IO2-A2: DUAL EDUCATIONAL PACK

CROSS CURRICULAR SCENARIO 5

3D2ACT:

FOSTERING INDUSTRY 4.0 AND 3D TECHNOLOGIES THROUGH SOCIAL ENTREPRENEURSHIP: AN INNOVATIVE PROGRAMME FOR A SUSTAINABLE FUTURE

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PROJECT INFORMATION

PROJECT ACRONYM:

3D2ACT

PROJECT TITLE:

FOSTERING INDUSTRY 4.0 AND 3D TECHNOLOGIES THROUGH SOCIAL ENTREPRENEURSHIP: AN INNOVATIVE PROGRAMME FOR A SUSTAINABLE FUTURE

PROJECT NUMBER:

2020-1-EL01-KA202-078957

WEBSITE:

https://3d2act.eu/

CONSORTIUM: PARTNER LIST

- **NATIONAL CENTER FOR SCIENTIFIC RESEARCH "DEMOKRITOS" (GREECE)**
- **EUROPEAN DIGITAL LEARNING NETWORK** (Italy)
- **POLITEKNIKA IKASTEGIA TXORIERRI S.COOP** (Spain)
- **A & A EMPHASYS INTERACTIVE SOLUTIONS Ltd** (Cyprus)
- **STICHTING INCUBATOR** (Netherlands)
- **REGIONAL DIRECTORATE EDUCATION OF CRETE** (Greece)
- **UNIVERSITY OF CRETE** (Greece)

3D2CT
ΙΔΡΥΜΑ ΚΡΑΤΙΚΩΝ ΥΠΟΤΡΟΦΙΩΝ IKY
Co-funded by the Erasmus+ Programme of the European Union

Real Life Social Entrepreneurial Opportunities for Applying the 3D-P Education

Cross-Curricular Scenario 5

MANUFACTURING ASSISTING TOOLS FOR PEOPLE WITH DEMENTIA

Introduction

When we grow older we begin to experience changes, some of which are mental. An example of a mental issue is dementia, which affects ourselves, but also our families. With dementia the risk of getting lost is higher, as those suffering from it do not always remember how to get home. This can be very frightening for families of those suffering from dementia.

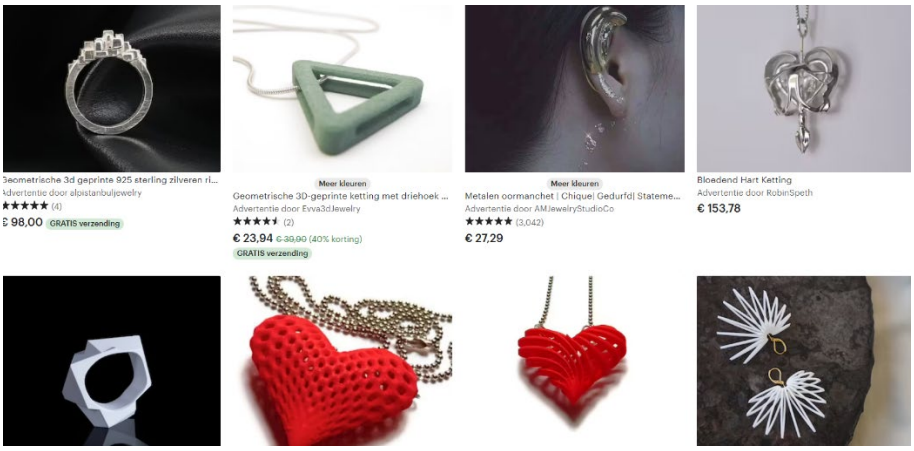
To make the families less worried, there should be a customizable solution created, as not every person suffering from dementia has the same products they are used to wearing. Also, it should be designed in a way that it can be reusable, considering the environmental footprint.

The need

Clara's mother, Mary, lives in an elderly home, and has dementia. Even though the elderly home has precautions Mary occasionally slips out. **Due to her dementia Mary often gets lost and Clara is often responsible for finding her.** The elderly home had considered different precautions, yet none seem to work, as Mary finds her way out.

The main question here is how can Clara and the elderly home make sure they can find Mary when she is lost, as locking her up is not a real solution. It would be handy to track Mary. However, just tracking a phone might not be enough, as Mary is not used to keeping her phone with her. However, Mary does like wearing necklaces. Etsy shows how you can 3D print necklaces, as well as put GPS trackers within the necklaces. The printed necklaces or other jewellery should be large enough to hide a 35×41,5x10 mm GPS tracker.

Erasmus+ is a programme that has inclusion as a high priority and if there would be a solution to the need, in this case with a GPS tracker in a 3D printed jewellery, it would have an impact in that matter, specifically addressing people with mental disabilities. Thus, the people that suffer from dementia or anything alike, will not “get lost” in the society.



Examples of 3D printed jewellery (Etsy, 2022)

Example of a necklace with GPS tracking (GPStrackeronline.nl, 2022)

Key terms

| 3D design/printing | Social entrepreneurship | Climate change problem | Social impact | Assisting physical functions |

Objectives and Expected Learning outcomes

- *To stimulate the interest of students from different areas of vocational education.*
- *Students to gain social empathy for mental challenges of the elderly people and their impact on elderly people's family.*
- *Students to work up as a team and promote a collaborative approach in finding acceptable solutions.*
- *Students to learn to categorize and evaluate the above solutions.*
- *The collection of necessary data and the design of the solution (in 3D printing design) to meet the needs of the ones suffering from dementia and their family.*
- *To identify business opportunities, by analysing market needs.*

Prerequisites

- *Basic knowledge of pre-mentioned guided lesson plans in 3D printing*
- *Basic IT knowledge*
- *Basic knowledge of the main issue*
- *Basic knowledge of economics and analyzing business models*

Time distribution - Estimated Delivery

The duration of this open-ended challenge-based scenario can vary depending on the depth of approach by students and teachers. Taking 2-4 hours per week, it will probably take 4-6 weeks before the end product is created.

Modes of Interaction

This challenge-based scenario provides the opportunity for teachers and students from different areas of vocational education to get involved. For example, areas such as **Public Health and Vocational Medical Training** have a direct connection, since the script negotiates issues related to their subject. Also, **Management/Economics** is an area that can play an important role in the scenario, since the whole process will eventually have to evolve into a social business model suitable for the social needs of the market. The **IT** sector can also be involved in the script, helping with the whole process regarding the software for a 3D printer, printing and having a final creation. This scenario could be also interesting for teachers or students with a high interest/expertise in **Human behavior.**

When having VET students from these different disciplines, it is best to split them into groups of 2-4, keeping in mind that in each group every discipline is represented. There should be at least 2 teachers present to guide the students and the teachers should be preferably from 2 different disciplines.

Guidelines - Milestones

Below, there are some steps presented that will guide through the whole process of students working on the challenge. The main focus is on the **GPS necklace** (see the 4th page), but there could be different other solutions created to adapt to the wishes of those with dementia, such as belts.

Milestone 1 - (est. 2 hours)

Get familiar with dementia and how it affects those around them.

> *Hint: Use Google to read about the problem, with the searching topics like **dementia** or **family with dementia**. How do these issues affect the ones suffering from it? What do their daily lives look like? How do they face the simple tasks, like getting outside for a walk and getting back home?*

Milestone 2 - (est. 2 hours)

Look at the problem from the perspective of the medical sector. How would the solution contribute to the medical sector? Can we use 3D printing to provide some tools to create more comfort to those suffering from dementia? Of course, the idea can be based on the GPS necklace on page 4, but there can be different ideas opted in order to make the quality of life better for those who have to deal with the issue.

> *Hint: Students brainstorm about the possible solutions to use for their 3D printing design and creation. All ideas are to be evaluated, also for different uses, like a solution to make accessories with GPS trackers for men (necklaces and bracelets for example). There will be a democratic way to choose the best idea, based on the collected and listed arguments for each idea.*

Milestone 3 - (est. 8 hours)

After choosing the best solution, students should be divided in teams per preferably 4 students, with at least 2 teachers from different disciplines to support them.

Team-1: The first team will focus on the preparation of a prototype under these aspects:

- Sketching/drawing of the prototype on paper
- Description of the operation of the chosen idea for a tool
- Identification of parts which the prototype consists of

- General dimensions

Hint: Students must verify each of the above steps taking into account the final produced item.

Team-2: The second team will deal with the computing requirements and equipment that will be used in this scenario. For example:

- List of hardware requirements
- List of software requirements
- Description and study of the operation of a 3D printer

Hint: Students can search the Internet to find out what software they will use for 3D design (TinkerCAD, OnShape, etc.) and justify their preference.

Team-3: The third team will focus on the analysis of the social business model based on the idea of the prototype and how this process is involved in the production phase. For example:

- Design of the social business model
- Analysis of the production line
- Identification of prototype's involvement

Hint: Students can use real or fictive (hypothetical) data to implement the above guidelines.

Team-4: The fourth team can focus on the positive effects, which should be measured after the use of the tool. For example:

- Research on all the negative effects that the ones with dementia had before the existence of the tool
- Summarize the positive results that will arise from the use of the tool
- List of how the ones facing the issue will keep on living and the negative effects without the tool in the long term

Milestone 4 - (est. 4 hours)

Students under their teachers' guidelines proceed in the optimization of all prepared materials (the prototype, IT requirements, business model analysis, and quality of life improvement).

Team-1: Correction/Finalisation of the prototype.

Team-2: Reviewing of the computing requirements and equipment that will be used in this scenario. Identify resources and which 3D design software will be used.

Team-3: Correction and finalisation of the social business model based on the idea of the prototype.

Team-4: Report on findings.

Milestone 5 - (est. 8-10 hours for Team-1 & Team-2 and 4 hours for Team-3 & Team-4)

Implementation of Prototype's 3D design for 3D printer.

Team-1 & Team-2: Implementation of Prototype's 3D design in the chosen 3D software.

Team-3: Investigation of alternative production methods in the business model, including the new prototype-based approach for 3D printer.

Team-4: Study to capture the data that will highlight the usefulness of the production of the prototype concerning the problem of physical discomfort.

Milestone 6 - (est. 2-4 hours)

Team-1 & Team-2: Correction and printing of the final design.

Milestone 7 - (est. 4 hours)

Team-1 & Team-2 will focus on the preparation of the technical documentation. For example:

- List of materials
- List of parts / commercial items
- Assembly plans and exploded view
- Assembly Manual
- Manufacturing processes + process sheets + instruction phases

Milestone 8 - (est. 4 hours - All teams)

Presentation of the final product. Each team will make a presentation mentioning the steps they followed until the completion of the project, providing as well photos from each stage and relevant data-tables.

Reflection & Feedback

To get valuable feedback on this scenario, students could be presented with a questionnaire, to learn how to improve on the scenario and its progress. The final evaluation must be correlated to the degree of students' satisfaction with the results of the project, in combination with their initial assessments.

Indicative Questionnaire

1. *In which team did you participate?*
   ○ *Team-1* ○ *Team-2* ○ *Team-3* ○ *Team-4*

2. *Do you think that this scenario enhanced your knowledge and skills?*
   ○ *Definitely* ○ *In most cases* ○ *Not sure* ○ *Not at all*

3. *Do you think that this scenario met your personal motivations/criteria?*
   ○ *Definitely* ○ *In most cases* ○ *Not sure* ○ *Not at all*

4. *Was there enough time to fulfill your goals?*
   ○ *Yes* ○ *No, I needed more time*

5. *What problems did you face and how did you overcome them?*

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6. *What did you like most?*

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7. *What did you like least?*

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8. *What would you suggest for the optimisation of the scenario and the process of its implementation?*

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9. *What would you like to be your next goal?*

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Expansion

This educational scenario can easily be the basis for expanding the educational process, as it is oriented towards principles and techniques that promote the dynamic development of the student. In particular these techniques:

Allow choice: Students gain the flexibility to choose both the main topic to be dealt with and the approach they will seek to achieve this goal.

Promote research: Students rely on the know-understand-research model to build the knowledge base on which they will work.

Promote collaboration: Through the teams that are created, collaboration is promoted and bilateral channels of communication are created.

Use of technology: Through IT tools and 3D printers, students learn or even deepen their skills on new technologies.

Teach creativity: Students are asked to tackle issues, which might help the ones who suffer from dementia.

Encourage self-assessment: Through feedback and assessment practices, students have the opportunity to assess what they have learned and what they have gained from the script implementation process.

Sources

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