IMAGINE LLP KA4

Workpackage 2 – Final Report.

Version 1.0

Compiled by Maja and Paul Pivec

FH JOANNEUM University of Applied Sciences

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

Table of Contents

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

1. Introduction

This report undertakes the task of identifying Game-Based Learning (GBL) projects within the European community and provides a description of good practice case studies spread across all levels of education. This report was carried out within the frame of the Work package 2 – Desk Research of the IMAGINE project. The aim was to provide a summary of available research on GBL and a comprehensive valorization of work carried out to date to be used as a foundation for the further work, and to increase mainstreaming of games in learning policies.

The methodology employed to identify projects for assessment within this desk research included the compilation of a database of European GBL projects by all the Imagine project partners, and use of the extensive research completed for the Games in Schools report (http://games.eun.org).

Guidelines were established and subsequently utilized for selecting which projects to include in this report, consideration given to the financial volume of projects, and the international cooperation, or the cooperation of at least several national partners. The quality guidelines from SIG-GLUE and the Pan-European Game Information (PEGI) age rating system (http://www.pegi.info) were both employed within the selection criteria to further identify good practice examples.

The SIG-GLUE Quality Commission identified and defined the criteria to analyse and to evaluate games used for learning. The evaluation criteria was developed and explained in detail in a downloadable guide (http://www.sig-glue.net), and was established primarily for two main purposes:

1. to be used by the quality Commission in the certification process, and
2. to support and allow the process of self-evaluation by the producer; e.g. the producers having in mind the criteria can assess his/her own materials during the development process and improve the quality of the product.

Teachers and trainers can also evaluate the quality of games using this report and use the criteria to establish if the selected resource can be considered as a quality learning resource.

Of the 82 projects identified, only 56 of these were included as they were found to have referenceable material. A selection from these projects are mentioned within this report and further linked to more detailed information within each section, providing additional descriptions. In short, examples are chosen because of completeness of results, usefulness of output, and perceived sustainability. Although the examples often belong and appear in

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

several categories covered by the report, they are outlined as an example only for one category.

Furthermore, in the footnote of each section, additional details are provided on the included projects, enabling the readers to see the timeline of projects and outputs, as well as geographic information thus allowing a search of projects by specific country. In addition to this, the funding landscape is mapped onto the selected projects.

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

2. Executive Summary

The following section summarises the main goals and key findings from this research. Within the report itself, additional information can be found and the identified projects have been catergorised by:

1. Targeted Audience
2. Targeted Technology
3. Targeted Output

These categories are further broken down into *types of audience* (primary/secondary, tertiary, life-long learning and industry), *technology* (mobile, web-based, computers and recreational), and *output* (literature, methodology and GBL resources). A section on sustainability has been included, and conclusion and recommendations are tabled.

2.1 Goals of IMAGINE Project

This project will bring together and valorise results from other projects and initiatives to date on Game-Based Learning (GBL), with the aim of helping to persuade policy makers in school-based, adult and vocational education to include pilots, multipliers, and mainstream GBL in their strategies for implementation. The major products of the project will be:

- A State of the Art Report on games-based outcomes, segmented by educational level (school/children, adult and vocational) which will the project's main valorization tool.

- Identification and description of convincing good practice case studies (at least 20) spread across the three education levels covered.

- A Directory of proven software platforms, commercial and other games products etc which are available for wider use in GBL, terms and business models for their availability.

- A series of recommendations to policy makers also segmented by level of education. The recommendations will cover multiple dimensions of the policy-making issues concerning the introduction of games in education including: education systems; individual institutions; the uses of technology; economic and financial issues; and cultural and linguistic issues.

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

2.2 Key findings from the Research

Those projects that did achieve what they set out to accomplish, were usually extremely successful and widely received by the community. However, some projects did not achieve their stated objective of producing a useable game, many only produced a prototype, and some only created the assets to be used in the un-developed game.

Sustainability appeared to be a recurring issue while compiling data for this report. Many of the projects identified have not produced sustainable results. Outputs and resources are often only available while the project is being funded and some only for the life of the project.

2.3 Summarized results from Examples

The majority of the projects reviewed targeted primary schools, both students and teachers. All sectors of the community had representation including the elderly, the disabled, at-risk people, and some projects were specifically aimed at women. The spread of projects across technologies is consistent with what is in use in schools. The use of mobile platforms appears to be on the increase as does web based technology. Although the majority of projects reviewed focus on resource as an output objective, many of these only create prototype games for use within the project. Only a select few go on to commercialise the resulting product, or to create a community that lives on after the project has ended.

Exemplary examples of notable mention are as follows (in no particular order):

Discover - *www.discoverproject.net*

Games in Schools - *games.eun.org*

eMapps – *www.emapps.info*

ElderGames - *www.eldergames.org*

eCircus - *www.e-circus.org*

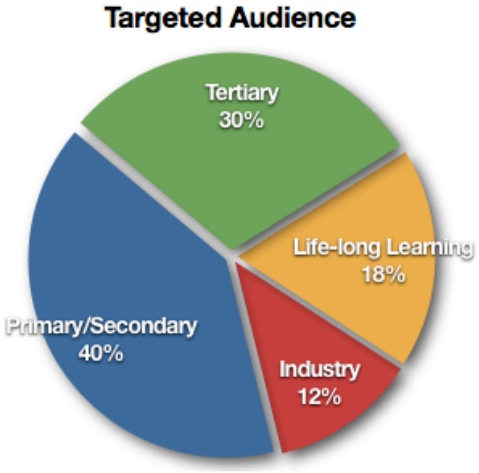
These examples are chosen because of completeness of results, usefulness of output, and perceived sustainability.

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

3. Categorized by Targeted Audience

The 60 examples identified have been categorized by their documented target audience. Selected examples in each of the below categories are presented in more detail and relevant comments as to the success in appealing to the chosen audience are tabled. The examples were selected from available data and the accuracy of published documents has not been verified. Of the 60 projects reviewed, over 40% targeted primary or secondary teaching institutions as the receiving audience, with the majority being primary institutions. A further 30% of the projects were aimed at tertiary institutions only. Only 18 % targeted life-long learning (this category includes tertiary as adult education), and only 12% were for industry use.



Primary/Secondary

eMapps
Discover
ARGuing
cu@city.eu
eCircus
RENAISSANCE
ThinknDrinkn
Easy2
Consolarium
Games in Schools
DANT/IPRASE
Kaleidoscope
Eurogame
Teaching with Games
Racing Academy
Honoloko
Europa Eureka
Learning Game
Radiation Games
SITCOM
TiM

Tertiary

Aitmes
ELEKTRA
mGBL
UNIGAME
IPerg
80Days
GAMES
InterLoc
VirtualLife
TARGET
INSCAPE
Prosperity
FUGA
GaS
GameSpace

Life-long Learning

SIG-GLUE
Goal Net
L2C
Playmancer
ElderGames
G@L
TA2
e-vita
ILGRECO

Industry

Touareg
Game On
ANSWER
edutain@grid
GameTools
mGain

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

3.1 GBL used within Primary/Secondary Teaching Institutions

Computer and video games have traditionally been associated with children. Hence it is understandable that 40% of the examples reviewed targeted school children, teenagers and younger, and the resources for their teaching as the primary output. The *Racing Academy* [1] created a prototype car racing simulation for students aged between 11 and 16. Trialed at two schools in Bristol with 40 students, the game was found to be motivating, challenging and rewarding. The researchers observed that students obtained more in-depth knowledge of engineering and mechanical principles through interacting within the game, and via communication with others outside of the game. However, most of the student-to-student dialogue was of a competitive nature, rather than a mutually supportive one.

The Scottish centre for teaching and learning also found a community being created around the game. With their project, *Consolarium* [2], they used recreational game platforms such as dance pads, hand-held devices, and game consoles, with students aged 9 to 11. Through building a meta-game around the game; writing tasks, role-plays, competitions, they found that the students would discuss and strategize outside of the classroom, thereby continuing learning and fostering collaboration.

ARGuing [3] is an innovative project that attempts to address two fundamental needs in European education: 1) How to bridge the widening technological gap between educators and their students and 2) How to motivate students to understand the benefits of learning languages at a level that impacts on their existing personal and social lives. The project aims to construct a type of puzzle game called an Alternate Reality Game (ARG) that will utilise digital technology as a communication tool for international, multilingual, peer student communities. The project will create collaborative, multilingual communities of secondary school students that are motivated to communicate in European languages to complete a single objective. The project aims to engage students by asking them to solve cryptic, multilingual clues through game-based learning. This project aims to create a multilingual community of high school students across Europe with the goal of understanding and appreciating the necessity and practicality of knowing additional European languages.

3.2 GBL used within Tertiary Teaching Institutions

The *UniGame* [4] project opened the field of the game-based learning to Universities students as well as for continuous education (Life-long Learning). This project used a game-based approach for areas where interdisciplinary knowledge is necessary and where skills such as critical thinking, problem solving in a group and social interaction are of

[1] 2004, Partners – UK, Funding - Industry
[2] 2007-2009, Partners – UK, Funding - LTS
[3] 2007-2009, Partners – UK, Funding - Socrates
[4] 2002-2004, Parnters – AT, SE, EL, IT, UK, Funding – Socrates/Minerva

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

importance. Role-play scenarios were acted out in teams over an e-learning platform, where students debated to win points for their stated goals. Communication and collaboration was the outcome, and topics could be tailored to fit within any curriculum. The project was very successful in creating a prototype platform and resulted in various publications.

GameSpace [5] and *GaS* [6] were also were also aimed at the tertiary level. However, as both project are research orientated, the studies utilize available participants, being those students at the university. *GaS* is looking into the future developments of games as online services and *GameSpace* is aiming to develop an evaluation method suitable for mobile devices used for gaming. Both of these studies are ongoing.

Virtual Life [7] observed that European tertiary institutions are more and more conducting researching and communicating within virtual worlds such as Second Life. The aim of the consortium for this project is to create a new virtual world platform that will be innovative both from a technical and a philosophical point of view. They suggest that they are mainly focused on administrative and legislative issues and on security and data protection, but graphics and aesthetic issues are also important.

3.3 GBL used for Life-long Learning

Life-long Learning suggests that learning is not confined to childhood or the classroom, but takes place throughout life and in a range of situations. Learning should not be divided into a place and time to acquire knowledge (school) and a place and time to apply the knowledge acquired (the workplace). It can also include the pursuit of knowledge for either personal or professional reasons and not only enhances social inclusion, active citizenship and personal development, but also competitiveness and employability.

Edlergames [8] decided to promote the e-inclusion of elderly people through the use of games. They created prototype games and methodologies to improve the quality of life through collaborative play with an emphasis on cognitive activities. The project will create a pre-commercial version of an interactive play board. Their aims are to utilize this for therapeutic activities to improve the quality of life (affective, physiological and social) for users. The project is ongoing.

The *Ta2* [9] project is unique in that it targets families and seeks to create methodologies where families can play and learn together. Using interactive and digital technology, the project hopes to deliver methods to develop multimedia products to nurture and develop the family relationship. Their marketing phrase is “Together, anywhere anytime”. The project started in 2008 and will finish in January 2012.

[5] 2009, Partners - FI, Funding - Tekes
[6] 2009, Partners - FI, Funding - Tekes
[7] 2009, Partners - IT, EE, IT, RO, IT, LT, FR, DE, IT, Funding – FP7
[8] 2006-2009, Partners – ES, IT, AT, UK, ES, ES, NO, UK, Funding – FP7
[9] 2008-2012, Partners – DE, UK, BE, NL, DE, DE, SE, NL, NL, DE, UK, SW, AT, Funding – FP7

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

Goal Net [10] boasts a "user-sensitive" approach to the design, development and testing of game-based e-learning objects to promote skills for work-sustainability for people at risk of social exclusion. The target audience is people with learning disabilities, sensory impairments, with low-level employability skills, and specific learning difficulties such as Dyslexia. The project will conclude December 2009.

Game On [11] provided a multitude of resources including three games with content editor in five different languages. The project aimed to create highly engaging and motivating materials using Game Based Learning to develop basic, personal and work sustainability skills in prisoners, those at risk of offending and ex-offenders, including those with disabilities. Although the project officially finished in 2008, update to documentation and the web site have been ongoing.

3.4 GBL used within Industry

The *Learning to Collaborate (L2C)* [12] Project was aimed at providing knowledge tools for managers and decision makers in public and private companies and staff members within groups and organizations to overcome collaboration challenges and traps. The project created prototype simulations for and completed research trials with selected participants. The consortium reportd the project as a success with participants being highly motivated to use the developed tools. Unfortunately, the link to join the L2C community is no longer avaliable and the links to the prototype simulations provides for only documentation and not the prototype games.

The aim of the *Prosperity* [13] project, is the development of a computer decision making game which shall be a simulated environment related to managing the company, together with developing training methods and teaching materials which will allow the user to complete business management training. Designed for use with a computer simulation, the games create a virtual environment allowing for decision-making and for identifying the player with the role played by them inside the game. It is envisaged that the players will feel the realism of the economical processes they have created. This supports the formation and the development of the key administrative and executive skills.

[10] 2007-2009, Parners – UK, EL, BG, UK, UK, Funding - Leonardo
[11] 2006-2008, Partners – UK, IT, BG, EL, RO, Funding - Socrates
[12] 2006-2008, Partners - FR, IT, DE, AT, SW, IT EL, IT, US, IT, UK, FR, Funding – FP6
[13] 2006-2008, Partners - PL, DE, IT, SE, Funding - Leonardo

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

3.5 Summary of Targeted Audience

Although the majority of the projects reviewed targeted primary schools, both students and teachers, all sectors of the community had representation including the elderly (*Edlergames)*, the disabled (*Goal Net)*, at-risk people (*Game On)*, and projects such as *SITCOM* were specifically aimed at women.

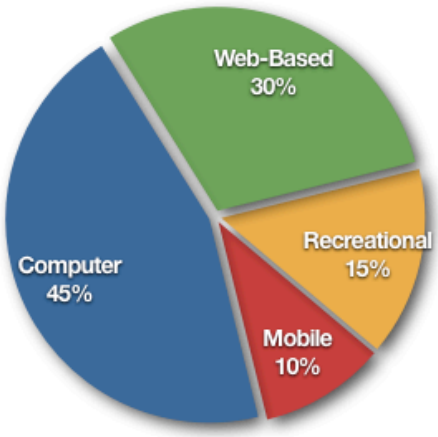
Some projects were trialed at tertiary level, such as *UniGame* and others; the overall target could easily be life-long learning. Methodologies developed for primary and secondary level could also be used at higher levels of education and vice-versa. However, it is generally easier to develop for a higher level of audience and reduce the content, than attempt to make products developed for younger audiences appropriate for older users by changing the content.

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

4. Categorized by Targeted Technology

The majority of examples identified (45%) targeted computer technology (PC/MAC) as the resource used or studied within the project. A further 30% were specifically web-based technology but still with utilizing computers. Only 15% of the projects included recreational devices such as hand-held games, consoles, or interactive television. The remaining 10% specified the use of mobile phones for the study or resource produced. Selected examples are highlighted in the following sections and were chosen on the data being available.



Computer

eMapps
ELEKTRA
SIG-GLUE
Touareg
Game On
Goal Net
80Days
L2C
Playmancer
GAMES
ANSWER
edutain@grid
TARGET
eCircus
INSCAPE
e-vita
Games in Schools
Eurogame
Teaching with Games
Racing Academy
Learning Game
Radiation Games
TiM

Web-Based

Discover
UNIGAME
ARGuing
cu@city.eu
InterLoc
ElderGames
VirtualLife
RENAISSANCE
ThinknDrinkn
Prosperity
Easy2
DANT/IPRASE
Honoloko
ILGRECO
Europa Eureka
SITCOM

Recreational

GameTools
G@L
TA2
FUGA
GaS
Consolarium
Kaleidoscope

Mobile

Aitmes
mGBL
IPerg
GameSpace
mGain

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

4.1 Examples using Mobile Technology

Project *mGBL* [14] developed 3 prototype mobile phone games aimed at 16 to 24 year old students. The goal was to improve the effectiveness and efficiency of learning through the use of mobile technology. Quiz type games were developed in the area of health and career guidance and published results suggested a high motivational factor by the player to interact with the games.

IPerg [15] (Integrated Project on Pervasive Gaming) also found a high motivational factor from players. In a 4-year project running from 2004 until February 2008, *IPerg* created and trialed 18 pervasive games. Not all of them were developed for mobile devices, but they included "Massively Multiplayer Mobile Games", games where a large number of players play the game for long periods of time using mobile phone. Their games "Day of the Figurine", "Coup" and "Mythical: The Mobile Awakening", are examples of such games. Other titles developed, such as "Hitchers", were prototype games that exploited cellular positioning on mobile phones to support location-based play, or "GeoQuiz", where players competed against each other in a mobile location-based game of questions and answers.

4.2 Examples using Web-based Technology

ThinknDrinkn [16] was a project designed to raise the issues associated with alcohol abuse in young people and their local communities. A web-based game was developed where players must provide fluids and food to a drunk friend and take them home or to hospital, avoiding obstacles including youth gangs along the way. They must also answer questions related to alcohol misuse and can use links to other websites to research information. Subsequently, the local Council explored how the game could be used as a template to develop other campaigns surrounding issues such as drugs, gambling and sexual health.

The *eMapps* [17] project also used the web as a platform. Their goal was not only to build communities students and teachers, but also to develop web-based interactive tools to deliver the required learning objectives. The project resulted in a child's living map of Europe, based on geography, history and heritage, and is accessible through mobile devices as well as the web. Supporting documents were also made available via this platform.

[14] 2006-2008, Partners – AT, AT, AT, AT, UK, HR, HR, IT, IT, SI, SI, Funding – FP6
[15] 2004-2008, Partners – SE, SE, SE, UK, DE, SE, UK, Funding – FP6
[16] 2008, Partners – UK, Funding - Renfrewshire Council
[17] 2006-2008, Partners – CZ, ES, UK, EUN, UK, Funding – FP6

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

The aim of project *SITCOM* [18] (Simulating IT-Careers for women) was to explore the potential of simulations and games to motivate girls and young women at the age of 12 to 16 to enter educational pathways related to information and communication technologies, science and engineering.

4.3 Examples using Computer Technology

The *ELEKTRA* [19] project set out to develop an adventure game that had the look and feel of a commercial recreation product, but focused primarily on curriculum-related educational purposes by incorporating a sound psychological and pedagogical framework. The project's goals were to create new learning experiences in the game environment, to enable the transfer to formal learning by using school curricula learning content, and to validate the learning process in the learning game environment. Extensive research was completed for the design, however only the concept and some game assets appear to have been produced as a final result.

The project titled *eCircus* [20] developed an approach of using computing to support social and emotional learning within Personal and Social Education. This was achieved through virtual role-play with synthetic characters that establish empathic relations with the learners. Two prototype games were created both in a 3D environment; "Orient", focusing on intercultural empathy, and "Fearnot", an anti-bullying educational game. The project ran for 3 years and ended in April 2009, with the trials of the prototypes reported as highly successful.

A small number of projects focused on providing tools and resources to the game development industry. One such project is *PlayMancer* [21]. This is a collaborative project, started on 1st of November 2007 and will run for 36 months until 2010. The goals are to develop a game engine that will lower the cost of development for serious games by shortening the development time required, and at the same time provide built in accessibility features.

Edutain [22] also collaborated with industry in an attempt to bring GRID technology (the use of computational grids where an application uses multiple computers at the same time) to the gaming sector. They created a pilot application in the form of a multiplayer first-person shooter and suggested ways that the game development sector could utilize this technology.

[18] 2004-2006, Partners – AT, PL, ES, PL. CZ, RO, EL, FR, RO, AT, Funding - Minerva
[19] 2006-2008, Partners – DE, DE, DE, DE, FR, IT, IE, AT, BE, Funding – FP6
[20] 2006-2009, Partners – UK, UK, PT, DE, UK, DE, DE, IT, UK, Funding – FP6
[21] 2007-2010, Partners – EL, AT, SW, EL, AT, ES, SW, Funding – FP7
[22] 2006-2009, Partners – SL, UK, FR, AT, UK, DE, AT, Funding – FP6

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

4.4 Examples using Recreational Technology

GameTools [23] main objective was to create next generation 3D graphics code libraries for use with future generation PC hardware, with videogame consoles such as Playstation and Xbox. The code libraries would include modules for geometry, visibility, and illumination. They developers suggest that this will allow for larger, more realistic and impressive worlds to be presented to the player, and leads to a stronger emotional immersion in the game and therefore a better gaming experience and more immersive learning. The libraries were released as open source at the end of the project.

The *Games@Large* [24] mission is to research, develop, and implement a new platform for recreational gaming. The principle is focused around a centralized server, interfacing with multiple distributed gaming displays and control units, including the TV, hand-held devices and other elements. Whether at home, in a hotel room or at the Internet Café, users can access a video game, be it for fun or for learning. Their technology will center on the television set-top box and will culminate in a commercial product.

4.5 Summary of Targeted Technology

The spread of projects across technologies is consistent with what is in use in schools. The use of mobile platforms appears to be on the increase as does web based technology.

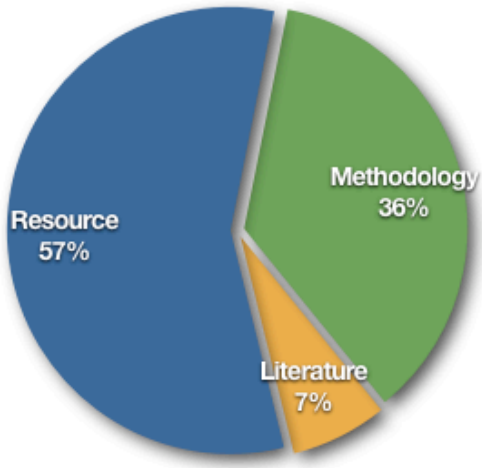
The high cost of development tools for recreational platforms adds a barrier to entry into this market. However, as many of the larger manufacturers look at alternative business models for developers to complete with the success of games from independent game developers and Apple's iPhone store, this may change over time.

[23] 2006-2008, Partners – AT, FR, HU, ES, Funding – FP6
[24] 2006-2008, Partners –IL, DE, NL, NL, FI, EL, AT, EL, IT, NL, UK, IL, PT, IT, FR, UK, Funding – FP6

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

5. Categorized by Targeted Output

Most of the projects (57%) result primarily in resources provided for game-based learning. However, the resource is not always a useable game, and often only a prototype and only the trial results from the prototype are available. Methodology and use cases were the result of 36% of the projects, with 7% having literature as the main output. Selected examples were chosen from the data available.



Resource
mGBL
SIG-GLUE
Touareg
UNIGAME
IPerg
Game On
Goal Net
cu@city.eu
L2C
ElderGames
edutain@grid
GameTools
G@L
VirtualLife
eCircus
RENAISSANCE
INSCAPE
ThinknDrinkn
e-vita
Prosperity
Easy2
DANT/IPRASE
Eurogame
Racing Academy
Honoloko
ILGRECO
Europa Eureka
Radiation Games
SITCOM

Methodology
Aitmes
eMapps
ELEKTRA
Discover
ARGuing
80Days
Playmancer
GAMES
InterLoc
ANSWER
TA2
TARGET
IRIS
FUGA
GameSpace
Consolarium
Kaleidoscope
Learning Game
TiM

Literature
GaS
mGain
Games in Schools
Teaching with Games

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

5.1 Output is Primarily Literature

The *Games in Schools* [25] project resulted in an extensive document covering use cases from throughout Europe and a literature review of current research in the field. The document concludes with recommendations for both decision makers and game produces. The report is over 160 pages and is published in both hardcopy and digital format. Guidelines for teachers are currently in production.

MGain [26] set out to answer the question, what constitutes mobile entertainment? They reviewed all forms of entertainment delivered through a mobile device, whether it is a mobile phone, a personal digital assistant or a handheld gaming device. Their goal was to understand possibilities and restrictions of existing and emerging mobile entertainment technologies and to provide guidelines for industry and policy makers, and input for preparation of IST Framework Programme 6 in the areas of mobile entertainment services and technologies.

5.2 Output is Primarily Methodology

The *Discover* [27] project focused on the teachers rather than student or industry, and held workshops providing resource and methodologies to implement game-based learning and to foster a community of practice within this environment. Although not specifically aimed and primary institutions, many of those attending the workshops were from this audience. This project also published a book (Pivec & Moretti, 2008) detailing procedures on choosing and implementing games for learning with the classroom. This publication is available to all interested parties via the publisher. Selected guides were also translated into several languages.

The *eMapps* [28] project focused specifically on resources for teachers of children within the age of 9 to 12 years. Results included a teacher's toolkit for creating and implementing game-based learning, as well as some game-based activities for students. These are available from the project web site.

IRIS [29] is a new project (started January 2009) aiming at creating a centre of excellence that will be able to achieve an understanding of interactive storytelling and the development of corresponding technologies. The goals are to develop an integrated approach to interactive storytelling and to create methodologies to evaluate these systems as well as the media experience of interactive narrative. The project will run until the end of 2011.

---

[25] 2008-2009, Partners – EUN, Funding - ISFE
[26] 2006-2008, Partners – FI, UK, SW, UK, FI, NO, TR, FI, SW, Funding – FP6
[27] 2006-2008, Partners – IT, SW PT, ES. EL, AT, Funding – FP6
[28] 2006-2008, Partners – CZ, ES, UK, EUN, UK, Funding – FP6
[29] 2009-2011, Partners – UK, DE, FR, AT, FR, FR, SW, DE, NL, Funding – FP7

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

80Days [30] is also in the area of storytelling, integrating models of adaptive personalized learning with those of adaptive interactive storytelling. The second objective is to research the merging of virtual game environments with existing learning resources, reducing development costs and time.

The main objective of the *Learning Game* [31] project is to promote the application of innovative strategies and solutions to education, making use of videogames as teaching and learning tools. Similar to the GBL section of the *Discover* project, this project provided tutorials and training material and also held workshops in the project partner's countries on the topic of the application of videogames to education.

5.3 Output is Primarily GBL Resource

The project *SIG-GLUE* [32] provided a portal for resources of game-based learning and for the fostering of a community of practice in this area. The mission was to convince non-users of games of their educational value, to encourage and support game developers in the creation of better educational games and to make educators aware of how to use games more effectively in education. *SIG-GLUE* attracted a network of over 500 participants worldwide and established the *SIG-GLUE* quality stamp for educational games. The newly established project, *ENGAGE Learning* [33], will follow on from this work, further establishing a game-based learning community involving teachers, students, their parents, and industry.

The *Eurogame* [34] project aimed to design, build and test, a game-oriented, multilingual, multimedia tool for teaching and learning the geography of Europe. The main challenges were found to involve the actual users in all the phases of the project, and to set up a network of schools playing and learning about Europe together. Two simulation games, "Adventure" and "Strategy", were made available for the 11-14 and 15-18 years old, and "Puzzle games" were designed for training.

Honoloko [35] uses a web-based isometric platform to construct an Island for learning how to care for health and the environment. Similar to the popular Habbo hotel style, players are asked questions about what they would do for specific environmental issues. The platform is provided in 26 different languages.

[30] 2008-2010, Partners – AT, SW, DE, IE, IT, UK, DE, Funding – FP7
[31] 2006-2008, Partners – IT, IT, BE, EL, UK, LT, Funding – Socrates/Comenius
[32] 2002-2004, Partners – AT, EL, DE, IT, FI, SE, UK, Funding - Minerva
[33] 2008-2010, Partners – AT, IE, BE, ES, IT. Funding – LLP
[34] Partners – FR, DE, ES, ES, FR, FR, BE, BE, UK, UK, UK
[35] Funding – European Environment Agency

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

5.4 Summary of Targeted Output

Although the majority of projects reviewed focus on resource as an output objective, many of these only create prototype games for use within the project. Some projects, such as *Edlergames*, go on to commercialise the resulting product, and others such as *SIG-GLUE* create a community that lives on after the project has ended.

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

6. Project Sustainability Issues

Many of the projects identified have not produced sustainable results. Outputs and resources are often only available while the project is being funded and some only for the life of the project. Some projects did not achieve their stated objective of producing a useable game, many only produced a prototype, and some only created the assets to be used in the un-developed game. Other projects failed to disseminate the results, with one only registering the project URL for exactly the timeframe of the funding and no longer. The sustainability and ongoing viability of results and outputs from work undertaken, be it EC funded or from within industry, is paramount to the perceived success of any project.

6.1 Examples with Sustainable Output

Networks of community practice, such as *SIG-GLUE,* promote collaboration within the area of game-based learning and teaching. This project started in 2004 and ran for 2 years. However, the web site is still available in 2009 and the community has been actively involved in the more recent projects of *ENGAGE* and *Discover*. The *Discover* project published a book (Pivec & Moretti, 2008) detailing procedures on choosing and implementing games for learning and the *eMapps* project created resources including a teacher's toolkit for creating and implementing game-based learning.

The *Honoloko* Island for learning how to care for health and the environment is still available for public use, as are two games developed for *eCircus*; "Orient" and "Fearnot". However, there appear to be just as many projects, if not more, that have either not completed the development objective, or have not made any output available post project end date, even with a goal of public dissemination. So as not to put a negative slant on this report, these projects are known but not listed. However, some project web sites that are still reachable after the project ends have not been maintained, and now include vast amounts of spam in the forums and feedback pages. This promotes a negative connotation within this area of EC projects.

6.2 Examples relating to European Parliament Session Document

The European Parliament session document (2009) on the protection of consumers, in particular minors, in respect of the use of video games, completely supports the use of video games in education. It states that they embrace "the view that video games can stimulate learning of facts and skills such as strategic thinking, creativity, cooperation and innovative thinking, which are important skills in the information society" and further "acknowledges the educational value of video games".

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

However, the bulk of the EC report stresses the acceptance of the Pan-European Game Information (PEGI) rating system, yet none of the projects reviewed relate any of the games used or developed, with the PEGI system. PEGI not only suggests which age level the games are appropriate for, but uses a further eight categories to describe the content: violence, bad language, fear, drugs, sexual, discrimination, gambling, and online gameplay with other people. To abide by the EC recommendations, games developed for educational use, even if they are not commercialized, should not be exempt from such ratings. The *ENGAGE* project aims to catalog both recreational and educational games using the PEGI system, however, games developed within and exclusively for research cannot be cataloged unless they are made publicly available.

The report also acknowledged that video games are increasingly popular among different age groups and estimated the total revenues in the video games industry will exceed €7.3 billion in 2008. Furthermore, the Committee on Culture and Education emphasized, "video games are played by children of an increasingly wide range of ages and can have substantial educational advantages and be beneficial in developing linguistic, creative and strategic skills and intellectual capacities". However, very few of the reviewed projects created marketable products and even less took advantage of the potential lucrative market in this area.

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

7. Conclusions and Recommendations

The *eMapps* project elaborated a set of 14 recommended actions for policy-makers that resulted from the findings of the project evaluation, ongoing observations in the field and extensive interviews with project participants, teachers, officials and young people. The recommendations dated in the early 2008 foster endorsement of new pedagogies into the curriculum, address how approach innovation at the school level, by removing the barriers and allowing experimental settings. Further recommendations are categorised in pedagogical aspects, cultural and linguistic aspects, topics related to ICT and services and economic requirements.

A recent report on how are digital games used in schools, based on a thorough study initiated by the ISFE – EUN partnership, also summarized the findings in set of recommendations, in order for this potential to be exploited and made more widely available. The recommendations are tackling issues from introducing more rigorous and various methods for evaluation of practice, investigation on how digital games support learning and which types of it, to encouraging open support of various experimental approaches of usage of digital games in schools, and building communities of practice where interested teachers could communicate and exchange experience. Collaboration between teachers and industry is presented as crucial factor to get quality-learning material, which will spark overall creativity in all European schools.

Research for this report highlighted the difficulty to ascertain information from previous projects and the lack of available resulting resources. A suggestion would be to create a central repository, perhaps EC controlled, of all published documents and resulting products. Access to these could be made publicly available or upon request from interested parties.

To abide by the EC recommendations from the European Parliament session document (2009) on the protection of consumers, games developed for educational use, even if they are not commercialized and only utilized within a project, should not be exempt from the established PEGI ratings. PEGI guidelines suggest which age level a game is appropriate for and uses a further eight categories to describe the content. Project partners should be encouraged to implement these. Further information on PEGI can be found in appendix 9.3 or from their web site - http://www.pegi.info/en/index/

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

8. References

European Parliament. (2009) Report on the protection of consumers, in particular minors, in respect of the use of video games. Retrieved from http://www.europarl.europa.eu on 1st March 2009.

Pivec M., & Moretti M. (Eds.) DISCOVER Guidelines on Game-Based Learning. Pabst Vrlg. 2008, ISBN 978-3-89967-521-4.

Blamire R., & Balanskat A. (2008): Contextual analysis of the impact and potential of eMapps on national policies in relation to strategic elearning initiatives at European level (D13). http://emapps.info/eng/Results/Public-Deliverables/(offset)/10

Pivec M., & Pivec P. (2008): What do we know from research about the use of games in education? Chapter 7 in Final report: How are digital games used in schools? Complete results of the study. http://games.eun.org

Project eMapps.com. http://www.emapps.com

Wastiau P., Kearney C. & Van den Berghe W. (2009): How are digital games used in schools. Main results of the study. http://games.eun.org

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

9. Appendices

9.1 Glossary of Game Terminology

Action Game:	This genre focuses on speed, physical drama with high demands on the player's reflexes and coordination skills.
Adventure Game:	This genre focuses on puzzle solving within a narrative framework relying on the player's ability to think logical.
Avatar:	An avatar is an interactive representation of a human figure in a games-based or three-dimensional interactive graphical environment.
Commercial game:	An overall term for computer games that are sold through traditional distribution channels.
Drill-and-practice software:	Software that primarily relies on training a number of very specific skills by letting the user repeats the activity endlessly.
Educational games:	Games for learning are often imaginary (e.g. fantasy) interactive and immersive environments in which role play, skills rehearsal and other learning (e.g. collaborative or problem-based) may take place individually or in teams.
Game console:	A game console is an electronic machine for playing dedicated video games. Game consoles may need a separate output device e.g. television or a PC monitor. The main input device is a games controller, e.g. hand controller, joystick.
Game engine:	Each computer, video game or interactive application with synchronous raphics has a game engine. The game engine is the central software component, providing the underlying technologies. The engine greatly simplifies the task of games development, and often allows the game to be used on different platforms, e.g. different game consoles and PC operating systems.
Immersive world:	Immersive world is a term used in this report to mean simulations, games and other interactive, often 3D virtual spaces, or crossover spaces (e.g. between virtual and real).
MMO or MMORPG:	An abbreviation for massive multiplayer online game in which a large number of players interact with one another in a virtual world.
RPG:	An abbreviation for role-playing games in which the participants assume the roles of fictional characters and collaboratively create or follow stories. Participants determine the actions of their characters based on their characterization, and the actions succeed or fail according to a formal system of rules and guidelines
RTS:	An abbreviation for real-time strategy games that refer to a combination of action a strategy typically involving resource management and the waging of war.
Simulation:	Games where realism is first priority. The player's ability to understand and remember complex principles and relations is paramount.
Strategy Game:	Genre where the ability to make deal with dynamic priorities is key.

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

9.2 Examples Listed by Funding

Project Title	Funding Program
InCoCo Innovation, Coordination and Collaboration in Service Driven Manufacturing Supply Chains	EC
SIG-GLUE Special Interest Group for Game-based Learning in Universities and lifE long Learning	EC eLearning initiative
cu@city.eu A game on Citizenship for young people	Education and Culture
GAMES Games for Design and Verification	FP5
RENAISSANCE Virtual Renaissance Court	FP5
IPerg Integrated Project on Pervasive Gaming	FP6
edutain@grid GRID technology	FP6
GameTools next generation realtime 3D libraries	FP6
eCircus Roleplaying capabilities that understand social interaction	FP6
INSCAPE Interactive Storytelling for Creative People	FP6
FUGA The Fun of Gaming: Measuring the Human Experience of Media Enjoyment	FP6
mGain Mobile Entertainment Industry and Culture	FP6
mGBL mobile Game-Based Learning	FP6
L2C Learning to Collaborate	FP6
G@L Games@Large Integrated Project's	FP6
80Days around an inspiring virtual learning world in eighty days	FP7
Playmancer	FP7
ANSWER creative process of film and game production	FP7
VirtualLife computer-based simulated environment	FP7
TA2 Together Anywhere, Together Anytime	FP7
TARGET Transformative, Adaptive, Responsive and Engaging Environment	FP7
IRIS Integrating Research in Interactive Storytelling	FP7
ElderGames e-inclusion of elderly people	FP7
Games in Schools	ISFE
InterLoc Digital Dialogue Games	JISC
Consolarium	Learning and Teaching

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

Scottish center for games and learning	Scotland
Touareg Tourism platform for European educational games	Leonardo
Goal Net Game On Accessible Learning Programme	Leonardo
Prosperity Interactive Vocational Training System	Leonardo
BE CuLT extend Language learning platform	Leonardo
e-vita European life experiences – game-based and intergenerational learning	LLP
ENGAGE Learning European Network for GrowingActivity in Game-based learning in Education offering	LLP
Games Atelier Development of location-based mobile games	M&ICT
ThinknDrinkn? GBL for alcohol abuse in young people	Renfrewshire Council
ARGuing **Alter**nate reality game for education	Socrates
Easy2 Language learning platform	Socrates
Discover Helping teacher to discover the pleasure of learning and teaching	Socrates/Comenius
Game On GBL for Prisoners, those at risk of offending and ex-offenders.	Socrates/Grundtvig 1
Aitmes Appling IT Mobile Education on Schools	Socrates/Minerva
UNIGAME Social skills and Knowledge Training	Socrates/Minerva
ELEKTRA Enhanced Learning Experience and Knowledge transfer	STREP
eMapps Motivating Active Participation of Primary Schoolchildren in Digital Online Technologies for Creative Opportunities through Multimedia.	STREP (FP6 IST)
GaS Games as Services	Tekes
GameSpace A Method for Design and Evaluation of Mobile Multiplayer Game	Tekes
Great European game	Youth 2000

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

9.2 Example URL Reference

Project Title	Website URL
Aitmes Appling IT Mobile Education on Schools	www.aitmes.org/index.html
eMapps Motivating Active Participation of Primary Schoolchildren in Digital Online Technologies for Creative Opportunities through Multimedia.	www.emapps.info
ENGAGE Learning European Network for GrowingActivity in Game-based learning in Education offering	www.engagelearning.eu/
ELEKTRA Enhanced Learning Experience and Knowledge transfer	www.elektra-project.org
mGBL mobile Game-Based Learning	www.mg-bl.com/
SIG-GLUE Special Interest Group for Game-based Learning in Universities and lifE long Learning	www.sig-glue.net/index.html
Touareg Tourism platform for European educational games	almaty.fh-joanneum.at/touareg/
Discover Helping teacher to discover the pleasure of learning and teaching	www.discoverproject.net
UNIGAME Social skills and Knowledge Training	www.unigame.net
IPerg Integrated Project on Pervasive Gaming	http://www.pervasive-gaming.org
ARGuing Alternate reality game for education	arg.paisley.ac.uk
Game On GBL for Prisoners, those at risk of offending and ex-offenders.	gameon.europole.org
Goal Net Game On Accessible Learning Programme	www.goal-net.eu
80Days around an inspiring virtual learning world in eighty days	www.eightydays.eu
cu@city.eu A game on Citizenship for young people	www.mollydesign.com/citizenship/
L2C Learning to Collaborate	www.l2c.info
Playmancer A European Serious Gaming 3D Environment	www.playmancer.com
GAMES Games for Design and Verification	www.games.rwth-aachen.de
InterLoc Digital Dialogue Games	www.interloc.org
InCoCo Innovation, Coordination and Collaboration in Service Driven Manufacturing Supply Chains	www.ventanasystems.co.uk
ElderGames e-inclusion of elderly people	www.eldergames.org

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

ANSWER creative process of film and game production	www.answer-project.org
edutain@grid GRID technology	www.edutaingrid.eu
GameTools next generation realtime 3D libraries	www.gametools.org
G@L Games@Large Integrated Project's	www.gamesatlarge.eu
VirtualLife computer-based simulated environment	www.ict-virtuallife.eu
TA2 Together Anywhere, Together Anytime	www.ta2-project.eu
TARGET Transformative, Adaptive, Responsive and Engaging Environment	Available soon (new project)
eCircus Roleplaying capabilities that understand social interaction	www.e-circus.org
RENAISSANCE Virtual Renaissance Court	www.cultivate-int.org/issue3/renaissance/
INSCAPE Interactive Storytelling for Creative People	www.inscapers.com
IRIS Integrating Research in Interactive Storytelling	iris.scm.tees.ac.uk
ThinknDrinkn? GBL for alcohol abuse in young people	thinkndrinkn.paisley.ac.uk
e-vita European life experiences – game-based and intergenerational learning	www.evitaproject.eu
Great European game	www.mladinski-ceh.si/
Prosperity Interactive Vocational Training System	prosperity.wsb-nlu.edu.pl/eng/o-projekcie.html
BE CuLT extend Language learning platform	www.becult.org
Easy2 Language learning platform	www.easy2.org
FUGA The Fun of Gaming: Measuring the Human Experience of Media Enjoyment	project.hkkk.fi/fuga/
GaS Games as Services	gamelab.uta.fi:8080/gas
GameSpace A Method for Design and Evaluation of Mobile Multiplayer Game	gamelab.uta.fi:8080/GameSpace
mGain Mobile Entertainment Industry and Culture	http://www.mgain.org
Consolarium Scottish center for games and learning	http://www.ltscotland.org.uk/ictineducation/gamesbasedlearning
Games in Schools	http://games.eun.org
Games Atelier Development of location-based mobile games	http://www.waag.org/project/gamesatelier

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

DANTE / IPRASE project Learning by playing	http://www.iprase.tn.it/en/
Kaleidoscope Learning Patterns for the design and deployment of Mathematical Games	lp.noe-kaleidoscope.org
Eurogame European Regions Game	http://www.educational-concepts.de/pprojects/eurogame.html
Teaching with Games	http://www.futurelab.org.uk/projects/teaching-with-games
Racing Academy	http://www.futurelab.org.uk/projects/racing-academy
Honoloko An Island to Learn How to Care for Health and the Environment	honoloko.eea.europa.eu
ILGRECO Implementing Learning Game Resources based on Educational Content	http://ilgreco.europole.org/
Europa Eureka! Have fun discovering Europe and its languages	http://www.europa-eureka.cz/
Learning Game	http://learninggame.pixel-online.org/
Radiation Games in Virtual Reality and Adressing Public Ethical and Risk Concerns	http://www.bioanim.com/
SITCOM Simulating IT Careers for Women	http://vk-server2.donau-uni.ac.at/sitcom-moodle/
TiM Tactile Interactive Multimedia Computer games for visually imparied children	http://inova.snv.jussieu.fr/tim/

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

9.3 PEGI age rating labels

PEGI 3
The content of games given this rating is considered suitable for all age groups. Some violence in a comical context (typically Bugs Bunny or Tom & Jerry cartoon-like forms of violence) is acceptable. The child should not be able to associate the character on the screen with real life characters, they should be totally fantasy. The game should not contain any sounds or pictures that are likely to scare or frighten young children. No bad language should be heard and there should be no scenes containing nudity nor any referring to sexual activity.

PEGI 7
Any game that would normally be rated at 3+ but contains some possibly frightening scenes or sounds may be considered suitable in this category. Some scenes of partial nudity may be permitted but never in a sexual context.

PEGI 12
Videogames that show violence of a slightly more graphic nature towards fantasy character and/or non graphic violence towards human-looking characters or recognisable animals, as well as videogames that show nudity of a slightly more graphic nature would fall in this age category. Any bad language in this category must be mild and fall short of sexual expletives.

PEGI 16
This rating is applied once the depiction of violence (or sexual activity) reaches a stage that looks the same as would be expected in real life. More extreme bad language, the concept of the use of tobacco and drugs and the depiction of criminal activities can be content of games that are rated 16+.

PEGI 18
The adult classification is applied when the level of violence reaches a stage where it becomes depictions of gross violence and/or includes elements of specific types of violence. Gross violence is the most difficult to define since in a lot of cases it can be very subjective, but in general terms it can be classed as the depictions of violence that would make the viewer feel a sense of revulsion.

Descriptors shown on the back of packaging indicate the main reasons why a game has received a particular age rating. There are eight such descriptors: violence, bad language, fear, drugs, sexual, discrimination, gambling and online gameplay with other people.

Bad Language
Game contains bad language

Discrimination

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme

Game contains depictions of, or material which may encourage, discrimination

Drugs
Game refers to or depicts the use of drugs

Fear
Game may be frightening or scary for young children

Gambling
Games that encourage or teach gambling

Sex
Game depicts nudity and/or sexual behaviour or sexual references

Violence
Game contains depictions of violence

Online gameplay
Game can be played online

Extended Consumer Advice
This is specific information explaining why a game received its classification. A number of examples are listed below:
Contains: extreme violence, criminal techniques, glamorisation of crime, strong language
Contains: comic violence
Contains: nudity, strong language, unrealistic violence

This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Education and Culture DG
Lifelong Learning Programme