this stage, they should not be considered as prescriptive, but rather as statements that capture perceptions and expectations of the participants that can inform the design of the C<sup>2</sup>Learn environment.

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#### 3.1.4.1 PEDAGOGICAL CONSIDERATIONS

A number of pedagogical considerations at the junction of games, learning and creativity arose in the course of our discussions, that are documented here to inform the design of the C<sup>2</sup>Learn digital environment (both the tools and the game) and the design of the C<sup>2</sup>Learn pedagogical approach (learning design and scenarios). As it can be expected by the description of EA's work so far, most of these focus on the school context, but issues of broader relevance were also documented.

In brief, these considerations touch on the fundamental (in)congruity of gaming and schooling, the relevance of commercial games to education, the appropriate relation between games and the curriculum, foreseeable constraints in introducing games in the school environment, and game-based learning environments for fostering creativity.

The fundamental congruity of gaming and schooling can be questioned on two dimensions. First, there seems to be a core contradiction between the voluntary nature of games and the compulsory nature of schooling: by all definitions games and play are activities that are taken up voluntarily; indeed voluntary participation is the crux of the definition. Can the essence of game and play be preserved in the schooling context, where activity is mandated and regulated? Can a set of motives of voluntary engagement be built into school activity, despite the mandatory nature of school and the more or less rigid structure of the school day? Second, the peer culture of gaming communities is incongruous with the hierarchical teacher-led, cohort-based social organization of schooling. The top-down introduction of a game by an adult, especially by the teacher, goes against this whole culture of belonging to the social group that plays such and such game, the peer engagement, identity and status involved and the trends that bring games in and out of fashion. Of course, games are already part of the school practice, especially in elementary school, but in a rather circumscribed way. In advocating and designing for a more central role of games for learning, the dimensions above are worth considering.

A related question is whether commercial games that students play outside school be our frame of reference and school be required to move in the direction of digital popular culture because this is students' 'reality'. Should we use the learning involved in commercial games as the ideal we aspire to? Or, is what schools do very different from what the gaming industry does? Students already get learning that is to be had just by playing games outside of school; therefore it makes no sense to bring this experience inside the school wholesale, unless there is something else to be done with it. Further, learning games may appear as a losing proposition for the gaming industry: immature gaming applications will not fly because students have high expectations as gamers; but making a good game is expensive and hard, and adding learning content and learning value complicates the problem, adding cost when the market is considerably smaller. The experience with serious games so far suggests that most learning games are inadequate games that would not pass the replayability test: none would be played for pleasure, though they might be rated preferable to some other classroom activities. On the one hand they tend to be didactic, because they are marketed to teachers and parents, who care for their specific learning value, not to children, who care about their entertainment value. On the other hand, they are often also light on the learning content and learning challenge.

However, these problems may stem from framing the relation between games and learning in terms of making learning fun. This 'spoonful of sugar (game) and the medicine goes down (learning)' framing is misleading. We should redefine the problem. Instead of talking about balancing fun with learning, we should move beyond this, and define the specific place of play in learning. The focus should not be to take what we have in other media and turn it into a game, but to see what the special learning potential of games is. What can a game be good for? A game can be the place where students integrate their conventional school knowledge and skills in a creative way, see new connections, and make meaning through context, narrative and engagement. Through a game students can learn to analyse, synthesize and create something beyond the given. Games can validate using personal experience to attack a problem, valuing the diverse knowledge and personal experience in the group for solving a problem and generating multiple solution paths. Thus, games can legitimize strategies developed in informal out-of-school learning, introducing them and reframing them within the school context. A game can be good for learning patience, persistence, resilience, collaboration, leadership and initiative. Finally, games can be good for learning to cope with failure and to destigmatize failure in self and others. Another useful angle may be the well-known distinction of *Alan Kay* and *Seymour Papert* between hard fun and soft fun: hard fun comes from activities that are difficult, have a steep learning curve and the development of skill is a prerequisite for participation, but people engage in this 'learning task' voluntarily for the pleasure of it (sports, music, crafts, strategy games, etc.). Bringing such activities to their limits requires hours of skill learning that has all the characteristics of the formal education drill and practice, but it involves a different set of motives and relates learning to creativity.

In addition, we should also be examining the question of what formal education has to offer in a digitally saturated culture where gaming is pervasive, not only the other way round. For example, education may be a good place for examining and managing game-generated tensions that relate to competition, peer conflict, and disappointment over failure. It is also crucial to examine critically and creatively recast stereotypes that are common in gameplay. For example, gender stereotypes were highlighted as a major concern with commercial games, both in their design and in the way they are marketed as boys' or girls' games. This may be a worthy area of focus with respect to creativity. Related directions to take may also involve deconstructing games for their underlying assumptions about what is winning or losing behaviour and in general understanding and critiquing the system logic of the game. Maybe games in education that are amenable to such exploration are different kinds of games, or games with attributes not available in commercial games.

Further, we should be mindful that digital games are only a subspecies of play. Playful learning should not be equated with gaming. We should guard against elevating digital games to the dominant form of play at the expense of other play forms that engender creativity and learning. The ideal we may want to be building includes the incidental learning, exploratory activities and open-ended play that are central to how children learn before they go to school and outside school. Particular stress is placed on the importance of physical play and outdoor exploration for creativity, making sure that digital games are not introduced at their expense.

Taking the broader view of trying to capture the special learning potential of games, it may also be better to avoid starting from the curriculum and trying to incorporate it into a game. To call a game educational, we tend to want it to focus on what school focuses on; but focusing too much on the curriculum may result in forcing into a game that cannot be well integrated into it and in missing opportunities to use games for fostering creativity. Further, a game-based environment is expected to cut across the age-cohort organization of the school. Learning and mastery is not necessarily age-based. Therefore we may want to consider an environment where the challenges encountered by the players are broader than the curriculum, and connect knowledge and students from different grades. Of course, mapping onto the curriculum makes it more likely that time will be allocated to playing the game in the school context. Therefore it is suggested that we should not be thinking of games that incorporate the curriculum, but rather about games that are curriculum compatible at least and curriculum catalysts at best: games that have clear links to the curriculum, do not undermine the subject matter (e.g. factually inaccurate use of cultural content, etc.), and reinforce learning objectives without being the premium means of learning. For example, a game may serve as context for seeking and understanding subject matter. Accurate subject matter (from physics to history) may be built into the game world without the intention of teaching it. Games that require high player/student agency, because of the difficulty involved, can create a context for a lot of 'formal' learning: students involved in doing something that is engaging but difficult, invite 'traditional teaching', which is the same process as looking for YouTube videos about game tricks and shortcuts.

Working with school constraints certainly represents a challenge. The mandate to follow the textbook and practice specific skills is very likely to make the introduction of games hard and slow with the exception of drill-and-practice games. However, it may be useful to consider ways of building on existing practice. Here, there are differences between primary, middle and high school. In primary school, play is already part of the educational process, though mostly in the lower grades. In middle school too, teachers occasionally engage in exploratory or playful activities with their students some of the time, including the design and playing of games. Both primary and middle school are not under strong external pressures, most notably the yearly and national exams, which are very pronounced in high school; this may be the most challenging context for introducing games.

Further, clearly school time is a limited resource and schools operate in schedules of forty-five minute periods. However, despite ostensible rigid schedules, 'making time', within their given constraints, often occurs in schools. In inducing schools to 'make the time', the decisive parameter is that school principals and teachers will perceive game-based digital environments as useful tools for their job, rather than more demand on their time. Nowadays teachers are faced with constant proposals for innovation and they often cite being pressured for time when it comes to introducing activities that they see as divergent or distracting from their main mission. Working within the time constraints of the school schedule is also important. On the one hand, forty-five-minute periods mean thirty minutes of engagement time. Two adjacent periods may be workable. On the other hand, contrary to most informal learning situations, the sustained nature of school education allows for sustained play over the whole school year. Therefore an important design question to ask is how the duration of the game fits into the school time cycles. The kind of free exploration associated with game-playing

practices can be at odds with time constraints associated with education; therefore a learning scenario may be a way to negotiate such tensions. Though not without their own set of complications, options of combining in-school, out-of-school and on-the-way-to-school play, could be examined.

Finally, games are likely to be construed as a diversion from serious learning. There is a deeply ingrained work-play divide in schools; therefore not only teachers, but also parents and even students may resent their learning time being consumed frivolously with games. Some parents may object to schools introducing gaming, when they themselves are restricting it at home. Parental consent is important and should be part of the process.

In designing game-based learning environments that foster creativity, we need to examine critically some common assumptions. For example, popular rhetoric notwithstanding, games do not necessarily create 'high challenge, safe failure' environments. Observing children playing digital games in their spare time suggest that there are high levels of competition and also high levels of disappointment when they fail, especially when their friends have succeeded. There are also disputes over sharing or not sharing inside knowledge about the game. We should also be aware that creativity can be fostered by very simple games such as for example simple constructions or dressing a doll. What students find creative may be surprising, therefore we should be focusing on creative activity and creative talk that happens around games, rather than just on creativity exhibited in response to complex inside-the-game challenges. We may try out this idea by conceiving of some relatively simple problems that interact in a relatively small world, and focus on the variety of solutions.

To foster creativity we need to provide a learning environment where it feels safe for learners to create. This involves validating their small acts of creativity and focusing on what is creative in their own context, as opposed to universally novel. It also involves cultivating creative resilience, by supporting learners in managing the emotions of creativity, in sustaining creative effort through failure, impasse, unexpected directions, doubt and self-doubt, and through phases of the process that are not fulfilling or engaging. The right to be wrong, the right to wonder, to not know the answer and the ability to tolerate not knowing are also very important aspects of fostering creativity, and may run counter to the expectation, both by teachers and by learners, for regular critique, feedback and assessment. At the same time, though creativity does not always lead to successful creation, and failure is part of the process, we need to give students experiences of arriving to a successful creative outcome, of creating something new: an artefact, a solution, an explanation, an act. We need to support students into delivering on their creative ideas, rather than just expending creative energy in thinking and imagining interesting creations. Finally, to foster creativity, we need to explore in the classroom the social construction of creativity: a classroom can be a microcosm of that, where the acts and works of some individuals are construed as creative and their voice acquires influence, not by some clear objective measure of creativity, but through social processes elevating them to the status of creative contributions by being perceived as such.

In this section, we have focused on general pedagogical considerations that have arisen in our work with teachers and experts. Some direct implications that can be gathered for the design of the C<sup>2</sup>Learn environment are articulated in the next section, together with other preliminary requirements statements gathered. Even when their implications are not as straightforward however, these pedagogical considerations can provide points of reflection in examining the evolving designs for the C<sup>2</sup>Learn environment.

### 3.1.4.2 PRELIMINARY REQUIREMENTS FOR THE C<sup>2</sup>LEARN ENVIRONMENT

After presenting the above broader pedagogical considerations, we now turn to more specific preliminary user requirements for the C<sup>2</sup>Learn environment that have emerged in EA's work with teachers. At this stage, most of these statements represent options to be considered, often with trade-offs attached.

#### Accommodate diverse learning scenarios and contextual constraints

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The C<sup>2</sup>Learn environment will be a world with many worlds embedded in it, corresponding to diverse learning scenarios. Embedded worlds may be independent or interconnected, again depending on learning scenarios and the particulars of their deployment in the school. Learners can be 'citizens' of one or more of these worlds, thus, there may be a need to specify and restrict access rights. As contextual constraints are to be variable (e.g. school time, home use), the environment should be designed in a way that enables teachers/authors to customize it, by expanding or contracting the available options depending on their particular setting; this includes access rights. Thus, each player or group of players may be aware of smaller or larger parts of the C<sup>2</sup>Learn world. An authoring component for the insertion and definition of new worlds with their own problem scenarios is desirable, as discussed separately below.

#### Enable and scaffold end-user authoring

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End-user authoring is desirable in the C<sup>2</sup>Learn environment, not only because it can add to its flexibility with respect to diverse curricular and contextual needs, but also because it resonates with the quest for teacher and learner creativity which is in the core of the project. For example, end-user authoring would enable teachers to customize difficulty based on student progress, pacing challenges so that they are neither too frustrating nor too easy. It would also provide means of self-expression for both teachers and students within the game. It would also make creativity scenarios possible, where students first understand the game as a system and then change the system, by modifying its entities and its rules to what themselves and their group decide would make a better game, thus moving students from consumers to creators within the game, and eventually to game designers building games from scratch. However, in practice the adoption of end-user authoring can be tricky. Only a minority of end-users tend to make the transition from consumers to producers; the majority of end-users do not choose to author. Further, the many choices offered by an authoring suite can be experienced as overwhelming by end-users, affecting learnability. They can also undermine the play experience, by affecting the integrity of the gameplay and the quality of the content. The C<sup>2</sup>Learn environment needs to find the optimum point for its purposes in the continuum between a predetermined game and an open-ended authoring tool, maintaining the balance between keeping the initial learning curve at levels that will enable wide adoption, while at the same time leaving the window open to moving from consumer to creator, allowing the end users to run the course from choose-and-play, to customize, to build from scratch within available types of games. It is therefore vital that learning scenarios that demonstrate the main contextual cases in C<sup>2</sup>Learn are implemented into specific instantiations of C<sup>2</sup>Learn game cum tools, in order to (a) serve as working models of C<sup>2</sup>Learn pedagogical approach and technological potential, and (b) provide an entry point for end-users, both teachers and students, that does not involve authoring, but merely selecting and playing a learning scenario using a specific game implementation and tools configuration of the C<sup>2</sup>Learn environment. Further, learning scenarios that require student agency in modifying and building games will need to employ the C<sup>2</sup>Learn tools for creating scaffolds for this process and to complement them with other learning and supporting material and resources.

### Do not glue learners in front of the screen, engage them with the world around them

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There was a high consensus among teachers and experts in associating creativity with outdoors play and exploration, with making physical artefacts and with body movement. There was also a concern about gaming being antagonistic to such activities. Therefore, in C<sup>2</sup>Learn both the choice of technological platform and gameplay itself will need to incorporate digital play into physical play and entice learners into the exploration of the real world.

### Create games that require collaboration to be won

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A notable challenge when children are asked to do complex activities is that they do not know how to collaborate. They tend to divide up the work and know only their individual part, or one person takes the lead and the others passively follow. C<sup>2</sup>Learn games and scenarios should be designed intentionally to require collaboration, provide practice in collaboration, provide rewards for knowledge-sharing and balance between competition and collaboration.

### Be aware of and sensitive to gender stereotypes related to games

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Such stereotypes are often present, both in the design of games and in the perception of games as boys' or girls' games. They may be addressed either by ensuring that the game design will appeal to intended end-users independently of gender; or by 'rocking the waters' and being disruptive around common gender stereotypes that games introduce.

### Consider the trade-offs of realism vs. fantasy

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Teachers generally developed realistic scenarios. When asked directly, they said that they preferred realism. For example, the astronomy teacher rejected the idea of building an imaginary solar system or planet, as it 'it is so wondrous by itself!' The primary school teachers pointed out that if the geography terrain was not realistic then geography concepts could be incorporated into the scenario but not specific factual geographic content, thus limiting the mapping to the curriculum. However, teachers were willing to contemplate fantasy elements in in-game behaviour such as magic powers that would support learning by enabling students to have a perspective on the world that they would not normally have. For certain scenarios (e.g. evolution) they were also willing to consider a non-realistic world that incorporates accurate concepts, problems and constraints as means for facilitating learning by reducing complexity and also compressing time. In other scenarios, for example the civic education scenario, an imaginary game world with problems and constraints that correspond to the real world makes it possible to consider counterfactual options, e.g. whether to form the equivalent of the 'European Union'.

### Role play is important: Provide diverse roles with diverse sets of motives

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Assigning roles, taking the perspective of a role, and even switching roles are proposed by the majority of teachers, not only in relation to the game but also in relation to creativity. It was also suggested that games providing a diverse set of motives for playing (e.g. through modes or through roles), where (almost) everyone will find themselves engaged, will probably be more widely adopted.

### Design an environment where learners feel safe to create

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Intentionally design for 'high challenge, safe failure'. Safeguard the right to be wrong, to wonder and to experiment with different solution paths, by providing for painless recovery. Safeguard from early criticism, assessment, or ranking, and make assessment processes covert so that they are not perceived as such by the players.

### Rely on complex open problems

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Complex open problems with no easy answers invite the player to explore multiple options rather than focus on finding the right answer. This may involve requiring players to construct solutions rather than choosing from available options; providing ways to explore questions by experimenting with changes in a system; allowing players to construct entities in the environment that have consequences for other entities, etc.

### Provide entry points to the increasingly available open learning resources

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Many prominent institutions of formal education are offering open learning resources. The C<sup>2</sup>Learn environment should provide reasons, ways and opportunities for using such resources to meet the challenges of the game and learning scenarios.

### Make the social dimension integral to the game

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This may include negotiation, where players try to convince others for their proposed solutions and reach a decision through consensus or voting. Players may also engage in spreading their ideas for proposed solutions or changes in the world through messages and campaigns. Further, players may be setting challenges for each other. The social construction of creativity, gaining in status and influence within the game community through solutions and constructions that are perceived as creative, and the role this plays in framing the motives and the meaning of mastering the game should be used to advantage, while avoiding the obvious pitfalls (e.g. allowing it to degenerate into a popularity contest).

### Leverage game metrics and social processes for evaluation

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If game metrics can capture dimensions of in-game behaviour that are related to learning and creativity then they can provide evaluation that is more complex, more accurate and more contextually valid than school grades, focusing on creative process as well as creative product. Further, the social dimension could also be leveraged in evaluation, not measuring how creative something is in itself by some objective measure, but measuring the sentiment of creativity: that something is perceived as creative by self and others. Focus on acts that are creative in the context of the player, rather than universally novel. Finally, it would be useful to be able to assess the ability to wonder, to tolerate not knowing and to act purposefully under uncertainty, through in-game actions.

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#### 3.1.4.3 TECHNOLOGY IN THE SCHOOL

The information on this section was gathered by posing the following questions to the school principals and to the lead IT administrator of Ellinogermaniki Agogi:

- What is the currently installed technological base in the schools, available in the classroom?

- What is the anticipated / desired direction for technological upgrade in two years from now? What installed technologies are underused, could be used better/more?
- What personal devices can be considered ubiquitous among students, though they do not belong to the school?

The currently installed technological base in Ellinogermaniki Agogi comprises an interactive whiteboard in each classroom; laptops on trolleys (usually 1:2 students, but 1:1 can be arranged if desired); desktop computers available in labs and in the libraries. All the above have permanent internet connection. Digital cameras and portable computers with internet connections can be used outside the classroom as well.

The anticipated / desired direction for technological upgrade in two years from now is to move toward more portable and more individualized solutions, by gradually replacing conventional hardware with tablets, serving among other things as students' individual e-books.

Installed technologies that are underused and could be used better or more, are the interactive whiteboards in the classrooms and the portal for parents and students, in broader terms, the capacity to offer parents and students remote access to digital content and services outside the school.

Finally, with respect to students' personal digital devices, all middle and high school students have mobile phones; all high school students in EA can be expected to have i-pods and some, but not all, may have i-phones, i-pads, smartphones, or tablets. Practically all students, including primary school students, have computer and internet access from home. However, there are cases of students' having their computer time and internet access restricted at home and the school closely collaborates with parents in accommodating such decisions, with respect to homework assignments, etc.

## 3.2 UNITED KINGDOM, OPEN UNIVERSITY (OU)

### 3.2.1 OU C<sup>2</sup>LEARN WORKSHOPS

As indicated above, the OU C<sup>2</sup>Learn team's work was positioned as pupil-focused and encouraging co-creativity between pupils and teachers alongside the researchers. This approach reflected the team's perspective on co-creativity and transformational school change, and offered a fresh perspective to sit alongside the distinctive approaches used in Greece by EA and in Austria by BMUKK.

The OU C<sup>2</sup>Learn team facilitated three one and a half hour workshops in each of its four sites over the course of two months, keeping in conversation with participants through the school blogs in between. Workshop participants were involved in audio-recorded individual and small-group creative learning conversations and interviews with us about their experiences using digital games for the study. This included the practices (reading, writing and design) associated with consuming, creating, modifying and designing digital games and/or their paratexts (the print and multimodal texts used and often developed by game players that circulate in the complex nexus of digital gaming cultures). The process of facilitating the workshops included modelling versions of co-creativity including how to respond to one another's ideas within the blog, building on what others say and following a line of collaborative or communal enquiry.

In keeping with the OU team's commitment to transformational learning in which teachers and children collaborate, where multiple voices are valued and creative learning conversations facilitated, hierarchies between teachers and pupils (and indeed between staff of differing seniority) were 'flattened' as part of the workshop process (Figure 3).



**Figure 3: Flattened hierarchies in the OU C<sup>2</sup>Learn workshops**

Thus, the workshops were held with a strong emphasis on pupil voice, participation and leadership so as to develop in-depth understanding of user requirements in relation to serious games both from the perspective of pupils and also from the perspective of teachers. Each group explored:

- Gameplay habits and preferences
- Experiences of and preferences in relation to digital technology within and beyond school
- Co-creativity which attends to wise outcomes (wise, humanizing creativity)
- Existing serious games and their potential to develop wise, humanizing creativity
- Potential scenarios for serious games that may enable the development of wise, humanizing creativity as possible starting points for the C<sup>2</sup>Learn serious game.

Teachers in each school considered potential curriculum links and contexts for serious games. Each school group was supported by a blog in which a survey and other research questions were embedded. Focus group pupils engaged in a more informal on-going conversation about their experience of playing a range of serious games and their potential for learning.

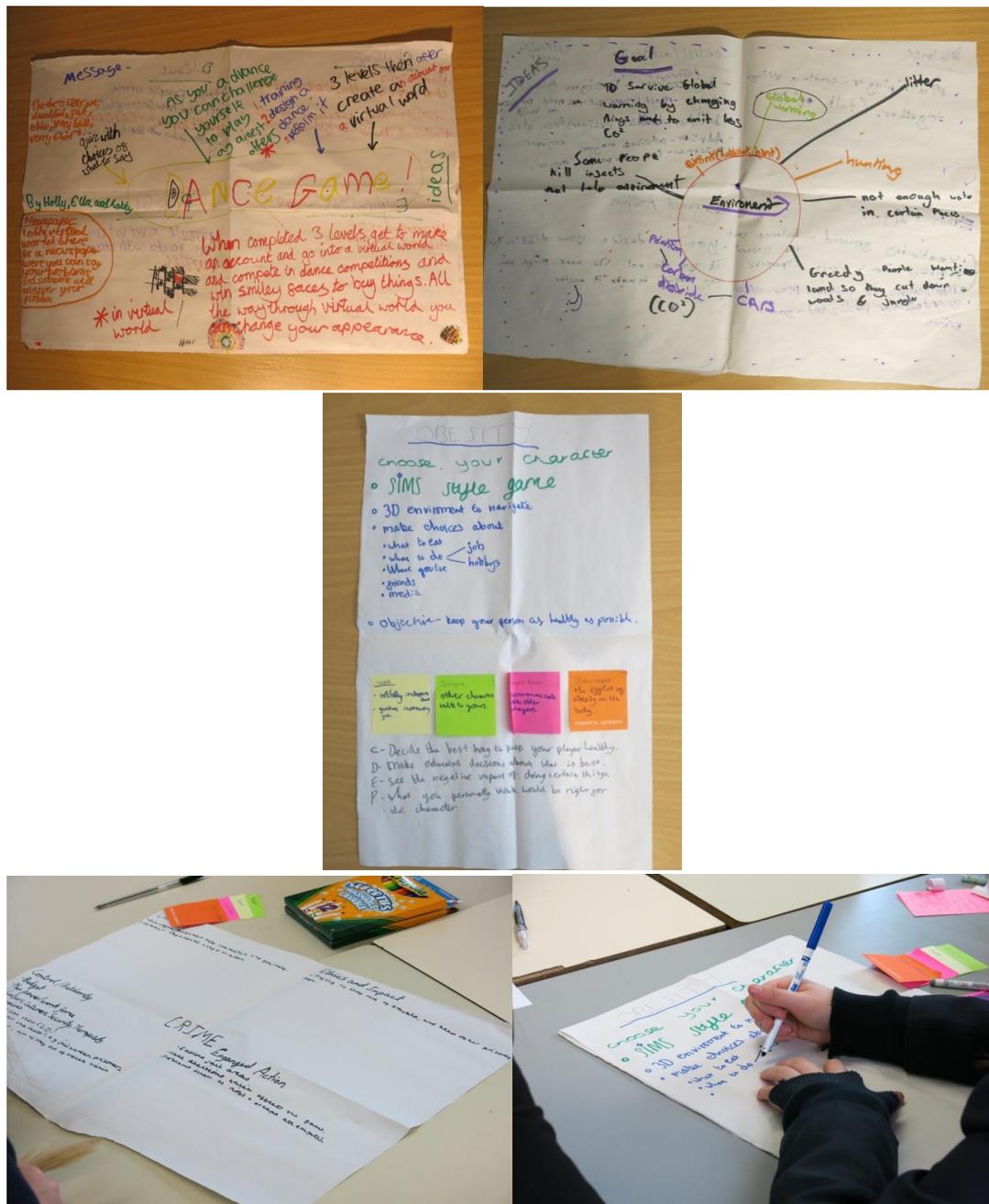


Figure 4: Pupils and staff at work in the OU's C<sup>2</sup>Learn workshops

The workshops, which encouraged collaboration between pupils and teachers, each generated digital game scenario ideas with learner voice evident and involving collaboration between teachers and pupils. Each workshop also involved preparation spent playing serious games and reflecting on elements of gameplay in blogs set up for each school (using [www.kidblogs.org](http://www.kidblogs.org)).

The workshops themselves each involved time spent playing a selection of serious games, responding to blog posts and online tasks, as well as sorting exercises, blue-sky exercises and idea-development tasks involving discussion and collaboration in pairs, small groups and the group as a whole. Serious games considered and analysed by each group included:

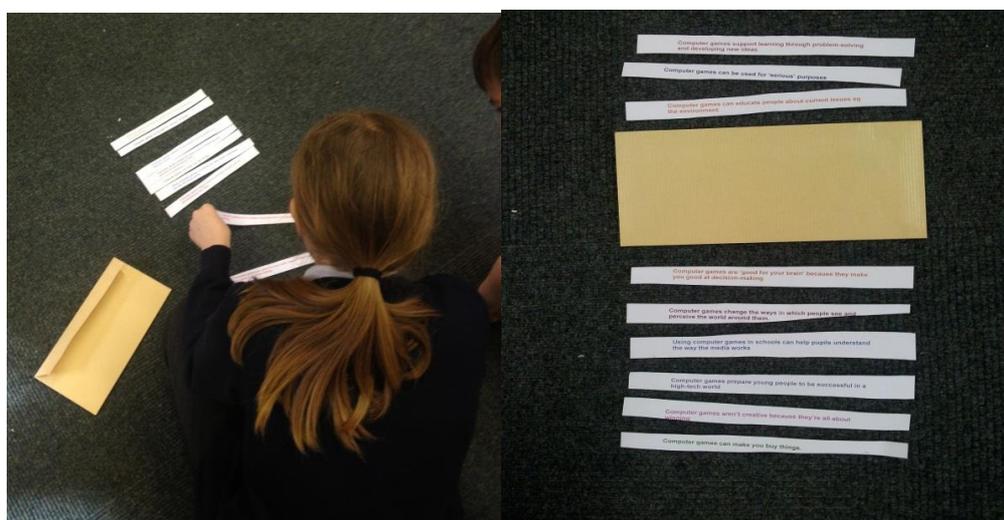
- Stop Disasters! <http://www.gamesforchange.org/play/stop-disasters/>
- Rizk <http://www.sciencemuseum.org.uk/ClimateChanging/Rizk.aspx>

- Past/Present <http://pastpresent.muzzylane.com/>
- McDonald's Video Game (only accessible to some pupils as the school firewalls blocked this game) <http://www.mcvideogame.com/index-eng.html>.

In addition, serious games were suggested by pupils including:

- Games about global warming <http://archive2.globalsolutions.org/multimedia/games>
- Foldit (about protein folding) <http://en.wikipedia.org/wiki/Foldit>
- See with perspective <http://www.seewithperspective.com/>
- Troublesome Twin (health) <http://www.centreofthecell.org/interactives/twins/index.php>.

A wide variety of data was collected from the twelve workshops: blog postings; field notes made by the research team; audio recordings (later transcribed); digital images of groups at work and of the ideas generated; artefacts generated by the research process including post-it stickers with notes and responses; results of sorting exercises; word generation; and also large posters of collaboratively-generated ideas and game scenarios. The data from each workshop was anonymised and stored in a secure shared digital space only accessible by the research team. The full dataset was then subject to a thorough qualitative analysis by the three OU researchers.



**Figure 5: Sorting exercise on what digital gaming enables**

Workshops moved from a focus on gaming behaviours (e.g. gameplay, gaming literacies and gaming capital) and preferences and technological access, to analysis of potential for co-creativity, to the designing of potential scenarios for the C<sup>2</sup>Learn serious game. The precise focus of each workshop is given below. The full workshop plans are given in Appendix 2.

**Workshop 1: Exploring Gameplay** This workshop, led by OU C<sup>2</sup>Learn researchers in every site during early February 2013, aimed to:

- Familiarise teachers and pupils with the project (and get them really excited)
- Reflect on the experience of playing the serious games (using questions)
- Reflection on pre-circulated readings
- Reflect on participants' prior experience with digital games
- Consider four terms in relation to creative quiet revolutions (WHC): Dialogue, Control/authority, Ethics and impact, and Engaged Action (immersion).

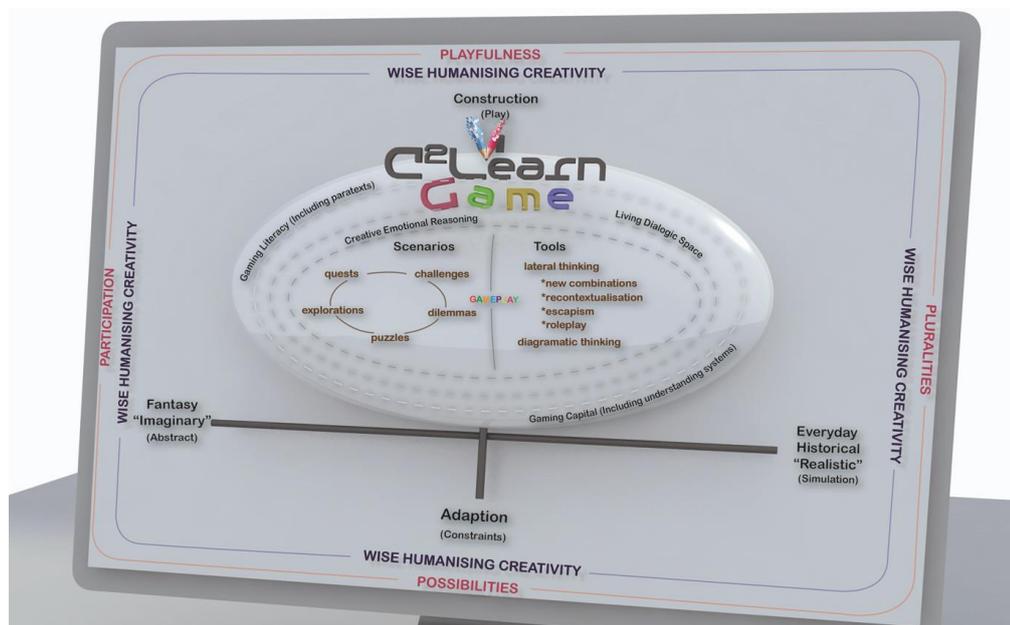
**Workshop 2: Co-Creativity in Game Scenarios (Part 1).** This workshop was led in early to mid-March 2013 by OU C<sup>2</sup>Learn researchers in the two primary sites and by teachers in the two secondary schools. Its goals were to enable pupils and staff to:

- Reflect on the experience of playing additional serious games
- Consider and draw on the four key aspects of creative quiet revolutions (this extends work undertaken in workshop 1): Dialogue, Control/authority, Ethics and impact, Engaged Action
- Consider possible qualities of game scenarios in which the C<sup>2</sup>Learn game might engage gameplayers, from perspective of potential for wise humanizing creativity (WHC)
- Start developing concrete game scenario ideas for workshop 3.

**Workshop 3: Co-Creativity in Game Scenarios (Part 2).** This workshop was led in mid to late March by OU C<sup>2</sup>Learn researchers in all four schools. It sought to enable pupils and staff to:

- Gather information on technological platforms in schools (and beyond them)
- Reflect further on the experience of playing the serious games
- Consider their previous game scenarios and further develop the four key aspects of creative quiet revolutions (this extends work undertaken in workshop 2) i.e. Dialogue, Control/authority, Ethics and impact, Engaged Action (immersion)
- Consider and develop new game scenario ideas.

The development of scenarios for games in Workshops two and three included having pupils focus closely on the kinds of activities that could be involved, for example generating DILEMMAS, PUZZLES, CHALLENGES and EXPLORATIONS that their game scenario might involve. These are terms developed during early collaborations in the C<sup>2</sup>Learn consortium, and represented in the work-in-progress theoretical frame summarized in the figure below:



**Figure 6: C<sup>2</sup>Learn theory graphic (February 2013)**

The theory graphic situates the lateral thinking and specific activity involved in the game within the wider goal of wise, humanizing creativity. Whilst the C<sup>2</sup>Learn game may be situated anywhere on the spectrum between fantasy and everyday or historical, it is notable that most of the ideas generated during these twelve workshops were actually anchored in the everyday/historical context.

Teachers and pupils worked in collaboration during Workshop one, and to a lesser extent during Workshops two and three, where teachers were asked to document for part of each workshop on the potential for curriculum contexts and links.

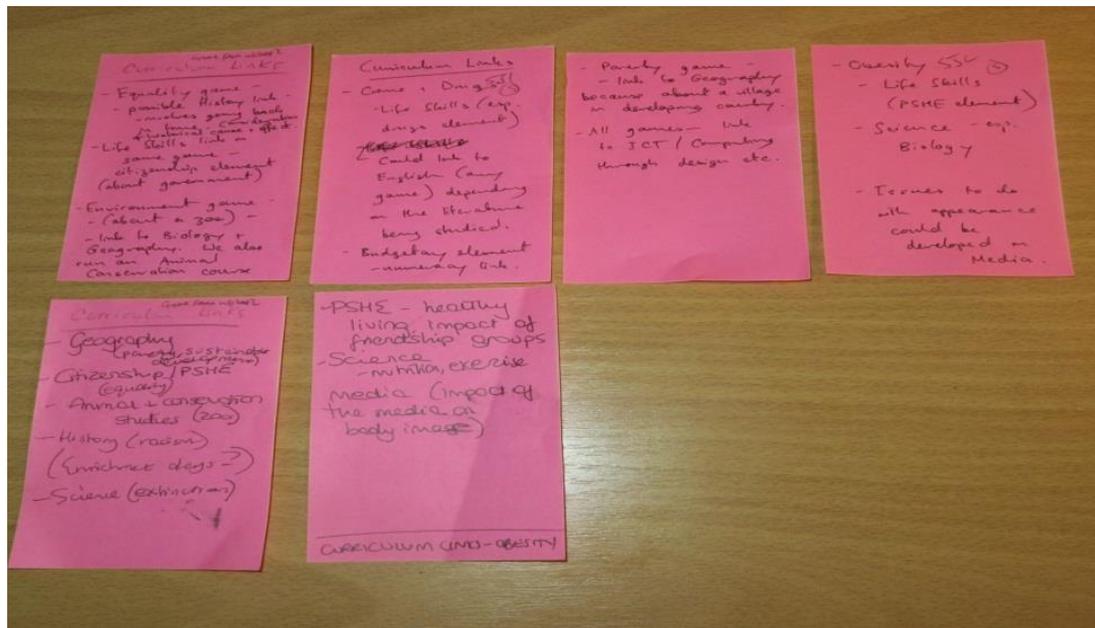


Figure 7: Secondary teachers' perspectives on curriculum potential

At the end of all three workshops pupils and staff were asked for one-word reflections on the potential of the collaborative work they had undertaken with C<sup>2</sup>Learn. Words used were overwhelmingly enthusiastic, including 'interesting', 'fun', 'lots of potential', 'engaging', 'formative', 'unique', 'enjoyable', 'new' and 'interactive' (secondary).

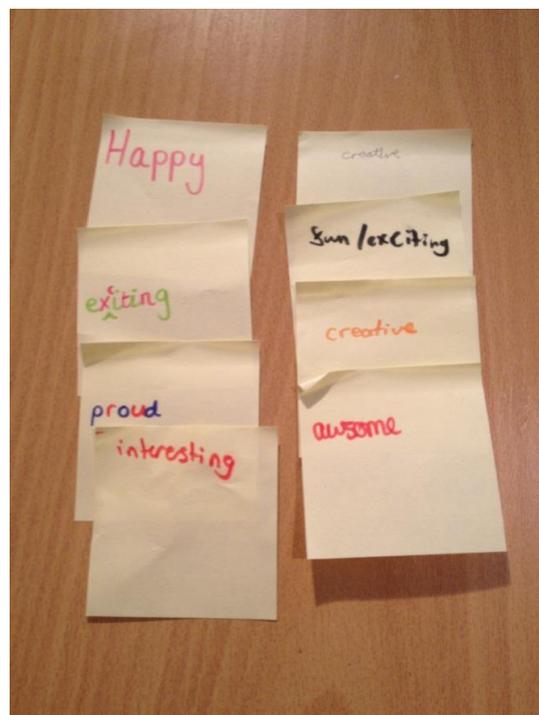


Figure 8: Primary pupil responses to the workshop process for C<sup>2</sup>Learn

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### 3.2.2 ANALYSIS OF OU WORKSHOP DATA

As indicated a range of anonymised, qualitative data emerged:

- Audio-recorded small-group creative learning conversations and interviews
- Blog posts
- Artefacts generated by the research process
- Field notes made by the visiting researchers
- Digital images
- Interview notes.

Data was qualitatively analysed using a mix of inductive and deductive approaches. Credibility was increased through triangulation of data analysis with a cross-section of the dataset, with the three OU C<sup>2</sup>Learn researchers all analysing the same key sets of data. The over-arching research question brought to bear for the analysis was: ***What does this material tell us about what we need to attend to in developing scenarios for C<sup>2</sup>Learn?*** The analysis attended to specific pedagogical considerations, preliminary requirements for the game environment, and preliminary requirements for the creativity tools.

The scenarios for games which emerged from the workshops were also analysed both within the workshop by participants, and then beyond the workshops by the OU C<sup>2</sup>Learn research team, with respect to the goal of wise, humanising creativity which the C<sup>2</sup>Learn game seeks to foster. Four criteria for wise, humanising creativity were used for this analysis, evaluating the scenarios' potential for nurturing:

- Control
- Dialogue
- Engaged action
- Ethics and impact

In the pages which follow the scenarios for the digital games are prioritised in terms of those which seem, from these two layers of analysis, to hold most potential for nurturing wise, humanising creativity.

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### 3.2.3 PRELIMINARY SCENARIOS

Firstly pupils were provided with some scaffolding by the OU C<sup>2</sup>Learn research team who asked self-selecting groups to generate scenarios for games using one of two possible themes which the research team considered potentially to lend themselves to the fostering of wise, humanizing creativity. These two themes were Environment and Equality. During the workshops, pupils were initially encouraged to brainstorm possibilities before alighting on the one they wished to develop.

Pupils used the ideas for game scenarios generated in relation to these two themes as a focus for scrutiny, considering carefully what opportunities their game proposal might offer for the four key aspects of wise, humanizing creativity (i.e. control, dialogue, engaged action and ethics and impact).

Having engaged critically with these key drivers, pupils were then invited to design their own game scenarios with a much freer rein in terms of theme, around anything that mattered to them inside or outside of school. Again they brainstormed a fuller list of possibilities before alighting on scenarios that they wanted to develop further.

A set of Environment, Equality, Inside and Outside School game scenarios was therefore developed by each age group. The OU team then analysed and prioritized these scenarios in terms of how much they showed potential for co-creativity. Six scenarios fitted these criteria and are reported below. Three of these are marked with a \* as particularly promising:

- Scenario 1: Surviving Global Warming (from 10-12 year olds) – environment theme
- Scenario 2: Removing Racism (from 13-15 year olds) – equality theme
- Scenario 3: Eradicating Poverty (from 16-18 year olds) – equality theme

Therefore the game scenarios presented below detail the pupils' wider thinking regarding each of the four overarching themes. This is then followed by the game scenarios within each age group which show the most potential for co-creativity. The remainder of the pupils' scenario ideas are presented at the end of each section in paragraph form as scenario seeds.

The pupils had two opportunities to work on the Environment and Equality game scenarios (the first opportunity to generate ideas and the second to elaborate them) and one opportunity to work on the Inside and Outside of School game scenarios; there is therefore less detail on analysis of the key aspects of wise, humanizing creativity for the latter (see later scenarios 1, 4 and 4 for further details).

Each scenario is structured with a description of the main goal followed by critical consideration by the pupils of how their game scenario might facilitate the four key features of wise humanizing creativity: Control, Dialogue, Engaged Action and Ethics and Impact. In some cases, pupils developed their own terminology for these features and where this is the case the pupils' words are given in brackets after each heading. Each scenario is then completed by a list of concepts or game elements which might benefit that scenario, although it should be noted that, unlike all the other thinking within each scenario, these concepts lists have been generated by the OU research team following the workshops, NOT by the young people and their teachers. The scenarios for games are now outlined in relation to the age groups 10-12 year olds, 13-15 year olds and 16-18 year olds.

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### 3.2.3.1 SCENARIOS GENERATED BY 10 – 12 YEAR OLDS

#### Theme summaries

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##### *Scaffolded scenarios: Environment*

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In brainstorming their own foci for games around the OU-defined Environment theme, the 10-12 year olds generated four different kinds of foci. These were human-generated environmental foci, general environment foci, weather foci and animal foci. Examples of the largest category, human-generated environmental foci were: recycling human-generated waste; dealing with human destruction of habitats; dealing with pollution including oil spillages; and slowing or halting global warming. The other three categories contained similar numbers of suggested foci. Examples of general environment foci were: earthquakes and fires. Examples of weather foci were: tornadoes and blizzards. Examples of animal foci were saving snow leopards and preventing elephant hunting.

##### *Scaffolded scenarios: Equality*

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The youngest pupils brainstormed around three emergent foci for the OU-defined Equality theme. These were human rights equality foci, animal equality foci and other equality foci. Examples of the largest category, human rights equality foci were: supporting vulnerable groups such as children, homeless people, people in care; and supporting groups who may not have equal rights in all cultures

- women and girls, people with disabilities, different racial groups; as well as foci on the principle of equal rights, for example bullying, fairness and access. The other two categories contained similar small numbers of suggested foci. Examples of animal equality foci were: saving animals such as polar bears. Examples of other equality foci were: trusting food suppliers, for example around the recent horsemeat scandal.

#### *Open scenarios: Inside School*

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The 10-12 year old pupils generated four emergent foci for the open theme, Inside School. These were social foci, teaching and learning style/content foci, structure foci and practicalities foci. Examples of the largest category, social foci were: bullying, friendship issues and perceived unfair prioritizing of particular groups within the school system. The second largest category was school structure, examples of which were centred around finding different ways to restructure the school day and the learning within it. Examples of teaching and learning style/content foci were: suggested different subject balances within school and different teaching approaches for better engaging pupils. Examples of practicalities foci were: changing the size of the school and how different spaces and facilities could work more productively within it.

#### *Open scenarios: Outside School*

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In brainstorming foci for games around the open theme, Outside School, the 10-12 year olds generated four different kinds of foci. These were family and friends/social foci, societal foci and activities foci. Examples of the largest category, activities foci, were: school-focused activities such as revision; leisure activities such as playing with friends, gaming, sports, music; animal-focused activities like pets or horse-riding; celebratory/relaxations like birthdays or holidays. The next largest category, family and friends/social, focused on: friendship issues including friendship strength and bullying; family relationships, positive and negative; power issues such as whether or not children are allowed money or access to technologies. Examples of societal foci were: equality; the environment; dealing with criminal activity such as mugging; dealing with technological issues such as digital viruses; and power issues such as age limiting access to activity.

### Developed scenarios on the Environment theme

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There were five Environment scenarios developed by the pupils aged 10-12. All five demonstrate pupils' sensitivity to the ethical environmental dilemmas which are faced at this point in the 21st century. Pupils seek—to differing degrees—to offer opportunities to 'possibility think' or to generate 'what if' and 'as if' thinking in engaging with these. The first four share a great deal in common; they expect the game player to enter the role of enabling survival by offering a range of possibilities for protection, in response to a threatening context. In each of the games the game player is offered a fixed role and responds to the threats generated by the game scenario. The fifth game scenario however goes beyond this in offering a range of possible roles, thus introducing perspective-taking. It also implies a multi-player element not present in the first four games. Thus, whilst all games offer opportunities for wise creative decisions, the scenario prioritized below seems to offer the greatest potential by being the most complex. In expecting different roles to work together for a collective end it also seems to offer the greatest potential for co-creativity. Following this game outline, suggestions are given for possible concepts required if this became the C<sup>2</sup>Learn game.

**Scenario 1\*:** 'Surviving global warming' (10-12 age group Environment Scenario). In this game scenario, the game player takes on multiple roles (citizen, mayor, engineer, builder, etc.) who are

trying to survive global warming by changing things to emit less carbon dioxide. The goal is to create a village to survive together.

**Control**

Different jobs:

- Engineer: designs things
- Mayor (most power): need permission to build
- Builder (builds): Designs/can advise engineer

**Dialogue**

Multiplayer: Create a village together (talk option)

**Engaged action**

You can decide your difficulty, if you do not like hard things, you can decide to make it easier.

**Ethics and Impact**

Modifications may effect ground, e.g. Solar panels = underground wires (?)

Pupils also described the following in relation to surviving global warming:

**CHALLENGES**

More resourceful ground/land is weaker than other land

**DILEMAS**

Attacking polar bears (animal control), volcano under the sea

**EXPLORATIONS**

You can explore different polar landscapes; you can explore at night or day (wolves may be asleep at night)

**PUZZLES**

Figure out how to get houses/building out of water; making building out of different materials

Suggestions are given below for concepts required within the game if 'Surviving Global Warming' became the focus for the C<sup>2</sup>Learn game. Note, however, that some of the ideas are natural phenomena which may not necessarily be linked with global warming; it may be best to restrict concepts required to the latter:

- Territory: village/town by sea's edge and land for building on (click-legend giving information about properties of particular land for building on)
- Natural features: volcano (under water?), tectonic plates, coastal edge
- Building resources: solar panels, different materials and designs
- Lifestyle choices for the village/town and its people: e.g. how to keep warm, what to eat, what the local economy is based on, how these all relate to the wider global context
- Consequences of lifestyle and building decisions in terms of global warming
- Built-in natural disasters (?): volcano, sea level rise, tsunami
- Wild animals: wolves, bears, etc. (again click to know needs and potential impacts)
- Crops / land use options: again click legend giving information

- Options for roles (builder, mayor, engineer): each with extensive specialist information

The other four scenario ideas developed by the 10-12 age group on the Environment theme are the following:

- **Save the Elephants.** This scenario is about saving elephants as an endangered species; in this game the players assume the role of gamekeepers and poachers who are trying to save or kill endangered elephants (dependent on role). They can do this in various ways, for example by attacking poachers and rescuing elephants from them or killing elephants to steal their tusks. After a few levels the aim would be to keep the elephants happy too and improve their quality of life rather than just saving them from poachers.
- **Surviving the Elements.** This game is about stopping global warming and allowing a set of characters to survive the different elements of the weather. The main player will assume the role of head of a village or town who is trying to protect the community by creating defences against the weather. The game would involve conflicts and would look and work something like Minecraft.
- **Save the Animals.** In this scenario, the game players assume the role of animal saver (or scientist) who is trying to save animal populations in different habitats by understanding (learning) how animals are important in society. To succeed in the game, all animals must be saved.
- **Create a Balanced Ecosystem.** In this scenario, the gameplayer must take on the role of a habitat warden, manager, and or builder who is trying to create a balanced ecosystem to help keep endangered species alive. This includes animals, plants and insects.

#### *Developed scenarios on the Equality theme*

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There were two developed Equality game scenarios developed by the pupils aged 10-12. Both demonstrate pupils' awareness of inequality and discrimination inherent in lived experience. Each game explicitly offers opportunities to shift 'what is' to 'what might be' or to 'possibility think' using 'what if' thinking. Each game scenario also involves taking on roles (campaign organizer in the first, dancer in the second) and thus involve 'as if' thinking. Both games provide scaffolding for alternative perspectives on acceptable or even desirable behaviours, and both games offer opportunities for novel ideas (for example, generating the campaign and persuading people to participate in the first game, designing dances in the second game). In each case, the digital game would throw up problems or challenges and game players would have to 'possibility think' their way around these. In each case the scenario starts out with an assumed situation of inequality and invites game players to challenge this so effectively each one expects a 'quiet revolution' or 'wise, humanizing creativity' through the experience of gameplay. In each case players have to collaborate with or engage with others and to engage with a goal that is a collective rather than a purely individual one – thus offering potential for co-creativity. Both may therefore have potential as C<sup>2</sup>Learn game scenarios given the goal of the C<sup>2</sup>Learn game. After each, suggestions are given for concepts which would need to be built into the game if this were to be the heart of the C<sup>2</sup>Learn open sandbox.

**Scenario 2: 'Girls' Rights March!'** (10-12 age group; Equality Scenario 1). In this game scenario the players assume the role of campaign organisers trying to achieve better rights for girls by organising a campaign march. The main aim is to organize and run a larger and larger march to campaign to the government about things that girls should be allowed to do e.g. 'learning'. There is also a sub-game within this game from a discussion about girls' rights to own and look after pets, hence the references to pets within the features.



- **Setting:** Urban map. Demonstration walking route to be chosen (info needed on strengths/weaknesses of route choices)
- **Pets:** variety of pets that can be cared for; info needed on what they require
- **Funding/resources:** organisers need a budget, this has to cover advertising, safety concerns etc.; they need options on how to raise resources
- **'Pretty stuff':** with which to design messages for the demonstration (need info buttons on issues that affect girls e.g. addiction, eating disorders, as well as rights to equal opportunities and equal treatment)

**Scenario 3: 'Dance Game!'** (10-12 age group; Equality Game 2). The scenario for this game developed over the course of the workshop. Originally the girls working on this scenario came up with a goal: 'Don't be 'sizeist' to win the finals (dance)'. Then to better figure out their game's goal, they further developed this idea. In this game, game players assume the role of dancers who are trying to dance and experience what it is like, for other people who are different from them (e.g. in shape, size and ability) by competing in a dance competition. In addition, game players will enter a dance competition and dance as different sizes or avatars ('fat', 'disabled', 'thin', 'very tall', 'very short') so they can learn to change the way they think about others.

|                |                                                                                      |
|----------------|--------------------------------------------------------------------------------------|
| <b>Control</b> | The dance- people (different); use the arrow keys; help button (with a '?' in a box) |
|----------------|--------------------------------------------------------------------------------------|

|                 |                                   |
|-----------------|-----------------------------------|
| <b>Dialogue</b> | Help advice= ask computer-replies |
|-----------------|-----------------------------------|

|                       |                                           |
|-----------------------|-------------------------------------------|
| <b>Engaged action</b> | Design your own house; dance competitions |
|-----------------------|-------------------------------------------|

|                          |                                  |
|--------------------------|----------------------------------|
| <b>Ethics and Impact</b> | Your appearance does not matter. |
|--------------------------|----------------------------------|

As pupils were brainstorming the goal or aim of their game, they wrote a number of things down on the big sheet of paper that likely fit into the charts above and below, but not succinctly, for example (see Figure 3 below):

- As you advance you can challenge yourself to play against others;
- 3 levels, then after create an account for a virtual world;
- When completed 3 levels, get to make an account and go into a virtual world and compete in dance competitions and win smiley face to buy things. All the way through the virtual world you can change your appearance;
- Quiz with choices of what to say;
- Newspaper: In the virtual worlds there is a newspaper where you can say your problems and someone will answer your problem;
- (1) Training, (2) design a dance, (3) perform it.



Figure 9: Dance Game!

Pupils also described the following in relation to fostering equality:

#### CHALLENGES

Dance competitions; change the way they think about others.

#### DILEMAS

Prove people wrong; work out how to complete level; questionnaire-consequences e.g. See lady with limp (a) laugh, (b) silent, (c) smile at her

#### EXPLORATIONS (explore)

Different dancers; different types of people

#### PUZZLES

Puzzle—every time you log on to do with dance—same puzzles

Initial suggestions are given below for elements required within the game if 'Dance Game' became the focus for the C<sup>2</sup>Learn game:

- **Roles:** avatars can be constructed representing different abilities of dancer (including dancers with temporary and permanent disabilities), different size and shape of dancers, specializing in different styles of dance
- **Setting:** dance studio or performance space; players' own 'houses' or 'dressing rooms' which can be embellished when competitions are won
- **Levels of play:** training, choreograph a dance, perform it (?)
- **Quiz:** testing out how dancers may react to each other
- **Agony aunt column in newspaper:** where dancers can write in with problems (this could be enabled so that the agony aunt is also a role that can be adopted)

## Developed open scenarios (Within School)

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Children aged 10-12 generated one open scenario. They chose the commonly identified problem<sup>4</sup> of the school toilets:

- **The Toilet Stinks – Privacy!!!!!!.** In this game the players will assume the role of girls and boys in the school toilets who are trying to use the space as a new place to ‘hang out’, to play hide and seek by using the blurred toilet windows as hiding devices. The aim being who can ‘own’ the space. You could eat in there and you could hang out, you might get food taken away. Different levels might have different levels of blurring on the windows; you can click on the boys or girls if they look through the window; you can use duct tape to get extra privacy. Games could include catching the boys/girls who flicker the lights. It would include Janitor characters.

Due to time constraints, this scenario was not developed using the dialogue, control, engagement and impact features. The issue of power and authority seems to dominate the game with the goal focusing on who earns the right to ‘own’ the space. Whilst it raises ethical dilemmas by inviting conflict, and by making the toilets mixed-gender, it nevertheless seems limited in terms of co-creativity potential. It seems to be focused on the individual rather than collective action, and also seems to pre-assume how problems might be solved based on actual experience (for example, offering duct tape as a resource in the game with which to cover toilet windows which could otherwise be seen through). Thus, this scenario was not one of the prioritized six.

## Developed open scenarios (Outside of School)

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The pupils aged 10-12 came up with seven open scenarios focusing on issues outside of school. It was notable that the majority of the children chose beyond-school issues. The scenario, which we prioritized offers the game player the role of lawkeeper in preventing criminal activity and has the potential to raise questions about what matters most and why in relation to law-making and breaking. Although the pupils have not articulated the possibilities for co-creativity here, these could in theory be developed at the levels of both citizens and law enforcers. There is plenty of space for ethical decision-making. So this scenario could perhaps offer particular potential for the C<sup>2</sup>Learn game.

**Scenario 4: ‘Stop Crime!’** (10-12 age group; developed ‘Outside School’ open activity 4). In this game, the game player must take on the role of crime stopper and look after a town and stop crime!

|                |                                                                                                           |
|----------------|-----------------------------------------------------------------------------------------------------------|
| <b>Control</b> | Save button, so progress cannot be lost. Bad language = 10 minute ban. You must look after a town. Rules. |
|----------------|-----------------------------------------------------------------------------------------------------------|

|                 |                                                                                                                   |
|-----------------|-------------------------------------------------------------------------------------------------------------------|
| <b>Dialogue</b> | Have conversations with people around you to help complete a level! Walkie talkie tells you where the crimes are! |
|-----------------|-------------------------------------------------------------------------------------------------------------------|

|                       |                                                                               |
|-----------------------|-------------------------------------------------------------------------------|
| <b>Engaged action</b> | Lots of levels. Fast moving action. Consequences not too serious. Difficulty. |
|-----------------------|-------------------------------------------------------------------------------|

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<sup>4</sup> In previous work on school transformation, the OU team has found that complaints about the school toilets are often top of the list of pupils’ concerns; these centre around privacy and cleanliness, the exact issues chosen here by the pupils working on this scenario.

|                          |                                                                                                                                                                                            |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Ethics and Impact</b> | <p>Trying to stop crime!</p> <p>How crime effects!</p> <p>How crime can be dealt with!</p> <p>Which crime is more important?</p> <p>Choose how you should deal with the crime at hand!</p> |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Initial suggestions are given below for elements required within the game if 'Stop Crime' became the focus for the C<sup>2</sup>Learn game.

- **Roles:** player takes on role of crime stopper (of which there are many)
- **Setting:** a cityscape in which a range of crimes take place
- **Resources:** players have walkie talkies and can contact one another
- **Types of crime:** button info on these inviting evaluation of which crime is worse than what
- **Impacts of crime:** button info
- **Preventing crime:** button info

The other six *Outside-of-School* scenarios developed by the 10-12 age group are the following:

- **Not being allowed to decide anything until you are 18.** The game players assume the role of an adult. The game player experiences, or is allowed to do, the things adults can do by voting (for the Prime Minister), getting a job and explores the consequences. The player is controlling difficult decisions throughout our game.
- **Hacking.** The game player is assuming the role of protecting his/her computer (with a fixed budget) by trying to stop his/her computer from being hacked by taking action to build good defences (e.g. building firewalls) and maybe, if applicable sending anti-hacking programmes to the hacker (attacking).
- **Animal Cruelty.** The game player is assuming the role of a scientist who are trying to keep every animal, especially endangered species, in the world alive on a balanced ecological scale by building and managing habitats (with a certain amount of money).
- **Sports.** The players will assume the role of sportspeople who are trying to win a multi-sports competition like the Olympics by playing lots of different sports and competitions including swimming, running, football, American football
- **Alien Eruption.** The players will assume the role of people who are trying to save the world from aliens by killing them in juggernauts using modern weapons and vehicles. It is set in the present and there are different species of aliens.
- **My Pets.** Players assume the role of a person who is trying to look after their own pets and make sure they don't get lost or harmed. This would happen through activities like feeding games, looking after endangered pets, walking them and going over obstacles, bathing them, talking to them , a puppy catwalk, taking them to the vets, telling them your secrets; mini-games like spot the difference, spot the pet.

Of these, the first two seem also promising for co-creativity. The first scenario, which focuses on children being able to take on adult responsibilities earlier than usual, offers many opportunities for both 'what if' and 'as if' activity, and offers choices many of which could bring ethical dilemmas. It offers potential for co-creativity though this is not explicitly built in. Similarly, the second scenario,

which focuses on hacking, offers opportunities to reverse perspectives and to tackle ethical dilemmas by reverse-hacking attackers, but like the first scenario it is fairly individually focused in its framing.

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### 3.2.3.2 SCENARIOS GENERATED BY 13 – 15 YEARS OLDS

#### Theme summaries

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##### *Scaffolded scenarios: Environment*

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In brainstorming foci for games around the Environment theme, the 13-15 year olds also generated four different kinds of foci. These were human-generated environmental foci, general environment foci, weather foci and animal foci. Examples of the largest category, human-generated environmental foci were: population growth and its implications; war and its implications; loss of fossil fuels and its implications; dealing with human destruction of habitats including via nuclear radiation; dealing with pollution including oil spillages; and slowing or halting climate change. The general environment category was the next largest, with the other two categories very small. Examples of general environment foci were: issues around natural disasters such as earthquakes, hurricanes and tornadoes. An example of a weather focus was drought. An example of animal foci was dealing with endangered species.

##### *Scaffolded scenarios: Equality*

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The 13 – 15 year olds’ brainstorming generated three emergent foci for the Equality theme. These were human rights equality foci, animal equality foci and other equality foci. Examples of the largest category, human rights equality foci were: supporting vulnerable groups such as children and those in war zones or in poverty; and supporting groups who may not have equal rights in all cultures - women and girls, people with disabilities, different racial groups, different religious groups, those with different sexual orientations; as well as foci on the principle or sources of equal rights issues, for example prejudice, democracy, politics, discrimination and access. The other two categories contained one main suggestion each: saving polar bears/pandas for the animal category and encouraging fair trade in the other category.

##### *Open scenarios: Inside School*

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The 13 - 15 year old pupils generated six emergent foci for the Inside School theme. These were people foci, structure foci, pupil approach foci, social foci, learning context foci and practicalities foci. People, pupil and learning context foci were the largest categories, with the other three categories featuring less and with similarly low numbers of two to three suggestions per category. Interestingly, the people foci centred on rights and authority issues in school such as: bullying, racism, homophobia, vandalism, drugs and theft. Pupil learning approach foci centred around pupil autonomy for example being in a school culture, in which you could ask things, work hard, be treated equally, enjoy learning and do well. Learning context foci were about accessing more of different subjects such as: PE, science and technology. Structure, social and practicalities foci were respectively about suggesting different structures for the school day, in school friendships and how the canteen worked.

##### *Open scenarios: Outside School*

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In brainstorming foci for games around the Outside School theme, the 13-15 year olds generated five different kinds of foci. These were family and friends foci, social foci, societal foci, global concerns foci

and activities foci. Family and friends, societal and activities foci were the largest categories here, with the other two categories featuring less and with similarly low numbers of two to three suggestions per category. Examples of the family and friends/social focused on: friendship issues and family relationships; power issues such as whether children are treated in an age appropriate way; and issues of personal safety and feeling safe. Examples of societal foci were: equality issues such as racism, general bullying and homophobia; dealing with criminal activity such as drugs and vandalism. Examples of the activities foci were: school-focused activities such as homework; leisure activities such as what technology pupils have access to and gaming. Examples of global concerns foci were: Africa and the multiplicity of problems there including poverty and illnesses like malaria; global warming and the environment. Examples of social foci were: inequalities caused by money both personally and societally; issues caused by recent economic problems such as loss of jobs.

### Developed scenarios on the Environment theme

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The pupils aged 13-15 developed four scenarios on the Environment theme:

- **Environmental pollution.** The players will assume the role of people who are trying to clear up rubbish by driving around in a little truck and clearing up the rubbish. There's a time limit and at each level more rubbish is thrown away. The rubbish is thrown away by little people who are the other characters in the game. You can buy extra upgrades such as bigger trucks. Players would control the game using the arrow key; you have control through the faster you go the more rubbish you collect; you can control the player you are but the rubbish is out of your control; you have to make sure that the rubbish is put in the right bin.
- **Extinction Zoo.** The game players will assume the role of a zookeeper you own a zoo that will house endangered and nearly extinct animals. You need to rescue the animals from the wild and breed them, until you have helped the population and released them into the wild. How many to take from the wild and how many to release and to keep for breeding. This game is meant to make people feel a lot more about animals and the environmental impacts and issues we (humans) have caused. It will impact on our knowledge of endangered animals. You will have challenges to find animals and make all animals healthy. You will also have to make them happy and make sure that you have enough enclosures to house them. There will be little mini-games within the game. For examples, an animal could escape and you would have a certain amount of time to try and find that animal.
- **Global Warming.** In this scenario f, the game players assume the role of leader who is in charge of a town/village. As leader the game player has to put in place things to help save energy and prevent global warming (e.g. wind turbines, sea turbines, turning off/automatic lights, water butts, closing windows, radiators). The more energy you save the more coins you collect to expand your town/city. The more money you earn the more options there are of what you build; the higher level you are the more things you can build. You also need to think about how/whether you attract tourists to your city. There will be an online leader board of the best cities.
- **[Ecofriendly Life].** Here players assume the role of people who are trying to get through life and finish with a certain amount of points by being environmentally friendly Due to time constraints and student absence, this scenario was not developed further. .

The first scenario ('Pollution') is rather procedural and seems to involve little creativity. Interestingly, the second scenario, the 'Extinction Zoo' is very similar to an idea developed by the younger age group and it offers opportunities for 'what if' and 'as if' possibility thinking although the co-creativity and ethical decision-making is less evident. Scenarios 4 and 5 which both focus on how to reduce global warming, do seem to bring the potential for evaluating the impact of personal actions on the

wider context but being both quite focused on individual action, offer less scope for co-creativity. Thus, these scenarios were not among the ones prioritized.

### Developed scenarios on the Equality theme

One equality scenario was developed by this age group. With its roots in history and yet offering a fantasy scenario of ruling a kingdom which is coping with racism, this scenario would demand dialogue and a continuous engagement with evaluating ethical decision-making. Co-creativity would in a sense be a goal of the game which might make it a useful possibility for the C<sup>2</sup>Learn consortium to consider.

**Scenario 5\*: Removing Racism** (13-15 age group; Equality Scenario). In this scenario for the game, the game player assumes the role of a ruler, who is tasked with ruling over a place that is highly racist and he/she has to try to stop it. First level: 1968 death of Martin Luther King Jr. Last Level: Present day. You own a fictional country. You can choose.

**Control** You have control of your city and the people of your city.

**Dialogue (interaction)** Constant news feed to tell you how well you are progressing. Tutorial teaching you the basics.

**Engaged action (engaging)** You were quite engaged ruling your own country.

**Ethics and Impact (decisions & outcomes)** This game is solely based in equality within a city and events and problems such as poverty and racism are what you have to tackle to level up and proceed throughout the game.

Pupils also described the following in relation to the scenario:

**CHALLENGES** If you want to do a protest and there is a lot of racism it will be a challenge to make a successful protest without riots. Challenged by the public, due to the risk of being thrown out of office. Persuading people to eradicate racism.

**DILEMMAS** Choices may be limited due to resources. Dilemmas arise through choice good and bad. Racism and equality.

**EXPLORATIONS (explore)** Going back in time. Zoom in on a specific area to see citizens going about their daily lives. You can eavesdrop on conversations to monitor your progress. Different level, times and difficulty.

**PUZZLES** Entire game is a puzzle. Figure out how to talk to people.

Initial suggestions are given below for elements required within the game if 'Removing Racism' became the focus for the C<sup>2</sup>Learn game.

- **Roles:** player takes on role of ruler of the country [info needed on the problem and goal, and their 'powers': tutorial needed for this exploring aspects of racism and equality]. You raise awareness by organising parades (and similar campaigns) where you try to keep the city equal.
- **Setting with historical zoom:** a map of a city (similar to Stop Disasters!) where you try to make it (the city) more diverse, but then you have different areas that are rich, poor and you try not to ignore the rich places by focusing on the poor places, but fix problems like racism, crime in the rich places as well; it is possible to go back in time (again and again), where it is even harder to fix the problems because they are worse in the past; game player experience interactions in this city in earlier eras and against which to compare the results of their decisions / efforts
- **Resources:** there are certain resources that can be spent to improve matters (these might be focused on interaction e.g. workshops, talks, conversations, simulations)
- **Interaction:** the game invites the player to talk with and persuade others to behave in less racist ways; once you finish the game you go back to the present to see how it all turns out in the end (how your work in the past effects the present.
- **Impacts of racism:** button info
- **Preventing racism:** button info

### Developed open scenarios (Within School)

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The pupils aged 13-15 came up with only open scenario focusing on an issue within school, namely the prices of the school canteen:

- **Canteen prices.** In this game the players will assume the role of the manager of the school canteen, who is trying to make the canteen food less expensive but still make a profit by deciding what will be sold, and how it will be cost. They have to try to choose things that children will like, that won't be expensive. They also have to hire staff and pay them.

This scenario was not prioritized, because it seems to be more of a problem solving type game than a creativity focused one and does not offer opportunities for co-creativity in that the manager of the canteen appears to act alone. Players would each take on the same role. Ethics do not seem to form a particularly important aspect of the game.

### Developed open scenarios (Outside the School)

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The pupils aged 10-12 came up with four open scenarios focusing on issues outside of school:

- **Crime & Drugs.** The game players will assume the role of police officers who are trying to wipe out crime and make the streets safe by catching criminals, prisoners trying to escape, gangs trying to kill you by catching them and sending them to prison. You will engage in the game by trying to make your streets safe, undercover work and uncovering drug dealers. You will have to drive around in your police car and catch the criminals.
- **Crime.** The game players will assume the role of crime fighters e.g. jail wardens (not necessarily the police) who are trying to stop crime, stop prisoners from escaping and stop riots through various security measures. The game also allows players to play the role of a prisoner.
- **[Adults within a Family].** In this game the players will assume the role of adults within a family who are trying to maintain contact with their family and support them by making enough money by keeping their job or getting a job, and they have to find ways to improve

their job. They have to do the right thing to keep in contact with their family, choose the 'right' job and where you live for you and your family.

- **[Money for Charity].** The players will assume the role of people who are trying to get different jobs and then be able to give money to charity. The game would work with different difficulty levels for what job you want to do in different places, e.g. if you take a job in Africa you won't get paid as much so it would be harder to raise money and give money to charity. One of the challenges would be that you have to try to do lots of jobs in a set time to try to raise money to give to charity.

Interestingly these scenarios, although they have different titles and two in particular focus on crime, all seem to be about finding one's way in a challenging world at a personal level. To this degree they do demand creative decision-making and they each offer opportunities to weigh up the 'right' course of action. One scenario offers the opportunity to take on a different role (such as that of a prisoner) thus offering 'what if' and 'as if' opportunities to experience new perspectives so as to make decisions however none of the games is particularly focused on co-creativity, and there for they were not among the prioritized.

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### 3.2.3.3 SCENARIOS GENERATED BY PUPILS AGED 16 – 18

#### Theme summaries<sup>5</sup>

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##### *Scaffolded scenarios: Equality*

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The 16 – 18 year olds brainstormed around one main emergent focus for the Equality theme – this was human rights centred. They focused on equality issues in terms of: sexual orientation, gender, age, relationship status, culture, class, geographic area, intelligence, wealth, beliefs, disability, race, profession, politics and money – and how this might influence access, rightly or wrongly to such resources as health care and water.

##### *Open scenarios: Inside School*

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The 16 – 18 year old pupils generated one emergent focus for the Inside School theme, centred around people and societal concerns. They focused on rights issues for example bullying, homophobia, racism; crime such as theft; personal issues such as healthy eating and class/its relationship to money.

##### *Open scenarios: Outside School*

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In brainstorming foci for games around the Outside School theme, the 16-18 year olds generated two emergent foci centred around people and societal concerns and the environment. They focused on rights issues such as racism and cyber bullying; crime such as alcohol/drug abuse; personal issues such as obesity, personal image, and class/its relationship to money. The environment focus was simply a reference to awareness about environmental issues.

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<sup>5</sup> This age group did not develop an Environment theme.

## Developed scenarios on the Equality theme<sup>6</sup>

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The pupils aged 16-18 generated one game scenario on the theme of Equality. It is an inherently creative game in that the aim of preventing poverty invites enterprising and ethical decision-making although having game players take on the role of leader reduces the possibilities for co-creativity. However with some development in relation to role, this game could have potential for the C<sup>2</sup>Learn game.

**Scenario 6\*: Eradicating Poverty** (16-18 age group; Equality Scenario). In this game the players assume the role of head (leader) of a village who is trying to stop poverty by creating jobs, homes, and providing medical care and attention as well as farming resources in the context of Zambia. The aim is to successfully eradicate poverty. Game players are given a certain amount of money. And game players 'have to sufficiently eradicate poverty in 15 min' (see figure #). Each of the following costs a certain amount of money, changes get more money:

- Schooling (education)
- Clean water
- Farming resources (opening jobs)
- Housing
- Medical care

The game explains why these are important:

- You are in control (independent game)
- All changes explained in details

Objectives:

- To create jobs
- To provide homes for villagers
- To save lives
- To provide sufficient medical care and education
- To establish farming resources.

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<sup>6</sup> No scenarios on the Environment Theme were developed by pupils aged 16-18. There were also no within school scenario, which may reflect older pupils' greater concern with issues beyond their immediate experience (it is also true to say that there were only two pupils in this age bracket).

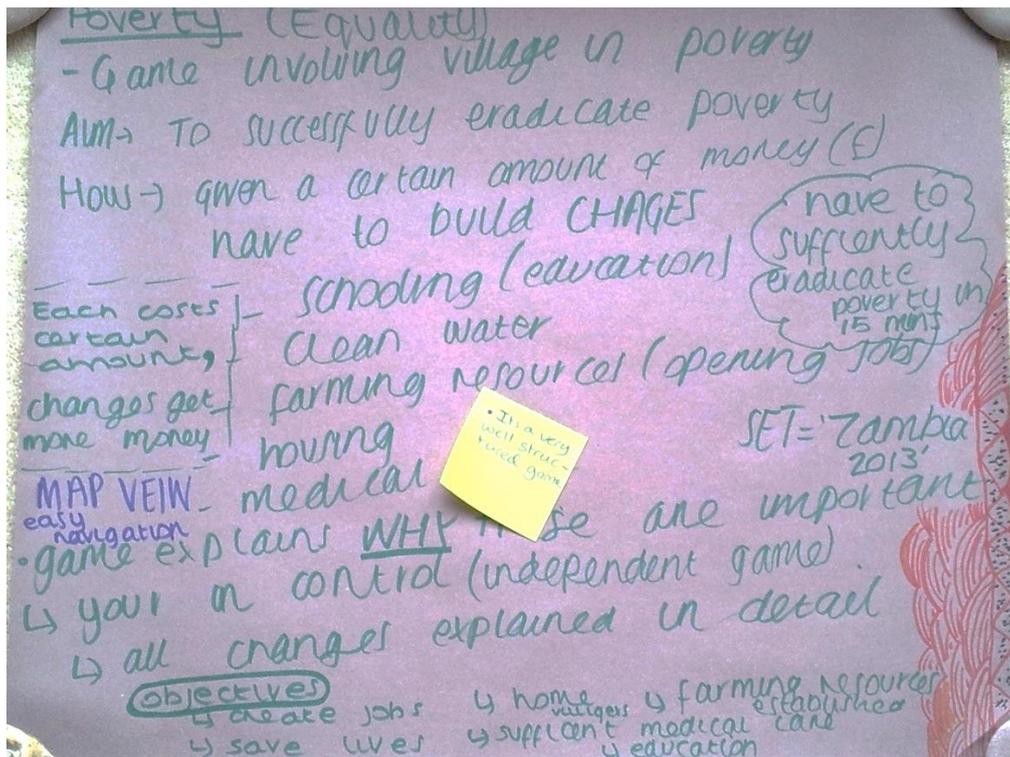


Figure 10: 'Eradicating Poverty' game

|                                                     |                                                                                                                                                                                                                                                               |
|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Control</b>                                      | Your decisions impact villages. Fully in control. Constant control                                                                                                                                                                                            |
| <b>Dialogue (interaction)</b>                       | Constant newsfeed to tell you how well you are progressing. Tutorial teaching you the basics. Narrator telling the story of what had happened etc. Own decision making. Hints given when needed.                                                              |
| <b>Engaged action (engaging)</b>                    | You were quite engaged ruling your own country. It is easy to get lost as you are endeared in character. All decisions decided by you.                                                                                                                        |
| <b>Ethics and Impact (decisions &amp; outcomes)</b> | This game is solely based in equality within a city and events and problems such as poverty and racism are what you have to tackle to level up and proceed throughout the game. Have to make choices in who to save. Death when reaction is not quick enough. |

Pupils also described the following in relation to the scenario:

**CHALLENGES** Saving people all the time. Limited amount of money.

**DILEMAS** What objectives to do first. Consider a lot of things. Choose how quickly things should be done (prioritise)

**EXPLORATIONS** Finding out about Zambia culture. Finding out about the culture. Educate yourself on poverty and its effects.

**PUZZLES** Working out everything within a time limit. Outbreak of disease.

Initial suggestions are given below for concepts required within the game if 'Eradicating Poverty' became the focus for the C<sup>2</sup>Learn game.

- **Setting:** Zambia 2013: rural map view, with easy navigation
- **Objectives buttons:** aims of game (i.e. education, clean water, farming jobs, housing, medical care etc.) given on buttons explaining why these are necessary – effects of poverty
- **Roles:** there is a narrator; each player takes on the role of head of the village, and has access to the objectives buttons and a certain amount of resource and limited time to do the best job possible.
- **Culture info:** buttons giving info about the culture of Zambia
- **Hints buttons:** how to achieve goals - hints
- **News feed:** this tells players how they are doing
- **Challenges:** outbreak of disease, crops failing, weather cycles affecting livelihoods

#### *Developed open scenarios (Outside the School)*

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The pupils aged 16-18 came up with one open scenario focusing on issues outside of school:

- **Obesity.** In this game the players assume the role of someone like them who is trying to keep his/her body healthy by learning about obesity and the bad decisions individual make in regards to their health. This game is a SIMS style game with a 3D environment the game player has to navigate. The objective is to keep your person (avatar) as healthy as possible. You make choices about, what to eat, what to do (jobs, hobbies), where you live, friends and media.

This was not one of the prioritized scenarios. Whilst it is to a degree focused on creative decision-making and path-finding with respect to health, it is also focused on the individual rather than on co-creativity, so offers less potential than some of the other ideas for C<sup>2</sup>Learn.

### 3.2.4 PRELIMINARY DOCUMENTATION OF USER NEEDS AND EXPECTATIONS FROM C<sup>2</sup>LEARN, PARTICULARLY OF PUPILS

#### 3.2.4.1 PUPILS' GAMEPLAYING HABITS

Workshop 1 has yielded the following background information about pupils' gameplay habits. The pupils are just about evenly split where 50% who game more than five hours per week and 50% who game less often. They play games on mobile phones, Xbox, Nintendo Wii, iPod, iPad, Nintendo 3 DS, laptops, tablets and fixed computers. The games most mentioned across all age groups were Minecraft, Fifa and Sims. All game players refer to collaboration in gameplay particularly around asking for help; both face-to-face from family and friends (including, phoning or texting a friend or family and for adults, their children), and from online digital gameplay paratexts (YouTube, walkthroughs, social networks including forums, wikis and Facebook). Interestingly one 17-year old said that he would never ask for help 'that makes you a NOOB' and one teacher (of ICT) declared that she would never ask for help as 'I like to find things out for myself'. Very few had played serious games before. In each school at least one adult expressed scepticism about use of computer games in education<sup>7</sup> although by the end of the three workshops in each site, every teacher was extremely keen to explore their potential and in one school other staff had already been invited to explore this.

Responding to what computer games enable in a sorting exercise derived from a reading that had been circulated beforehand<sup>8</sup>, pupils and teachers across the two primaries and the SE secondary school identified the top four as:

- Computer games can be used for serious purposes
- Computer games can educate people about current issues e.g. the environment
- Computer games can make you buy things
- Computer games are 'good for your brain'; they make you good at decision-making.

Workshop 2 introduced pupils to an online gaming survey. 19 pupils and 1 Teacher completed the survey online between 14th of February and the 22nd of March. 10 of the pupils were secondary (ages 13-16) and 9 pupils were primary (ages 10-11). In secondary, 3 female and 7 male pupils responded to the online survey. In primary, 5 female and 4 male pupils responded to the survey.

The complete qualitative and quantitative data from the online survey is included Appendix 4, but a summary of key findings is presented below.

- 19% of pupils play digital games on a their laptop or computer, 19% play on their tablet or iPad, 22% play on their mobile phones, 14% on a Wii, 8% on a Nintendo DS and Xbox, and with only 1% playing on a Playstation and Facebook. 4% indicated other.

<sup>7</sup> These were mainly parents however teachers were concerned to minimise missed lessons and one head teacher articulated concern about the term 'gaming', associating it with gambling, indicating that 'playing games' would not be something she or her parent community would welcome at the top end of the primary school although this was not borne out by parental consents or by anecdotal discussion with parents and staff. The head's perspective is especially intriguing as this school has been researched by OU academics as embracing creativity in a range of ways for a number of years; notable too that the staff member directly involved in the workshop saw enormous potential for digital games across the upper primary curriculum and was keen to involve the whole of the final year of primary school, not simply a group of ten.

<sup>8</sup> Williamson, B. (2008). *Games and Learning: Policy Recommendations Report*. Bristol: Futurelab

- The platforms used most to play digital games where the computer/laptop 40% and the tablet/iPad 40%, followed by Xbox 15%.
- Most pupils play digital games with friends or family, but some play online with game players they do not know.
- With the pupils who play digital games online, 40% of pupils reported they personally know the other game players, and 60% reported they do not know them.
- Pupils reported that they play digital games 100% of the time at home.
- 48% of pupils reported they do not use social networking, 24% use Facebook, 12% use Twitter and 16% of pupils use another social network.
- 30% of pupils reported they complete a digital game by levelling up most of the time, 35% some of the time, 20% rarely, 10% never, and 5% reported they always complete a digital game.
- The games pupils reported completing by levelling up are Assassin Creed, Pokemon, Sims 2, Ratchet and Clank, Minecraft and Angry Birds.
- Pupils reported they stopped playing digital games because they were boring, out of fashion, they completed the game, wasn't appealing to the eye, they outgrew it, they had to pay for them or because they had been too hard.
- Pupils' favourite games presently are Fifa 13, Minecraft, Team Fortress and Hot Donut.
- Pupils' favourite games 6 months ago included overwhelmingly Minecraft, Fifa 13, The Sims and Moshi Monsters.
- Pupil's favourite game a year ago was Minecraft, Binweevils, & Moshi Monsters
- The first game pupils played on any platform was Pokemon, Club Penguin or games on hand-held devices or consoles.
- Pupils' first digital games included Pokemon, Club Penguin or games on hand-held devices or consoles.
- Pupils' first digital games on a mobile phone were Angry Birds, Sims & Sudoku.
- The digital games pupils have and spent the most time playing are Minecraft, Fifa 13, and Angry Birds.
- Pupils' indicate they sometimes use cheat codes when playing digital games by talking to friends, going to YouTube or forums online.
- 25% of pupils indicated they have used cheat codes and 75% indicated they have not.
- 60% of pupils indicated they had not played a serious game like Stop Disaster! before.
- The only other serious game pupils indicated they play is The Sims.
- 35% of pupils indicated they play MMORPGs and 65% indicated they do not.
- The MMORPGs pupils indicated they play are Minecraft, Tekkit, Clash of Clans, Runescape and Star Trek online.
- Pupils indicated that by playing serious games they can learn through having fun, learn to think logically, they take more cooperation than partner work in school, learn responsibilities and decision making and new ideas or creativity.
- Pupils indicated the best digital game they ever played were Fifa 13, Minecraft, Viva Pinata and Hot Donut.
- 55% of pupils indicated cheating in digital games was ok and 45% indicated it was not.
- When asked to explain why it is ok or not ok to cheat in a digital game, most pupils reported you are just cheating yourself, it takes the fun out of it, you have to work hard for it, but that it can also help you learn how to win the game.
- Pupils reported the best thing about digital games is that they are 'fun'.
- Pupils reported the worst thing about digital games is that they 'lag', 'are repetitive', 'can be all consuming', 'addictive' or 'badly made'.

- When asked whether they agreed or disagreed that digital games are bad for young people as reported in the news, most disagreed.

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#### 3.2.4.2 PRELIMINARY REQUIREMENTS FOR THE GAME ENVIRONMENT

Part of Workshop 1 and the activities that the OU team asked participants to do around that workshop focused on critiquing existing serious games, and existing theories/statements about serious games. Analysis of that data suggests the following must be attended to in developing scenarios and game environments: all particularly relevant to enabling co-creativity.

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##### Control, choice and understanding

Pupils were interested in having control and choice within game environments. This might be in relation to very practical elements such that they have ‘freedom to make decisions’ (10-12 year olds). For example, in relation to how many houses to build, and where, in a community-focused serious game like Stop Disasters! ([www.stopdisastersgame.org/](http://www.stopdisastersgame.org/)). And that they could then see changes happening in the environment as a result of their decisions, e.g. because they built houses on a particular piece of land they were able to avert natural disasters like floods causing more damage. But they also wanted to ‘feel in charge’. This related to which perspectives they were offered in the environment and how they were able to take these on. One of the secondary teachers commented that ‘different viewpoints and perspectives give you different ideas’. And one of the 10 -12 year olds said ‘I felt like I was the boss of the city’.

These findings suggest that it is not only the practicalities of control and choice within the game environment that will be important but ‘how’ these are experienced by players. Alongside this, some of the 13 – 15 year olds identified that they wanted to be allowed to ‘make mistakes – but not always’. They enjoyed playing games repeatedly, and seeing cause and effect happen as a result of their actions, with clear feedback mechanisms for the players. They then learned from their mistakes (within reason) and progressed onto new levels via this process.

Pupils were also clear that they did not want to be unnecessarily limited by the game environment. For example in Stop Disaster! the 13 – 15 year olds picked up on the fact that for no explainable reason there were ‘some places you couldn’t put anything’. The pupils felt this stopped them being able to take meaningful action. Conversely in critiquing games like Minecraft, pupils could become frustrated by too much building which took away from other foci that they might be interested in within the environment.

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##### Immersion/engagement

In the pupils’ own words, immersion/engagement meant that the game environment, the scenarios at its heart, the activities and the look and feel of the game combined to make it ‘unput-down-able’ and ‘addictive’. The pupils tried and critiqued a game called *Rizk* (<http://www.sciencemuseum.org.uk/ClimateChanging/Rizk.aspx>) in which the player collects resources to grow a plant, wards off threats and manages risks to the plant. For them this was ‘put-downable’. The 10 – 12 year old pupils explained that this was due to a combination of factors: the plant was not realistic; for whatever reason they did not care about it, it did not ‘matter’ to them; and the music that accompanied the game was ‘irritating’. Where pupils became very engaged with a game and its environment they said that this was connected to the game being ‘exciting’ (10-12 year olds) ‘cool’ (see credibility point below), ‘fun’ and ‘risky’ (13- 15 year olds). In terms of games like *Minecraft* they were addictive because the game and its environment were ‘never-ending’. The

feelings experienced by the pupils (e.g. excitement, happiness, trepidation, boredom) and their accompanying emotional journeys were therefore very important to how the game and its environment functioned.

### Accessibility

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Accessibility was closely associated with the pupils' ability to become engaged and immersed in a game and its environment. Accessibility was about practical factors such as the map function in *Stop Disasters!* being easy to control (13 – 15 year olds). Pupils wanted easy 'navigation', as well as clear instructions, goals and feedback. For example, clear positioning of leader boards on multi-player games. Pupils were also very keen to avoid lag in games but this was often to do with the speed of internet connections and general computer capacity/speeds within school systems that needed addressing and was out of pupils' hands. Accessibility was also connected to realism. The 10 – 12 year olds had issues with *Stop Disasters!* because 'graphics [were] not realistic'. In all age groups, again related to engagement the pupils connected accessibility with the aesthetics or 'look and feel' of the game and how 'cool' (see credibility point below) it was. Accessibility was also related to how clearly scaffolded games were in terms of moving up levels, getting scores and upgrades.

### Novelty

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The novelty of the environment itself was of interest to the pupils, i.e. they were interested to work in unfamiliar territory or with a theme they didn't already know about. For example the 10 – 12 year olds discussed how within *Stop Disasters!* 'the topic is new and different from other games'; they were learning about and experiencing the impact of natural disasters and they found that motivating in itself.

### 'Multi'

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The 13-15 year olds were more interested than the 10 – 12 year olds in the gaming environment having the capacity for multi-player elements. They were also keen that the game should have '3 or 4 types of different games within one' (i.e. hinting at multiple scenarios within one environment), as well as the idea of 'multi-tasking – doing one thing while watching another' during the game. This age range seemed much more interested and potentially capable of dealing with different elements of the game running in parallel. These pupils also discussed the ability to collaborate as being important. For example they thought that being able to download and modify other people's buildings and structures within games brought with it a lot of advantages. Another kind of collaboration came in the form of playing with or against your friends and being able to talk to them about different elements of the game and its environment as they played.

### Credibility

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The 13-15 year olds also particularly focused on how 'cool' and therefore how credible the game was to them and their peers. This was something that the 10-12 year olds commented on too in terms of having 'good upgrades' available, but the older age group brought this up much more and were clearly more concerned with it. For the 13-15 year olds a game being 'cool' also meant there were no unnecessary frustrations, such as, for example, defences not necessarily working in the *Stop Disasters!* game, or very practical frustrations such as in *Fifa 13* having their account hacked into and losing their long term progress in the game because online security is not adequate.

## 'Openness'

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The 16 – 18 year olds were keener than the other age groups that games should be open enough to have the space for players to customize the game and its environment. They also wanted to be able to develop their own ideas within the game.

### 3.2.4.3 TECHNOLOGY IN THE SCHOOLS

The OU team collected in-depth responses from pupils and teachers to a series of questions relating to the technology available in their schools presently and what they hoped for in the future. Not surprisingly, most schools have similar hardware for pupils to use. This consists of PCs and laptops running Windows 7 and below. All schools had projectors, interactive white boards and some Mac hardware (desktops and iPads). The equipment most likely to be available to play a digital game on, at the English primary and secondary schools, will be a PC desktop or laptop connected to the internet via the schools' servers.

It is important to stress that school servers do block/filter many sites and pupils across all 4 case sites had difficulty in accessing the *Past/Present* serious game we wanted them to try for Workshop 2. We did find this surprising. Less surprising was the block on *The McDonald's Video Game* due to bad language within the game. *YouTube* is also blocked.

Additionally, to access a blocked website or digital game on an individual school's server, while not impossible, is very hard to achieve in reality and time consuming for the individual(s) tasked/requested to remove such a block.

The servers will also likely block the download of stand-alone versions of a digital game or even online versions for flash-enabled browsers. Because *Stop Disasters!* and *Risk* were playable on the schools computers, it will be important to make sure, from the start of the game design, that is both accessible and playable in schools in England where there is a server that filters content.

The following quotes from teachers reflect the anticipated and desired technology upgrades in schools:

'Our school is aiming to upgrade laptops to laptop/tablet hybrids. We are also looking at purchasing a 3D printer. We will also be developing the use of the TV studio, upgrading editing software. We have also decided to develop the use of 'control' software in computer programming and computer aided design. The school aims to ensure that children have access to devices that are of similar quality, if not better, to what they have at home.' (Primary Teacher)

'If money was not an object (!) the desire would be to integrate tablet devices into our ICT provision which were used to support all areas of the curriculum so that children could access serious games / internet etc. in all classes / within all age phases, including FS. We are finding (in particular with the youngest children) that they assume screens are touch-screen so it would be good to integrate this within the school setting too. In the real world however, it is planned to improve the wireless connectivity in school so that the laptops (currently installed in the ICT suite) could be used anywhere in the building. We are lucky enough to already have IWB in all classrooms and shared learning areas. However, we are planning to change at least one IWB (the one in the hall) to a rear projector screen to improve the on screen image resolution for children in the hall.' (Primary Teacher)

'Over the next two years I would like to see tablets / iPads used more frequently. As staff we have been in the process of having our laptops updated along with the introduction of the latest windows

office programmes. A greater flexibility in the use of technology would be an advantage. The ability for pupils and staff to evidence work and store in a cloud. The use of phones is not allowed in school but the use of some apps would be very useful. Greater access for pupils before and after school would be good. Updating the online learning facilities and web pages would also help. There does not seem to be a strategic over view plan for the improvement of technology but someone must have a plan!' (Secondary Teacher)

### 3.3 AUSTRIA, MINISTRY OF EDUCATION (BMUKK)

#### 3.3.1 VISIONARY WORKSHOPS

As mentioned above, two core groups of teachers – one from lower secondary schools and one from higher secondary school – and a group of young university students were engaged in the C<sup>2</sup>Learn participatory process of BMUKK.

The participatory process was organized via:

- Visionary workshops
- C<sup>2</sup>Learn Wiki.

Throughout the period of M3 to M6, four different visionary workshops were held, each lasting approximately 3-4 hours. These visionary workshops were complemented by a C<sup>2</sup>Learn wiki that enabled teachers and game-based learning experts to share and discuss C<sup>2</sup>Learn scenarios and user requirement via a suitable online tool.

The work reported here is based on the first visionary phase of the C<sup>2</sup>Learn participatory process in Austria, specifically on the three Visionary Workshops held on<sup>9</sup>:

- January 12, 2013
- March 08, 2013
- March 17, 2013.

The **first workshop** was mainly focused on introducing the C<sup>2</sup>Learn project, its aims and methods, its pedagogical underpinnings and its desired impact. The first workshops core aim was to inform a small group of Austrian teachers from various types of schools that can act as multipliers for future activities within the Austrian school communities. An information leaflet was developed with the multipliers to focus on the practical value of C<sup>2</sup>Learn and on the benefits for teacher communities (see Appendix 3).

The **second workshop** was mainly focused on going into C<sup>2</sup>Learn details in regards to creativity in education, computational tools, game design, educational scenarios and use cases. Different topics that are important to creativity and game based learning were discussed.

The **third visionary workshop** was focused on developing game designs and educational scenarios, discuss system requirements as well as concepts and themes, playful learning activities and parameters of educational context.

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<sup>9</sup> A fourth workshop is planned to be held in early May 2013.

### 3.3.2 GENERATING AND ELABORATING C<sup>2</sup>LEARN SCENARIOS WITH PARTICIPATING TEACHERS

Game design and scenario design underpinnings were used as an entry point to the C<sup>2</sup>Learn discussion. Teacher and experts gave input to the C<sup>2</sup>Learn methodology and some reference points were outlined.

One core question evolved in regards to generating and elaboration C<sup>2</sup>Learn scenarios: *What kind of structure, information and activities should and can be included in a scenario that should foster creativity and how much formalism can a scenario stand without jeopardizing the main creativity aspects?*

The Austrian teachers elaborated the initial schematic on educational scenarios (Figure 1) to include two main kinds of activities: macro-activities and micro-activities.

**Marco-activities** orchestrate different C<sup>2</sup>Learn tools for educational scenarios. The main value of macro-activities is to involve several C<sup>2</sup>Learn tools and, therefore, engage into different kinds of lateral thinking processes and creativity activities. So, macro-activities ensure that learners will work with a broad range of tools that foster creativity in a different way.

Furthermore, macro-activities assemble C<sup>2</sup>Learn tools so that they fit to one or many concrete learning outcomes. Macro activities are set up so that learner can move towards a new skills or competence.

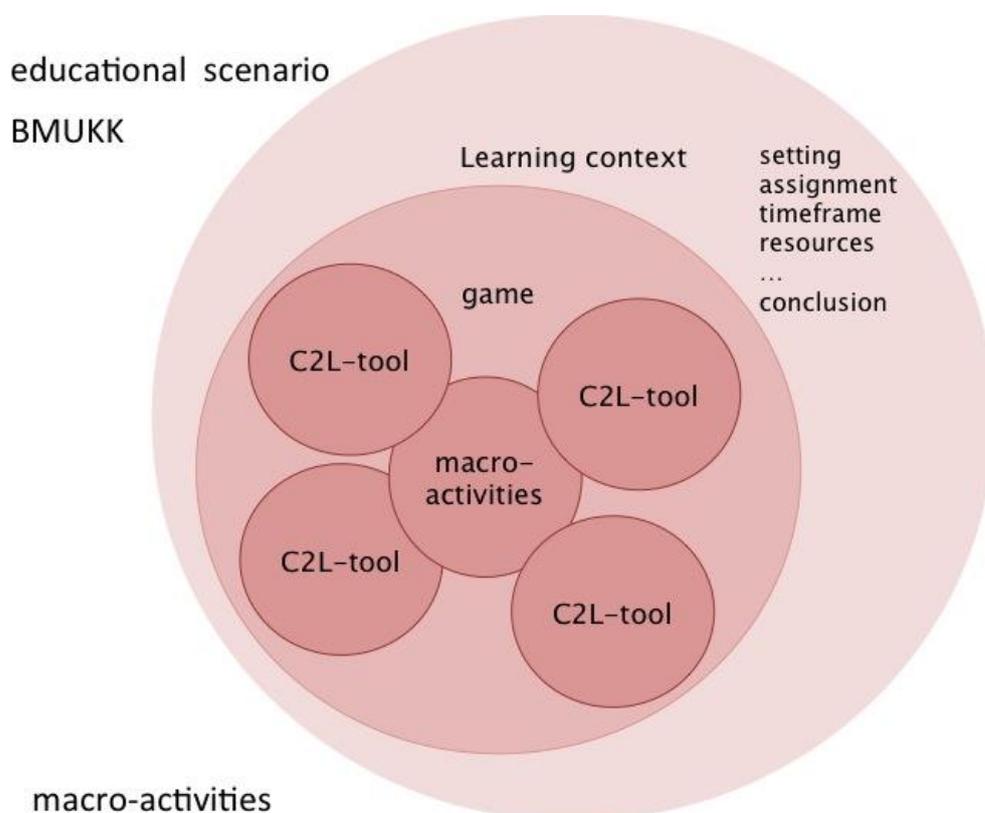


Figure 11: A BMUKK version of the C<sup>2</sup>Learn educational scenario schematic focusing on macro-activities

For example, macro-activities can be conceived as **quests**. A quest in the C<sup>2</sup>Learn game is a task that a learner-controlled character or group of characters should complete in order to gain a reward. Rewards may include an increase in the character's experience in order to learn new skills, abilities or competences as well as access to new locations or areas (e.g. a new tool, a new activity, a new level), or any combination of the above. Quests can be linked together to form quest series or chains. In this manner, quests are used to provide the learner with further background to the setting their characters are in. This mechanism can also be used to advance any story or plot the game might have.

Macro-activities as quests will have:

- A certain goal for the player, which is equivalent to a certain learning outcome for the learner
- Implicit ways to reach this goal for the player, which is equivalent to an implicit learning pathways for the learner
- A specific reward (e.g. a new ability for the avatar and a graphical token) for the player, which is equivalent to a specific new skill (and e.g. grade) for the learner.

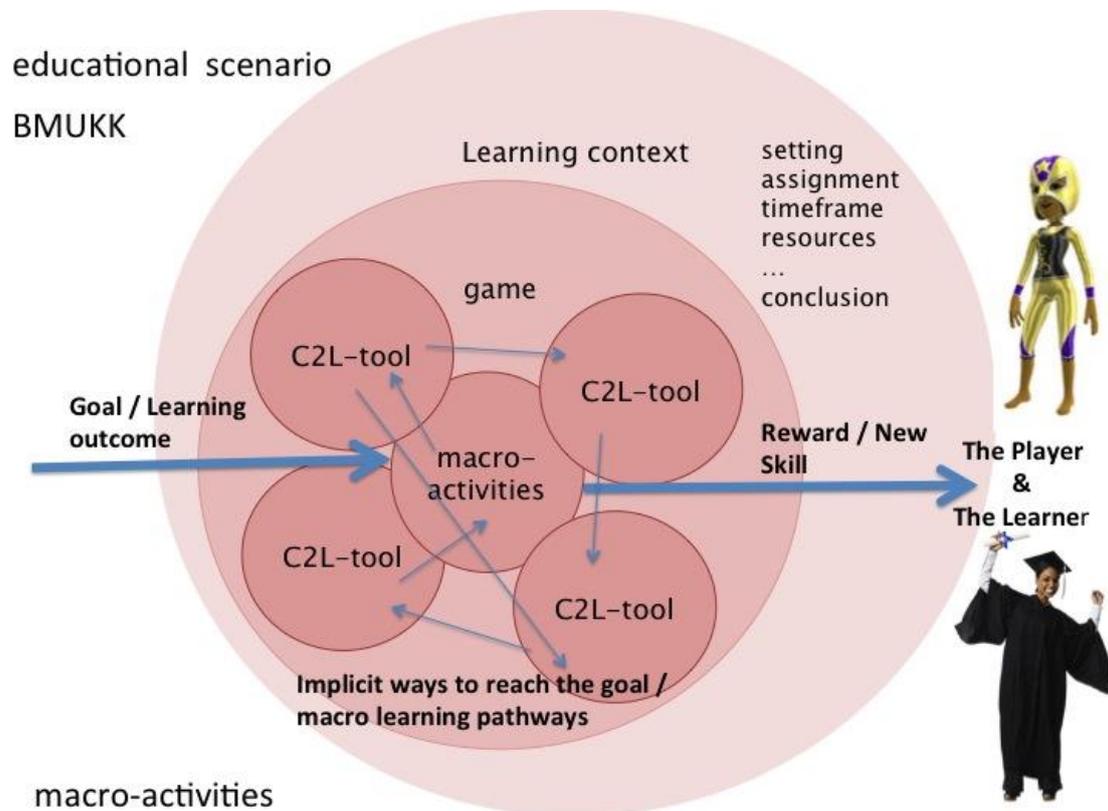


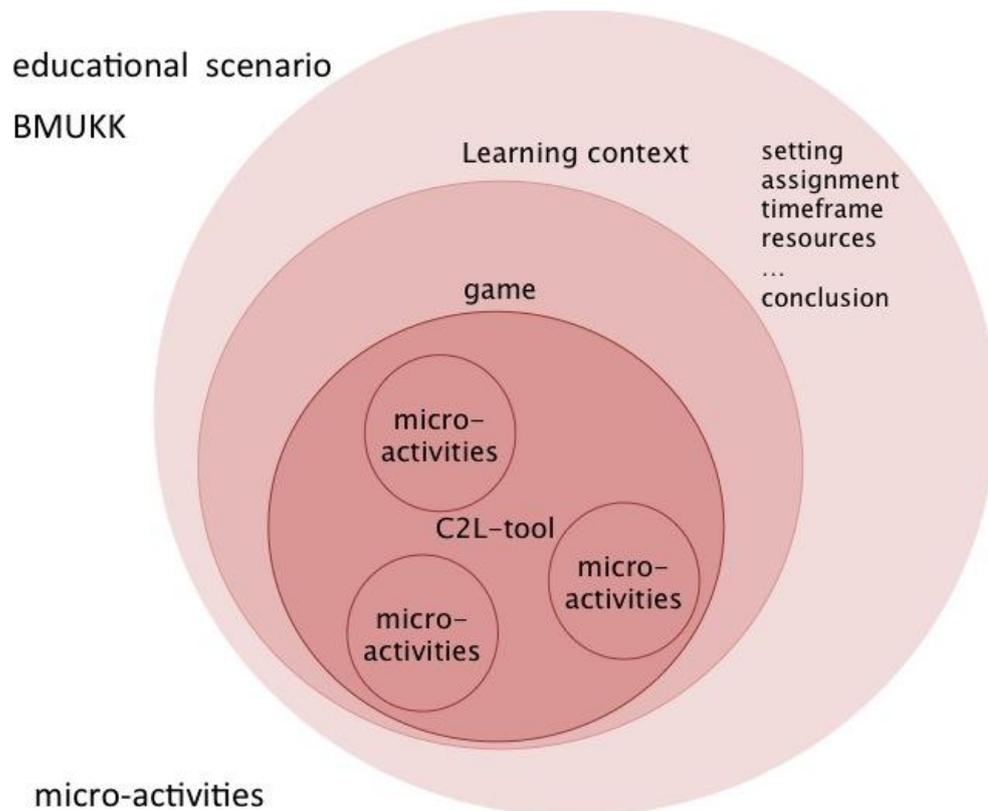
Figure 12: Equivalent aspects for learners and game-players within macro-activities

**Micro-activities** support students to engage into one specific C<sup>2</sup>Learn tool in different manners. Micro-activities can be orchestrated within one C<sup>2</sup>Learn tool for educational scenarios. The main value of micro-activities is to involve students into several activities within one specific C<sup>2</sup>Learn tool and, therefore, engage systematically into one kind of lateral thinking process. Furthermore, micro-activities can ensure that learners will work on broad range of e.g. topics, educational levels and explore one kind of C<sup>2</sup>Learn tool very intensively.

In that sense, micro-activities can be used so that students work:

- On different (educational) levels
- On different subject matters
- On different topics within one subject matter
- With different social-didactical forms.

Furthermore, micro-activities assembled within one C<sup>2</sup>Learn tool can fit to one or many concrete learning outcomes. Micro activities can be set up so that learners navigate towards a new skill or competence.



**Figure 13: A BMUKK version of the C<sup>2</sup>Learn educational scenario schematic focusing on micro-activities**

Micro-activities on different (educational) levels would support playful motivation. Students can gain experience points on one level of one tool. At one point the student has gained enough experience points so that s/he gets access to the next level.

Micro-activities on different subject matters would support cross-subject activities. Students can engage into different subject by using the same tool. Different results in terms of the subject matter could be compared to the similar output in regards to the used tool.

Micro-activities on different topics within one subject matter can ensure comparable results of different groups or individuals that have engaged into different topics. Students would use similar lateral thinking process but work on different topics. So teacher can generate a reflective mode of similar creativity process against the background of different topics.

Finally, micro-activities can be used to support learning with different social-didactical forms. Students can engage into the same topic and the same tool, but would be assembled in different social-didactical forms. One students would work alone, other students would work on groups of two

or three; students would be set up in gender-balanced and gender-unbalanced groups; students would be assembled to generate culturally heterogenic or homogenic groups.

Macro-activities and micro-activities can be combined within one educational scenario, so that the benefits of both kinds of activities can serve innovative teaching and learning.

Besides, the core discussion on how to set up educational scenarios, the visionary workshops have been used to raise the following questions and themes:

- What features of C<sup>2</sup>Learn tools would have practical value to teaching and learning?
- What kind of macro-activity can be developed and which game features would be necessary to implement these activities?
- What ICT facilities are provided by school?
- How should the C<sup>2</sup>Learn Game be developed, so that a broad range of school can use the game?
- What system requirement can be handled by ICT facilities of diverse schools?
- What curriculum concepts could be used to engage into C<sup>2</sup>Learn scenarios?
- Which activities associated with curriculum concepts could be developed?

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### 3.3.3 SCENARIOS

Two main playful contexts for educational scenarios were elaborated in the BMUKK workshops: The Teleporter and The Amusement Park.

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#### 3.3.3.1 PLAYFUL CONTEXT #1: THE TELEPORTER

The game is designed as a space environment with different planets. Starting point is the space mission on earth. At the beginning of the game every player can choose a personal avatar. This avatar will be equipped with basic skills that correspond with the real life skills of the learner. The existing knowledge or skills of the player can be assessed in the mission control e.g. by a supercomputer or a special character such as 'Obi Wan Kenobi' or a special 'Oracle' that grants the avatar a specific set of skills after complete a certain challenge.

Now, the player can start with their avatar via the teleport gate in the mission control centre and choose on which planet they want to travel. On this planet they find a certain tool (e.g. puzzle) that corresponds to a specific lateral thinking process and is filled with different subject-layers. Based on the subject syllabus or the learning pathway, students can choose their level layer and work on certain levels to navigate towards a certain reward / new skill. As a symbol for this new skill player can be gratified by e.g. gaining more energy for the Teleporter to travel to planets in a greater distance. Using the newly gained energy students can travel to another planet that offers a different tool that engage into advanced lateral thinking processes. Again, students would choose a subject-layer and will try to go through all the level to gain more energy and navigate towards a new skill. The travelling and 'skill-(l)earning' will go on until the last planet (tool) is reached. This last planet can function as end game and provide a recapitulatory challenge to test all skills. By completing this end game the player / learner will gain the last skill. His or her skill set is now complete and adds up to a specific

new competence. This competence may give the player / learner the energy to travel to a new galaxy and find her/himself in the mission control centre of a totally new species.

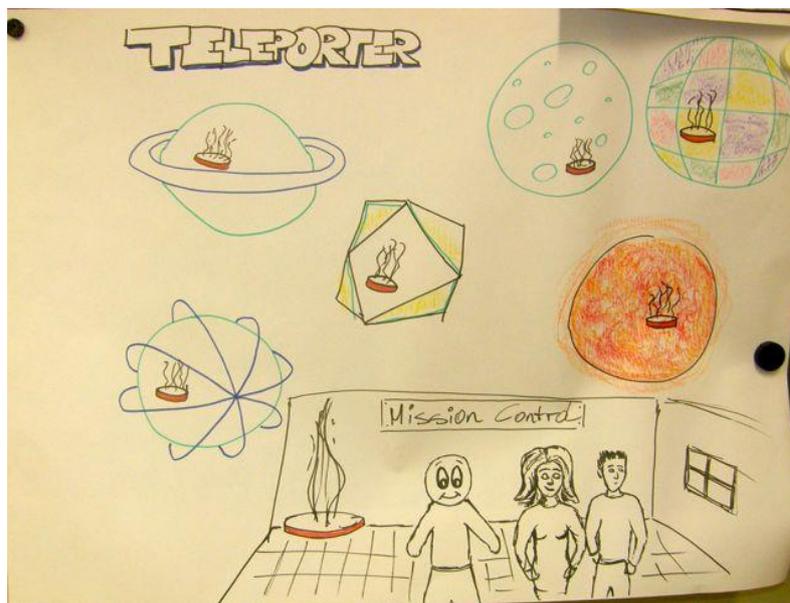


Figure 14: The Teleporter

Thus, game-based learning as captured in this scenario has the following important features.

**Skill-based learner management.** Individual avatars are equipped with basic skills. These skills should be based on the real skills (current learner state) and they should be shown as graphical tokens on the avatar (e.g. patches, wrist bands, buttons, medals, armour, etc.). Further, they should undergo constant change; e.g. gaining additional skills will change the skill set as well as the graphical tokens. Gaining new skills will be a prerequisite for advancing the avatar and advancing to a higher level or unlocking a new tool.

**'Level model' based on space & planet game design.** Each planet can host one specific tool. This tool works with one specific lateral thinking process but can be filled with different subject matters and different levels. The planet name represents the computational tool. The teacher or student can act as authors of levels in combination with subject-specific content.

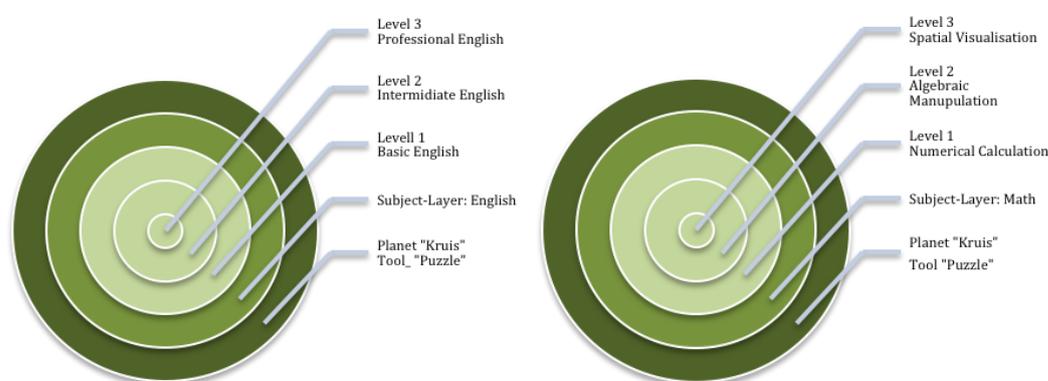


Figure 15: 'Level model' for the Teleporter playful context

In order to implement educational scenarios, each planet will be equipped with a different tool. The following tools could be installed at the planets:

Planet 1: Cloze: Especially useful if a basic knowledge is already existing, and that knowledge shall be deepened or expanded.

Planet 2: True or false questions: If a question is answered correctly, the player moves a level up – if the player is wrong, he/she either stays at the reached level and gets a second chance or even moves back to the level he/she has started. By this system existing knowledge will be deepened and new knowledge can be gained.

Planet 3: Word search: Various words are hidden in a ‘word field’ and need to be found. Can be combined with a crossword riddle.

Planet 4: RRTD-Engine: According to the project outlines so far, a RRTD-engine based on the ITM-method can be implemented on planet number 4.

Planet 5: Visualization: Words need to be matched with pictures; if a match is reached, the player can continue. This seems to be highly relevant for improvement of language skills.

Planet 6: Puzzle: Several aspects of a topic need to be brought together to generate a ‘big whole concept’ of something. If that is reached, the player can move up to the next level. This next level can vary according to the aspects the player has picked to create that concept.

The following is an example, of how this might work, in a specific scenario: several groups of space troopers travel to a planet. The aim is to find a hidden area of the planet to gain special energy for the teleporter. There are several main challenges

- Make the planet human-friendly, so that exploring can start (Chemistry & Biology)
- Talk to inhabitants and explore the different planet areas (levels), to find the hidden place with the special energy (French/German/Spanish/English)
- Solve the riddles at the hidden place to open the main gate
- Extract the special energy from the hidden area (Engineering)

The first group consists of chemistry experts. They need to add certain substances to the atmosphere in order to make the air breathable. Only after completing this task, the 2nd group can enter the soil of the planet. The second group consists of language experts. They need to learn the foreign language so that they can talk to the inhabitants. In that way they can explore the planet and find the hidden area. After finding the hidden place the third group takes centre stage. They consist of math experts and have to solve several complex mathematical riddles to open the main gate. The last group consists of engineers and they have to build a specific machine to extract the energy from the hidden place.

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### 3.3.3.2 PLAYFUL CONTEXT #2: THE AMUSEMENT PARK

The ‘Amusement Park’, inspired by the ‘Prater’ in Vienna, consists of various stations. These stations are ‘game attractions’ in the amusement park, each hosting a specific tool.



Figure 16: The Amusement Park

The following stations were elaborated.

**House of Mirrors.** The House of Mirrors provides a communication platform for students and teachers, a so called 'get together'. Here the players can check the progress of other players and also can self-assess their own advancement. The players have the opportunity to design an avatar and to equip it with characteristics and skills that make it easy to identify with. Different game levels will motivate students to advance. Furthermore this is the place for students to find game-partners. To gain knowledge the House of Mirrors offers some kind of encyclopaedia that will be used by learners to search for information about the respective topics.

**Ferris Wheel.** The Viennese Ferris Wheel corresponds to a buddy-system. In each cabin the learner finds a special topic, one teacher and 3 buddies. Players become buddies themselves after they have reached a certain number of points. When you are a buddy you can further advance and go to the next level.

**Merry-Go-Round.** This tool works with the method of 'trial an error'. The faster the player solves a problem the more 'points of happiness' he will earn: this will lead to an improvement of several skills.

**Labyrinth.** In the labyrinth the player can find a quiz that contains numerous questions and offers different answers for each question. Students can check their own knowledge and they also have the possibility to invite other students to play the game. Further this tool contains so-called 'info-icons', an instrument for switching back to the House of Mirrors to consult the encyclopaedia or to ask the buddies in the Ferris Wheel for help.

**Roller Coaster.** The Roller Coaster contains puzzles for certain topics. The more puzzles a learner is able to solve, the faster the roller coaster becomes and the player becomes more and more competent. Moreover the player may choose partners for collaboration: they all work together to solve the tasks.

**Tunnel of Horror.** This tool is some kind of final examination (=Exit Level). All tasks are equipped with a timeout function and have to be completed under a certain time pressure. Players have to handle all the topics, but there is always the possibility to return to other tools.

This game can be used to elaborate a specific topic or as an educational instrument to consolidate knowledge. For example it can be used by teachers to instruct students to solve several tasks in a certain timeframe.

Students walk through the Amusement Park and set their own pace. They choose topics according to their deficits and work (play!) in order to advance. Specific wording should be used in all components and activities to reflect the metaphor of the Amusement Park. The fun factor comes to the foreground; affirmative challenges motivate students as well as reward and positive feedback.

Teamwork is an integral part of most activities; therefore players have the possibility to choose their partners in the House of Mirrors. In the House of Mirrors students also can assess their previous knowledge. In accordance to the result of this 'starting-check' the game proposes an individualized learning pathway for each student. When students complete the proposed exercise, they get feedback on the result and a proposal for further learning steps.

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### 3.3.4 PRELIMINARY DOCUMENTATION OF USER NEEDS AND EXPECTATIONS FROM C<sup>2</sup>LEARN

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#### 3.3.4.1 PRELIMINARY USER REQUIREMENTS

Finding one set of user requirements to fit all age classes the game is aimed at seems to be difficult as different school children (and young adults) have different requirements. The following general requirements apply across contexts and user groups:

##### Easy to use

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This includes great usability and graphic design of the C<sup>2</sup>Learn game. Further, no special technical skills should be required.

##### Programmed in a logical picture-supported way

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This is important so that children in younger target group and for children with a migration background, who do not bring in the requested language skills, will also reach learning progress

##### Accessible to users with disabilities

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Eventually the C<sup>2</sup>Learn digital environment should become useable by children with disabilities. For example, language output for the blind or easy control by a joystick for motoric disadvantaged).

##### Designed to decrease technical barriers to adoption

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The C<sup>2</sup>Learn digital environment should have low system requirements and should not use too much bandwidth. It should run on various platforms (Windows, Mac, open source) as well as on computers up to date back to computers being a maximum of five years old.

### Web-based application preferable

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It seems to be most useful to generate the browser-based application rather than a program that needs to be installed on computers. This has the added advantage that it can be continued at home computers (in terms of homework as well as voluntary deepening of knowledge).

### Mobile application desirable

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If there is a mobile version, the game can be played on mobile devices (smart phones) and the teacher are not dependent on school equipment only.

### End-user authoring

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There should be easy authoring and co-creation tools for teachers AND students.

### Generic C<sup>2</sup>Learn tools

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C<sup>2</sup>Learn Tools should be generic and easily adaptable to carrying varied subject matter content.

### Options for teacher intervention in the game

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The aspect of teachers influencing the progress of the players is an interesting and exciting as well as a challenging one for the reason of separating assistance and support on one side, as well as supervision and control on the other side. Finding the balance between those two sides will be crucial to make the game a success. One option how this situation can be reached is the programming of an 'emergency button' for players that bring support to life (for example in form of a holographic avatar of the teacher providing help). It has to be ensured by the programmers that this option has the function of a 'joker' and is only available for limited use. At a specific time in the week students should have the opportunity to chat with their teachers in order to ask questions. Each teacher is available in the chat at a specific time per week. Another possibility would be a forum where students can deposit their questions and receive answers within 24 hours. This fosters self-reliance and self-responsibility for the own learning progress. Students will build capacities and competences they need in their future life

### High institutional support

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The adoption of the C<sup>2</sup>Learn innovation will depend greatly on institutional support such as training for teachers, ICT capacity building in schools with very little ICT facilities, etc.

## 4 Conclusion and future directions

In this first version of the D5.1 deliverable, we present preliminary scenarios and requirements about the C<sup>2</sup>Learn digital environment gathered in the context of initiating the development of prospective C<sup>2</sup>Learn end-user communities in Greece, UK and Austria, and collected using a range of methodologies, from co-participative work with students and teachers, to collaboration with teachers, to consulting with teachers and other potential users/experts.

The common structure that informed the work of all three teams was the broad framework of an educational scenario, as presented in the introduction. The framework was used as a starting point and was elaborated to encompass different elements in the work of each team. Taking into account the input from the work with three different teams – as reported in this deliverable – future versions will develop a unified representation for educational scenarios that is appropriate to the game-based approach of C<sup>2</sup>Learn, making sure that we strike a balance between capturing scenarios at the desired level of detail in a common standard format and avoiding overproceduralizing and overformalizing. The goal is to have a framework that is simple, easy to use, transparent, and allows for adaptation and variation, so that the researchers in collaboration with the user communities can capture all aspects that they consider important. A combination of scenario narrative, standard elements to be included and suggestions for dimensions to be considered will probably serve this purpose.

A great variety of scenario ideas were collected. This may appear overwhelming at first glance. However, in closer reading, there are common themes (e.g. the geography theme in EA is congruent with the environment theme in OU) and expectations (e.g. players obtaining evolving roles and identities within the game) across the different scenarios, which can be used to inform the direction of the C<sup>2</sup>Learn environment design. It should be noted, further, that a central requirement for the C<sup>2</sup>Learn environment from its inception, is the capacity to accommodate different scenarios, within constraints, of course.

These constraints were not yet in place in this iteration of developing scenarios with end users, because in the course of the project, the work reported here precedes all theoretical, pedagogical and game-design reports. Thus, this first iteration was completely bottom-up, which presented a major challenge for the co-design process, creating a very open-ended situation. We viewed this as an opportunity to opt for an approach that captures a wide range of potentially meaningful directions, aiming not to be prematurely prescriptive.

In all three sites, game-based learning served as an attractive and accessible entry point for engaging end user communities. Moreover, the absence of a C<sup>2</sup>Learn game scenario in this phase created a vacuum which allowed less discussion of other aspects of the educational scenarios in the wider context of fostering co-creativity in learning processes. As a result, the *game* dimension of the scenarios is more pronounced than the *learning activities* dimension or the *educational context* dimension. Thus, the work reported here is illustrative of the participants' expectations primarily about learning games, and educational scenarios are often conflated with game scenarios. In subsequent iterations, when the C<sup>2</sup>Learn game concept will be in place, we intend to emphasize the broader framework, seeking more comprehensive educational scenarios, along all the above dimensions, and specifying their interface with the C<sup>2</sup>Learn game scenario.

As the articulation of the C<sup>2</sup>Learn theoretical and pedagogical framework is currently in progress, the creativity dimension was present in varying degrees in our work with end-user communities across the three different sites. The Wise Humanising Creativity (WHC) framework was central to shaping the

workshops of the OU team. In EA and BMUKK the approach was initially a-theoretical and creativity concepts (e.g. the 4 Ps, Possibility Thinking) were gradually introduced toward the end of the process. Most notably, scenarios at this early stage (month 6 of the project) are not yet informed by concepts and techniques from the Creative Emotional Reasoning (CER) framework. Elaborating scenarios along the creativity dimension, in accordance to the overall C<sup>2</sup>Learn frameworks of learning design and game design, is a top priority in their next iteration.

Thus, the scenario ideas presented here will serve different purposes in the coming months of the project:

- As a source of information and inspiration of the design of the C<sup>2</sup>Learn game and computational tools, as they reflect user expectation with respect to game-based learning and illustrate a range of possible directions that are meaningful to users.
- As possible contexts for grounding the C<sup>2</sup>Learn theoretical and pedagogical approach on creativity and exploring their implications for game and tool design, thus developing a common understanding and a common language within the C<sup>2</sup>Learn project. We envision, for example, a design session where three or four scenarios are jointly revised and elaborated to encompass learning opportunities that foster creativity in the form of game elements, computational tools and micro-activities.
- As a basis for arriving at candidate scenarios for development within C<sup>2</sup>Learn, through selection and synthesis, based on (1) the game designer teams' assessment on what scenarios can lead to promising games, (2) the theoretical expert teams' assessment on what scenarios present the best contexts for fostering creativity, and (3) last but not least, the assessment of end user communities in all prospective sites of application about the appropriateness of these scenarios with respect to curricular content and contextual constraints. To this end, the user groups will continue to be active and to expand to include wider age groups (particularly more young adults) during the next piloting phase (see below).

Thus, we expect a more limited set of scenarios to be elaborated, with respect to defining content and orchestrating the learning activity, and specifying the desired features of the digital environment and tools in the context of the overall project aim to foster co-creativity in learning processes, as well as eliciting adequate information across sites about contextual parameters.

With respect to user requirements, the statements recorded in the requirements section for each research site are the result of the first iteration of consulting with the users. These statements need to be further integrated with the C<sup>2</sup>Learn vision, they need to be prioritized both with uses and with the development teams, and they need to be examined in connection with the C<sup>2</sup>Learn game and tools designs as they develop. Thus, rather than trying to decide arbitrarily what the common requirements appear to be, we intend to build upon the groundwork laid here, in order to elicit feedback from the designer teams and from end users on defining and prioritizing the main parameters and questions along which common requirements will be finalized. This will be accomplished more usefully by inquiring about the statements gathered in this iteration in the context of initial designs about the C<sup>2</sup>Learn game and tools as they become available in the coming months.

Finally, with respect to end-user communities, the majority of the users engaged in this phase represented the formal learning context of schools for the 10-18 age range. In the next iterations of our work, we intend to extend both the context (exploring the potential for C<sup>2</sup>Learn for informal learning outside school), and the age range to post-school age young adults. For this purpose, all three partners are considering options in their respective sites.

This deliverable captures a great wealth of ideas and information about the expectations of end users, which constitute indispensable input for the development teams without being prescriptive. The NCSR-D team has already used EA's scenario seeds in their design thinking about the C<sup>2</sup>Learn computational tools, and we expect that the more comprehensive set of scenarios and requirements here, however preliminary, will be put to full use by all technical partners.

In subsequent work, as the theoretical and pedagogical framework as well as major parameters of the technological environment are in place, we will focus, together with our user communities, on elaborating scenarios and requirements that are more specific to their constraints. The second iteration of this document will be informed specifically by the Creative Emotional Reasoning framework (deliverable D2.1.1, month 6) the C<sup>2</sup>Learn Learning Design framework (deliverable D2.2.1, month 9), and the Game Design document (deliverable D4.1.1, month 9).

## References

- Carroll J.M. (2000), Five reasons for scenario-based design, *Interacting with Computers* 13, 43-60.
- Cooper B. and Brna (2000), Classroom Conundrums: The Use of a Participant Design Methodology, *Educational Technology & Society* 3(4).
- Gee, J. P. (2007). What video games have to teach us about learning and literacy. New York, Palgrave Macmillan.
- Mor, Y. (2011). Design narratives: an intuitive scientific form for capturing design knowledge in education. In: Sixth Chais Conference on Instructional Technologies Research: Learning in the Technological Era, 17 Feb 2011, Raanana, Israel.
- Mor, Yishay (2013), SNaP! Re-using, sharing and communicating designs and design knowledge using scenarios, narratives and patterns, to appear in R. Luckin, P. Goodyear, B. Grabowski, and N.Winters, (eds.) *Handbook of Design in Educational Technology*. London, Routledge.
- Quinn C.N. (2005), *Engaging Learning*. San Francisco, Pfeiffer.
- Rosenberg K. (2013) Problems in education, as solved by James Paul Gee, on-line at the 'Motivate. Play.' website (<http://www.motivateplay.com/2012/04/problems-in-education/> Posted by on Apr 16, 2012, Accessed on Apr 20, 2013)
- Rosson M.B. and Carroll J.M. (2002), *Usability Engineering. Scenario-based Development of Human-Computer Interaction*, San Francisco, Morgan Kaufman Publishers.
- Scaife M. and Rogers Y. (1999), Kids as Informants: Telling us what we didn't know or confirming what we knew already?, in Alison Druin (ed), *The Design of Children's Technology*, San Francisco, Morgan Kaufmann Publishers.

## Appendices

APPENDIX 1: C<sup>2</sup>LEARN BOOKLETS FOR EA'S CUMULATIVE VISIONARY WORKSHOP



Συνάντηση Εργασίας

Ελληνογερμανική Αγωγή, Παλλήνη, 27 Μαρτίου 2013

**Α' Μέρος: Διερευνητική συζήτηση**

Καταγραφή σκέψεων

Το όνομά σας: \_\_\_\_\_

Παρακαλούμε σημειώστε στο έντυπο αυτό τις σκέψεις και απόψεις σας σχετικά με τα θέματα που θα συζητήσουμε σήμερα. Το έντυπο είναι διαρθρωμένο σύμφωνα με το πρόγραμμα της συνάντησης.

Παρακαλούμε επιστρέψτε μας το έντυπο με τις σημειώσεις σας πριν αποχωρήσετε από τη συνάντηση εργασίας.

Σας ευχαριστούμε για τη συνεργασία και την πολύτιμη βοήθειά σας!

**Δομημένη διερεύνηση ιδεών**

✓ Ευκαιρίες και προκλήσεις

| παίζοντας ψηφιακά στην τυπική μάθηση |            |
|--------------------------------------|------------|
| ευκαιρίες                            | προκλήσεις |
| 1.                                   | 1.         |
| 2.                                   | 2.         |
| 3.                                   | 3.         |

| παίζοντας ψηφιακά στην άτυπη μάθηση |            |
|-------------------------------------|------------|
| ευκαιρίες                           | προκλήσεις |
| 1.                                  | 1.         |
| 2.                                  | 2.         |
| 3.                                  | 3.         |

| παίζοντας ψηφιακά μεταξύ τυπικής και άτυπης μάθησης |            |
|-----------------------------------------------------|------------|
| ευκαιρίες                                           | προκλήσεις |
| 1.                                                  | 1.         |
| 2.                                                  | 2.         |
| 3.                                                  | 3.         |

- ✓ Τι κάνει ένα ψηφιακό εκπαιδευτικό παιχνίδι επιτυχημένο;
- ✓ Ψηφιακό περιβάλλον στο σχολικό περιβάλλον

| καλή σχεδίαση ψηφιακού εκπαιδευτικού παιχνιδιού |        |
|-------------------------------------------------|--------|
| DO                                              | DO NOT |
| 1.                                              | 1.     |
| 2.                                              | 2.     |
| 3.                                              | 3.     |

| ψηφιακά περιβάλλοντα κατάλληλα για σχολική χρήση |        |
|--------------------------------------------------|--------|
| DO                                               | DO NOT |
| 1.                                               | 1.     |
| 2.                                               | 2.     |
| 3.                                               | 3.     |

| τεχνολογικές επιλογές για το σχολικό περιβάλλον τα επόμενα 2-5 χρόνια |
|-----------------------------------------------------------------------|
|-----------------------------------------------------------------------|

✓ *Power to the people?*

| ανοικτοί κόσμοι κατασκευής και περιπέτειας στο σχολείο (sandbox games) |                   |
|------------------------------------------------------------------------|-------------------|
| δυνατότητες                                                            | πιθανά προβλήματα |
| 1.                                                                     | 1.                |
| 2.                                                                     | 2.                |
| 3.                                                                     | 3.                |

| εργαλεία τροποποίησης του παιγνιδιού και συγγραφής περιεχομένου από εκπαιδευτικούς (end user game authoring) |                   |
|--------------------------------------------------------------------------------------------------------------|-------------------|
| δυνατότητες                                                                                                  | πιθανά προβλήματα |
| 1.                                                                                                           | 1.                |
| 2.                                                                                                           | 2.                |
| 3.                                                                                                           | 3.                |

| εργαλεία τροποποίησης του παιχνιδιού και συγγραφής περιεχομένου από <b>μαθητές</b> (end user game authoring) |                   |
|--------------------------------------------------------------------------------------------------------------|-------------------|
| δυνατότητες                                                                                                  | πιθανά προβλήματα |
| 1.                                                                                                           | 1.                |
| 2.                                                                                                           | 2.                |
| 3.                                                                                                           | 3.                |

✓ Καλλιεργώντας τη δημιουργικότητα με ψηφιακά παιχνίδια

| ψηφιακό παιχνίδι και δημιουργικότητα                                     |                                                                     |
|--------------------------------------------------------------------------|---------------------------------------------------------------------|
| στοιχεία παιχνιδιού που μπορούν να <b>ενθαρρύνουν</b> τη δημιουργικότητα | στοιχεία παιχνιδιού που ίσως <b>αποθαρρύνουν</b> τη δημιουργικότητα |
| 1.                                                                       | 1.                                                                  |
| 2.                                                                       | 2.                                                                  |
| 3.                                                                       | 3.                                                                  |

ο παίκτης είναι δημιουργικός όταν...

ο μαθητής είναι δημιουργικός όταν...

ο δάσκαλος είναι δημιουργικός όταν...

το ψηφιακό παιχνίδι ως ευκαιρία για καλλιέργεια της δημιουργικότητας

ιδέες, σχόλια και παρατηρήσεις που δε χώρεσαν παραπάνω



## Συνάντηση Εργασίας

Ελληνογερμανική Αγωγή, Παλλήνη, 27 Μαρτίου 2013

### Β' Μέρος: Συνεργασία με εκπαιδευτικούς

#### Καταγραφή σκέψεων

Το όνομά σας: \_\_\_\_\_

Παρακαλούμε σημειώστε στο έντυπο αυτό τις σκέψεις και απόψεις σας σχετικά με τα θέματα που θα συζητήσουμε σήμερα. Το έντυπο είναι διαρθρωμένο σύμφωνα με το πρόγραμμα της συνάντησης.

Παρακαλούμε επιστρέψτε μας το έντυπο με τις σημειώσεις σας πριν αποχωρήσετε από τη συνάντηση εργασίας.

Σας ευχαριστούμε για τη συνεργασία και την πολύτιμη βοήθειά σας!

## Καταιγισμός ιδεών (brainstorming)

✓ Δημιουργικές σκέψεις για τη δημιουργικότητα

Για μένα δημιουργικότητα στη μάθηση σημαίνει...

**Πιθανότητες:** σκέφτομαι πιθανότητες και ενδεχόμενα, θέτω τις κατάλληλες ερωτήσεις, περνώντας από «αυτό που είναι» σε «αυτό που θα μπορούσε να είναι»:

«Τι θα γινόταν αν...;»

«Σαν να ήμουν/ήσουν/ήταν...»

Για να βοηθήσω τους μαθητές μου να σκεφτούν πιθανότητες και ενδεχόμενα, θα μπορούσα να...

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

**Συνεργασία:** Συμμετέχω στην ομάδα, δρω, κάνω να ακουστεί η φωνή μου, κάνω τον εαυτό μου ορατό στους άλλους με τους δικούς μου όρους, δρω ως παράγοντας αλλαγής

Για να μπορούν οι μαθητές μου στην τάξη να κάνουν τον εαυτό τους ορατό στους άλλους με τους δικούς τους όρους, θα μπορούσα να...

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

**Πολλαπλότητα:** Πειραματίζομαι με πολλαπλούς χώρους, δραστηριότητες, ταυτότητες, ανθρώπους...

Για να βοηθήσω τους μαθητές μου να βιώσουν την εμπειρία της πολλαπλότητας, θα μπορούσα να...

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

**Παιγνιώδης διάθεση:** Δημιουργώ και αυτό-δημιουργούμαι, ενεργά και μαζί με άλλους, στον συναισθηματικά πλούσιο χώρο των παιχνιδιών, των κοινωνικών δικτύων και της παραγωγής περιεχομένου από μένα τον ίδιο

Για να αξιοποιήσω την παιγνιώδη διάθεση των μαθητών μου (και τη δική μου!) με τρόπο που θα τους βοηθήσει να μάθουν, θα μπορούσα να...

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

**Ηθική δημιουργικότητα, «με νου και ανθρωπιά»<sup>10</sup>:** Δημιουργώ και συν-δημιουργώ με κατανόηση και συναίσθηση της θέσης του άλλου, με υπευθυνότητα απέναντι στον εαυτό μου και στο σύνολο, με σεβασμό σε κοινές αξίες, με σκέψη για τις συνέπειες της δημιουργικότητας και της αλλαγής. Αποδέχομαι την από κοινού κτήση του αποτελέσματος της συλλογικής δουλειάς, αναλαμβάνω συναισθηματικό «ρίσκο» και διαπραγματεύομαι την αντιπαράθεση και τη διαφορά...

Για να βοηθήσω τους μαθητές μου να συνειδητοποιήσουν τις ηθικές και ανθρώπινες διαστάσεις τη δημιουργικότητας, θα μπορούσα να...

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

Αν ήθελα να κάνω το μάθημά μου πιο δημιουργικό θα...

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

---

<sup>10</sup> «...με λογισμό και μ' όνειρο...»

Αν κρατούσα μία μόνο σκέψη από τη συζήτηση για τη δημιουργικότητα στη μάθηση, αυτή θα ήταν...

#### Πρακτική διερεύνηση δυνατοτήτων

✓ Υπολογιστικά εργαλεία και δημιουργικότητα: Τι θα μπορούσα να κάνω στην τάξη μου;

Οι σημειώσεις μου

**Συνεργατικός εκπαιδευτικός σχεδιασμός****✓ Δουλεύοντας με σενάρια – Σε ομάδες!**

Αν το εκπαιδευτικό παιχνίδι είναι η λύση, ποιο είναι το πρόβλημα;

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

Ποιο σενάριο σας έτυχε στον κλήρο;

**η ζωή που θέλουμε... ο κόσμος που θέλουμε ...**

Οι παίκτες αποφασίζουν να κάνουν αλλαγές στο περιβάλλον και στη ζωή τους. Αυτό έχει συνέπειες: (1) για τη συνολική κατάσταση του κόσμου και (2) για τη δική τους ποιότητα ζωής. Υπάρχουν περιοχές στο παιχνίδι με διαφορετικά χαρακτηριστικά και διαφορετικές αποφάσεις: π.χ. περιβάλλον, έρευνα, καθημερινή ζωή...

**γενετική μηχανική**

Ένας μηχανικός γενετιστής θέλει να δημιουργήσει ένα γενετικά τροποποιημένο τρόφιμο (π.χ. μήλα με γεύση κανέλας). Το παιχνίδι περιέχει πειράματα γενετικής μηχανικής. Περιέχει επίσης κινδύνους της γενετικής μηχανικής και κοινωνικές αντιδράσεις που θέτουν διλήμματα...

**διαστημική αποστολή**

Οι παίκτες αναλαμβάνουν διάφορους ρόλους και συνεργάζονται για να οργανώσουν επιτυχημένες διαστημικές αποστολές. Μερικοί είναι αστροναύτες. Άλλοι δουλεύουν στην αίθουσα ελέγχου και καθοδηγούν την αποστολή. Ανατίθενται διάφορες αποστολές, που περιλαμβάνουν, μεταξύ άλλων, και τη μελέτη αστρονομικών εννοιών ...

**εξέλιξη**

Κάθε νέος παίκτης αρχίζει το παιχνίδι σε ένα καινούργιο πλανητικό σύστημα ως βακτήριο που ταξιδεύει σε ένα μετεωρίτη. Διαλέγει έναν πλανήτη για να εγκατασταθεί και αν υπάρχουν οι κατάλληλες συνθήκες εξελίσσεται...

**παράλληλη πραγματικότητα στο σχολείο**

Οι παίκτες είναι μέλη ομάδων που πρέπει να λύσουν διάφορους γρίφους, προβλήματα ή

ηθικά διλήμματα, που συνδέονται με διάφορα αντικείμενα ή σημεία του σχολικού χώρου. Για να λύσουν τα προβλήματα πρέπει να επισκεφθούν, π.χ., τη βιβλιοθήκη, τον κήπο, κλπ., και να μαζέψουν στοιχεία.

**γεωγραφία του πολιτισμού**

Οι παίκτες επισκέπτονται διάφορες χώρες. Για να συνεχίσουν το ταξίδι τους, πρέπει να λύσουν γρίφους που συνδέονται με ιδέες, ανακαλύψεις και πολιτιστικά επιτεύγματα που έχουν την αφετηρία τους στη συγκεκριμένη χώρα.

**τι θα γινόταν αν...; (1)**

Αρχίζοντας από ένα γεγονός που συνέβη στην πραγματικότητα, π.χ. ένα ιστορικό γεγονός, μια φυσική καταστροφή ή μια είδηση, οι παίκτες προσπαθούν να αλλάξουν διάφορα επιμέρους στοιχεία, ώστε το αποτέλεσμα να είναι διαφορετικό.

**τι θα γινόταν αν... (2)**

Ένας κόσμος, όπου μια βασική παράμετρος που θεωρούμε δεδομένη, λείπει ή έχει αλλάξει, και η ζωή πρέπει να οργανωθεί με βάση αυτή τη νέα πραγματικότητα: π.χ. πώς θα ήταν η ζωή αν η γη δεν ήταν 70% νερό;

**από τη μυθολογία στο παιχνίδι**

Ένα παιχνίδι που έχει ως έμπνευση τη μυθολογία, πχ. το μύθο του Θησέα και του Μινώταυρου στο Λαβύρινθο. Χρησιμοποιεί τη δομή του μύθου (ο ήρωας, ο αντι-ήρωας, τα εμπόδια, κλπ.), ή ιδέες για το χώρο, όπως ο Λαβύρινθος, ή μεταφέρει το μύθο στο σήμερα ή σε ένα φανταστικό κόσμο.

**επιβίωση και διάσωση**

Οι παίκτες χωρίζονται σε δύο ομάδες: Η μία ομάδα βρίσκεται χαμένη κάπου και πρέπει να επιβιώσει στον καινούργιο, άγνωστο κόσμο. Η δεύτερη ομάδα αναλαμβάνει την αποστολή να βρει την πρώτη ομάδα και να τη διασώσει.

**κατασκευή κόσμου**

Οι παίκτες κατασκευάζουν έναν κόσμο / μια περιοχή από το μηδέν. Αρχίζουν από τη γεωμορφολογία και το κλίμα, συνεχίζοντας με τη χλωρίδα και την πανίδα κλπ., φτάνοντας ως την ανθρώπινη δραστηριότητα. Για να το κάνουν αυτό επιτυχώς, οι παίκτες παίρνουν κρίσιμες αποφάσεις. Πού θα τοποθετηθεί το κάθε τι και γιατί; Ποιες θα είναι οι συνέπειες;

**ταξίδι**

Οι παίκτες σχεδιάζουν και πραγματοποιούν ένα ταξίδι, αντιμετωπίζοντας προκλήσεις, που απαιτούν κριτική σκέψη για τα δεδομένα της περιοχής, του προγράμματος, της μετακίνησης, κλπ. Η επιτυχία δημιουργεί προϋποθέσεις για τη συνέχεια του ταξιδιού, ή για το επόμενο ταξίδι.

**διαχείριση περιοχών**

Οι παίκτες αναλαμβάνουν διάφορες γεωγραφικές περιοχές και προσπαθούν να τις αναπτύξουν με ισορροπημένο τρόπο, παίρνοντας τις κατάλληλες αποφάσεις και λαμβάνοντας υπόψη τις συναρτήσεις των διαφόρων παραμέτρων (γεωγραφικών, κοινωνικών, οικονομικών, κλπ.).

Οι έννοιες της δημιουργικότητας που συζητήσαμε (πιθανότητες, συνεργασία, πολλαπλότητα, παιγνιώδης διάθεση, ηθική), με οδηγούν να σκεφτώ ότι αυτό το σενάριο θα μπορούσε να εξελιχθεί ή να συμπληρωθεί ως εξής:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

Τα υπολογιστικά εργαλεία για τη δημιουργική σκέψη που συζητήσαμε, θα μπορούσαν να αξιοποιηθούν σε αυτό το σενάριο ως εξής:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

Αν έπρεπε αύριο να μπω στην τάξη και να δουλέψω με αυτό το σενάριο, θα χρειαζόμουν τα εξής (υλικά, πηγές, χρόνο, υποδομή...):

Αν έπρεπε αύριο να μπω στην τάξη και να δουλέψω με αυτό το σενάριο, θα οργάνωνα τους μαθητές μου ως εξής (σκεφτείτε και τις έννοιες «συνεργασία» και «ανταγωνισμός»):

Αν έπρεπε αύριο να μπω στην τάξη και να δουλέψω με αυτό το σενάριο, θα παρουσίαζα και θα διαχειριζόμουν τη δραστηριότητα ως εξής:

Ιδέες, σχόλια και παρατηρήσεις που δε χώρεσαν παραπάνω

## APPENDIX 2: OU'S WORKSHOP PLANS

### C<sup>2</sup>Learn Workshop 1

#### Workshop 1: Exploring Gameplay

- *familiarise teachers and students with the project (and get them really excited!)*
- *reflect on the experience of playing the serious games (using the questions)*
- *reflect on some of the readings*
- *reflect on participants' prior experience with digital games*
- *consider four theories or terms in relation to creative quiet revolutions:*
  1. *Dialogue*
  2. *Control/authority*
  3. *Ethics and impact*
  4. *Engaged Action (immersion)*

#### 8.40 – 9.00 Warm up, flattening hierarchies and project intro (C) Camera

Create a circle: Letter of alphabet starting first name then each person go round circle and introduce the person next to them and one thing they know about them; then go round again and offer 2 words to describe how you're feeling about this workshop

Taking your gaming temperature - move near the centre of the room if you think you game a lot, stay near the edge if you game a little bit, spend 30 seconds (take it in turns, one then the other) talking to the person nearest to you about the game you played most recently and one thing you learned in the game last time you played it

Your games; our game – each pair share their games and learning with the group; OU team share ideas about their project and current learning within it; and the plans for the 3 sessions this term

#### 9.00 – 9.15 What do people say about gaming and education? (A) gaming slips, camera

In groups of 3 (try to work with someone you don't usually work with) look at the gaming statement slips of paper and rank them in order of how much you agree with them. Put those that you most agree with at top of your table and those that you agree with least at the bottom

Share your top 3 most agreed with, with the other groups AS WELL AS where you have ranked the pink statement about gaming and creativity. Discuss as whole group.

#### 9.15 – 9.35 your games and co-creativity (C) Access to internet/computer + question sheets, big pens/paper....In groups of 3 Questions:

1. How do you play with other gamers (online, in front of the TV, via Bluetooth, etc)?
2. Do you ask other gamers for help in playing games? (Do you go to other sources -- *YouTube, game sites, game magazines, etc.*- for help in playing games?)
3. What do the games you play enable you to do in terms of being creative / doing things that are new?
4. How does what you are able to play in **this serious game** compare with what you play in other games in terms of working with other game players?

#### 9.35 – 10.00 Serious games and wise humanising co-creativity (A) Access to internet, Post its, pens

In pairs think about the game that you played in preparation for today.

Together (always write the name of your game on the top of each post-it note):

- What is good about this game? YELLOW
- What does the game allow you to do that is new/creative? How? GREEN
- What is not good about the game and what would you want to change? ORANGE
- How does it make you feel to play this game (why)? PINK

Debrief...

Now think about questions 7 and 8 from the Ethics and Impact section of the preworkshop activities questions. Discuss (use A4 sheets??)

- (qn 7) What dilemmas did this game pose for you?
- (qn 8) Did any of your own actions surprise you?

Debrief – focus on WISE CREATIVITY – creativity with an impact... CO-CREATIVITY creating with others including teachers, students and us

#### **10.00 – 10.15 Introduction to blog + what to use it for, preparation for next time (C)**

- **games literacy/capital** digital survey is in blog

#### **10.15 – 10.30 Blue Sky Wrap up (C, A) post its, Aspire axes**

Stand in a circle: *what elements are you keen to see embedded in a serious game?*

Use POST ITS then go around the room? Possibly use Aspire Axes?

## C<sup>2</sup>Learn Workshop 2

### Workshop 2: Co-Creativity in Game Scenarios

This workshop was led by C<sup>2</sup>Learn researchers in the two primary sites and by teachers in the two secondary schools. Its goals were to enable students and staff to:

- Reflect on the experience of playing the serious games
- Consider and draw on the four key aspects of creative quiet revolutions (this extends work undertaken in workshop 1):
  1. Dialogue
  2. Control/authority
  3. Ethics and impact
  4. Engaged Action (immersion)
- Consider possible qualities of scenarios in which the C<sup>2</sup>Learn game might engage players, from perspective of potential for wise humanizing creativity
- Start developing concrete scenario ideas for workshop 3.

#### 20 mins Warm up, flattening hierarchies and catch-up Camera

Make connections: move around the space sharing ONE WORD to describe how you're feeling about C<sup>2</sup>Learn; pair with someone who has similar word to yours and explain to each other....

Find the gaps: Do it again and this time pair with someone who has a different word.... Discuss these and introduce each other explaining other's word and a QUESTION that occurs to you in relation to it

Taking your gaming temperature – a version of last time's game but one by one with games we have shared with them – reaction to games in terms of CO-CREATIVITY – positive to negative and talk these through a bit

TODAY –OU team share ideas about co-creativity in C<sup>2</sup>Learn, what we are learning so far in it; and the plans for next 2 sessions

**Teacher to make Curriculum connections from here onwards - documenting curriculum and pedagogy connections across the workshop**

#### 20 mins Quiet Revolutions in Wise Humanising Creativity Access to internet/computer + question sheets, big pens/paper....In groups of 3

With a focus on one of the serious games research team has shared with participants the four key aspects of quiet revolutions are further considered. TASK: In 3s, find examples of each of these in Stop Disasters or Rizk or McDonalds or other serious games you play. If you can't think of examples how would you change the game to include that element?

Work through each of the 4 with facilitator leading progress [may need whole group explanation of what the key aspects are; the following notes in italics may help].

1. *Dialogue (green post-its) – when were you interacting with someone else/something else? Who made decisions – you or them/it? How else could you have interacted with someone/something inside or outside the game?*
2. *Control/authority (yellow post-its) – when were you in control? When you weren't in control who was?*
3. *Ethics and impact (orange post-its) – what difficult choices did you struggle with? Did the results of any of your actions surprise you? When were you being creative?*

4. *Engaged Action (immersion) – (pink post-its) – did you get lost in playing the game? Did you come up with your own ideas*

You may want to put these into your own words. What does each term mean to your group? Do you want to rename it? Can you think of a better way of putting it?

**30 mins SCENARIOS FOR THE C<sup>2</sup>LEARN GAME** Post its, big paper, pens

**Focus on integrating quiet revolutions into possible scenarios for the C<sup>2</sup>Learn game.** In threes work with COMPONENTS of co-creativity scenarios – generate characteristics / example activities. Choose from these two themes:

ENVIRONMENT

EQUALITY

Step 1. In pairs:

What environmental issues are you aware of in your day to day life? What are you aware of outside of the UK? Write down your ideas on yellow post-it notes.

OR

What equality/fairness issues are you aware of in your day to day life? What are you aware of outside of the UK? Write down your ideas on pink post-it notes.

Whole group – share environmental and equality/fairness issues on two separate large sheets of paper, brainstorm for anymore.

Step 2: Decide which area you want to start to think about a game around and get together with 2 other people. Look at the environment/equality papers and decide which issue you want to focus on

What is the tension that needs to be resolved or the goal that needs to be reached re your issue? What is the quest? In the middle of a large piece of paper can you draw together what success looks like in your scenario?

Step 3: How does it demand wise creativity? By this point replace with their terms?\_Go back to your post-it notes from the last game, and your new names for the terms – how can your new game include the four elements?

1. *Dialogue*
2. *Control/authority*
3. *Ethics and impact*
4. *Engaged Action (immersion)*

Step 4: Look at your ideas so far,

- What kinds of CHALLENGES could be involved?
- What kinds of DILEMMAS could be involved?
- What kinds of EXPLORATIONS could be involved?
- What kinds of PUZZLES could be involved?

Debrief...

**15 mins Blue Sky Blog (if time...)**

In scenario groups - what elements of co-creativity are you excited about in your scenario?

### *C<sup>2</sup>Learn Workshop 3*

#### **Workshop 3: Co-Creativity in Game Scenarios (ctd)**

*This workshop's goals were to enable students and staff to:*

- *Gather information on technological platforms in schools*
- *Reflect further on the experience of playing the serious games*
- *Consider their previous scenarios and further develop the four key aspects of creative quiet revolutions (this extends work undertaken in workshop 1):*
  5. *Dialogue*
  6. *Control/authority*
  7. *Ethics and impact*
  8. *Engaged Action (immersion)*
- *Consider new scenario ideas.*

#### **15 mins Warm up, flattening hierarchies, catch-up and techno platforms**      **Camera**

Make connections: move around the space sharing ONE WORD to describe how you're feeling about the game you developed in the last workshop; pair with someone who has similar word to yours and explain to each other....

Find the gaps: Do it again and this time pair with someone who has a different word.... Discuss these and introduce each other explaining other's word and a QUESTION that occurs to you in relation to it

Taking the temperature: How confident are you that the game idea you started to develop would work in practice? Middle of the room = very confident

TODAY – OU team share responses from European colleagues to games developed last time and explain plan for this session

**Teacher to make Curriculum connections from here onwards - documenting curriculum and pedagogy connections across the workshop**

**10 mins Finding out about your technology** [Post its/access to blog](#) [Discussing in groups of 3/writing individually](#) (Note for KC – in Bc students to register answers on their blog/ in St P's to use post-its)

1. What technology do you currently have installed in your school? Can you write one technology per post-it note, together with its location? Eg classroom/shared space? PINK
2. What is the anticipated / desired direction for technological upgrade in two years from now? (teacher version) What upgrades would you like to see in the technology installed in your school two years from now? (student version) GREEN
3. What technologies that are already in place do you not use enough? How could you better use them? Use them more? YELLOW
4. What personal devices do students/you all have that don't belong to the school? ORANGE

**10 mins Quiet Revolutions in Wise Humanising Creativity** [Previous post-it notes on WHC](#) [In 3 groups](#)

As a group look through the sets of 4 different coloured post-it notes that one of the groups from last time came up with. Remind yourselves what each colour stands for. We called them Dialogue, Control, Ethics and impact and Engaged action – what did you call them?

1. Can you remember what words you came up with for the four aspects of WHC we gave you last week?

2. Can you think of one example to share with the whole group of each of the four aspects of WHC within the Stop Disaster or your own game?

Share with whole group.

*Last week's questions if useful:*

5. *Dialogue (green post-its) – when were you interacting with someone else/something else? Who made decisions – you or them/it? How else could you have interacted with someone/something inside or outside the game?*
6. *Control/authority (yellow post-its) – when were you in control? When you weren't in control who was?*
7. *Ethics and impact (orange post-its) – what difficult choices did you struggle with? Did the results of any of your actions surprise you? When were you being creative?*
8. *Engaged Action (immersion) – (pink post-its) – did you get lost in playing the game? Did you come up with your own ideas*

**20 mins DEVELOPING PREVIOUS SCENARIOS FOR THE C<sup>2</sup>LEARN GAME** Post its, big pieces of paper with last week's ideas on, pens Groups of 3 from Workshop 2

Spend some time working on your ideas from last week:

Task 1: How can you make sure your game has more elements of dialogue, control, ethics and impact and engaged action in it?

Task 2: Can you also now put the following elements into your games? Or label in your game where you've already included these elements?

- What kinds of CHALLENGES could be involved?
- What kinds of DILEMMAS could be involved?
- What kinds of EXPLORATIONS could be involved?
- What kinds of PUZZLES could be involved?

Possibly share across groups here to critique and add to other groups' ideas if there seems to be time.

**30 mins NEW SCENARIOS FOR THE C<sup>2</sup>LEARN GAME** Post its, big paper, pens

**Focus on integrating quiet revolutions into possible scenarios for the C<sup>2</sup>Learn game.** In threes work with COMPONENTS of co-creativity scenarios – generate characteristics / example activities. What themes are important to you?

WITHIN SCHOOL

OUTSIDE OF SCHOOL

Step 1. In pairs:

What issues are you aware of in your day to day life WITHIN SCHOOL? What are you aware of outside of the UK? What is fair/not fair? What is right/wrong? Write down your ideas on yellow post-it notes.

What issues are you aware of in your day to day life OUTSIDE OF SCHOOL? What are you aware of outside of the UK? What is fair/not fair? What is right/wrong? Write down your ideas on green post-it notes.

Whole group – share your 2 sets of issues, brainstorm for anymore, if possible cluster the ideas into different themes – do any of the ideas have anything in common?

Step 2: Decide which area you want to start to think about a game around and get together with 2 other people – try to work with different people to your last game. Look at the papers and decide which issue specifically you want to focus on

What is the tension that needs to be resolved or the goal that needs to be reached re your issue?  
What is the quest? In the middle of a large piece of paper can you draw together what success looks like in your scenario?

Step 3: How does it demand wise creativity? Go back to the coloured post-it notes from the last game, and your new names for the terms – how can your new game include the four elements?  
*Dialogue, Control/authority, Ethics and impact, Engaged Action (immersion)*

Step 4: Look at your ideas so far,

- What kinds of CHALLENGES could be involved?
  - What kinds of DILEMMAS could be involved?
  - What kinds of EXPLORATIONS could be involved?
  - What kinds of PUZZLES could be involved?
- Debrief...

**15 mins Blue Sky Blog (if time...)**

In scenario groups - what elements of co-creativity are you excited about in your scenario?

## APPENDIX 3: INFORMATION LEAFLET FOR POTENTIAL MULTIPLIERS IN AUSTRIA FROM BMUKK



### **C2Learn** fostering creativity in learning through digital games

#### INFOBLATT

##### **WAS?**

Es handelt sich um ein EU-Projekt im Rahmen des „7th Frameworks Programs“, trägt den Titel „Creative Emotional Reasoning Computational Tools Fostering - Co-Creativity in Learning Processes“ und hat zusammengefasst zwei wesentliche Ziele:

- Entwicklung von digitalen Spielen, um kreatives Lernen in formellen und informellen Lernsituationen zu fördern
- Entwicklung von Konzepten und Ansätzen, die die Möglichkeiten und den Umgang mit digitalen Spielen und sozialen Methoden fördern

Eine ausführlichere Beschreibung (in englischer Sprache) findet sich am Ende dieses Dokumentes.

##### **WER?**

Insgesamt sind sieben Partner in diesem Projekt involviert:

1. **Koordination:** EA Ellinogermanik Agogi GR, <http://www.ea.gr>
2. Edinburgh University, UEDIN (UK), <http://www.ed.ac.uk>
3. Open University, OU (UK), <http://www.open.ac.uk/>
4. National Center for Scientific Research, NCSR, <http://www.demokritos.gr>
5. University ta Malta, UoM (MA), <http://www.um.edu.mt/>
6. Serious Games Interactive, SGI (DK) <http://www.seriousgames.dk/>
7. Bundesministerium für Unterricht, Kunst und Kultur, IT-Systeme für Unterrichtszwecke, BM:Ukk (AT), <http://www.bmukk.gv.at>, <http://www.virtuelleschule.at/international>

*Ansprechperson beim BM:Ukk* ist Frau Mag. Elisabeth Zistler von der Abteilung „IT/3, IT-Systeme für Unterrichtszwecke.

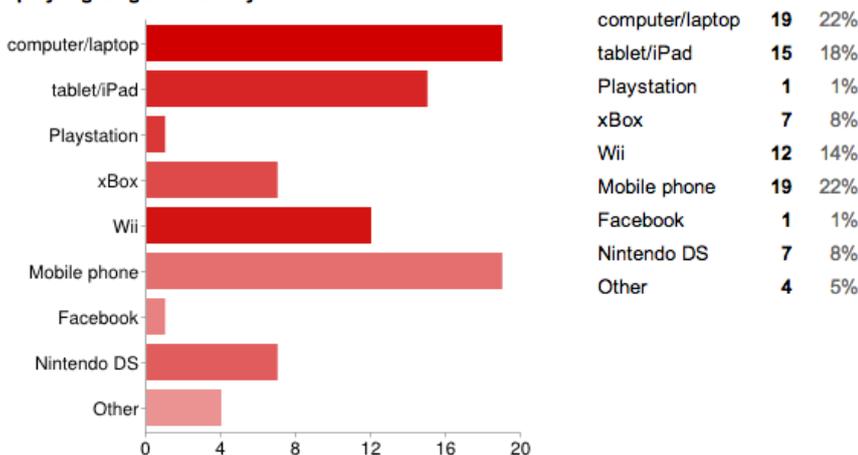
*Im Auftrag des BM:Ukk sind vier Personen tätig:*

- \* Mag. Alexander SCHMÖLZ: Universität Wien (Institut für Bildungswissenschaft): Projekt-Koordination Wien
- \* MMag. Stefan OSSMANN: Universität Wien (Institut für Publizistik und Kommunikationswissenschaft)/EU Projektmanagement
- \* Dr. Marion OBERMÜLLER: BM:Ukk Consultant

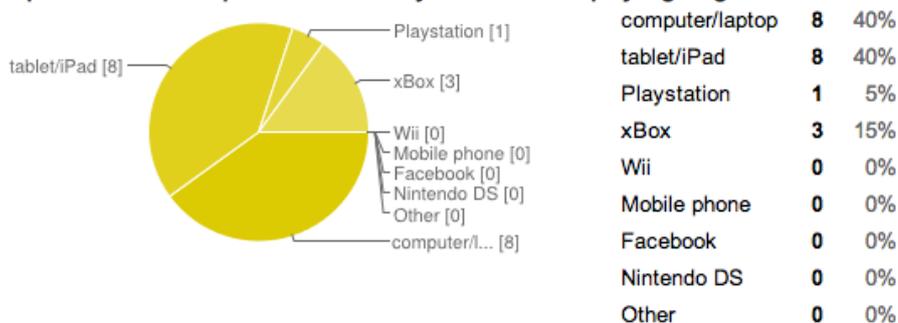
APPENDIX 4: C<sup>2</sup>LEARN GAMING SURVEY IN OU'S WORKSHOP 1

This appendix presents data from the Gaming Survey taken by participants in OU Workshop 1<sup>11</sup>.

**I play digital games on my:**



**What platform from the question above do you use most to play digital games?**



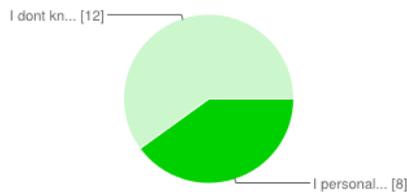
**Who do you play digital games with?**

- on my own but sometimes with my sister or friends
- the community of the game
- mostly Friends and sometimes with random people
- I play games on my own most of the time but sometimes i play with people online
- Myself mostly!
- on my own mostly but sometimes with my freinds my sister and dad
- My friends and other people that are playing the same game on the same server

<sup>11</sup> NOTE: information from the teacher had been deleted in error in the quantitative data sections, but not the graphs and charts. Errors in spelling were not corrected.

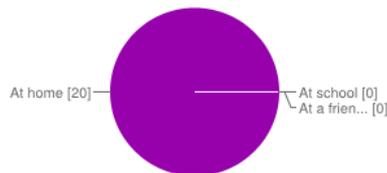
- Friends family or on my own
- Friends and family
- My friends and other people that are playing the same game on the same server
- Family Friends
- Online or with my friends
- FRIENDS FAMILY
- Usually, on my own, but occasionally with my friends.
- People I don't know online Friends online Friends offline On my own
- Family Friends
- i normally play games by myself or with my brother or with my friends
- My sisters
- I play digital games with my friends and sisters
- i play mostly as single player because creative games are more suited to single player.
- I play with my friends or family for the less creative games.

**If you play digital games online, do you personally know the other gamers, or have you met them in the gameworld?**



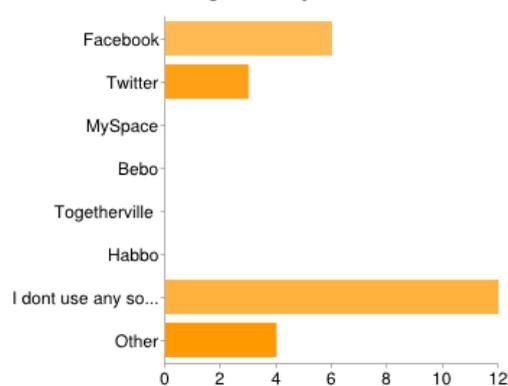
|                                                |    |     |
|------------------------------------------------|----|-----|
| I personally know them                         | 8  | 40% |
| I dont know them, I meet them in the gameworld | 12 | 60% |

**Where do you play digital games most of the time?**



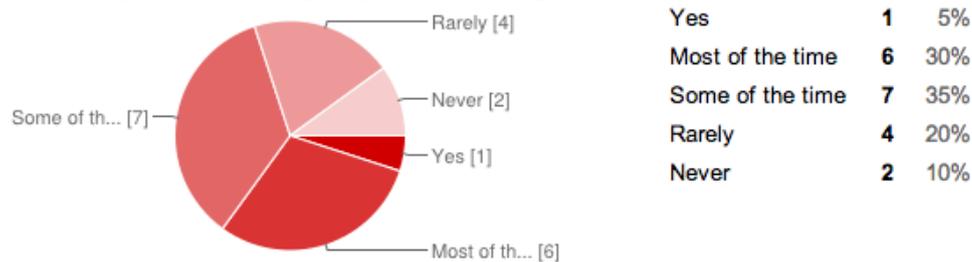
|                     |    |      |
|---------------------|----|------|
| At home             | 20 | 100% |
| At school           | 0  | 0%   |
| At a friend's house | 0  | 0%   |

**What social networking sites do you use?**



|                                        |    |     |
|----------------------------------------|----|-----|
| Facebook                               | 6  | 24% |
| Twitter                                | 3  | 12% |
| MySpace                                | 0  | 0%  |
| Bebo                                   | 0  | 0%  |
| Togetherville                          | 0  | 0%  |
| Habbo                                  | 0  | 0%  |
| I dont use any social networking sites | 12 | 48% |
| Other                                  | 4  | 16% |

**Do you always complete a digital game by levelling up to the end?**



**What digital games have you successfully levelled up to the top or end playing?**

- I haven't
- I cant remember
- Assassins Creed, Assassins Creed 2, Assassins Creed Brotherhood, Assassins Creed Revelations, Assassins Creed 3, Uncharted, Uncharted 2 City of Thieves, Uncharted 3, Battlefield 3, Infinity Blade, Infinty Blade 2, Call of Duty Modern warfare 2, Call of Duty Modern Warfare 3, Call of Duty Black Ops, Super Hexagon, The Impossible Game, Scribblenauts, Skyrim, etc.
- "Pokemon – Black, Pokemon – Heartgold, Pokemon - Dimond"
- Hotel Giant 2, lots of time managment/role playing games.
- "Pokemon – Black, Pokemon – Heartgold, Pokemon - Dimond", 'Rachet and Clank', Temple Run, other games i cant remember"
- "Sims 2, Call of duty: Modern warfare , Call of duty: Modern warfare, Saints Row: the third, Spyro
- Ratchet and Clank, Other games I can't remember"
- Pokemon -Dimond
- "off the rails, surgeon simulator 2013, Exit, Angry Birds"
- angry birds cut the rope
- minecraft
- n/a
- Games on the ipad such as angry birds
- ice breaker
- "mario games such as mario kart or super mario those sort of games.
- leps world-a bit like mario but on my i pod touch."
- Flow Free

super mario bros when i was younger, hot donut. crazy man cliff diving

**What digital games have you stopped playing? Why?**

- The Sims 2, I found it quite addictive and takes up too much time
- I have stopped playing games such as Mario Games, as they are just repeated over and over and they seem tiring.
- Brink because it was absolutly awful.
- Action games, because I don't like violent games.
- Pokemon - I completed them and they went out of fasion

- Pokemon (I don't really play on my DS anymore) Ratchet and Clank (Bit outdated for me now)"
- Pokemon -Diamond = i completed it
- Zombie Apocalypse because there were just too many ads, it was very slow and it wasn't very appealing to the eye.
- none
- binweevils because a bit too old for it
- i stopped playing club penguin because it got boring and you had to pay to get certain things
- Some games on my dsi because they are too babyish
- "moshi monsters -because a lot of the things you have to pay for.
- I have stopped playing games which are not necessary for my age group i stopped playing them because i think creative games should be aimed to be suited for all ages not just one age group because then you have freedom to be more creative and more imaginative.
- quite alot because they have either been too hard or too boring.
- club penguin because it started getting boring and some people were using bad language

**What is your favorite digital game right now?**

- Temple run 2
- The Sims 3
- Far Cry 3
- Fifa 13, Simpsons Tapped out, Pocket Planes on Ipad Touch
- Imagine Fashion Designer 3DS
- Team Fortress 2
- Gmod, Minecraft, Trouble In Terrorist Town, Team Fortress 2
- Fifa 13
- Minecraft
- pet shop story(on my tablet)which is an online virtual world. I like it because ,a bit like stop disasters , you have a budget but you can earn more money by looking after your pets.
- clash of clans
- Minecraft
- Sonic Jump
- Clash of Clans
- movie star planet
- games on the wii just dance
- Virtual Families
- probably hot donut

**What was your favorite digital game 6 months ago?**

- The Sims 2
- I quite enjoyed Minecraft with my friend.
- Dead Space 2
- Theme Hotel
- Fifa 13

- Minecraft
- Minecraft
- Minecraft
- Fifa 13
- Minecraft
- moshi monsters
- minecraft
- Minecarft
- Angry birds
- moshimonsters
- style boutique- ds, leps world- i pod touch, angry birds
- Flow Free
- Minecraft

**What was your favorite digital game a year ago?**

- Little Big Planet
- Mario Kart
- The Elder Scrolls: Skyrim
- Formula 1 2012 and Forza Motorsport 4
- Farm Frenzy
- Formula 1 2012 and Forza Motorsport 4
- Tekkit
- Minecraft
- Minecraft
- Forza Motorsport 4
- Animal Crossing
- moshi monsters
- binweevils
- Fifa 12
- New super mario bros
- club penguin
- moshi monsters
- Binweevils
- sims3

**What was the first digital game you ever played on any platform?**

- Snake, Nokia Brick
- No idea
- Soul Blade, Playstation 1
- Pokemon - Dimond
- I don't know, I was 10 months.
- Pokemon - Dimond
- Pokemon
- Sonic on gameboy

- Sonic on gameboy
- Pokemon
- Age of War
- vtech laptop cinderella
- probally binweevils
- Epic Duel
- Brain training on the dsi
- club penguin
- wii fit games along that line
- i can't remember
- club penguin

**What was your first computer-based digital game?**

- Snake, Nokia Brick
- No idea
- Soul Blade, Playstation 1
- Pokemon - Dimond
- I don't know, I was 10 months.
- Pokemon - Dimond
- Pokemon
- Sonic on gameboy
- Sonic on gameboy
- Pokemon
- Age of War
- vtech laptop cinderella
- probally binweevils
- Epic Duel
- Brain training on the dsi
- club penguin
- wii fit games along that line
- i can't remember
- club penguin

**What was your first hand-held digital game?**

- Nintendo Dogs
- No idea.
- Star Wars The Attack of The Clones on the Gameboy Advanced
- Wii
- Imagine Babysitter
- Wii
- Pokemon
- Gameboy
- Gameboy
- FORMULA 1 2012

- Animal Crossing
- talking tom
- cut the rope
- DS
- dsi
- nintendogs
- brain teasers or puzzles not that much creativity- ds
- Dolphin Island
- mario cart ds

**What was your first mobile phone-based digital game?**

- Angry Birds
- Bubble Burst
- Snake on a really really really old Nokia.
- Sudoku
- Angry Birds
- Sudoku
- Assasins Creed (very bad)
- sims
- sims
- sudoku
- Solitare
- i dont have a mobile phone
- motogp
- n/a
- Football manager
- brickbreaker
- word mole - word searches
- uno
- tetric
- pinball"
- Brick Breaker
- hot donut

2.1

**What digital game do you, or have you, spent the most time playing?**

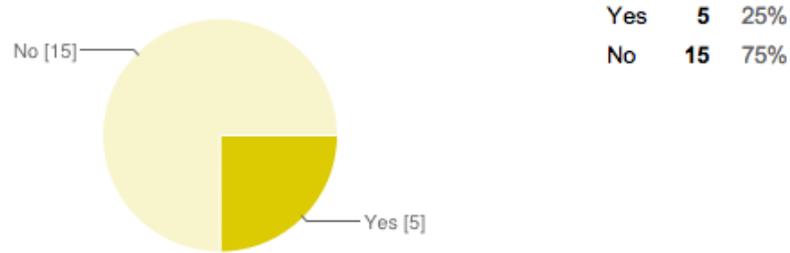
- Lego Star Wars
- Sims
- Too many to decide
- Fifa 13
- Hidden Mysteries - Buckingham Palace/ Mysteryville 2
- Fifa 13
- Minecraft
- Minecraft
- Minecraft

- Fifa 13
- Minecraft
- moshi monsters
- clash of clans
- Minecraft
- Most of the time playing
- club penguin
- angry birds or games on mobile phones something quick and easy to set up but something easy and fun to play.
- Flow Free
- hot donut

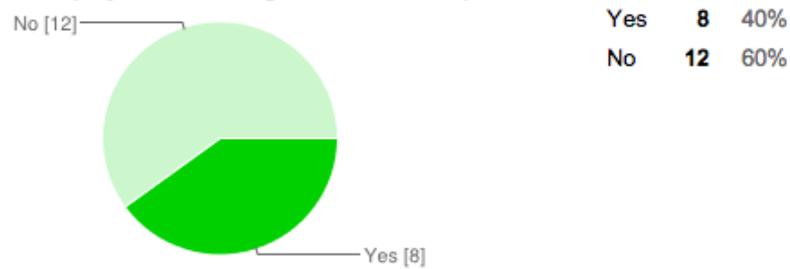
**Do you use cheat codes or walkthroughs to play games? If you do, where do you access them (YouTube, game magazines, etc?)**

- No
- I use cheats in Sims from friends and forums.
- Occasionally on youtube.
- I sometimes look on Youtube and chat to friends
- I occasionally use Youtube walkthrough videos, but only when I'm really stuck.
- I sometimes look on Youtube and chat to friends
- i sometimes use youtube if i am stuck on a level for along time
- I do on certain games
- I do on certain games
- Youtube friends
- sometimes
- no
- I don't usually use them but I sometimes do when i'm really stuck.
- if I do use them i usually google them or sometimes get them through friends.
- sometimes if i am realy stuck on games
- No
- no
- i dont normally but if i do i go to youtube or an annual that might tell you about it
- sometimes. i get them from youtube or sometimes you can get free cheats
- no

**Do you share or trade cheat codes with other game players?**



**Have you ever played a serious game besides Stop Disasters or the McDonalds Serious game?**



**What other serious games have you played?**

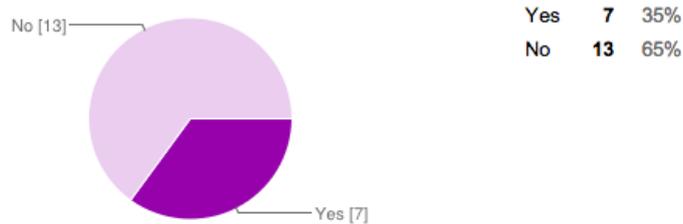
- I played Stop Disasters once before when I was 12.
- Ride Sims - You control a roller coaster
- Ride Sims - You control a roller coaster
- Sims 1, Sims 2, Sims 3"
- none
- n/a
- n/a
- None
- stop disasters(a lot)
- the science new creative game
- i dont think that i have come across any others yet!sorry!
- none

**What online games do you play?**

- Minecraft
- I dont play that many online.
- Too many to name. Majority of ones listed above.

- Fifa 13
- Fifa 13
- Minecraft, Tekkit, TF2
- Minecraft, Gmod, Steam Games, Xbox Games, PC Games"
- Fifa 13
- Minecraft, Surgeon simulator, Electric man, Mario, Tekkit, junkyard fun, Stop Disasters"
- friv moshi monsters bin weevils you tube
- clash of clans, minecraft
- Minecraft, Clash of Clans (on ipod)
- Clash of Clans
- movie star planet, ourworld games on friv
- i play the various games on friv
- i used to play moshi monsters but then went off it -too young for my age group any other games which allow you to have fun!"
- friv
- hot donut, crazy man cliff diving, sims3, moviestar planet

**Do you play any massively multiplayer online-role playing games (MMORPG) like World of Warcraft?**



**If you play MMORPGs, which games do you play?**

- Minecarft
- Tekkit
- clash of clans
- minecraft
- Runescape
- Runescape
- None
- Minecraft
- Star Trek Online
- None
- Minecraft
- i dont play mmorpg's games.

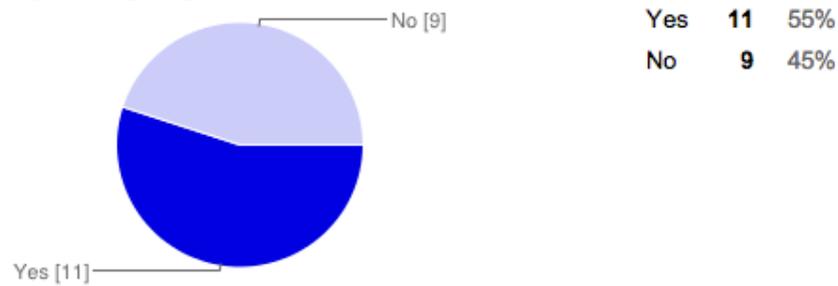
**What can you learn form computer games that you can't learn from school?**

- quick thinking and learning through having fun
- Minecraft on some games you can learn to be creative and build for example Minecraft
- You can learn to think logically eg. the Stop Disasters game how to look after another person or creature
- That multiplayer games take a lot more cooperation than partner work in school as you have to do things together to not die. For example in Water Boy And Fire Girl.
- You have lots of chances to go back and try something again differently in a way that pupils might not have time to do in a lesson.
- Not Much
- What to do in situations
- Not Much
- Sometimes you can learn responsibility
- Decision Making About the environment
- I learnt quite a few of the elements from Minecraft eg. Iron, Gold ect..
- What happens in the real world such as the disasters that may occur- stop disasters. new ideas or creativity
- 

**What is the best digital game you ever played and why?**

- Lego Star Wars, I liked the film and I found it exciting
- Too many to decide
- Fifa 13
- Fifa 13
- Minecraft because it is fun
- Minecraft (Made me more creative and it's very fun)
- Minecraft (Made me more creative and it's very fun)
- Junk Jack and Minecraft as they are both games where you have to survive in the wild and you have tons of freedom!
- Moshi Monsters. because you can solve missions, play games, look after your own monster, grow plants that attract pets.
- It would probably be Clash of Clans because you get to make your own village and defend it from other online players attacking it
- Minecraft because it lets you have freedom and you can be creative
- I always enjoyed Mario Kart because I found it enjoyable - I don't enjoy violent games and as I have never had much time to devote to gaming I don't want to get involved in games that will take me a long time and a lot of thought to complete - I play games to have fun and relax with friends/family on occasion, but it isn't a regular part of my life.
- Clash of Clans because you can play online and have fun
- Probably Viva Pinata Paradise because I enjoyed looking after the little animals and curing them when they were sick
- Games in general each game has a different aim and they all have good things as well as the bad things.
- Flow Free because it challenges your brain but is still fun and enjoyable.
- Hot Donut, because it is really unpredictable and you have to think about what will happen in the future and save some fuel for it so you don't die

**Is cheating in a digital game ok?**



**Please explain why it is ok or not ok to cheat in a digital game.**

- You are just cheating yourself
- Some games allow more creativity with cheating.
- It is wrong because it is unfair, however should only be allowed if the game is beaten first normally.
- Because you want to complete it
- It is only ok if it only affects you, not other people.
- because it takes the fun out of it
- In certain contexts it's ok because it can make your experience more enjoyable
- because you want to complete it
- because it takes all of the fun out of it
- no because otherwise what's the point of doing the game in the first place
- it's ok as long as they allow you to use the cheats
- it's not ok because it takes the fun out of the game
- I think that it can be ok to cheat in one-player games as it shows resourcefulness and collaboration - in real life we don't try to solve everything on our own, so why should we in games? However, if you are playing against others I think it would be better to rely totally on your own skill.
- Because you should try instead of cheat
- because even though it is online it doesn't mean it is ok, you wouldn't cheat in a normal board game so why does going online make it different. Also when you don't cheat if you have to get something then you have to work hard for it.
- if you cheat you can learn what to do next time cheating is all about the first stages of learning. I still do not think that cheating should be allowed all the time but it can help you to understand the game and get really involved in the game.
- It is ok to cheat because it is not real life and it is only a game. As long as you get a choice whether to cheat or not I think it is ok.
- because game makers spend hours making games and if you cheat all their hard work will be for nothing

**What is the best thing about digital games?**

- Imagination
- Allowing to free our minds.
- they r fun
- they are fun
- Trying new things
- that you can play online which is fun
- They are fun and you can make new friends
- they are very fun and engaging
- they can be really realistic
- there not real but it feels real
- the best thing about them is that you get to interact with the play of the game
- their fun
- They offer an escape from reality but they are also actively engaging your brain and developing your thinking and reactions, rather than just sitting passively watching TV, for example. Playing games with friends and family can be a sociable and competitive activity.
- Their individuality
- moving up levels because it makes you feel like you have achieved something
- It links to learning , a new thing every time.
- They are fun and allow you to escape from the real world.
- enjoyment

#### **What is the worst thing about digital games?**

- Increases aggression levels
- It can sometimes stop our freedom and some are just repetitive.
- blank
- nothing
- Can take forever to load/Can be really inappropriate
- nothing
- small kids screaming over mic's
- lag
- lag
- nothing
- sometimes they can be too slow
- somtimes if the machine crashes you lose all your previousdata
- the worst thing is sometimes people try to hack into the ones you need an account for
- people who cheat
- Sometimes they can be all-consuming and distract you from other things you ought to be doing.
- "They only are popular a short amount of time
- "
- having to pay for bits of the game
- you get too addicted to them and you may become too involved in to it in some cases that can become a good thing but in other cases it can be bad for you it might be all you ever do.
- Some are badly made.
- when people cheat or say bad laungage

**Sometimes, the news reports digital games are bad for young people. Do you agree or disagree?  
Why?**

- I study Psychology and it is very clear that it can have a negative impact on how a person feels but it can also encourage positive attributes EG. Confidence in decisions
- I do agree, seeing as there are cases of young boys, mostly, playing violent games and killing or injuring people.
- No if controlled
- i disagree as they are sometimes educational
- Disagree in general, but games can occasionally be bad.
- disagree because they are educating us and very helpful
- I don't agree because it can help people in life i.e could help someone with jobs like a graphics designer or a coder
- I agree as if you play too many it can be bad for your eyes and general health
- i agree because wifi may be bad for your health
- i disagree because there are games that change your behaviour and health but there are actually educational games out there.
- disagree because u can learn some stuff from them
- I don't think that games are bad for young people per se, apart from if young children are playing games intended for an older audience. I think if age-appropriate games are played for sensible lengths of time they can promote problem-solving skills and playing games with friends can also be important socially. However, if a young person who spends large amounts of time gaming at the expense of physical activity/social activity then I think that is a bad thing.
- Yes because they are good for children to learn stuff
- i think that some are like violent games because it encourages violent behaviour
- i don't agree because it makes them see just what disasters or unfortunate events happen in the real world so if they happen they know what to do.
- I am not sure as they challenge your brains but they also mean you get unhealthy.
- not really

**Do you have any other comments about digital games you would like to tell us?**

- I find them very fun and engaging
- I find them very fun and engaging
- i like digital games because you don't have to go out to play with friends
- I really enjoy games with a lot of freedom
- no
- no
- It is good to make a digital game but make sure that it is serious and has some link to learning.