

Genius methodology - implementation protocol

Krzysztof Podlaski¹, Ali Bitarafan², Hiram Bollaert³, Shane Dowdall⁴, Johanna Hautamäki², Artur Hłobaż¹, Maes Sven³, Piotr Milczarski¹, João Monteiro⁵, José Pereira de Morais⁵, Nelson Neves⁵, Philippe Possemiers³, Derek O'Reilly⁴, Grzegorz Szewczyk², and Sarah Tanner⁴

¹Faculty of Physics and Applied Informatics, University of Lodz, Poland

²Centria Ammattikorkeakoulu Oy, Finland

³AP Hogeschool Antwerpen, Belgium

⁴Dundalk Institute of Technology, Ireland

⁵Instituto Superior Politécnico Gaya, Portugal

Contents

1	Introduction	2
1.1	The concept	2
1.2	Project Genius	2
1.3	Methodology, short description	3
2	Participants	4
2.1	Students	4
2.2	Mentors	5
2.3	External experts	6
3	Virtual workshops	7
3.1	Genius didactic materials	8
4	The main event	10
4.1	Venue	10
4.2	Accommodation	10
4.3	Schedule	10
4.3.1	Daily schedule	10
4.3.2	Event workflow	11
4.4	Presentations	13
4.4.1	First presentation - day D2	13
4.4.2	Second presentation - day D6	13
4.4.3	Working prototypes show-off - day D9	13
4.4.4	Testing the final presentation - day D9	13
4.4.5	Final presentations - day D10	14
4.5	Social events	14
5	Teamwork and mentoring	15
5.1	The team	15
5.2	Teamwork	15
5.3	Mentoring	16
6	Didactic outcomes	17
6.1	Domain competencies	17
6.2	Soft-skills	17
7	Implementation case studies	19
7.1	Internal school project	19
7.2	Shorter version of the project	19
7.3	One small team integration	19
8	Summary	20

Chapter 1

Introduction

1.1 The concept

In the society of the XXI century, we can observe very strict specialization. Everyone is a specialist in a rather narrow domain. The reason for this can be explained by a massive amount of the knowledge humanity possesses. One person cannot be good at everything. On the other side, the complications of everyday products grow rapidly too. Creating a product or service, a company needs specialists from many different domains. All this leads to important questions: how to build a modern information society from highly specialized individuals? How to prepare young people that graduate from academia to fit in the modern job market nicely? On the one hand, the market demands a high level of specialization and, on the other very interdisciplinary teams of specialists. Thus, academia has to prepare students for these demands. The student along the domain competencies should be equipped with adequate soft competencies. We can collect soft-skills in ten groups: communication, teamwork, adaptability, problem solving, creativity, work ethic, interpersonal skills, time and self-management, leadership, and attention to detail. These groups are not disjoint, for example, empathy is required for communication, teamwork, interpersonal skills, and leadership. Moreover, these skills cannot be taught in class, and we can just enhance their development during specially prepared training. This development of soft-skills in students was the main reason to start the Genius project.

As soft-skills can't be learned in a traditional teaching approach, we have decided to use the project team-based approach. The students are required to work in interdisciplinary and international teams and achieve goals. There are not too many types of project goals that require a multidisciplinary team, which can be requested from a group of students and is achievable in a short time, around ten days. We have chosen the area of gamification, here we need a group with technical competencies, other persons that can create the content of the game, and last but not least persons with knowledge on commercialization and business potential assessment. It is also worth to mention most of the young people, students, are fond of games and gamified solutions.

This document is an implementation protocol of the methodology developed during the Genius Project. Here one can find a description of the methodology, the requirements, and essential suggestions on how others can implement it.

1.2 Project Genius

Genius is an Erasmus Plus project that took place between 1 November of 2017 and 1 December of 2020. The project was financed by the Erasmus Plus Programme. The project's main goal was: to develop and test the methodology for soft skills development with the use of blended learning activities. The consortium of the Genius project has five participating academic institutions: University of Lodz (Lodz, Poland - leading institution), AP Hogeschool Antwerpen (Antwerp, Belgium), Centria Ammattikorkeakoulu Oy (Kokkola, Finland), Dundalk Institute

of Technology (Dundalk, Ireland), Instituto Superior Politécnico Gaya (Gaya, Portugal). In the project, the methodology was developed and tested within intensive projects in Kokkola (2018) and Antwerp (2019). It was planned to run the last final testing event in Porto in 2020, but unfortunately, the COVID-19 pandemic changed our plans drastically. In the three year project, 15 teachers and more than 90 students, from 5 different intuitions, participated. This methodology could not exist without them and many others who helped us.

1.3 Methodology, short description

The proposed method is divided into two parts virtual and physical workshops.

The first virtual part is devoted to preparation. The students who participate in the project should have a basic set of domain competencies. This part is needed when we have a set of students from different educational institutions. Otherwise, it would be unreasonable to demand two sets of students from various institutions, countries to have the same set of domain competencies on any level of their study programme. For that reason, the first period is designed to give students the same level of domain competencies. As was mentioned before, in the project, we expected many different students from many domains, and we do not demand that all the students have the same competencies, this would kill the interdisciplinary. On the contrary, we need a set of students with different skills. However, for example, all computer science students are expected to be on a similar level as their tasks in the project would be similar. Therefore, we have prepared exemplary didactic materials for these virtual workshops (details in Chapter 3).

When students are prepared, they meet in a real environment for a short period (around ten days). All students who participate in the project, from different study programmes are divided into small groups, and each has 5 - 8 persons. Every group is appointed with a mentor who helps the group to achieve its goal. The groups have a task, create a prototype of a gamified solution in the theme provided. The themes of the event should be connected to the local society. In the Genius project, we have used two themes: “Elderly care in Europe, especially in Finland” and “Motivate people to sports activities in the city of Antwerp”. As we can see, these themes are based on society and its needs. At the beginning of the event, we present the theme to all students. The groups have to invent their ideas of games, gamified apps connected to the topic. During the event, students have to create/prepare the prototype of the solution and assess its business potential. In the final official presentation, the group has to convince others that the idea is worth supporting in the future.

Our reference implementation students are from five different countries and represent a few disciplines (computer science, graphic design, tourism, management, and others). In this case, in a small, five-member team, we can find two technical persons (from CS), and three students represent other areas. It creates a pleasant interdisciplinary and international mix, and the participants have to be able to communicate with other members who do not exactly have the same knowledge and competencies. Very often, “technical” members have to explain technical details in simple words to the others, the same is when the group discusses the business potential of the solution. Students have to present, as a group, the idea, and the prototype. All these demands from students to train, develop their soft-skills to achieve the goal as a team.

Chapter 2

Participants

The presented methodology demand two crucial groups of people: Students and Mentors. Both groups are fundamental, and the students are the group that will develop their soft-skills. The students are the primary beneficiaries. At the same time, the mentors observe and help the participants to obtain goals. Here we discuss both of the groups in detail.

2.1 Students

The students, as was mentioned before, are the primary beneficiaries of the method. These are the people whose soft-skills will be developed during the project. One, if not essential, demand is the group of all students has to be diversified. Only diversification and interdisciplinary can be very challenging for participants' communication skills. The small teams created in the project are asked to create a prototype of a mobile game, gamified mobile app. Therefore, we need a group of computer science students with some skills in development. The teams are also asked to present the business plan for a start-up, created to realize their idea. This demand to have a group of participants with competencies in management and business potential assessment. The theme should be connected to the real need of society, organizers companies. As the theme can be very open in the project, there is a place for students representing many other disciplines. In truth, all possible mixtures are on demand.

Let us now recapitulate. The types of students we think should participate in Genius like projects are:

- Computer science students, with a high/moderate level of competencies in application development. Probably the second or third year of bachelor's degree or any level master's degree. These people will take the role of a senior developer in a team.
- Computer science students, with low/moderate level of competencies in application development. Probably the first or second year of bachelor's degree. These people will take the role of a junior developer in a team.
- Management or business students, they will take the role of **business planners**.
- The other types of students that can take the role of content creators, content designers. Here very welcome are people with some level of graphical skills, story building skills, tourism activity designers, etc.

The student can take many roles in the team. Some are more obvious as are connected to their educational background. Others might depend more on the student's personality or experience.

Remark

In the Genius reference implementation, all teams were asked to create a mobile game or gamified app. Therefore, we demand the participation of CS students. If someone would like to change the predicted outcome, the demands from a group of participants can slightly differ. However, the interdisciplinary is very welcome as this enforces on a participant to train empathy, clarity in communication, active listening idea exchange, and other competencies needed in intercultural and interdisciplinary communication.

2.2 Mentors

The mentors are the persons that lead the project. These people are responsible for tracking if all participants can obtain the right results. As was mentioned, each team has one mentor. The role of the mentor is to observe the students. In any case, a mentor should not lead the team. It can happen that mentor can take the role of moderator or critic and show the team a different perspective of their idea. As the tasks in the team during the project are very diverse, the mentor cannot be a specialist in all the areas the team has to cover. We suggest that the group of mentors should cover all aspects relevant to the project, from technical, business, and management to presentation and communication skills. In that case, if a group has a problem with business assessment, and their mentor has a technical background, the mentor can ask an appropriate member of the mentor group to advise the team.

The group of mentors should contain persons with competencies in the following fields:

- Computer science, a specialist in game, apps development.
- Teamwork, team management, and preferably agile development.
- Business potential assessment.
- Services design and appropriate methodologies like Design Thinking.
- Content design, storytelling.
- Gamification processes.
- Areas connected to the theme of the project¹

Remark

It is natural that teams treat the event as competition and would like their team to win it. However, the mentors should propagate the idea that if a single team does not achieve its goal, a project can be treated as a failure. The mentors have to enforce cooperation between the groups. That means if one group has a solution for a specific technological problem, and the other one also needs that solution, both teams can and should exchange ideas and knowledge.

¹It is possible that some persons that have needed competencies in the area of the theme are not a member of the group of mentors, they can take an advisory role for the project. This way they can advise all teams in the project.

2.3 External experts

The project often requires the existence of external experts. They can help teams to work on their ideas (as advisors). The external experts can take part in the audience during all presentations. However, the external experts are required during the final presentations, and here the role is to assess the quality of teams' ideas and prototypes. In our mobilities, the external experts were the client or representatives of the client. The client is the organization who puts forward the theme of the event. In the Antwerp mobility, the sports department of the city of Antwerp assigned a representative who informed the teams on details of the theme. In Pietarsaari, it was a company that creates applications for elderly care institutions.

Chapter 3

Virtual workshops

The participant who started the project has a different level of competencies in their domain. The project designers should decide what type of technology they use. We can and probably should demand all teams use the same technology. Previous experience in Genius like projects suggests that many problems occur when students are allowed to use any technology. It happens as students often overstated their competencies in technology and cannot solve team problems in a short time (10 days). If the team uses the predicted technology and the team of mentors contain a specialist in the area, the problems can be solved during the main event of the project. Limiting the technologies teams are allowed to use for their idea, improves the outcome. The consortium of Genius decided to use web-based mobile technologies (Cordova¹ and Ionic²). For the reference implementation, the Consortium created a set of didactic materials that can be used by participants to prepare for the main event. The materials have been divided into three areas: Technological, Software and Service design, Business assessment, and Gamification.

1. *Technological materials*
 - (a) Animations in games Advanced game dev
 - (b) Mobile game/soft development
 - (c) Webservices and cloud communication
2. *Gamification*
 - (a) In the Magic Circle
3. *Service and content design*
 - (a) Applying the game to the real world
 - (b) Scenario thinking
4. *Project management and Business assessment*
 - (a) Business Plan
 - (b) Teamwork management
5. *Team work, Presentation and soft skills*
 - (a) An intercultural and interdisciplinary challenge
 - (b) Soft skills

¹Apache Cordova framework <https://cordova.apache.org>

²Ionic framework <https://ionicframework.com>

As we can see, the materials cover information from different areas that can be used in the main event of the project. It is rather evident that not all participants should use all the materials, that would kill the interdisciplinary, and on the other side, not all content can be understood by a general student as some specific background knowledge might be required. Therefore we can define three main tracks the students can follow:

Technical - courses 1a, 1b, 1c, 4b

Management - courses 4a, 4b

Content design - courses 2a, 3a, 3b

Soft-skills - courses 5a, 5b

Each student in the project should cover at least two tracks during the virtual preparation phase.

When running a Genius like project, one can decide what form the virtual part will have. In the case of our project, as partners were from different countries, we have decided to give students online material for self-learning and organize an online Q&A session for provided materials. It allows for a more flexible approach, students could arrange a time for themselves, and the Q&A sessions enforced students to do anything and will enable them to solve their problems and check their understanding of the material.

3.1 Genius didactic materials

Here we describe shortly the didactic materials created within the Genius project.

1a Animations in games, Advanced game dev

1b Mobile game/soft development

The material covers mobile development in Apache Cordova Framework. It allows students to create their mobile game/applications using HTML5, Javascript and CSS. The basic ways of accessing capabilities of mobile devices like GPS, accelerometer, etc. are also covered. As sometimes developer needs to access data using AJAX queries, the JQuery library is also introduced. The course should be taken after **1a**. Therefore, it shows how the code from the previous course can be run on a mobile device with the use of the Cordova framework.

1c Webservices and cloud communication

This course is an introduction to the Ionic framework. Ionic is a powerful HTML5 SDK that builds native-feeling mobile apps using web technologies like HTML, CSS, and Javascript. Because of those web technologies, it can run on a desktop browser which significantly simplifies testing. It is built on top of AngularJS to provide MVC architecture and Cordova for using native device functions with JavaScript code.

Ionic is focused mainly on the look and feel and UI interaction of an app and simplifies one big part: the front end.

The course comes with four starter projects to get students up and be able to start quickly.

2a In the Magic Circle

This mini-course is about gamification and strategies to design and implement gamification to motivate people.

After a definition and some examples of gamification, a holistic approach is outlined. All the steps necessary to create a gamification strategy are discussed. What follows is a list of

components from which gamification can be built, illustrated with examples and explication of their purpose and impact on the user who needs to be motivated to act.

To complete this course, the journey of the user through the gamification is described, along with sidebar topics that need attention whilst creating and implementing gamification.

The learning outcome for this course is an overall understanding of gamification, empowering the reader with tools, inspiration and knowledge to get creative and start designing a gamification strategy.

3a Applying the game to the real world

This didactic material connects games to the real world thorough service design approach. In software creation process you need to understand who your user is, what is the context where the software is used and what is the value your software creates for the user. This service design approach provides you with key elements for connecting your software to real world and to markets. Material consist of introduction to service design and value creation with instructions for a workshop. Tips for studying subjects further are included in materia. Soft Skills video presentation in teaching materials is connected to this material.

3b Scenario thinking

4a Business Plan

4b Teamwork management

The materials on teamwork management are intended to teach the learner basics of agile project management and best practices in an agile team where collaboration and teamwork is used as an strength rather than time consuming and distractive activities.

5a An intercultural and interdisciplinary challenge

Content is presented on the challenges of the pedagogical relationship between mentors and students involved in the program, focusing on the development of "hard" and "soft" skills in school contexts that mimic current employability challenges. The importance of internationalization practices pursued by higher education institutions is reaffirmed, confirming the role of pedagogical approaches to mentoring as a methodology for monitoring individual and group team performance in intercultural and interdisciplinary contexts.

5b Soft skills

Chapter 4

The main event

All participants in the project should meet during the main event. This event should take from 10 to 14 days. In the frame of the Genius, we had events that last for 10 days.

4.1 Venue

There are not many requirements for the venue of the event. There should be a rather big auditorium where general meetings can be organized. Here also all the presentations can take place. The more important is to have a place for teams to work, in our case, we had 10 small teams, each team needs a little privacy. This can be organized on a big corridor, a few big rooms where two teams can work without disturbing each other, or in a set of small rooms. Inherent to this type of project but not evident is access to internet and power.

4.2 Accommodation

If a part of the participants is not from the local city we recommend to accommodate them all in one hostel/hotel. This can be very useful in the late phase when participants often work and spend time together in the evenings. This spending time enforces integration.

Remark

The accommodation always comes with the cost. Nevertheless we suggest to arrange accommodation also for local participants. In that case all participants are in the same place, this makes cooperation and integration much easier.

4.3 Schedule

The main event is very intensive, therefore, has to be well organized. In a short time, participants have to divide into teams, design an idea for a game or application, build a prototype of the idea. Here we can present some basic drafts of a schedule (Table 4.2).

4.3.1 Daily schedule

As we can see on the table with the daily schedule (Tab. 4.1) every day in the project is very similar. The days D1 and D10 have a totally different schedule. At the beginning of the day, all mentors should meet and discuss the plan for the day. Later on, all participants and mentors meet on *General morning meeting*, here all information about the day plan, and announcements can be passed to students. During *Morning* and *Afternoon session* participants

Hours	Activity
8:00- 9:00	Breakfast
8:45 - 9:00	Mentors morning meeting
9:00-9:30	General morning meeting
9:30 - 13:00	Morning session
13:00-14:00	Lunch
14:00-14:30	General afternoon meeting
14:30 -17:30	Evening session
17:30 - 17:45	Mentors evening meeting

Table 4.1: Draft of daily schedule

usually work in groups, in days D2 and D6 one of the sessions is used for presentations, in the day D9 usually part of the *Afternoon session* is turned into prototype show-off.

Remark

We have to stress that the breakfast that starts the day is very important, from previous experiences in similar projects we have observed that this minimizes the possibility of student “arriving late” and eating together has also impact on the integration of participants. If all persons stay in the same hotel then the breakfasts could be organized there, if not we can use a big local cafeteria or common/student canteen.

4.3.2 Event workflow

Even though all days in the project have a similar plan, the task participants have to cover each day are different. The overall schedule of the main event is presented in Table 4.2.

The first day (D1) is devoted to team building. In the opening meeting, participants are informed on the theme of the event and some basic organizational issues like rules, schedule, etc. The students are told to build interdisciplinary teams. We can add some rules on team structure, in our case, it was not allowed to have two persons from the same participating institution in a team. Students should cover main roles in the team so a group that contains only programmers is not allowed. We can strengthen the team-building process by some kinds of activities like city game, bowling or another activity that allows participants to freely move between groups of people, on the other side all participants should stay in the same area. The quality of the team-building process can have an impact on team integration as well as on the quality of the teams.

The next day (D2) teams spent on brainstorming and building the first idea of a game/app within the theme of the event. Teams should decide what the game/app is, make a fast analysis if they can produce a prototype during the event, decide who is the target group of the game/app, and roughly identify stakeholders. At the end of the day in the *Afternoon session*, the teams present the first idea of the game (see Section 4.4). After the presentations team mentor should decide how to appoint a mentor to each team. Competencies of the members of the team mentor should be taken into account as well as the needs of the team. Very often at that point, we can identify easy-going teams and the teams that some problems can occur.

At the beginning of day three (D3) teams are informed about their mentors. From this day teams start to work on the idea of the game/app, build their prototype, and its content, some members should start work on a business plan. This is also the first day when mentors start the work with groups i.e. discuss with teams the game/app ideas and other issues connected to the task and teamwork.

The participants have a day off on Sunday (D4).

Day	Activity/Action
D0 [Wednesday ¹]	Arrival and accomodation
D1 [Thursday]	Opening of the event Presentation of the theme of the event Team building activities
D2 [Friday]	Teams work on game ideas The first presentation of game ideas
D3 [Saturday]	Appointment of mentors Teams work on game ideas Short workshops that recapitulate online virtual classes
D4 [Sunday]	Free time to visit a city, integrate the team
D5 [Monday]	Teams work on game ideas
D6 [Tuesday]	Teams work on game ideas Presentation of the current status of the idea
D7 [Wednesday]	Teams work on game ideas
D8 [Thursday]	Teams work on game ideas
D9 [Friday]	Teams work on game ideas Internal working prototypes show-off Testing the final presentations
D10 [Saturday]	The final presentation Assessment of the event Social event
[Sunday]	Participants travels home

Table 4.2: Draft schedule of the main event.

On days five and six (D5, D6), participants continue the work on their ideas. On day six we should organize a second round of presentations.

After the presentation on day six, when many weaknesses of team ideas were identified next two days (D7, D8) teams spend working on a prototype, business plan. At this moment usually, teams pass through moments where they are in low spirit, feel tired and lost. The help of a mentor is then very important.

Day nine (D9) is a preparation day for the final presentations. Teams can train their presentation. In our experience, we discovered that the quality of the prototypes (technical quality) is often lost when teams are focused on final presentations. Very often real solutions were replaced by some mockups. Therefore, we suggest doing something like a nonofficial prototype show-off. This makes participants aware that the quality of the prototype is important, however as this is totally internal no additional stress is put on teams.

Day ten (D10) is the final day. Participants were working hard to create the best possible prototypes and present their ideas. We usually plan to organize final presentations before lunch, after the presentation participants, mentors and observers can discuss the result, presentations during lunch, the best is to organize lunch like a buffet where people can eat and move around talking. This allows students to get additional feedback on their presented solutions. After lunch participants have free time, the mentors and organizers should assess the event. In the evening we suggest organizing a social event, this can take the form of a farewell party.

Remark

The last tenth day, can also be used for questionnaires organized by the mentor team to collect data on the perception of the participating students on the event, and to collect all their work (code, graphics, schedules, etc.).

¹As 10 days have to span across a weekend let us suppose the teams arrive at the venue place on Wednesday, this makes no big impact on the project, just shift a free day - Sunday.

4.4 Presentations

During the main event, we can distinguish four times when teams present something, here we describe independently each one.

4.4.1 First presentation - day D2

The first presentation is usually the shortest one. Each team has to create a few slides (up to five). The team has to present the team members and the idea of the game on one or two slides (like an elevator pitch). The show of one team should take up to five minutes. After each team presentation, anybody from the audience can ask questions. In the audience, we have all participants, mentors, organizers, and some external experts. One of the organizers or mentors should take the role of the moderator. It is important that mentors and organizers should be critical if the idea of the team is weak, the teams have still the time to change or rethink their ideas to make them better. It happens that the first ideas are too optimistic or too simple.

Remark

Beginning from the first presentation, mentors should demand that all members of the team have to take an active role. It is natural that some of the team members are shy and prefer not to be on stage. The main idea of the project is to develop/train the soft-skills in participants.

4.4.2 Second presentation - day D6

The second round of presentation allows the team mentor to assess if the group is going in the right direction. Each team has 8-10 minutes to present. All teams have to discuss: the team, the idea of game/app, the need the game/app solve, the target group, the technology, and technological solutions, stakeholders. Teams can omit more details like results of project assessment (canvas/swot analysis). The audience is the same as during the *First presentations*. One of the organizers or mentors should take the role of the moderator.

4.4.3 Working prototypes show-off - day D9

This happening is a less formal one. We can organize that like fair or flea market, each team has a place where at least one team member is equipped with the mobile device on which the prototype is installed. All the participants can move freely between stands, discuss with team representatives, and demand a short live demonstration. On that base organizers, and mentors can assess what was done in reality and what is mocked up in the final presentation. If the show-off is not organized the teams treat the prototype quality with less weight as the quality of final the presentation. Organizers can invite external experts to the show-off but their numbers should be minimized.

4.4.4 Testing the final presentation - day D9

The final presentations usually put a high-stress factor on the teams. The day before we usually open the place where final presentations will be organized, each team has a time slot allowing the team to practise and rehearse their final presentation in private. The teams can plan a special way to use the surrounding of the stage, therefore the testing should take place exactly in the place of final presentations. This is also a moment when teams can do tests of computer-projector connections. If organizers plan to use a single computer and upload presentations the teams should be aware of that.

4.4.5 Final presentations - day D10

The final presentations should have a form of official open ceremony, it is advisable to have as many external guests, experts as possible. Each team should have 8-10 minutes to present. The presentation should be treated as a presentation of an idea for future investors. The presentation should cover the team, the idea of game/app, the need the game/app solves, the target group, the technology, and technological solutions, stakeholders, business potential analysis, some kind of prototype demonstrations. Prototype demonstration can take the form of a live demonstration (not advisable) or film. Very often teams present something like 30 seconds advertising film. The moderator of the happening should not be a mentor of any team. The number of questions should be minimized, priority given to questions from guests and external experts. However, no team should be left without feedback, and so if there are no questions, someone, from mentors should ask a question or give a remark.

Remark

Every team presentation should be recorded. There are two reasons for that: the first as a way of documenting the event, the second, and even more important for the teams to assess their presentation. Every team member should take an active role in every presentation, therefore they cannot see how it looks from the audience's point of view. The recording allows the team to step into the shoes of the audience and assess their performance. In order to activate the audience, we applied the rule that the first team is recording the second, second the first, and so on, the last team record the first one. These recordings are done using mobile devices and shared between teams, for example on a facebook group. If there is a possibility the organizers can record or even stream the final presentations. We usually do not record prototype show-off event.

4.5 Social events

The social events are usually supplementary to the project. We have to remember that these activities can be important for group integration. The participants need to work together under high stress and reign of time. Therefore, the faster team integrates the better results can be achieved. In the project, we usually organize two social events - at the beginning and at the end. The latter can be treated as a reward for the participants for finishing the project. The former, team building social event that happens at the start is much more important and has an impact on the project and its results. On the first day, we have to enforce the introduction of the participants to each other. We propose to organize first day activities in two parts: first introductory and all participants integration, later near the evening activity that enforce teaming up and team level integration. In the beginning, the introduction can make participants present their competencies. After that, we can moderate integration using any methods of social integration games in smaller groups. We can organize a few tours of 0.5 - 1 hour integration games in a different division into smaller groups. In this way, we can introduce participants to each other. Later we should allow participants to freely team-up. We suggest the second part (teaming up) can happen in the evening in the form of sport-based activities. We suggest sports like bowling, billard/pool, darts – the games you can play in a team, move between teams and talk. For that reason, most of the activities in a swimming pool, outdoors are hard to be applied here.

As the teams should contain representatives with a complementary set of competencies, the team-up process has to be supervised. In our case, we often apply some additional rules – in one group can be only one representative of a given institution. Therefore, all teams have to be accepted, usually, the acceptance is done by one of the mentors. We apply the rule all teams are accepted or none, this prevents from creating a situation with a single person that no team accepts.

Chapter 5

Teamwork and mentoring

This chapter is devoted to groups and the teamwork in the groups that lead to final results.

5.1 The team

A team in our project has a well-defined task: to create an idea of gamification within a given theme. The gamified solution must be assisted with a prototype of a mobile game/app, moreover, the idea must have some commercial potential, therefore, have to have a well-defined target group, stakeholders, a basic version of a business plan. We can look at the team as on a team that creates a start-up. We can define the competencies that such a team should have in order to have success potential. The competencies are:

- technical skills – connected with mobile app development,
- business assessment skills – the team have to be able to prepare at least swot/canvas analysis,
- graphical skills – the team should be able to create a basic graphical design,
- storytelling – a game/app should have some content, the same can be said about presentations,
- leadership – the team needs a leader,
- organization skills – help to organize work in the team,
- entrepreneurship – the team should try to invent something unique.

The first two skills are strictly connected to the study domain, the rest are more personal competencies and cannot be connected to a specific study programme.

5.2 Teamwork

The team has to organize the work for itself, some basic iterative - agile approach is recommended. Every third-year computer science or management student should have basic knowledge in this area, however, some required elements are covered in prepared didactic materials. Our reference implementation has not only interdisciplinary but international members, the communication within the team can be demanding. Some small intercultural misunderstandings are to be expected. However, the team works in a strict time regime as well as stress, the presentations are official, and usually none of the team members presented in front of so numerous audiences, moreover it is expected that some of the participants are shy, have a low level of self-confidence, etc.

As was stated the team have to be self-governing one. So the team have an additional, if not one of the most important, task: use effectively the potential of every member in order to achieve the best results.

5.3 Mentoring

The role of the mentor cannot be neglected in Genius like project. The mentor assists a group, but should not drive the team. On one hand, the mentor has to advise the group and help in solving their problem. On the other the students have to learn to take a leading role in the real project. This can be argued if it is better for the team to fail but learn something or have success but act only passively so could not learn anything. The mentor has to strike a balance. The team when work on their own idea feels connected to it and works more effectively, sometimes the idea has important flaws and the team should not proceed, the mentor should try to convince, not enforce, the team to modify the idea. The mentor is not alone in that, other mentors can and should suggest modifications during the first or second presentation.

Teamwork always has a human factor. In the team, during the project, we can expect some tensions and heated arguments. It cannot be prevented, for example one strong personality can overwhelm the rest of the team, or fight with the rest of the team. The team and mentor have to solve all such issues.

Chapter 6

Didactic outcomes

The main reason to organize Genius like project is connected with its didactic outcomes. The full analysis of the didactic potential of such projects can be found in scientific articles given in the bibliography. Here let us collect all the identified outcomes with some reasoning.

6.1 Domain competencies

All the participants have a set of domain competencies connected to their study area. During the project, they usually apply these skills in real project and real problems. This allows participants to train and further develop them. For example, computer science students train their technical development skills, management students can use their business planning competencies, and so on. In this area, the growth of domain competencies is very similar to any problem-based model. However, as the projects are students' own ideas, they will feel more eager to solve all problems and so learning is much more interesting for participants. If in a project/team we have students with different level of area competencies we can observe that one student teaches the other, this behaviour is very welcome and should be recommended.

6.2 Soft-skills

The project is mainly focused on soft-skills development in participants. As we know the soft competencies cannot be taught in class during lectures or even discussions, they have to be trained/developed during a real experience. Therefore, the soft-skills are very hard to be build in the classical education. The team-based projects are an excellent playground for this. As we propose to have international and interdisciplinary teams, the students have to communicate. An so all the skills needed in intercultural communication have to be used if the team wants to fulfill their goals. We distinguished a few important elements that happen in the project: *Teamwork, Idea Creation, Work on Idea, Presentation, Communication in the team, Work on Goal*. For these, we can build a basic competencies matrix (Tab. 6.1). These competencies are needed and used in the activities that happen when a team works on idea during the project.

<div> <div>Skills</div> <div>Activities</div> </div>	Teamwork	Idea Creation	Work on Idea	Presentation	Communication in the team	Work on Goal
Active listening			X		X	
Analysis		X	X			X
Brainstorming		X				
Clarity		X	X	X	X	
Conflict management	X	X				X
Constructive feedback						X
Cooperation	X		X		X	
Critical observation		X				X
Cultural intelligence				X	X	
Curiosity			X			
Empathy	X			X	X	
Idea exchange	X		X	X		
Imagination	X	X		X		
Initiative	X			X		
Innovation		X				
Logical reasoning			X		X	X
Non-verbal communication				X	X	
Open-mindedness	X	X	X		X	X
Optimism		X	X	X		X
Planning	X					X
Prioritizing	X		X			
Public speaking				X		
Self-confidence		X		X	X	X
Stress management	X					X
Verbal communication					X	

Table 6.1: Soft competencies matrix for activities in project

Chapter 7

Implementation case studies

The reference methodology implementations that took place within the Genius projects demanded an international, interdisciplinary group of participants. The teams were asked to create a mobile game/gamified app on the theme. However, the methodology is not limited to such a case. We present some propositions on how the methodology can be applied in different situations.

7.1 Internal school project

We can imagine the application of the presented method in academia wide project. The method does not have to be modified, all participating students should meet for a period of 10 days. The main event of the project should be the only academic activity of the students, therefore they should have no other classes at that time. We suggest to demand from teams to create a prototype of game/application, therefore, some computer science students would be required. Most of the academia has many degrees and so the interdisciplinary of the teams are easy to obtain.

7.2 Shorter version of the project

The project demands some technical competencies and working mobile prototype of the game/app. If in the project, one have not enough technical participants or it is not possible to spend 10 days on the project, the organizers can focus on the idea and business plan. Therefore no working prototypes are needed, all can be done as a mockups of application screens. Then the project, can take about 5 days, day one - integration, team building, day two idea building and firs presentation, days three, four further idea development, day five final presentation. Most of the soft skills can still be trained/developed.

7.3 One small team integration

The project can be restricted to the one already defined team. Then the team needs one mentor. If the team have already a set high-level technological skills, the time of the project can also be shorter. This type of project can be useful for companies in fast team integration. We can give them a goal, ask them to produce an idea in a short time. This seems very familiar to the classical Design Thinking course, the difference should be on the requirements of training the presentation skills.

Chapter 8

Summary

The implementation protocol is created to help everyone who would like to create a project like Genius. We have tried to describe the methodology and its requirements, work-flow, and outcomes. We hope that anyone can find this useful in application proposed methodology in own activities. The most obvious recipients of the methodology are academia type schools, this can be applied to secondary level schools or companies.

Acknowledgement

The project Genius - *Innovative Interdisciplinary Contextual Education Using Games Development* was supported by Erasmus Plus in the frame of the programme KA2 - Cooperation for Innovation and the Exchange of Good Practices, KA203 - Strategic Partnerships for higher education.

The most warm THANK YOU has to be given to all students that took part in the project, you are the persons for whom we do it and the persons that give a sense to all such initiatives. In the Genius project 93 students took part in, we can't put all the names here, but THANK YOU VERY MUCH.

We would also thank all employees of our institutions and Polish Erasmus Agency who helped us to fulfill all this.

Bibliography

- [Åkerlund et al., 2020] Åkerlund, H., Audemard, G., Bollaert, H., Hayenne-Cuvillon, V., Hłobaż, A., Kozlenko, M., Milczarski, P., Monteiro, J., Morais, J. C., O'Reilly, D., Possemiers, P., and Stawska, Z. (2020). Project GGULIVRR: generic game for ubiquitous learning in interactive virtual and real realities. In *EDULEARN20 Proceedings*. IATED.
- [Almeida et al., 2013] Almeida, F., Bolaert, H., Dowdall, S., Lourenço, J., and Milczarski, P. (2013). The WalkAbout framework for contextual learning through mobile serious games. *Education and Information Technologies*, 20(3):415–428.
- [Milczarski et al., 2018] Milczarski, P., O'Reilly, D., Podlaski, K., Almeida, F. L., Dowdall, S., Hłobaż, A., Bolaert, H., and Lourenço, J. (2018). How Participation in an Intensive Project Can Increase 3rd Level Students' Awareness of Entrepreneurship. In Ermolayev, V., Suárez-Figueroa, M. C., Lawrynowicz, A., Palma, R., Yakovyna, V., Mayr, H. C., Nikitchenko, M. S., and Spivakovsky, A., editors, *Proceedings of the 14th International Conference on ICT in Education, Research and Industrial Applications. Integration, Harmonization and Knowledge Transfer. Volume I: Main Conference, Kyiv, Ukraine, May 14-17, 2018*, volume 2105 of *CEUR Workshop Proceedings*, pages 394–404. CEUR-WS.org.
- [Monteiro et al., 2019] Monteiro, J. C., Morais, J. C., Neves, N., Bollaert, H., Possemiers, P., and O'Reilly, D. (2019). Project GENIUS: an experience on innovative interdisciplinary contextual education using games development. In *EDULEARN19 Proceedings*. IATED.
- [O'Reilly et al., 2015a] O'Reilly, D., Almeida, F., Podlaski, K., Bollaert, H., Milczarski, P., Dowdall, S., Hłobaż, A., and Lourenço, J. (2015a). Using Intensive Games Development Projects to Teach Entrepreneurial Skills to Third Level Students. In *Proceedings of International Conference on Education and New Developments (END 15), Porto, Portugal*, pages 189–193.
- [O'Reilly et al., 2015b] O'Reilly, D., Milczarski, P., Dowdall, S., Hłobaż, A., Podlaski, K., and Bollaert, H. (2015b). Comparison between approaches used in two walkabout projects. *International Journal of Computer and Information Engineering*, 9(1):140–147.
- [Podlaski et al., 2020] Podlaski, K., Milczarski, P., Hłobaż, A., Monteiro, J. C., O'Reilly, D., Hautamäki, J., Bollaert, H., Possemiers, P., and Nelson, N. (2020). A methodology for soft-skills improvement via game development intensive project. In *EDULEARN20 Proceedings*. IATED.