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The assessment of entrepreneurial competence: a research in a secondary school

La evaluación de la competencia emprendedora: una investigación en una escuela secundaria

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ABSTRACT

The European Recommendations of 2006, and subsequently those of 2008, highlight the need to consider the key competences for the development of learning within the school curricula. From various researches (European Commission/EACEA/Eurydice, 2016) has emerged the need to develop in particular the entrepreneurial skills of young people since they are considered fundamental for the transition from school to the world of work. The purpose of this research is to show the importance of entrepreneurial competence for the integral development of each student through the use of ad hoc evaluation rubrics inserted in an innovative E-portfolio that assumes a triangular evaluation process participated by teachers and students. The evaluation rubrics used for this purpose were created as part of an Erasmus KA 201 project and referred to the EntreComp framework. From the analysis of the data collected, it emerges that the evaluation of the teachers does not differ significantly from the self-evaluation of the students, who generally appear more positive in all three competences analyzed.

KEYWORDS

Entrepreneurial competence; E-portfolio; Evaluation rubrics; Triangular assessment.

RESUMEN

Las Recomendaciones Europeas de 2006, y posteriormente las de 2008, destacan la necesidad de considerar las competencias clave para el desarrollo del aprendizaje dentro de los currículos escolares. De diversas investigaciones (European Commission/EACEA/Eurydice, 2016) ha surgido la necesidad de desarrollar en particular las habilidades emprendedoras de los jóvenes ya que se consideran fundamentales para la transición de la escuela al mundo laboral. El propósito de esta investigación es mostrar la importancia de la competencia emprendedora para el desarrollo integral de cada alumno mediante el uso de rúbricas de evaluación *ad hoc* insertadas en un innovador E-portafolio que supone un proceso de evaluación triangular en el que participan docentes y alumnos. Las rúbricas de evaluación utilizadas para este propósito se crearon como parte de un proyecto Erasmus KA 201 y se refirieron al marco EntreComp. Del análisis de los datos recogidos se desprende que la valoración de los profesores no difiere significativamente de la autoevaluación de los alumnos, que en general se muestran más positivos en las tres competencias analizadas.

PALABRAS CLAVE

Competencia empresarial; E-portfolio; Rúbricas de evaluación; Evaluación triangular.

RECOMENDED CITE

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Main contributions of the article and future research lines:

- The research makes it possible to develop the theme of entrepreneurial assessment which is underdeveloped in European school curricula.
- The research allows teachers to use an authentic and meaningful assessment thanks to the use of the assessment rubrics.
- Future investigation lines: to use the E-portfolio with related evaluation rubrics also for all the other key competences reported in the 2018 Recommendations adopted by the Council of the European Union.

1. INTRODUCTION

The Recommendations of the European Parliament and of the Council in 2006 (2006/962/CE) defined the eight key competences for permanent learning that each nation must promote, with an objective of improvement, by 2020.

From the analysis of the Organization for Economic Cooperation and Development for International Student Assessment (PISA) (OECD, 2016) emerges a high proportion of adolescents with insufficient basic skills.

As a result, the European Council reviewed in 2018 the key competences for learning (2018/C 189/01), to develop new competences for students capable of responding to the challenges deriving from the transformations of a complex and interconnected world, and the importance of the development of personal problem-solving skills, resilience, cooperation, creativity, and self-regulation (European Parliament, 2000). Among these, entrepreneurial competence is considered essential for this purpose (Kyro, 2008). The Technical Report (Kormakova et al., 2015) reports that the evaluation of entrepreneurial skills represents one of the least investigated field, partially due to the difficulties that teachers face in evaluating these skills (Lackéus, 2014; Haara et al., 2016).

The article proposes a research path implemented as part of an implementation of an Erasmus project ("E.S.S.E.N.C.E. Enterpreneurial skills in schools education: nurturing citizenship and entrepreneurship", nr. 2018-1-IT02-KA201-048137) to monitor the evaluation of the entrepreneurial competence of 20 students in a lower secondary school. This Erasmus project is one of the few projects in Europe related to the assessment of entrepreneurial competence (Michelotti, 2021). The evaluation process was based on the triangulation principle. Triangulation is a methodology used by the External Evaluation Nuclei (INVALSI, 2016) upon their visits to educational institutions in order to evaluate their service. The triangulation is based on the idea of comparing different data sources in order to determine if a phenomenon has been reliably described. To respond to the characteristics of the triangular assessment, the portfolio was used,

in a digital version. The portfolio is an evaluation tool that makes use of a systematic collection, based on specific objectives and criteria, of the work done by a student during a specific educational practice. Through this tool, it is possible to promote a comparative transversal evaluation, carried out by both the teacher and the student, by comparing what was shown at the beginning of an educational path and what has been shown over time (Pellerey, 2004). The use of this tool has become so important for authentic assessment that we have witnessed its evolution and use in a rapid time span thanks to the contribution provided by technology: from the paper version we have moved on to a computerized version (database), up to the E-portfolio (repository). The main advantages of the digital Portfolio compared to its paper version are (Rossi et al., 2006):

- it allows metacognitive reflection on student progress both individually and as a group.
- it allows to monitor the student's progress over a very long period of time.
- it favors the acquisition of new digital skills by teachers and students.

To carry out the activity of evaluating the stimulating activities delivered to students during the experimentation, specific evaluation rubrics built during the Essence project and inserted within the E-portfolio were used. The evaluation rubric is the most suitable tool for defining the evidence of learning, for evaluating the level of quality reached by the students and for helping them to recognize what they know and what they can do (Andrade, 1997; Napoletano, 2018; Park et al., 2020). The evaluation rubric becomes a useful tool if it is shared or built from the beginning with the students, not only to evaluate the finished product at the end of a path, but above all to monitor the progress and improvement throughout the process, by the teacher and by the student himself, who is no longer the recipient of the evaluation, but rather the protagonist that can self-evaluate himself using the same criteria as the teacher (Wiggings and Mc Tighe, 2004).

The evaluation rubrics used are double-entry tables that present criteria on the basis of which the stimulus-activities were evaluated according to the levels of mastery acquired, and were divided into: very good, good, acceptable, not acceptable (Castoldi, 2019).

The rubrics used in the E-portfolio were developed from the EntreComp framework. EntreComp (European Commission et al., 2016) is a comprehensive framework designed to describe and understand the definition of entrepreneurship. Entrepreneurship is defined as the ability to act on opportunities and ideas to create value for others, be it social, cultural or financial.

The EntreComp structure is made up of 3 interconnected areas of expertise:

- Ideas and opportunities.
- Resources.
- Actions.

Each of the three areas is made up of 5 skills which, taken together, constitute the 15 skills useful for individuals to identify opportunities and ideas useful for giving value to others (Figure 1).

For each of the 15 competences there are a series of different thematic priorities that describe their real meaning in practical terms. These priorities represent the foundation for building each competence.

Each thematic priority is associated with a set of learning outcomes based on eight levels of progression, from the basic level, to the intermediate, to the advanced, up to the expert level.

Starting from the EntreComp framework, an Erasmus KA 201 project ("E.S.S.E.N.C.E. Enterpreneurial skills in schools education: nurturing citizenship and entrepreneurship", nr. 2018-1-IT02-KA201-048137) was launched in 2018 with the aim of responding to some critical issues identified in the Italian and European system in relation to the development and assessment of entrepreneurial competence.

Figure 1.

The 15 skills related to the three areas of the EntreComp framework

The ESSENCE project first of all wanted to propose the planning of an improvement in the professional profile of the teachers participating in the Project, to be able to accompany lower secondary school students on a path to acquisition/evaluation of entrepreneurial skills, allowing them to develop transversal skills, such as critical thinking and creativity, useful for the realization of an active citizenship, and in view of their future educational and professional development.

Eight European partners joined: four countries (Italy, Poland, Portugal, Turkey) with the task of administering the activities related to entrepreneurial competence and testing the E-portfolio during the final period of the project; two training bodies (Finland, Sweden) with the aim of offering didactic material related to entrepreneurial activities and to elaborate the evaluation rubrics to be used during the piloting; a Consortium (Italy) to monitor the entire path with respect to the initial project; a University (Spain) specialized in educational and technological innovation for the design of the E-portfolio.

Table 1.

Links to the tool available in the various European languages.

Language	Link
English	https://pln.inf.um.es/essence/#set-locale/en-en
Finnish	https://pln.inf.um.es/essence/#set-locale/fi-fi
Italian	https://pln.inf.um.es/essence/#set-locale/it-it
Polish	https://pln.inf.um.es/essence/#set-locale/pl-pl
Portuguese	https://pln.inf.um.es/essence/#set-locale/pt-pt
Spanish	https://pln.inf.um.es/essence/#set-locale/es-es
Swedish	https://pln.inf.um.es/essence/#set-locale/se-se
Turkish	https://pln.inf.um.es/essence/#set-locale/tr-tr

This E-portfolio has been particularly useful for the characteristics previously reported. As an added value, the tool specifically has the following aspects:

- It is available in the main European languages (English, Finnish, Italian, Polish, Portuguese, Spanish, Swedish, Turkish) (Table 1).
- There is a specific evaluation section for teachers (Figure 2) and a specific self-assessment section for students (Figure 3).
- Results are automatically calculated and can be downloaded by students as well (Figure 4).
- Allows you to organize evaluations according to different projects (Figure 5) and allows you to organize assessment sessions in groups and subgroups of students (Figure 6).
- It is possible to add additional rubrics in addition to the already present one related to entrepreneurial competence.

Figure 2.

Teacher evaluation screen example

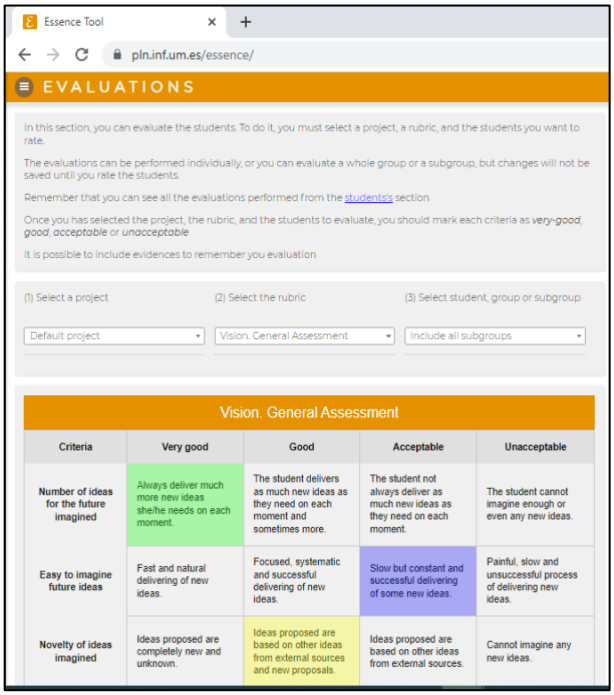


Figure 3.

Student´s self-asssesment screen example

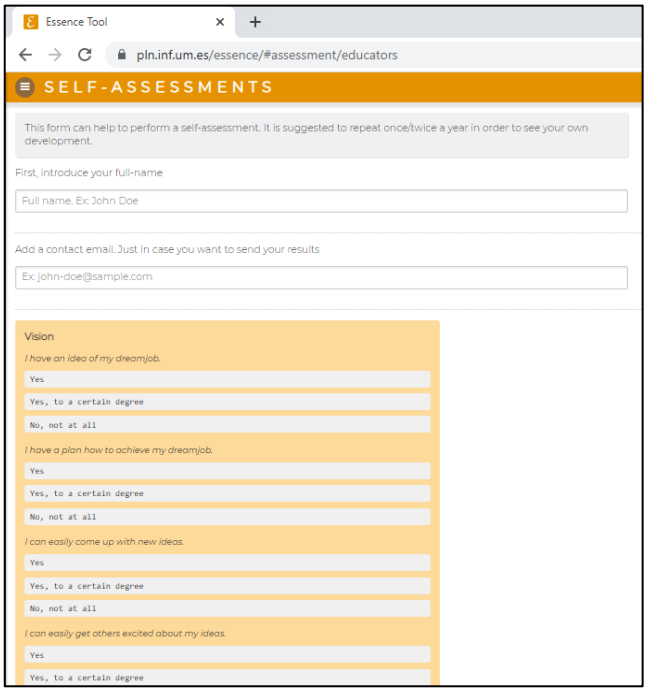


Figure 4.
Students results screen example

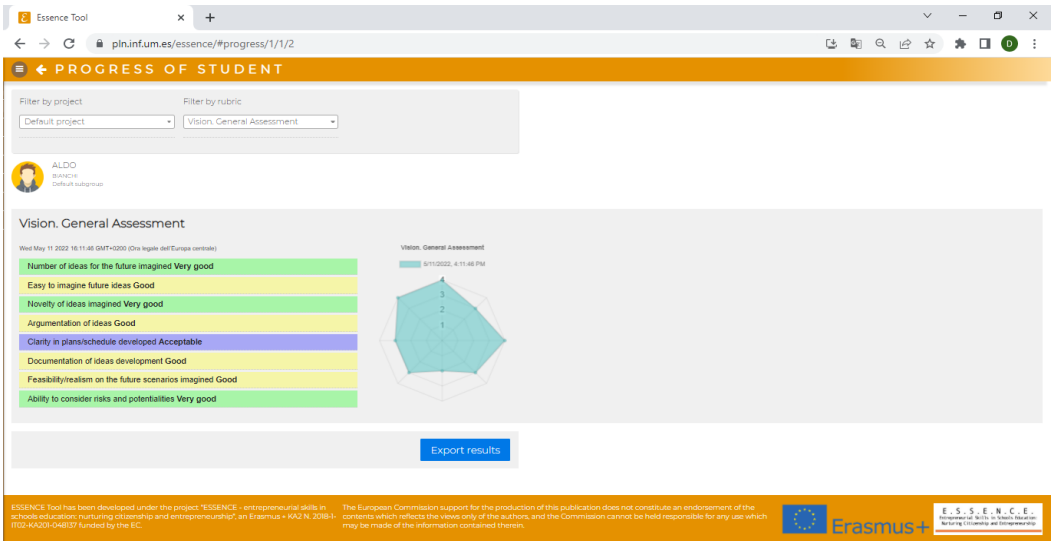


Figure 5.
Insertion of different projects example

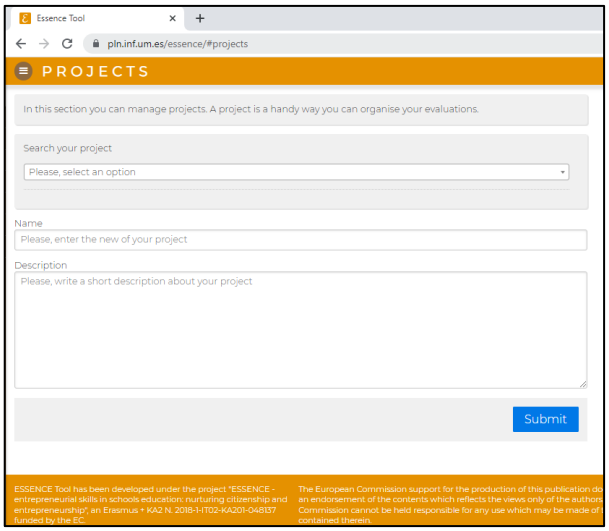
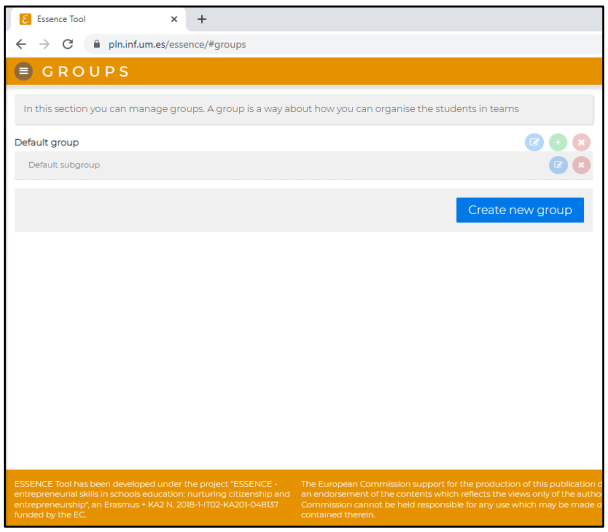


Figure 6.
Groups formation example



2. METHOD

The testing phase was carried out in the four countries involved (from January to May 2021). The testing phase is the piloting required in the final phase of the Erasmus project to verify the functioning of the E-portfolio within the process of evaluation and self-assessment of the students' entrepreneurial competence. In particular, in Italy, the teachers of the I.C. Fontanile Anagnino proposed six stimulus-activities, two for each competence, chosen by the EntreComp framework to twenty pupils (10 males and 10 females, ages 11-12) in a first class: Vision, Working with others, Self-awareness and Self-efficacy, administered and divided into two distinct periods. The same rubrics were administered both to 20 pupils of the same class and to 4 observing teachers in 2 specific moments: the first at the end of the administration of the first stimulus-activities related to the three skills (Vision, Working with others, Self-awareness and Self-efficacy), the second at the conclusion of the remaining three identified activities. Four teachers observed

the students while they performed the stimulus activities and in a shared manner reported the evaluations in the first and second periods on a single PC during the observation. The cooperation that took place between the observing teachers was very important. The students recorded their self-assessment on the E-portfolio: each of them had a personal PC.

Table 2.

Description, evaluation criteria of the three competences considered: Vision, Self-awareness and self-efficacy, Working with others.

Competence	Description	Criteria
Vision	Imagine the future. Develop a vision to turn ideas into action. Visualize future scenarios to guide efforts and actions.	Number of ideas for the future
		Imagine future ideas
		Novelty of ideas imaginated
		Argumentation of ideas
		Clarity in planes
		Documentation of ideas development
		Realism on the future scenarios imagined
		Ability to consider risks and potentiality
Self-awareness and Self-efficacy	Reflect on your own needs, aspirations and wishes in identifying and evaluating the individual and group strengths and weaknesses. Believe in own ability to influence the course	Environment
		Consciousness of what is happening
		Consciousness about the image she/he projects
		Concern what other people think of him/her
		Consciousness of its inner feelings
		Confidence on having enough persistence about goals
		Confidence on handle obstacles and overcome them
		Confidence on overcoming opponents
		Confidence on solving difficult problems
Working with others	Working together and cooperating with others to develop ideas and turn them into action. Network. Resolve conflicts and face competition positively when needed.	Planning
		Time
		Material
		Tranquillity
		Motivation
		Help and respect
		Delegate
		Friendliness

The students and teachers filled in the assessment by clicking on the descriptor in the specific assessment rubric corresponding to the criterion considered according to the 4 quality levels (very good, good, acceptable, not acceptable). It was possible to find out the results of teachers and students directly from the E-portfolio. The students' results were retrieved from the compilation each student made on the assessment rubric available to them. It should be noted that the E-portfolio offers an additional self-assessment for the students (Figure 3) to emphasise their metacognitive pathway. The results are sent to the student's personal e-mail. This self-assessment was not monitored for the purposes of the research here presented. The evaluation by the teachers and the self-evaluation by the students were carried out with the same evaluation rubrics (Table 2), thus implementing a triangulation process (Freddano et al., 2010). The stimulus-activities could be chosen among those proposed by the Framtidsfron training institution as well as others known personally by the teachers. The teachers of the IC F. Anagnino have chosen activities for the development of an entrepreneurial idea (Vinci, 2020) by the pupils for the

resolution of a problem related to one of the objectives of the UN Agenda 2030. Some teachers of our school, having observed how much food they pupils wasted during the breaks, chose objective no. 2, the title of which is: Defeating hunger. End hunger, achieve food security, improve nutrition, promote sustainable agriculture (United Nations, 2015). Given the wide extent of the topic and the limited time available, particular attention was paid to the aspect of food waste that is highly developed in our contemporary society, aiming to develop innovative and creative entrepreneurial ideas involving from which the whole institution could benefit. The business idea requested from the students was implemented with a cooperative methodology, according to the principles of Cooperative learning (Comoglio, 2007); the final product to be delivered could be chosen from a series of possibilities, including: a video, a poster, a debate, a power point, an oral paper, a 3D model (Pellerey, 2020).

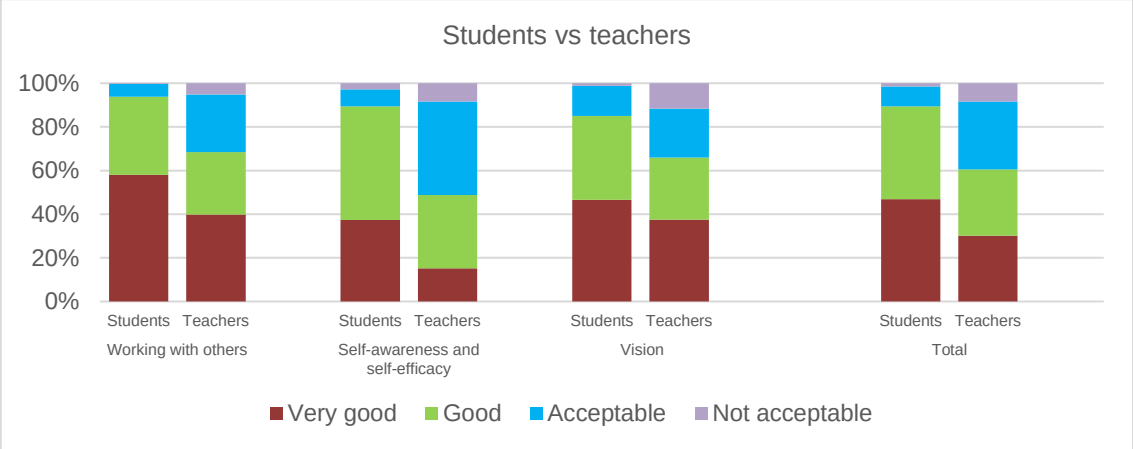
3. RESULTS

In the preliminary phase, the data collected was reported in tables containing the answers reported by each individual pupil and by the group of teachers following each of the two stimulus-activity phases, in order to be able to compare any differences.

Figure 7 below compares - for each of the three skills - the percentage of the 4 assessments for each rubric, reporting students (Pupils) in the left column of the histogram and teachers (Teachers) in the right column. For this first initial assessment, the answers given in both phases were aggregated.

Figure 7.

General comparison and for the three competences of the assessments given by students and teachers (aggregated data)



From the data it appears that students 'self-assessment is almost always higher than the teachers': in fact in about 90% of cases the students' self-assessment is good or very good, while the assessment good and very good does not exceed 60% of teachers' evaluations. Moreover, faculty members assigned unacceptable to about 10% of the total assessments, while students hardly ever use unacceptable.

Analyzing and comparing the students' self-assessments following the two requests to fill in the evaluation rubric (T1 - first compilation, T2 - second compilation) we observed that the students' self-assessment has remained substantially the same and indeed, in some cases, it is even

worsened, as observed by the reduction in the percentages of very good responses for the Working with Others and Vision skills. This is presumably because the activity has made them more aware of their own performance, which is reflected in a higher self-assessment for the competence Self-awareness and self-efficacy.

Figure 8 compares -for each of the three competences- the overall percentage of students' responses, after the first and second stimulus-activity phases.

Figure 9 compares -for each of the three competences- the overall percentage of teachers' responses, following the first and second stimulus-activity phases.

Figure 8.

General comparison and for the three competences of the students' self-assessments in the first and second compilation of the rubric

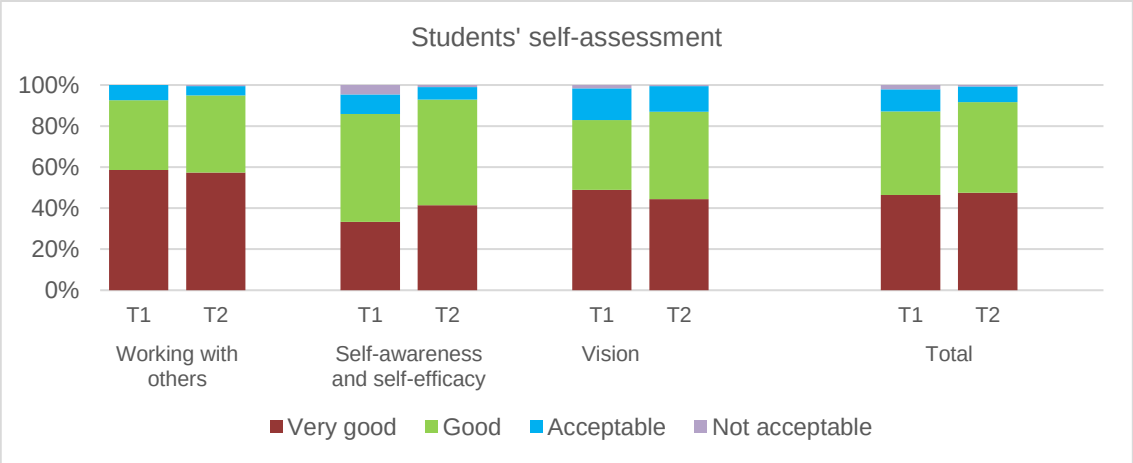
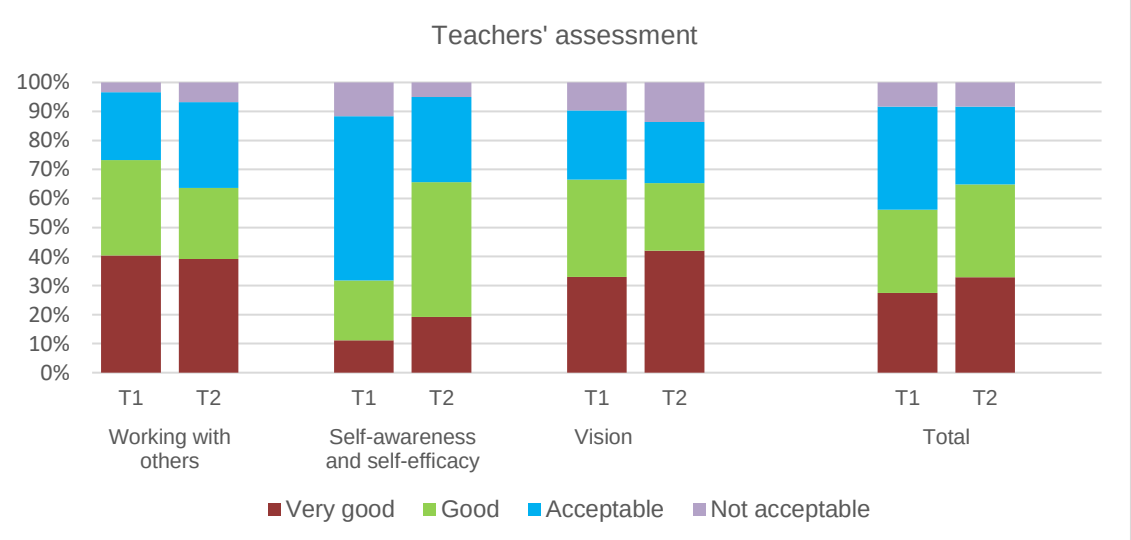


Figure 9.

General comparison and for the three competences of teacher evaluations in the first and second compilation of the evaluation rubric



For what concerns the evaluation of teachers, on the other hand, differences are observed in the assessments given before and after the activities in the case of two of the three competences, with an improvement in the case of Self-awareness and self-efficacy, while the score worsended

in the competence Working with others. If we add together the response categories good and very good - there are no changes for the Vision competency. In the following paragraphs we compare the each individual evaluation criteria of the three competences, both for students and teachers. The figures report the students' self-assessments, according to each criterion for the two compilation requests, the teachers' assessments and, finally, the comparison of the assessments between pupils and teachers are shown.

3.1. Vision

Figure 10 analyzes students' self-assessment referring to Vision competence, comparing the compilation of the first and second period.

For the different criteria of the Vision competence, following the first request to fill in the evaluation rubric, around 50% of the students evaluated themselves with a very good level, another 34% good, 15% acceptable and, only in 1 % of cases, not acceptable. After the second activity, the evaluation good increases to 40%, while all the other evaluations decrease, with an overall direction towards an intermediate level of self-assessment.

Figure 10.

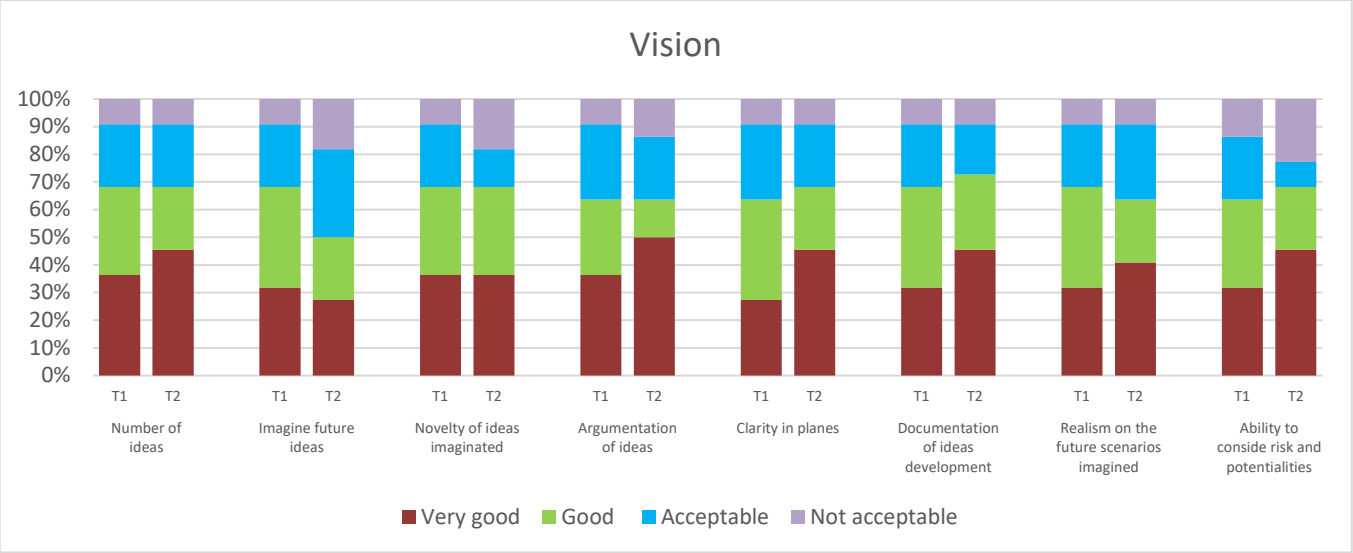
Self-assessment of students in the first and second compilation of the assessment rubric for the Vision competence

Observing the different criteria, it must be noted that those where students evaluate themselves more positively concern the "Number of ideas", "Novelty of ideas" and "Argumentation of ideas", all with good or very good evaluation of around 90%. For these criteria, however, after the second compilation request, the very good evaluations drop significantly. In the criteria "Imagining future ideas" and "Clarity of projects" the pupils consider themselves weaker but in both cases the evaluation improved after the second compilation. The only criterion that presented a worsening of self-assessment between the first and second delivery is "Feasibility and Realism".

Figure 11 analyzes teachers' evaluation referring to Vision competence, comparing the compilation of the first and second periods.

Figure 11.

Teachers' ratings in the first and second compilation of the evaluation rubric for the Vision competency criteria

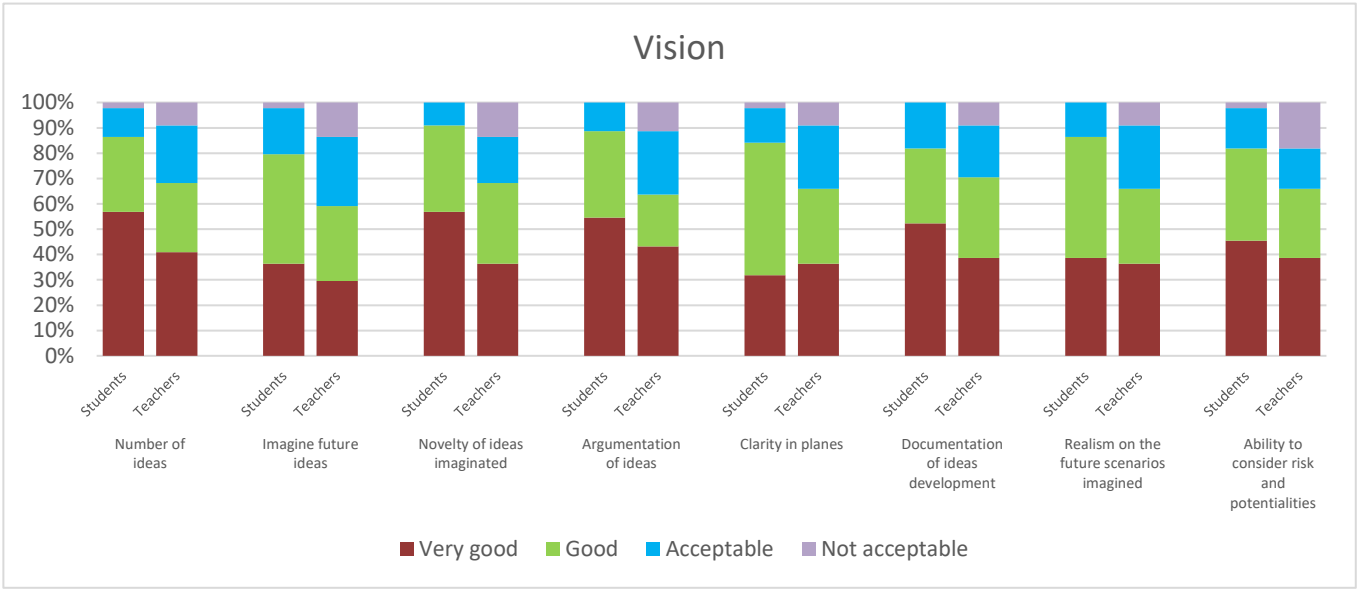


The evaluation assigned by the teachers for all the criteria was good and very good in about 65% of cases, but after the second compilation there was a greater polarization of the evaluations with an growth of the not acceptable evaluations up to 15%, but at the same time we note an overall increase of the very good evaluation over 40%, resulting therefore in a substantial decrease in both of intermediate assessment (good and acceptable). Observing the different criteria individually, there are no major differences and a similar distribution of evaluations. The most significant aspect would seem to refer to the criteria "Imagining future ideas", "Novelty of ideas" and "Considering risks and potential" with an increase after the second compilation of the not acceptable assessment in about 20% of pupils.

Figure 12 compares student and teacher evaluations for Vision competency.

Figure 12.

General comparison of student and teacher assessments for the Vision competency



By comparing pupils and teachers, Vision is the competence where assessment and self-assessment seem to come closest, while maintaining a certain distance: the sum of good and very

good on the part of pupils reaches 85% against 65% of the teachers. Moreover, the Vision is also the competence for which the teachers gave the highest percentage of not acceptable evaluation, over 10%.

Finally, it is interesting to note that only for the "Clarity of the projects" teachers attribute better judgments than students' self-assessment.

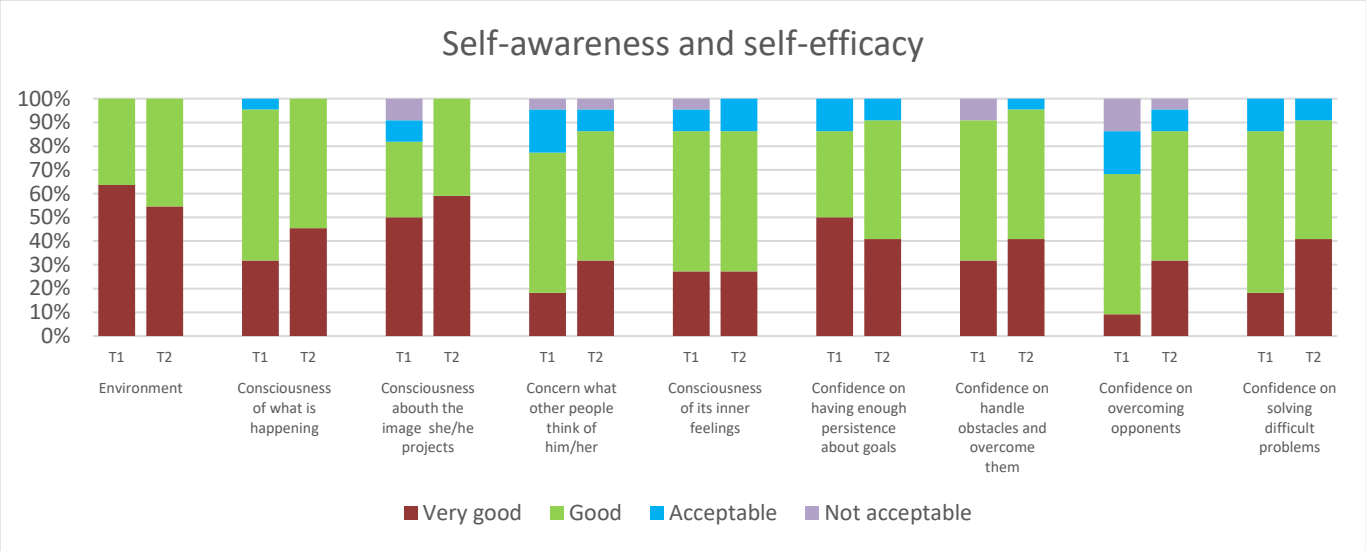
3.2. Self-awareness and self-assessment

Figure 13 shows the results of students' self-assessments related to the competence Self-Awareness and Self-Efficacy in the two periods.

Self-assessments by the pupils in the self-awareness and self-efficacy competence are strongly polarized on the good level, with over 50% both before and after the two activities. This is also the competence where we observed a greater improvement between the two evaluation rubrics, compared to the other two.

Figure 13.

Student self-assessments in the first and second compilation of the assessment rubric for the competence self-awareness and self-efficacy

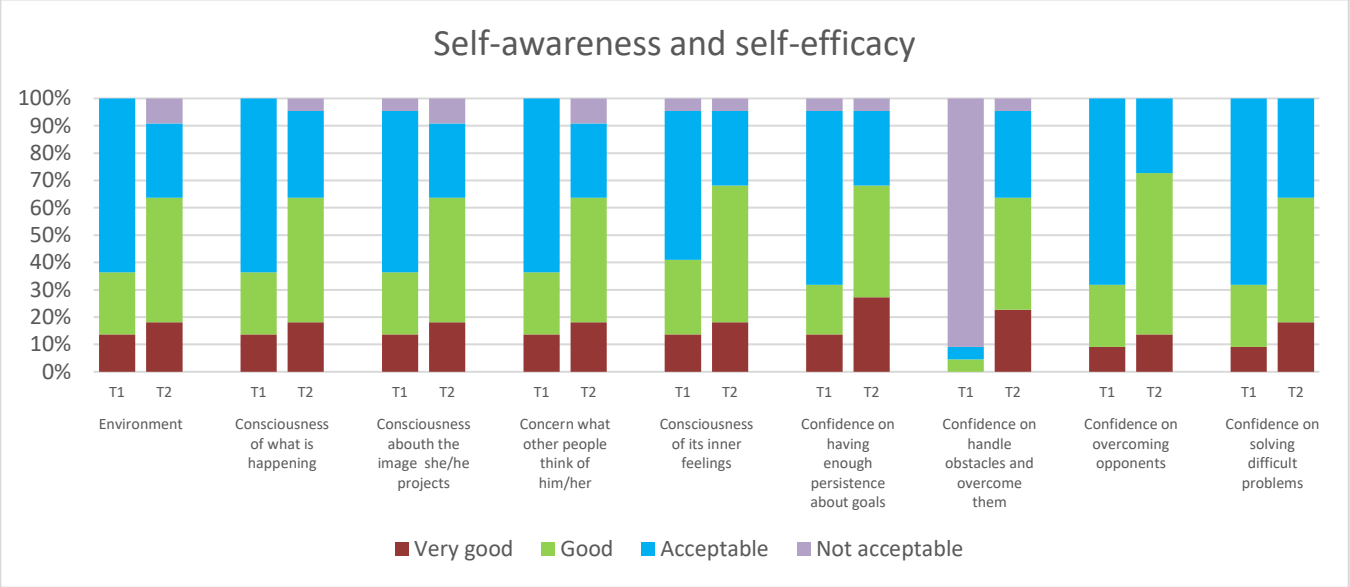


In particular, the self-assessment is low on "Believing to overcome the antagonists", "Interest in what others think" and "Awareness of one's feelings" even if it improves in the second compilation; the "Environment" is very positive (100% good and very good both before and after the activity, even if with a slight decrease), while "Image towards others" is the most appreciated criterion in the second compilation, with no evidence of acceptable or not acceptable.

Figure 14 shows teachers' evaluations related to competence Self-Awareness and Self-Efficacy comparing the first and second periods.

Figure 14.

Teachers' assessments in the first and second compilation of the evaluation rubric for the criteria of competence Self-awareness and self-efficacy.



As far as teachers are concerned, the competence in question was assessed very critically in the first phase (60% of acceptable and 13% of not acceptable) but it was also the one that had the greatest variation after the second group of activities, moving on to 30% of acceptable and 5% of not acceptable, resulting in the end even the competence with fewer evaluations not acceptable. This turn of evaluation is particularly evident in the "Confidence in overcoming obstacles" criterion, unacceptable in more than 90% of cases after the first phase and dropped to 5% after the second, bringing this criterion substantially in line with the others.

Figure 15 shows results related to the comparison of teacher and student evaluations for the competence Self-Awareness and Self-Efficacy.

Figure 15.

General comparison of student and teacher assessments for self-awareness and self-efficacy competency

In the comparison between pupils and teachers, Self-awareness and self-efficacy is the competence where the greatest distance is detected, as teachers have been particularly demanding regarding an activity that proved to be more complex than the others. The most consistent difference is in the criteria where the students had better self-assessment ("Environment", "Image towards others", "Perseverance") while the teachers do not seem to have the same considerations.

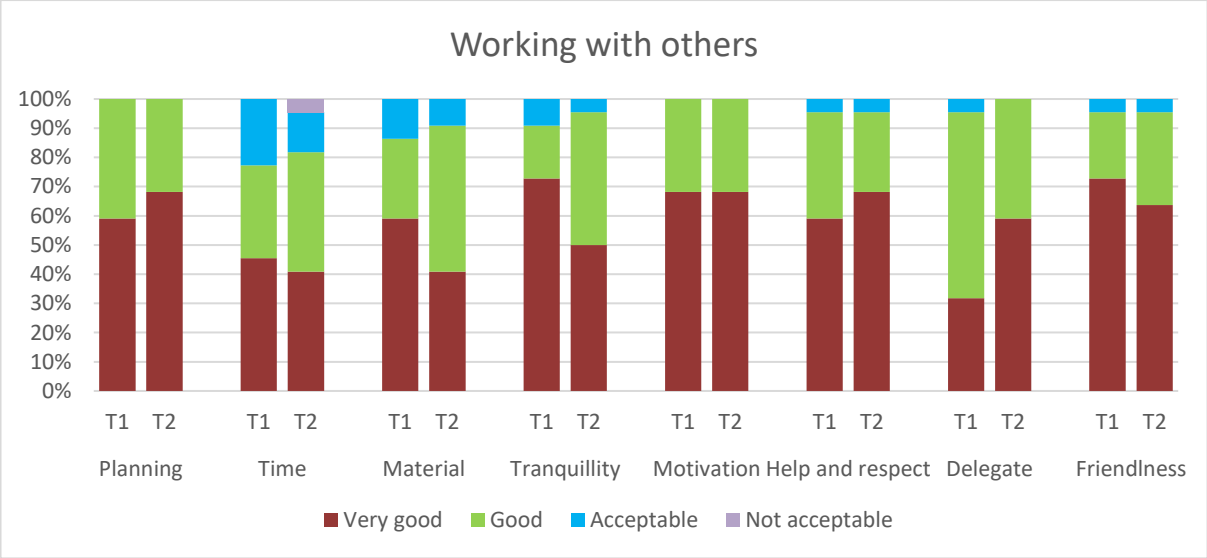
3.3. Working with others

Figure 16 shows the results for the comparison between the first and second periods of students' self-assessments related to the competence Working with Others.

Working with others is the competence where pupils evaluate themselves more positively (very good over 50%, acceptable more not acceptable less than 10%).

Figure 16.

Student self-assessments in the first and second compilation of the assessment rubric for the competence Working with others



Pupils evaluate themselves positively for "Planning" and "Motivation" (100% good and very good in both observations), less on "Time", "Material" and "Delegation", where "Time" and "Material" self-evaluation even decreased between the first and second compilation.

Figure 17 shows the results related to teachers' assessment, in the two periods under consideration, for the competence Working with others.

Teachers evaluated higher the competence Working with others after the first observation (good with very good greater than 70%), with a consistent decline in the second. In particular, the criterion evaluated more negatively appears to be "Time" both in the first and in the second observation. "Tranquility", "Delegation", "Friendliness" were evaluated among the most positive criteria in the first phase, decreased in the second phase, while "Help and respect" and "Planning" showed low evaluations at first, but were significantly higher in the second compilation.

Figure 17.

Evaluations of teachers in the first and second compilation of the evaluation rubric for the criteria of competence Working with others.

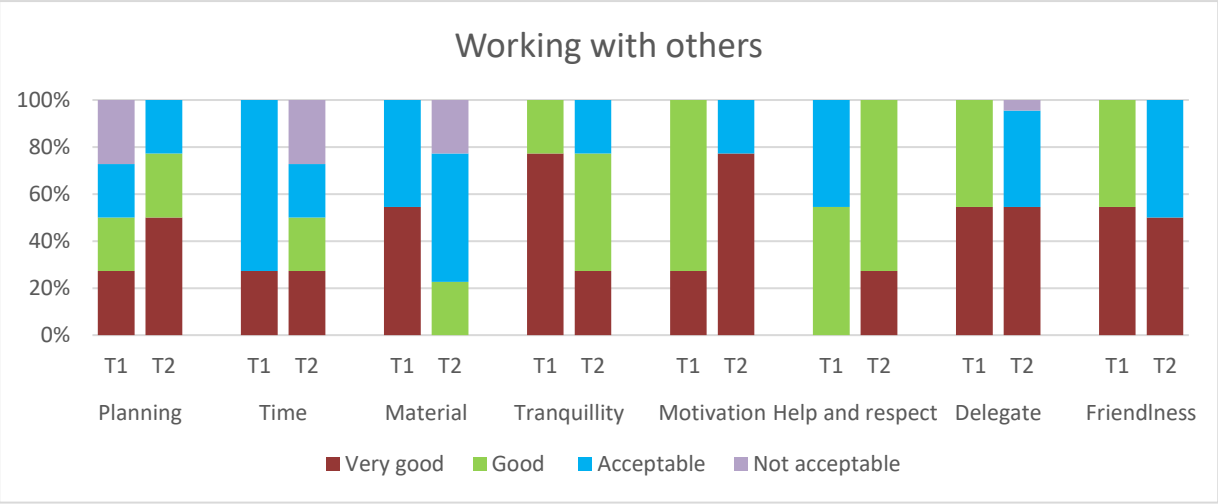
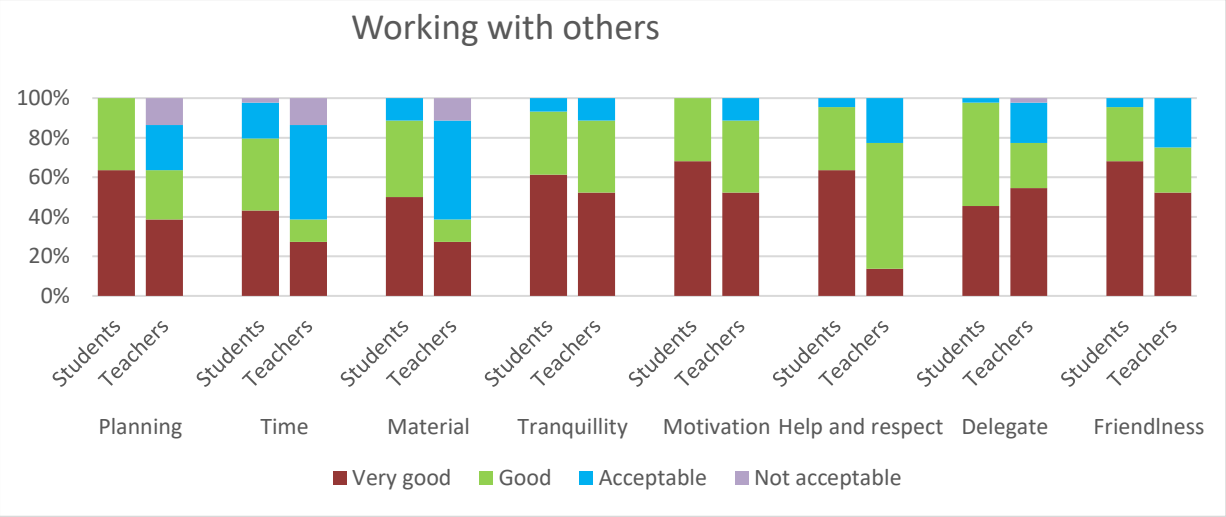


Figure 18 shows the comparison of teachers' and students' ratings of the competence Working with Others.

Figure 18.

General comparison of student and teacher assessments for the competence Working with others



For both pupils and teachers, the competence Working with others is the most positive, but nevertheless confirming the observation of a general gap between teachers and pupils. Among the criteria, “Tranquility” and “Motivation” are those for which the judgment of pupils and teachers is closest, in both cases substantially positive (good plus very good between 90% and 100%). The greatest distances are found in the "Time" and "Material" criteria - which are the worst for both, again showing a considerable distance (in these criteria the teachers have identified a 15% unacceptable) - and "Help and respect", where despite a very positive self-evaluation of the pupils, only 13% of the teachers assigned very good. Finally, it should be noted that the “Delegate” criterion is an exception, where the very good evaluations of the teachers are higher than those of the pupils.

4. DISCUSSION AND CONCLUSIONS

The article analyzed entrepreneurial competence by referring to the EntreComp framework which describes the range of skills necessary to develop entrepreneurship in the social, cultural and professional fields, underlining the key role given to creativity and the value of solidarity and sustainability.

In light of the EntreComp framework, the Erasmus Essence Project developed in the IC F. Anagnino lower secondary school in collaboration with other partners was considered.

The evaluation moment observed during the experimentation was analyzed and described through a participatory process that envisaged the use of the same evaluation rubrics for both the teachers and the students, one for each competence derived from the EntreComp framework (Vision, Self-awareness, self-efficacy, Working with the others).

The results of the research here presented show that:

- in general students evaluate themselves more positively than teachers, who in some cases use the not acceptable level of quality, while it is rarely expressed by students;
- the comparison of the evaluations carried out in two distinct moments does not reveal any particular differences: there are few variations on the self-evaluation of the students, which remained more constant than the evaluation of the teachers, which instead turned out to be more variable especially for the criteria relating to competence "Working with others";
- the evaluations in the “Vision” competence were found to be quite stable both in the evaluations between the first and the second evaluation phase, and in regards to pupil-teacher comparison. Of the three skills, the students' self-assessment was particularly positive with regard to "Working with others", while predominantly discordant assessments between pupils and teachers emerged for "Self-awareness and self-efficacy", with a lower rating attributed by teachers than the pupils.

Future developments with respect to the use of the E-portfolio can be on two levels, methodological and technological.

On the methodological level, the tool could be used to assess other competences by inserting new assessment rubrics and by varying the stimulus activities; it could also be extended to schools of other orders and grades.

At the technological level, the tool favours the improvement of students' and teachers' technological skills; finally, it allows the constant comparison of teachers' assessment and students' self-assessment both horizontally (within the group) and vertically (over time).

5. LINKS

Link to the website of the Erasmus project KA201 ("E.S.S.E.N.C.E. Enterpreneurial skills in schools education: nurturing citizenship and entrepreneurship", nr. 2018-1-IT02-KA201-048137): www.essenceproject.eu

Link to the E-portfolio used in this research:
https://www.um.es/essenceeu/herramienta/ESSENCE-Tool.html

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