RESEARCH GAME

The European scientific research game for schools

METHODOLOGY GUIDE

Authors

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1. Introduction

To avoid misunderstanding it is to be said that an educational online game is not a virtual classroom only based on online available courseware. The research game offers much more freedom and supports individual pathways what concerns the acquisition of knowledge about topics and methods used in sciences. The research game combines both the opportunities and advantages of collaborative work in virtual worlds on the one hand, and the didactical methods of science provided in the form of a serious game framed in an online competition. Each user of the research gamey can decide and choses his own way but can rely on the help and guidance of the participating teacher, trainer and e-moderators.

2. The abstract model

A serious game scenario can be seen as a kind of framework consisting of several elements, and is characterized by the interaction between the elements. The elements are of technical and human nature.

The platform is characterized by its content: the game itself, glossary, bibliography, links, blogs, sources, libraries, and the functionalities (communication channels, work space, bridges and connectors to other sources and thematic networks outside the research game space etc. provided, participants by its activities. Interaction (= actions) as indicative feature of a net game happens between the participants and the platform on the one hand, and on the other hand between the participants (=user) of the platform themselves. The activities of the participants depend on the level of the game.

Framework of the serious game

Platform			Participants
Tecnhical Components	Content	Functionalities	Activities

3 THE FRAMEWORK FOR THE RESEARCH GAME

3.1 The platform
3.1.1 Technical components

1) **Resources**: Providers will need well-trained programmers and software developers, experts for development or monitoring of learning materials provided on the site and within the community, administrative personnel, moderators and hosts (also monitoring behaviour of learners etc.) and creative experts in the fields of online marketing, social networking and Web 3.0/4.0 development.

2) **Hosting of the game**: As the number of users will be accordingly high and as it is assumed that the users will be from different the recommendation of experts goes to using a hosting service provider with all support levels, back-up system and eventual outsourcing of technical support hotlines for users / community members.

3) **Software**: For start-ups, open source software like Moodle is recommended. Other software, such as word press might be applicable allows blogging since it is easy to integrate. For the virtual learning environment, experts recommended Dokeos and open-EIS for its reliability, forms of modularization and language versions available.
The software packages includes assignment submission, discussion forums, file downloads, grading, instant messages, news and announcements, online quizzes.

4) **Design**: Most sites show the provider's CI, company logo and company colours. The sites in general have a clear navigation system on the left side or on the top below the top-banner. Navigation with some sites has additional pop-up boxes with additional functions. The design differs according to the allocated role of the member of the community. Thus offer additional functions which only are visible for registered users of the respective level. The design should be without too many gadgets, a quiet design, no moving or fancy hopping figures, light colors and a design that is clearly linked to an easy-to-use navigation

5) **Accessibility and Usability aspects**: Normally users gain access to the game following a registration process, providing an email address and setting a password to log in. Barrier free access is a must and should be compliant with w3c standards. Usability should not depend from speed of Internet access points (still not all learners have high-speed access etc., should also work with mobile access and access in remote areas, low-speed access).

6) **Interoperability and use of standards**:
The platform has to meet SCORM standards.

7) **Connectors**: To reach a wider scope (user / content) and to enable the possibility to embed more sources connectors to online resources should be foreseen. For linking with other networks/serious game communities social plugins (facebook, twitter, google+, etc) should be used.

8) **Privacy**: Privacy is ensured by registration of all users, commitment to follow national or European data protection laws, the possibility to file complaints about other users who seem to misbehave and, for some sites, the use of nicknames.

Today, privacy and protection of individual data rights are of upmost importance. Special attention should be given to:
• registration process of learners
• possibility of use of nicknames and real names
• verification of data (Post-Ident etc.)
• tools to report abuse or misuse of privacy
• tools to report harassment
• extra registration to upload materials.

3.1.2 The content
The content including the game provided is aimed for informal learning. The learner has the freedom to apply the learner style and speed accordingly. The content will be of different forms such as texts, images, audio and video files. Besides provisioning of content, such as game scenarios from third parties all possible material usable for informal learning can be shared by the learner and by the learning partners so that the stock of content is permanently growing.

The game design is described in a separate document.

3.1.3 The functionalities
• registration (asking for real name, valid email, valid address etc.)
• trail-learning course or experience

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- tracking system to check the learning progress
- profile of learner to indicate special interest, level, regions, etc.
- individual learning, e-learning
- group learning
- chat
- download of learning materials
- blogs
- chance to upload learning materials from other sources which a learner found useful (pay attention of copyright issues!)
- video and audio materials
- chat with e-tutor
- administrative and technical support
- FAQs
- exams and tests
- debating groups
- fixed groups of learners
- open groups of learners
- personal space and contact-box for message from other learners
- eventual space for teachers and providers of professional training materials
- matching system with recommendation for the participants
- typical features of social networks of forming groups of special/common interests
- links to external sources
- netted system
- user work space.

3.2 The participants and their roles

For a successful working community it is necessary to clarify, or better to say to define the roles and the responsibilities of the various actors in the community.
In some cases participants can have or take up different roles.

3.2.1 The role of e-moderators
The role of the e-moderator can be of different shape and covers mainly administrative tasks
- Passive help: map (for usage in offline times of the e-moderator)
- Motivator
- Support in matching processes
- Allocation of sources to the appropriate source pool
- Active help: guide through information, directions where to go when someone gets stuck (either content related or technical related)

- Control and schedule processes
- Intermediate in case of problems and conflicts.

3.3 Organizational aspects

1) Access to the game community (*free, or after registration*): The access to the game community should be for free as a fee represents in most cases a barrier. The learners receive their registration and online-access data from their classroom teachers. Valid data has to be entered and verified during the registration process. Learners should clearly see which data will later be public (i.e. name, location) and confidential (i.e. address, contact data). With non-commercial sites the user gains access to the community after registration, providing an email address and setting a password to log in.

2) Moderation of the community: Moderation should be available on all levels and entry points of the community. The moderator should serve as facilitator.

3) **Involvement of e-tutor e-tutors** are highly recommended, however they are difficult to provide for free. Learners we talked to appreciated an e-tutor at the end of each step of progress in order to check upon their achievements. An e-tutor can be a teacher talking to you, doing a live-test etc. or an expert discussing progress with students/learners in real time and their future progress in the learning community.

4) Communication process: 1 to 1, 1 to all, all to one, all to all: One to one communication applies to communications with tutors or teachers. All-to-all group discussions seem to be the most popular. 1-to-all and all-to-one happen during the game and the processing of the given tasks.

5) Resources: Providers need well-trained programmers and software developers, experts for development or monitoring of learning materials such as new game scenarios provided on the site and within the community, administrative personnel, moderators and hosts (also monitoring behaviour of learners etc.) and creative experts in the fields of online marketing, social networking and Web 3.0/4.0 development.

6) Forms: The game framework should be open to everybody but with a clear structure, scheduled

events such as online game competition, etc.

7) Institutional Support: Institutional support is provided in a few ways; through own capacities of the partner of the project. Furthermore the community links up with professional teachers in natural sciences, schools, universities or even governmental institutions in order to sustain their services and fulfil their learners' expectations in the role of e-moderator only.

8) Synthesis of the game: According to the registration the learner will be assigned to a starting point of the game. There he/she has the opportunity to get acquainted with the game rules, teaching materials and resources. Depending on the learning aim, either the learner enters into the self-learning process, or starts to join the online game competition.

9) Guidance: Depending on the individual background some users prefer professional moderators to maintain groups and chats and manage communication between members, on the other hand in some cases it was noticed that motivated users can take up the same role. In forums, a member of the forum might be selected as moderator.

10) Interaction: The interaction is manifold depending on the given task and game scenario. It happens between the learner and the virtual world by playing the game and/or communication with other participants of the game , and in the real world with the team members of the game by processing and fulfilling of given tasks.

11) Schedule: Although it is a community for informal learning 24/7 access to administrative and technical support should be provided, optional will be the access to e-tutors based on time slots during the day (with special concentration in the late afternoon and evening) which for these sites are times of high usage.

12) Help desk: Helpdesks, email hotlines, FAQs and online help & search inquiry lists shall be provided for the case that the user gets stuck. In additional, learners can voluntarily register to be part of a quality-assurance team. Advanced and more experienced learners.

13) Target group: The group is open to all levels and all kind of who wish to learn about then scientific method, useful for all sciences.

14) Game marketing: The success and the acceptance of a the serious game offer is totally dependent on the users themselves. If the community does not comprise a critical mass of active, permanent users the community will fail as it is matter of attraction and added value delivered by the contribution of each active user. Features of successful communities are strong marketing and sponsoring aspects, integration into networks, or cross-linked network operations, advertising. The serious game should be a "living" object. Open for further scenarios.

3.4 Didactical aspects

1) Sustaining Motivation and Commitment: Since these sites are paid-for sites, learners in general wish to make best use. Some sites allow a faster progress and thus a reduction of costs which motivates learners to keep on going and to work hard. All sites offer quizzes, quick exams etc.. Good results will receive public applause in the classroom.

2) Deal with disruptive change: Some have short online tutorials for new learning instruments. All learning material can be tested in mock-up applications on an individual base. Feedback-forms to the developing centre allow learners to give direct feedback on changes, technical innovation and other forms of disruptive and non-disruptive change.
Teachers, more than learners, need training and support to deal with new technologies that are taking an increasing importance within the serious game as a learning environment. Learners are already searching for serious games on the web, they just need tutor guidance to be able to choose the right tools and use them effectively.

3) Use of communication channels: All commercial serious game sites offer chat, forum, blogs, audio and video files for streaming and download. Some games offer additional functionality such as mobile apps linked to the online learning community and selected forms of off-line and on-line language learning with mobile devices (iPhone, Android phones). These sites are extending their reach out to learners and offering more "points of access" to the online learning community.

4) Level: All serious game sites have entry-levels: beginner, advanced, professional.

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5) Learning methods: The serious game offers informal learning on an individual level, although learning with virtual class room material will be accessible, tandem learning, e-tutor learning in groups of up to five learners and small group discussions (debating). Class atmosphere has to be avoided.

6) Definition of learning aims: The learning depends on the usage. On the one hand the aim can be to become familiar with a given topic, e.g. biodiversity, or on the other become familiar with special learning techniques such as the scientific method whereby the method is independent of the learning subject.

4 WORK FLOW

The workflow consists of 2 stages:

1)registration,

2) usage (getting familiar with additional materials, playing the game, evaluation of the results).

The user enters the community using the login/password combination chosen at the registration step.

5 LIFE CYCLE OF THE PLATFORM

5.1 Built

The software will be installed according to the given recommendation and the appropriate administrative rights will be set.

5.2 Pilot

The pilot will run through 4 revolving loops with the aim to identify errors, problems in the handling, missing features etc.

5.2.1 Test
The test has to be carried out for each language separately. The results will be documented by means of questionnaires.

The following items and issues should be checked:

Usability:
   NavigationDecision making process (always clear what happens next),
   Visibility (where I am? What is active and what is inactive),
   space,
   layout of the site,
   always visible what must be visible to the user according to his role,
   functioning of communication channels,
   function operational activities (create, add, delete, change, upload, download) - easy to use sources outside the platform,
   easy to communicate,
   import and export functionalities,
   easy to connect to other communities and to share materials such as photos, links, audio or video files.

Content:
   help desk always visible and in reach,
   clear allocation to the referring topic and language,
   working hyperlinks in the case that contents come for outside,
   take respect to IPR,
   is sufficient enough as supporting resource for informal learning avoid of overload of information,
   variety of authentic material (audio, video, images).

Technical:
   compatibility with different browser,
   appearance on different screens (resolution check),
   appearance on mobile devices.

5.2.2 Improve
After the evaluation of the questionnaires the appropriate changes and improvements have to be implemented. According to the plan for piloting the next cycle of testing can be started.

5.3 Launch

After the pass of the pilot phase the production model of the serious game will be launched to be exposed to the public.

5.4 Feed

The acceptance and with it directly connected the

success of the community is very close linked to the number of participants and to quality and quantity of the learning material and the way it is provided. There should permanently new stuff (cases, game scenarios)to share within the community to keep people in the community being keen on grabbing the latest news. The following ways are recommended: controlled feed of selected materials by the e-moderator feeds provided by the network partners and learners.

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