



YESict

Project co-funded by the European Union



Erasmus+

Report – Output 4

Skills Evaluation Model



UNIVERSITY OF NICOSIA

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University of Applied Sciences



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1. INTRODUCTION

This report provides information on the evaluation methodology and the tools for assessing entrepreneurial skills within the scope of the YESict Project.

Following the Consortium's decision during the 2nd Transnational Meeting held in Cyprus, the YESict Project will focus on the entrepreneurial skills of creativity, problem solving, and self-confidence and collaboration skills.

A definition is provided for each of the above mentioned skills, and the tools for their assessment, in accordance with the literature, are presented. Moreover, the limitations and considerations have been analyzed, reaching a final conclusion on a suggested model for the evaluation of entrepreneurial skills and the methodology used in the YESict Project.

This report is divided into 4 sections that include:

1. Definitions of assessment and assessment tools, short review of assessment tools and methods used in the EU and internationally for entrepreneurship education;
2. creativity, problem solving, self-confidence and collaboration; definition and assessment tools;
3. assessment tools and method issues for the YESict project
4. proposed evaluation model for assessing the pedagogical methodology, the ICT/non ICT tools and the students' entrepreneurial skills

2. DEFINITIONS OF ASSESSMENT AND ASSESSMENT TOOLS

2.1. What is meant by assessment in an educational/training context?

The Cedefop glossary of terms (2014, p. 28) defines assessment of learning outcomes as a “process of appraising knowledge, know-how, skills and/or of learning outcomes and competences of an individual against predefined criteria” (learning expectations, measurement of learning outcomes). Assessment is typically followed by validation and certification. The glossary notes that in the literature, ‘assessment’ generally refers to appraisal of individuals [to the assessment of learning outcomes] whereas ‘evaluation’ is more frequently used to describe appraisal of education and training methods or providers. Therefore, assessment means the process of collecting evidence and making judgements to determine whether the competency has been achieved, to confirm that an individual can perform to the standard required by the predefined criteria (or in the case of VET in the workplace). The assessment models used may be internal or external, formative or summative; results can be used for different purposes.

The OECD's DeSeCo Project provides some insights for the assessment of key competences, and it cautions that competence is a ‘holistic notion’ and ‘therefore not reducible to its cognitive dimension’ (European Commission, November 2012, p. 6). Hence, it is essential the assessment of the knowledge and the skills, as well as the attitudes that support their appropriate development and application.

In keeping with the EU key competences, DeSeCo asserted that the ‘constellations’ of key competencies will vary according to the context. This also has implications for assessment: ‘it is important for assessments to explore the patterns that make up these constellations, the interplay among the multiple, interrelated key competencies’. This observation is highly relevant and applicable for the measurement of entrepreneurship education outcomes as there are numerous dimensions and indicators in the various ‘constellations’.

2.2. What is meant by assessment tool?

The use of a variety of assessment tools is recommended for the accurate identification of individual strengths and weaknesses (Education, Audiovisual and Culture Executive Agency (EACEA), November 2012, p. 37). An assessment tool includes the following components: context and conditions of assessment, tasks to be administered to the student, an outline of the evidences to be gathered from the student, and evidence criteria used to judge the quality of performance. This term also incorporates the

administration, recording and reporting requirements, and may address a cluster of competencies as applicable for holistic assessment.

2.3. Short review of assessment tools and methods used in the EU and internationally for entrepreneurship education

The desk review of the relevant literature shows that there are many assessment tools and methods used to assess and measure entrepreneurship education across all national educational levels in Europe, and internationally too (European Commission, 2015a).

Across Europe standardised national tests, the main assessment tools which are used for summative or formative purposes, focus on the basic skills; especially, the teaching of mother tongue language (or the language of instruction) and mathematics, and to a much lesser extent on science and foreign languages. Among the transversal competences, which are particularly important for teaching entrepreneurship related materials, only civic and social competences are tested through nationally standardised assessment.

In most EU countries, a variety of subjects incorporate learning objectives or learning outcomes related to transversal competences. Consequently, student achievement in ICT, social and civic competences and entrepreneurship are assessed through the various subjects in which they are taught whether they are stand-alone subjects or broader curriculum areas into which aspects of transversal competences have been integrated. In some cases, teachers of subjects in which social and civic competences are integrated are provided with assessment tools that specifically focus on the transversal competence (Education, Audiovisual and Culture Executive Agency (EACEA), November 2012, p. 29).

There are numerous assessment tools and methodologies for entrepreneurship education in Europe and internationally. The OECD report (2015, p. 13) mentions a number of assessment and measurement tools such as the Measurement Tool for Entrepreneurship Education (MTEE) in Finland, the Assessment Tools and Indicators for Entrepreneurship Education (ASTEE) EU/international, the Entrepreneurial Skills Pass (ESP) international, the LAATURI in Finland, and the Entrepreneurial School Project (TES) in the EU.

For instance, the Entrepreneurial Skills Pass (ESP) is an international certificate that is issued by CSR Europe, EUROCHAMBRES, JA-YE Europe and its member organisations. It certifies that students, aged between 15-19 years, have gained a real entrepreneurship experience and learned entrepreneurial knowledge, competencies and skills (OECD, 2015, p. 18). The self-assessment includes three tests: students undertake the first test prior to the one-year mini-company experience, the second one during, and the third one at the end of the year. Questionnaires are available in Czech, Danish, German, Estonian, Greek, Italian, Maltese, Romanian, and Slovak languages. JA-YE Europe created an online platform to gather and to compare the survey data. It is expected that in the above mentioned countries 250,000 students will participate each year.

In the European Commission 13 cases report (2015a); there are also numerous examples of the use of different assessment tools for entrepreneurship education. For

instance, in Case Study 1, the South East Europe Centre of Entrepreneurial Learning (SEECEL) developed a three level assessment of entrepreneurship as a key competence at ISCED. The assessments included:

- i. schools and their progress in becoming entrepreneurial;
- ii. teachers and school management staff through a questionnaire and
- iii. learning outcomes based on Bloom's taxonomy (p. 8).

In Case Study 2, there is a detailed description of the findings of 11 evaluation and meta-analysis studies that examine the impact of JA-YE programmes on participants (pp. 22-45). In Case Study 6, UPI-Creativity and innovation in primary school (Slovenia), is also interesting as it describes in detail the activities and especially the impact measurement of UPI courses implemented in primary schools and measurement methods used (pp. 92-95). Students attending the UPI courses or entrepreneurship clubs, as well as students from the control group, engaged in a self-assessment process by filling in a survey on two occasions, before the beginning of the course in 2010 and after the end of the course in 2012.

Another example of assessment tools and methods include that of Ireland, where the National Council for Curriculum and Assessment has developed a senior cycle short course on enterprise. Its implementation in the curriculum is subject to on-going discussion with education stakeholders (Education, Audiovisual and Culture Executive Agency (EACEA), November 2012, p. 24).

Meanwhile in Sweden, where social studies teachers are responsible for the development of students' civic competences, the National Agency for Education has developed a set of six tests for school years 7-9 to support them in carrying out formative assessment of students' understanding of democratic principles (Education, Audiovisual and Culture Executive Agency (EACEA), November 2012, p. 29).

3. ASSESSMENT TOOLS AND METHODS ISSUES FOR THE YESict PROJECT

The existence of a considerable variety of assessment tools for measuring entrepreneurship education available in various EU countries and internationally presents a significant challenge for the YESict project in selecting the most appropriate and practical one to measure the impact of its entrepreneurship curriculum on school children and teachers. Project participants are expected to get several benefits from the YESict Project, such as knowledge about entrepreneurship, development of technical and innovative digital skills, identification of new opportunities in school environments, contribution in the development of local entrepreneurship and innovative territorial development, and other. It is expected that the curriculum will have a long term positive impact on children's' careers and work lives, and their personal development as they will be more confident about their own capabilities. It is therefore, imperative to develop the right assessment tools and methods to demonstrate the above expected results.

The assessment tools must be designed as questionnaires for interviews and focus groups and rubrics because the review of the literature shows that such tools are the most relevant for the purpose of this kind of project. Self-assessment questionnaires are also tools frequently used. One of the most critical considerations in selecting the assessment tools is the strategic priorities of the project as described in its application (p. 31). The strategic priorities of the project are based on ICTs and Human Centred Design methodologies to be adequately integrated into schools' reality, and also to create an integrated and realistic pedagogical methodology that will fit different European national educational systems. This means that for the main intellectual output of the project – the modular design of the curriculum – in order to be valid and to be potentially used in different European national educational systems, the assessment methodology and tools must be robust, appropriate, reliable, not overly complex and relatively easy to administer.

This approach requires the assessment methodology and tools to be used by the project for the measurement and the validity of the project's curriculum design and testing, and must utilise either wholly or partly relevant existing and proven assessment methodologies and tools.

It is beyond the scope of the project to develop a completely new assessment methodology and tools, as the reviewed literature shows that such assessment instruments are complex, require extensive statistical knowledge and are time consuming. Proven and tested assessment methodology and tools on entrepreneurship education are less likely to be questioned in terms of their validity, and this would potentially make the Project's curriculum more acceptable to different European national educational systems.

Other important factor to be taken into consideration in relation to the use of any assessment tools from the public domain is that these should not infringe any copyright rights, and they should not require loyalty payment as there is no such financial provision in the Project's budget.

According to the recommendation of Work Package Output 2, that actually completes the recommendations gathered together in the Output 1 on the selected entrepreneurial skills, a final list of 10 key entrepreneurial skills is recommended including: motivation for achievements, autonomous action, creativity, undertaking initiatives, risk taking, opportunity seeking, goal setting, self-awareness, internal locus of control and perseverance/persistence.

For the purposes of the YESict project, the focus of attention on the aforementioned entrepreneurial skills (Output 2 and 21st Century Skills) must be relevant to the target age group of primary and early secondary education settings. To address the above, four skills have been selected to be developed throughout the process of the Pedagogical Methodology developed in Output 3. These skills are: Creativity, Problem-solving, Collaboration and Self-confidence. In the following paragraphs, definition and assessment tools are described for each one of these skills.

3.1. Creativity

Definition

Creativity has been described as 'developing new methods instead of using standard procedures' (Born & Altink, 1996, p. 72). In the literature, a distinction can be made between four main components of creativity:

1. fluency, the ability to produce a large number of ideas (quantity);
2. originality, the ability to produce new and unusual ideas (quality);
3. flexibility, the ability to change between approaches; and
4. innovation, the ability to (re)define and perceive in an atypical manner.

A distinction can also be made between inventing something new (i.e., creativity) and adopting it (i.e., innovation). In the relevant literature, the creativity aspect has been frequently identified not only as a quality closely related to entrepreneurship, but also as an underlying enabling factor for other entrepreneurial skills (Crowley, Hisrich, Lankford, & B., 1995); (Herron, Smith-Cook, & Sapienza, 1992); (Gundry & Kickul, 1996); (Whiting, 1988). According to Hull, Bosley and Udell (1980) creativity (together with risk taking attitude) is a better indicator of venture initiation than achievement motivation and internal locus of control.

The above definition has been adapted by the consortium and already mentioned in the Report Output 2, section 3.1, Selection of entrepreneurial skills for the YESICT Project (p. 7).

Assessment tools

According to the literature, numerous resources have been developed to assess creativity and creative thinking for a range of ages. Assessment involves gathering, organizing, analysing, and interpreting qualitative or quantitative data. Measurement is usually important in evaluating special programs delivered to students for stimulating their creative thinking skills. In that case, for instance, pre- and post-tests could be used as part

of an evaluation plan. The complex and multidimensional nature of creativity cannot be captured effectively and comprehensively by any single instrument.

In the literature review, four different ways were found to gather information about a person's creative skills:

- **Behaviour or performance data:** In general, there are two ways to gather information about people's creativity; through observations in real-life settings, or through recording their performance in constructed tasks which are similar to real life settings but can be observed under controlled conditions. A variety of assessment tools can be used for collecting and utilizing information such as portfolio data for the real-life achievements, or performance data for the realistic tasks.
- **Self-report data:** In some cases, information about people's creativity can be collected from the answers they provide to self-assessment questionnaires.
- **Rating scales:** These are tools that give particular depictions of characteristics or practices that portray creativity qualities and which solicit individuals to rate the creativity of others. Teachers, parents or other adults might be asked to give their rating and define a person in relation to those descriptions
- **Tests:** Usually these instruments include structured set of tasks or questions and are administered under controlled or standardized conditions.

Also, four ways were found for classifying the level of advancement and articulation of creativity. These are described below:

- **Not Yet Evident.** This level shows that the person's present level of performance does not disclose traits of creativity according to the chosen definition of creativity. This level is not titled "uncreative" or "not creative" because it does not imply that creativity is unfeasible for the person but only that creativity characteristics are not yet evident. The category is about performance, not about ability or potential.
- **Emerging.** This level means that there is narrow indication of creativity characteristics in the individual's present performance. Creativity is beginning to emerge in ways that are consistent with the chosen description of creativity, even though the creative behaviour may be unsettled.
- **Expressing.** The individual's present level of creativity might be described as "expressing" when data demonstrate indications of creativity traits in the person's present behaviour with consistency and sporadic signs of high quality. This level suggests that the characteristics of creativity can often be observed in the person's typical actions and products.
- **Excelling.** The individual's level of creativity is categorized as "excelling" when data demonstrate consistently the existence of creative characteristics (according to the chosen definition for the assessment). Those characteristics are also followed by creative achievements in one or more areas, with exceptional depth, quality, and originality.

A database providing information about creativity assessment instruments can be accessed at the Center for Creative Learning website (www.creativelearning.com). The

database includes information about almost 100 tests, rating scales, checklists, self-report inventories, and other tools for assessing creativity.

The tests included at the database have been developed by researchers and have proven their validity and reliability after years of research and use. Nevertheless, these instruments are not open resources, they have copyright rights and an amount must be paid for obtaining the test material. Moreover, they demand special training for the examiners on how to administer and score them and in many cases their scoring is complicated and complex unless the person delivering and scoring the test has in depth knowledge of creativity, research methodology and statistics. Therefore, considering the indicators described in the Project's application (p. 53,) the creative assessment instruments included in the above mentioned database are not suggested for the evaluation purposes of the YESict Project.

3. 2. Problem solving

Definition

The draft framework for the Problem Solving domain in PISA 2012 (OECD, 2010) defines problem solving skills as "an individual's capacity to engage in cognitive processing to understand and resolve problem situations where a method of solution is not immediately obvious. It includes the willingness to engage with such situations in order to achieve one's potential as a constructive and reflective citizen".

The PISA 2012 Problem Solving (PS) framework defines a problem as existing when a person has a goal but does not have an immediate solution on how to achieve it. That is, "problem solving is the cognitive processing directed at transforming a given situation into a goal situation when no obvious method of solution is available".

Assessment tools

The 2012 PS framework identifies three dimensions as the basis for the assessment of problem solving (PS) skills. These are the problem context, the nature of the problem situation, and the problem solving process (OECD, 2010, p. 16).

The problem context refers to the problem's level of difficulty and how easy it will be for a person to solve it. The 2012 PS framework refers two elements of the problem solving context: the setting (if it is based on technology or not) and the focus (if it is personal or social).

When the person uses a technological device as a way of solving the problem, such as a computer, mobile phone or remote control, the main aim of the problem solving in this context is to understand how to control the device. In other problem solving contexts that do not make use of such devices the contexts include route planning, task scheduling, and decision-making (OECD, 2010, p. 17).

Regarding the focus of the problem solving, it is categorized as personal when the subject of the assessment is an individual, the individual's family, or its peers. When the focus of the problem solving is on the community or society in general the context is considered social.

The nature of the problem situation can be static when the information about the problem situation is complete and interactive when the solver needs to search for additional information. PISA 2012 makes one more distinction between those problem situations that are well-defined and those that are ill-defined. The first ones have clearly specified goals, given states, and legal actions. The second ones, multiple goals in conflict with underspecified given states and actions.

| | | |
|---|---|--|
| NATURE OF THE PROBLEM SITUATION Is all the information needed to solve the problem disclosed at the outset? | <ul style="list-style-type: none"> ▪ <i>Interactive</i>: not all information is disclosed; some information has to be uncovered by exploring the problem situation. | |
| | <ul style="list-style-type: none"> ▪ <i>Static</i>: all relevant information for solving the problem is disclosed at the outset. | |
| PROBLEM-SOLVING PROCESS What are the main cognitive processes involved in the particular task? | <ul style="list-style-type: none"> ▪ <i>Exploring and understanding</i> the information provided with the problem. | |
| | <ul style="list-style-type: none"> ▪ <i>Representing and formulating</i>: constructing graphical, tabular, symbolic or verbal representations of the problem situation and formulating hypotheses about the relevant factors and relationships between them. | |
| | <ul style="list-style-type: none"> ▪ <i>Planning and executing</i>: devising a plan by setting goals and sub-goals, and executing the sequential steps identified in the plan. | |
| | <ul style="list-style-type: none"> ▪ <i>Monitoring and reflecting</i>: monitoring progress, reacting to feedback, and reflecting on the solution, the information provided with the problem, or the strategy adopted. | |
| PROBLEM CONTEXT In what everyday scenario is the problem embedded? | <ul style="list-style-type: none"> ▪ <i>Setting</i>: does the scenario involve a technological device? | – <i>Technology</i> (involves a technological device) |
| | | – <i>Non-technology</i> |
| | <ul style="list-style-type: none"> ▪ <i>Focus</i>: what environment does the problem relate to? | – <i>Personal</i> (the student, family or close peers) |
| | | – <i>Social</i> (the community or society in general) |

Figure 1. Main features of the PISA problem-solving framework (OECD, 2014, p. 31)

The PISA 2012 PS framework identified the following four cognitive processes in individual problem solving: exploring and understanding, representing and formulating, planning and executing, monitoring and reflecting (OECD, 2010, pp. 20-21).

The PISA 2012 presents 6 levels of development for problem-solving (p. 57) and can be seen at the template below.

| Level | Score range | Percentage of students able to perform tasks at this level or above (OECD average) | What students can typically do |
|----------|------------------------------------|--|--|
| 1 | 358 to less than 423 points | 91.8% | At Level 1, students can explore a problem scenario only in a limited way, but tend to do so only when they have encountered very similar situations before. Based on their observations of familiar scenarios, these students are able only to partially describe the behaviour of a simple, everyday device. In general, students at Level 1 can solve straightforward problems provided there is a simple condition to be satisfied and there are only one or two steps to be performed to reach the goal. Level 1 students tend not to be able to plan ahead or set subgoals. |
| 2 | 423 to less than 488 points | 78.6% | At Level 2, students can explore an unfamiliar problem scenario and understand a small part of it. They try, but only partially succeed, to understand and control digital devices with unfamiliar controls, such as home appliances and vending machines. Level 2 problem-solvers can test a simple hypothesis that is given to them and can solve a problem that has a single, specific constraint. They can plan and carry out one step at a time to achieve a subgoal, and have some capacity to monitor overall progress towards a solution. |
| 3 | 488 to less than 553 points | 56.6% | At Level 3, students can handle information presented in several different formats. They can explore a problem scenario and infer simple relationships among its components. They can control simple digital devices, but have trouble with more complex devices. Problem-solvers at Level 3 can fully deal with one condition, for example, by generating several solutions and checking to see whether these satisfy the condition. When there are multiple conditions or inter-related features, they can hold one variable constant to see the effect of change on the other variables. They can devise and execute tests to confirm or refute a given hypothesis. They understand the need to plan ahead and monitor progress, and are able to try a different option if necessary. |
| 4 | 553 to less than 618 points | 31.0% | At Level 4, students can explore a moderately complex problem scenario in a focused way. They grasp the links among the components of the scenario that are required to solve the problem. They can control moderately complex digital devices, such as unfamiliar vending machines or home appliances, but they don't always do so efficiently. These students can plan a few steps ahead and monitor the progress of their plans. They are usually able to adjust these plans or reformulate a goal in light of feedback. They can systematically try out different possibilities and check whether multiple conditions have been satisfied. They can form an hypothesis about why a system is malfunctioning and describe how to test it. |
| 5 | 618 to less than 683 points | 11.4% | At Level 5, students can systematically explore a complex problem scenario to gain an understanding of how relevant information is structured. When faced with unfamiliar, moderately complex devices, such as vending machines or home appliances, they respond quickly to feedback in order to control the device. In order to reach a solution, Level 5 problem-solvers think ahead to find the best strategy that addresses all the given constraints. They can immediately adjust their plans or backtrack when they detect unexpected difficulties or when they make mistakes that take them off course. |
| 6 | Equal to or higher than 683 points | 2.5% | At Level 6, students can develop complete, coherent mental models of diverse problem scenarios, enabling them to solve complex problems efficiently. They can explore a scenario in a highly strategic manner to understand all information pertaining to the problem. The information may be presented in different formats, requiring interpretation and integration of related parts. When confronted with very complex devices, such as home appliances that work in an unusual or unexpected manner, they quickly learn how to control the devices to achieve a goal in an optimal way. Level 6 problem-solvers can set up general hypotheses about a system and thoroughly test them. They can follow a premise through to a logical conclusion or recognise when there is not enough information available to reach one. In order to reach a solution, these highly proficient problem-solvers can create complex, flexible, multi-step plans that they continually monitor during execution. Where necessary, they modify their strategies, taking all constraints into account, both explicit and implicit. |

Figure 2. Summary descriptions of the six levels of proficiency in problem solving (OECD, 2014, p. 57)

This progressive development is sufficient basis for an assessment rubric and to establish zones of proximal development for students, which is the first step towards developing an educational process for teaching and assessing problem-solving. Test questions have also been developed and they can be viewed at <http://www.oecd.org/pisa/test/>.

3.3. Self-confidence

Definition

Self-confidence is an 'attitude' that allows the individual to have a positive and realistic view of himself/herself and his/her abilities to handle situations or difficulties. In other words, it is the belief of a person that he/she has the ability to do what he/she desires, within his/her potentials. It reflects also the confidence someone has in his/her abilities and the sense that he/she has control over his/her life. Even if something goes wrong, positive attitude and acceptance of self in people with high self-confidence does not change.

On the other hand, people who have no confidence in themselves are overwhelmingly dependent on the acceptance and approval of others to feel good about them. They generally do not take risks for fear of failure, but also do not have any expectation that they will do something successfully.

Regarding levels and types of self-esteem there are several distinctions such as high-low, secure-defensive, shattered-vulnerable-strong (The three states by Martin Ross), implicit-explicit, contingent - non-contingent etc.

Assessment tools

Self-confidence is typically assessed using self-report inventories.

The Rosenberg Self Esteem Scale (Rosenberg, 1965) is one of the most widely used tools for measuring self-esteem. It is a 10-item self-esteem scale that requires respondents to choose their level of agreement (strongly agree, agree, disagree, strongly disagree) with a series of statements about themselves. The statements are the following:

1. I feel that I am a person of worth, at least on an equal plane with others.
2. I feel that I have a number of good qualities.
3. All in all, I am inclined to feel that I am a failure.
4. I am able to do things as well as most other people.
5. I feel I do not have much to be proud of.
6. I take a positive attitude toward myself.
7. On the whole, I am satisfied with myself.
8. I wish I could have more respect for myself.
9. I certainly feel useless at times.
10. At times I think I am no good at all.

Scores are calculated as follows:

- For items 1, 2, 4, 6, and 7:
Strongly agree = 3
Agree = 2
Disagree = 1
Strongly disagree = 0
- For items 3, 5, 8, 9, and 10 (which are reversed in valence):
Strongly agree = 0
Agree = 1
Disagree = 2
Strongly disagree = 3

The scale ranges from 0-30. Scores between 15 and 25 are within normal range; scores below 15 suggest low self-esteem.

The e-version of the scale can be found at <http://personality-testing.info/tests/RSE.php>.

Another instrument for measuring self-esteem is "The Coopersmith Self-esteem Inventory" (CSEI). The CSEI has two forms to operate: one for 8-15 years old children and one for adults. It measures self-esteem in four areas a) general self (24 items), b) self in relation to peers (8 items), c) self in relation to parents (8 items), d) self in relation to school (8 items). For each item respondents answer whether the statement given is "like me" or "unlike me". The tool can be used for pre-post measures but it's not provided for free.

3. 4. Collaboration

Definition

Collaboration in the Cambridge dictionary is defined as "the situation of two or more people working together to create or achieve the same thing".

There are a number of activities involved when collaborating. One activity is communication, the exchange of information, knowledge, opinions and ideas. Communication in this case is not just exchanging perspectives. The members of a group need to be able to take the perspective of others, and provide their feedback and input. The management of the collaboration itself (working with others) is one more activity involved which requires the social skills of participation, perspective taking, and social regulation.

Participation refers to an individual's readiness to externalize and share information and thoughts, in addition to their actual involvement. Perspective taking skills enable an individual both to understand another's point of view, and to modify or adapt their own behaviours. Social regulation skills provide the facility for individuals to be aware of and manage the problem space in terms of the implications of human behaviour upon it. Intra and inter-personal awareness is essential for optimizing these strategic aspects of collaborative problem solving.



Collaboration with regards to problem solving includes the exploration for relevant information from others, common use of various resources and agreement on strategies and solutions. It requires the active participation and responding with other people as well as taking others' perspectives and evaluating self and peers in the context of capacity to contribute.

Assessment tools

On the internet there are lots of online tools that can be used for assessing collaborative skills. The main assessment methods are self-assessment questionnaires and rubrics.

One of the questionnaires is "The Collaboration Assessment Tool" that has been developed by the Prevention Institute in the USA. The questionnaire helps individuals and coalitions identify specific strengths and areas of growth and enables partnerships to subsequently establish a baseline and gauge their progress via periodic checks on domains of effective collaboration. The questionnaire is available for free and can be downloaded from the following link:

<https://www.preventioninstitute.org/sites/default/files/uploads/Collaborative%20Effectiveness%20Assessment%20Activity.pdf>

Another method for assessing collaborative skills is by using rubrics. One example of rubric that could be used for assessing collaboration and team work skills is the one developed by the Rochester Institute of Technology and can be downloaded from the following link:

[http://www.rit.edu/affiliate/weimpact/documents/FinalWEIMPACT_Teamwork%20%20Rubric%20%201%20\(2\).pdf](http://www.rit.edu/affiliate/weimpact/documents/FinalWEIMPACT_Teamwork%20%20Rubric%20%201%20(2).pdf).

This tool is also provided for free by the Institute. This rubric is designed to measure the quality of a process, rather than the quality of an end product. As a result, the observation of students working in groups will need to include some evidence of group interactions. The final product of the team's work (e.g., a written lab report, a poster, a device etc.) should not be assessed with this rubric. The final product does not provide enough information into the functioning of the team.

More tools can be found on the internet for free. The above mentioned are examples of good practices.

4. PROPOSED EVALUATION MODEL

The aims and objectives of the evaluation as stated in the application are:

1. Collect feedback for teaching improvement
2. Gather data to improve the methodology or tools
3. Assess the effectiveness of the methodology and the tools
4. Detect, evaluate and orientate the skills acquired by the children through the learning process
5. Monitor the compliance of final objectives

For addressing the above aims and objectives the following evaluation model is suggested for the YESict project.

4.1. Type of evaluation

A combination of formative and summative evaluation is considered appropriate for the YESict project.

The Formative evaluation will survey the process through which the education for entrepreneurship programme was planned and actualized, with a specific end goal to identify ways in which the programme could be improved. It can clarify how, why, and under what conditions the programme worked or not. The results of a formative evaluation can provide valuable information on aspects such as the planning and design of the course, as well as areas of the content and the teaching methods utilized.

Feedback should be collected from the teachers delivering the course on entrepreneurship as well from the students attending the course, about various aspects of the programme such as;

- shift in attitudes about entrepreneurship;
- knowledge about the issues addressed in the programme;
- opinions about skills improvement;
- level of satisfaction from the course; and
- opinions on the ICT tools used during the programme.

The Summative evaluation or impact evaluation will focus on the outputs achieved by the entrepreneurial programme. This may be done through assessing the post-programme level of entrepreneurial skills of the participants. It requires an assessment of what would have happened if the programme had not been in place.

4.2. Approach to evaluation

Regarding the approach it is suggested to combine quantitative and qualitative methods.

Quantitative

Quantitative evaluation is suitable to study teachers' perspectives on the implementation of the programme. It might be utilized in conjunction with qualitative assessments in a blended strategy approach.

Qualitative

Qualitative methods enable issues to be researched in more prominent profundity. This is particularly critical when conducting formative evaluations, where impressions of the way in which a training course for entrepreneurship was delivered, and its subsequent usefulness and value need to be examined in detail. With this method the consortium can gain a better understanding of the perceptions and attitudes of the teachers and students on how the programme was implemented, and how improvements can be made.

4. 3. Tools for gathering data

4. 3. 1. Tools for gathering feedback on the pedagogical methodology and the ICT and non ICT tools

4. 3. 1. 1 Questionnaire

A questionnaire can be used to collect data and it may be administered online for self-completion. The online questionnaire can be delivered quickly to a big number of people, and avoid the risk of interviewer bias influencing the responses which are reported. Nonetheless, the questions have to be relatively simple and clear, as it cannot be controlled if the respondent has understood the question as it should be understood. One more issue to be considered is that the sample acquired might be skewed due to the possibility of some respondents not feeling confident in replying in this way. This type of questionnaire would be better at the second phase of the experimentation.

The strengths, weaknesses, opportunities and threats of on-line self-completion questionnaires can be summarized as follows (see Table 1):

Table 1. SWOT analysis of questionnaires

| | |
|--|---|
| <ul style="list-style-type: none"> • Can be sent quickly to large numbers of respondents • Avoid interviewer bias • Standardized questionnaire helps to compare responses • Respondents have time to think about their answers | <ul style="list-style-type: none"> • Low response rate • Misunderstandings by the respondents may occur, if questions are not clear • Difficult to explore complex issues in depth |
| STRENGTHS | WEAKNESSESSS |
| OPPORTUNITIES | THREATS |
| <ul style="list-style-type: none"> • Easy to analyse the answers | <ul style="list-style-type: none"> • The sample acquired might be skewed due to the possibility of some respondents not feeling confident in replying in this way |

4.3.1.2 Interviewing

Personal interviews can be organised in various ways, ranging from structured ones using a questionnaire with specific questions, to those which are semi-structured or unstructured, using topic guides which identify the points to be examined. In all cases, they will facilitate the examination of opinions, experiences, results etc. in greater depth. This is especially important for investigating the degree to which the specific programme has affected on student's acquisition of entrepreneurial skills. For the purposes of the YESict project, semi structured interviews with the teachers are recommended. Guidelines and questions for the interviews are included in the Annexes (see the section Interviews with teachers in the page 23).

The strengths, weaknesses, opportunities and threats for interviews can be summarized as (see Table 2):

Table 2. SWOT analysis of interviews

| | |
|--|--|
| <ul style="list-style-type: none"> • High response rates • Respondents can be asked to clarify their answers or provide more explanations on the opinion they expressed • The information collected is often rich in terms of detail and insights | <ul style="list-style-type: none"> • Laborious to set up and carry out • More difficult and longer analysis stage • Require extensive aptitude on part of the interviewer |
| STRENGTHS | WEAKNESSESSS |
| OPPORTUNITIES | THREATS |
| <ul style="list-style-type: none"> • Complex issues can be examined in depth • Quotation of responses can provide powerful evidence when reporting | <ul style="list-style-type: none"> • Sensitive to interview bias or misinterpretation |

Another option for interviews is telephone interviews using applications such as Skype, Messenger, WhatsApp etc. Nonetheless, there might be difficulties in reaching respondents, and time limitations as far as the time span each interviewee can devote to a telephone interview. These limitations can affect the degree of depth which can be explored. In addition, when the quality of the online communication is poor it can make the interviewing process more difficult.

4.3.1.3 Focus groups

Focus groups composed of participants' samples from the entrepreneurial courses, will enable students to share their experiences and perceptions about the entrepreneurship programme they attended. They can be especially helpful for conducting the formative evaluation of the programme, as they can encourage participants in the groups to develop ideas for addressing problems and for improving the programme. More instructions on the implementation of the focus groups are available in the Annexes (see the section Focus Groups in the page 25).

The strengths, weaknesses, opportunities and threats of focus groups can be summarized as (see Table 3):

Table 3. SWOT analysis of focus groups

| | |
|--|---|
| <ul style="list-style-type: none"> • Highlight a variety of perspectives • Lead to new awareness into issues | <ul style="list-style-type: none"> • Laborious to set up and carry out • The moderator of the discussion needs to be experienced in conducting focus groups • Difficult to analyse |
| STRENGTHS | WEAKNESSESSS |
| OPPORTUNITIES | THREATS |
| <ul style="list-style-type: none"> • May produce solutions or improvements for the entrepreneurial programme | <ul style="list-style-type: none"> • A small number of participants might monopolize the group conversation |

4.3.1.4 Case studies

Case studies of participants (teachers or students) could track their experiences in the programme, and identify difficulties and benefits which had accrued. The participant who will be the subject of the case study can be asked to record events and their views about the experience in a diary and interviewed after the end of the course.

4.3.2. Tools for evaluating students' entrepreneurial skills pre/post experimentation

4.3.2.1 Rubrics

Rubrics can be used by the teachers as tools for recording the level of the students' entrepreneurial skills. There is a variety of rubrics that can be found for free on the internet. For the purposes of the YESict project it is suggested to use the rubrics created by the Joint Research Center of the European Commission which can be found at <http://publications.jrc.ec.europa.eu/repository/bitstream/JRC101581/lfnaz27939enn.pdf>. Based on these rubrics, SYNTHESIS in collaboration with Antic had selected the most relevant sub skills and levels for the project's needs. This version of the rubric is available in the Annexes (see the section Entrepreneurial Skills Rubric in the page 26).

4.3.2.2 Observation

In the case where teachers are not familiar with the students, they can use this method for evaluating students' skills before the experimentation. Activities for observing and evaluating the level of the students' skills addressed by the project's pedagogical methodology can be found at <http://99u.com/articles/7160/test-your-creativity-5-classic-creative-challenges> and at <http://www.teachthought.com/critical-thinking/10-team-building-games-that-promote-critical-thinking/>. Teachers can rate the level of the students' entrepreneurial skills by observing their performance during the activities and record the relevant level according to the rubric provided in the Annexes (see the section Entrepreneurial Skills Rubric in the page 26).

The strengths, weaknesses, opportunities and threats of observation are (see Table 4):

Table 4. SWOT analysis of observations

| | |
|--|---|
| <ul style="list-style-type: none"> Provides greater insight of programme delivery and participant behaviour | <ul style="list-style-type: none"> Difficult to gain permission for access Time-consuming |
| STRENGTHS | WEAKNESSESSS |
| <ul style="list-style-type: none"> The data collected is rich | <ul style="list-style-type: none"> The observer may be biased Those observed may behave in a different way than they usually do |
| OPPORTUNITIES | THREATS |

5. CONCLUSIONS AND RECOMMENDATIONS

Based on the desk research's findings about methodologies and tools for assessing training programmes on entrepreneurial skills, a combination of formative and summative approach is suggested for the YESict project. A variety of tools will be used for gathering the relevant qualitative and quantitative data.

While developing the evaluation model, an effort has been made to create an assessment process that matches the spirit of the pedagogical methodology. The whole concept of the pedagogical methodology is playful and funny; thus, incorporating tests and self-assessment questionnaires for the students would destroy that spirit. Focus groups and interviews are considered the most appropriate methods for collecting participants' feedback. Rubric is also chosen as the most favourable tool for assessing students' entrepreneurial skills. Taking under consideration the amount of work teachers will have during the experimentation, it has been decided by the consortium that teachers can select randomly a group of students for evaluating their skills instead of all students.

In the Annexes questions for the teachers' interviews and the students' focus groups are included with some guidelines for the facilitators. In addition, the Entrepreneurial Skills Rubric is presented with a description per skill level.

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7. 1. Interviews with teachers

Interviews with teachers should be conducted by partners' organisation staff right after the completion of the first phase of the experimentation. For the second phase partners have two options: implementing again interviews or using a questionnaire for online self-completion).

The interview is expected to last about 1 ½ hour. Interviews will be semi-structured and a recording device should be used. Transcript of the recorded content should be submitted for further analysis.

Below is a list of questions the interviewer should ask the teachers. Other questions may be added but they should be reported when recording.

A. PEDAGOGICAL METHODOLOGY

In this section feedback about the different stages of the pedagogical process is expected to be collected. The pedagogical stages are **1)** Motivation/Introduction, **2)** Challenge Identification, **3)** Team Creation, **4)** Exploration, **5)** Ideation, **6)** Prototyping and **7)** Presentation. In case the teacher doesn't make any reference to one of these stages, please make a specific question about that stage.

- *Which aspects did/didn't you like and why?*
- *What was easy/difficult?*
- *What new knowledge did you gain?*
- *How this knowledge can be used in other subjects?*
- *What suggestions do you have for improving the methodology?*

B. ICT/non ICT TOOLS

In this section feedback about the tools that will be used is expected to be collected.

The **ICT tools** are the google drive (creating/ sharing files, creating google docs, uploading/sharing documents) and the pedagogical platform.

The **non ICT tools** per phase are:

- 1) Challenge Identification phase: Target Diagram, Strategy, Team Progress Diary
- 2) Exploration phase: Mind Map, Stakeholders, 5Q questions
- 3) Ideation phase: Association (flower), 5 senses, Superheroes, Brainstorming
- 4) Prototyping phase: Mockup, Physical Model, Role playing, Interaction, Diagrams (mood board, sketch), Story board

In case the teacher doesn't make any reference in one of the above mentioned tools, please make a specific question about that one.

- *Which aspects did/didn't you like and why?*

- *What was easy/difficult?*
- *In what way the tools were/weren't useful?*
- *What suggestions do you have for improving the ICT/non ICT tools?*

C. ASSESSMENT TOOL (Entrepreneurial Skills Rubric, Google Form)

In this section information about the assessment tools the teachers used is expected to be collected.

- *Which aspects did/didn't you like and why?*
- *What was easy/difficult?*
- *What suggestions do you have for improving the Skills Rubric?*

D. PERCEPTION OF ENTREPRENEURSHIP

The following questions are proposed in order to verify if the teacher has changed his/her mind about entrepreneurship thanks to the YESict project and to identify if he/she is interested in continuing teaching concepts related to it.

- *After following the YESict process, have you changed your mind about what entrepreneurship/entrepreneurial mind-set is?*
- *Do you think that it can be taught? How?*
- *Are you going to include some of these concepts in your lessons? Which ones?*
- *If it is the case, what kind of help would you ask for? (How to teach the concepts, definition of the lesson, evaluation...)*
- *Anything to add?*

7. 2. Focus Groups

The number of students participating in the focus groups should be minimum 4 maximum 8 students. The focus groups are expected to last 1-1 ½ hour depending on the number of the participants. The facilitator is advised to be one of the partners' organisations staff member and not the teacher delivering the workshop. A recording device should be used and transcript of the recorded content should be provided for further analysis.

- *What did/didn't you like from the workshop and why?*
- *What was difficult/easy?*
- *What new knowledge did you gain?*
- *How are you going to use this knowledge in your everyday life situations?*
- *What would you improve/change?*
- *Anything else to add?*

7.3. Entrepreneurial Skills Rubric

This rubric will be completed by the teachers online. A google form will be developed and a code per student will be used for securing their anonymity. Teachers will assess students' skills before the experimentation and after. In the case teachers are not familiar with the students and cannot pre-assess their skills, they could use the activities suggested in this document.

Table 5. Description of the skills' levels

| Level of proficiency | FOUNDATION Relying on support from others | INTERMEDIATE Building independence | ADVANCED Taking responsibility |
|----------------------|---|--|---|
| Progression | Under direct supervision or with reduced support from others, some autonomy and together with his/her peers | On his/her own and together with his/her peers or taking and sharing some responsibilities | With some guidance and together with others or taking responsibility for making decisions and working with others |

Table 6. Entrepreneurial Skills Rubric

| SKILL | DESCRIPTOR | THREAD | LEVEL 1-2 Discover and explore | LEVEL 3-4 Experiment and Dare | LEVEL 5-6 Improve and Reinforce |
|------------|---|---------------------|---|--|--|
| CREATIVITY | Develop several ideas and opportunities to create value, including better solutions to existing and new challenges. | Be curious and open | <ul style="list-style-type: none"> The student can show that he/she is curious about new things The students can explore new ways to make use of existing resources | <ul style="list-style-type: none"> The student can experiment with his/her skills and competences in situations that are new to him/her The student can actively search for new solutions that meet his/her needs | <ul style="list-style-type: none"> The student can actively search for new solutions that improve the value-creating process The student can combine his/her understanding of different contexts to transfer knowledge, ideas and solutions across different areas |
| | Explore and experiment with innovative approaches. Combine knowledge and resources to achieve valuable effects | Develop ideas | <ul style="list-style-type: none"> The student can develop ideas that solve problems that are relevant to him/her and his/her surroundings Alone and as part of a team, he/she can develop ideas that create value for others | <ul style="list-style-type: none"> The student can experiment with different techniques to generate alternative solutions to problems, using available resources in an effective way The student can test the value of his/her solution with end users | <ul style="list-style-type: none"> The student can describe different techniques to test innovative ideas with end users The student can set up processes to involve stakeholders in finding, developing and testing ideas |

| SKILL | DESCRIPTOR | THREAD | LEVEL 1-2 | LEVEL 3-4 | LEVEL 5-6 |
|-----------------|--|-----------------|--|--|--|
| | | | Discover and explore | Experiment and Dare | Improve and Reinforce |
| PROBLEM SOLVING | Act and work to achieve goals, stick to intentions and carry out planned tasks | Define problems | <ul style="list-style-type: none"> The student can approach open-ended problems (problems that can have many solutions) with curiosity The student can explore open-ended problems in many ways so as to generate multiple solutions | <ul style="list-style-type: none"> The student can take part in group dynamics and aimed at defining open-ended problems The student can reshape open-ended problems to fit his/her skills | <ul style="list-style-type: none"> The student can describe and explain different approaches to shape open-ended problems and different problem-solving strategies The student can help others create value by encouraging experimentation and using creative techniques to approach problems and generate solutions |
| | | Take action | <ul style="list-style-type: none"> The student can have a go at solving problems that affect his/her surroundings The students shows initiative in dealing with problems that affect his/her community | <ul style="list-style-type: none"> The student actively faces challenges, solve problems and seize opportunities to create value | <ul style="list-style-type: none"> The student takes action on new ideas and opportunities, which will add value to a new or existing value-creating venture The student values others taking the initiative in solving problems and creating value |

| SKILL | DESCRIPTOR | THREAD | LEVEL 1-2 Discover and explore | LEVEL 3-4 Experiment and Dare | LEVEL 5-6 Improve and Reinforce |
|------------------------|--|-----------------------------------|--|--|---|
| SELF-CONFIDENCE | Identify and assess individual and group strengths and weaknesses. Believe in his/her ability to influence the course of events, despite uncertainty, setbacks and temporary failures | Identify strengths and weaknesses | <ul style="list-style-type: none"> The student can identify things he/she is good at and things he/she is not good at | <ul style="list-style-type: none"> The student can judge his/her strengths and weaknesses and those of others in relation to opportunities for creating value The student is driven by the desire to use his/her strengths and abilities to make the most of opportunities to create value | <ul style="list-style-type: none"> The student cant team up with others to compensate for their weaknesses and add to their strengths The student can help others identify their strengths and weaknesses |
| | | Believe in its ability | <ul style="list-style-type: none"> The student believes in his/her ability to do what he/she is asked successfully The student believes in his/her ability to achieve what he/she intends to | <ul style="list-style-type: none"> The student can judge the control he/she has over his/her achievements (compared with any control from other influences) The student believes he/she can influence people and situations for the better | <ul style="list-style-type: none"> The student believes in his/her ability to carry out what he/she has imagined and planned, despite obstacles, limited resources and resistance from others The student believes in his/her ability to understand and take the good out of experiences that other may label as failures |

| SKILL | DESCRIPTOR | THREAD | LEVEL 1-2 Discover and explore | LEVEL 3-4 Experiment and Dare | LEVEL 5-6 Improve and Reinforce |
|----------------------|---|--------------------------------|---|--|---|
| COLLABORATION | Work together and co-operate with others to develop ideas and turn them into action. Solve conflicts and face up to competition positively when necessary | Develop emotional intelligence | <ul style="list-style-type: none"> The student can show empathy towards others The student can recognize the role of his/her emotions, attitudes and behaviours in shaping other people's attitudes and behaviours and vice versa | <ul style="list-style-type: none"> The student can express his/her (or his/her team's) value-creating ideas assertively The student can face and solve conflicts | <ul style="list-style-type: none"> The student can compromise where necessary The student can deal with non-assertive behaviour that hinders his/her (or his/her team's) value-creating activities (for example, destructive attitudes, aggressive behaviour and so on) |
| | | Work together | <ul style="list-style-type: none"> The student is open to involve others in his/her value-creating activities The student can contribute to simple value-creating activities | <ul style="list-style-type: none"> The student can contribute to group decision-making constructively The student can create a team of people who can work together in a value-creating activity | <ul style="list-style-type: none"> The student can use techniques and tools that help people to work together The student can give people the help and support they need to perform at their best within a team |