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Health Education and the Future of Natural Resources: Food Safety, Food Waste and the Culture of Sustainability

PEDICONI Ombretta (1), ANTOCI Salvatore (2), CALISTRI Paolo (3), CICCARESE Carola (4), CITO Francesca (5), D'ALBENZIO Silvia (6), PICHILLO Giancarlo (7), POMILIO Francesco (8), VALERII Lejla (9), ALESSANDRINI Barbara (10)

Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise (IZSAM), Italy (1)
Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise (IZSAM), Italy (2)
Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise (IZSAM), Italy (3)
Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise (IZSAM), Italy (4)
Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise (IZSAM), Italy (5)
Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise (IZSAM), Italy (6)
Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise (IZSAM), Italy (7)
Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise (IZSAM), Italy (8)
Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise (IZSAM), Italy (9)
Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise (IZSAM), Italy (10)

Abstract

Food safety, food security and its counterpart, food waste, are among the priorities set by the new UN Sustainability Development Goals (SDG) and the 2030 Agenda. The SDG 12, in particular, focuses on ensuring "sustainable consumption and production patterns". The implications of this challenge are multi-layered: economic, social, political and, above all, cultural.

Vocational education on such topics, addressed to students from two upper secondary schools, was the main goal of a three-year project implemented by Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise between 2016 and 2018. It was carried out in the framework of the National School Reform entered into force in 2015, as a contribution to implement the overall lifelong learning policies set by the EU 2020 Strategy, the Copenhagen Process and the Lisbon Strategy on Vocational Education and Training. Educational activities were dedicated to specific, interrelated themes, such as the "One Health" approach, food safety, environmental sustainability, the experimental method, and the techniques to disseminate scientific knowledge to peers through digital tools, with a focus on social media.

Class activities, visits to laboratories, creation of digital communication tools under the supervision of scientific experts, testing of e-cloud instruments and practical qualitative and quantitative research exercises were the main methodological and conceptual tools utilised so far. Questionnaires and daily diaries were filled by the project beneficiaries and their families. Indeed, during the third year, the health education project was centred on food waste and food safety, as an attempt to sum up the previous experiences, but also as a way to introduce the beneficiaries into a real research environment. The students were involved in an ongoing research project on the balanced distribution of food through the application of a method for waste reduction and sustainable social solidarity. They were asked to measure their household waste.

Training methods based on adult learning principles were applied to upper secondary school students, increasing their responsibility, self-confidence, and the value of peer-to-peer education and learning. The success of this initiative encourages the authors to further explore this approach and to increase connections between high school students and the working environment of a research institution.

Keywords: *Health education, sustainability, food safety, food waste, circular economy, scientific communication;*

1. Introduction

In 2015, Istituto Zooprofilattico Sperimentale dell'Abruzzo e Molise "G. Caporale" (IZSAM) started a three-year vocational education project in collaboration with upper secondary schools of Teramo province (Italy). The project was consistent with the 2015 national school reform (so called "*Buona Scuola*", L. 107/2015) and coherent with the involved schools' priorities and the IZSAM mandate (3). The main conceptual landscape was provided by the new UN Sustainability Development Goals (SDGs) and the 2030 Agenda, along with the EU 2020 Agenda. Given the multi-layered implications of

the challenges raised by the above-mentioned documents, and the young age of the beneficiaries, the project activities addressed any economic, social, political and, above all, cultural legacy of such themes.
IZSAM is a public health body belonging to the Italian national health system, whose mission is to provide scientific and technical support to the national and regional governments in veterinary public health, promoting the "One Health" integrated approach. The three-year vocational education project was composed of two different, yet interrelated, modules, which were titled: "Digital natives at work: digital communication for scientific dissemination and the safeguard of animal, human and environmental health" (2015-2016) and its follow up, "The future flows in our hands: scientific dissemination for the safeguard of animal, human and environmental health" (2016-2018).
The activities, devoted to 15-18-year students, were mainly based at the International Centre for Veterinary Training and Information (CIFIV) of IZSAM, whose training services are certified as conform to the ISO 9001:2015 norm. Hands-on work experiences and visits were carried out at the IZSAM laboratories of Diagnostic Microbiology, Virology, Serology, Food Hygiene and Biotechnologies. Furthermore, part of the activities was carried out in the school premises, also engaging schoolteachers.
The three-year project pursued the following general objectives:

- to approach the main veterinary scientific issues related to health protection;
- to experience modern communication strategies by using specific narrative techniques (i.e. storytelling) supported by audio-visual media;
- to use social networks and applications to disseminate scientific information;
- to be acquainted with a professional scientific environment;
- to practice students' attitudes, skills and abilities;
- to assess their educational and professional life plan;
- to apply the method of scientific research by testing qualitative and quantitative research tools in real environments;
- to get culturally aware of the multi-layered implications linked to the concept of "sustainability";
- to grow up as "reflective" global citizens by developing a "critical" mind set (*forma mentis*) towards the surrounding social landscape.

Indirect beneficiaries were the peer-group, families, and citizens who were informed on the project themes, either at home or via social media and other communication products.
The *One health* approach, food safety, effective use of natural resources, biodiversity conservation and environmental sustainability were among the technical issues addressed. The design and development of research activities, and the dissemination of scientific knowledge through digital tools were particularly cared, thus producing valuable outputs. The exploitation of social media to disseminate scientific knowledge and the use of the storytelling technique were explored successfully.
This paper highlights the themes chosen and the methods adopted during the third year of the project, when students were asked to test digital cloud instruments to share data and outputs. Above all, they were introduced to a real research environment through the research project D.E.MET.R.A. ("*Distribuzione Equilibrata delle risorse alimentari attraverso un METodo per la Riduzione degli sprechi e la solidarietA' sociale sostenibile*"), on the balanced distribution of food through the application of a method for waste reduction and sustainable social solidarity. The project is funded by the Italian Ministry of Health in the framework of the "Ricerca Corrente" programme. In the project framework, the students were trained on how to use and test qualitative and quantitative research tools such as questionnaires and weekly diaries for the detection of food consumption and eating habits and the measurement of food waste in their households.

2. Materials and methods

Blended training activities were implemented adopting an interdisciplinary approach to the transversal theme of "sustainability", dealt from an ecological to an anthropological perspective.
The project involved, in total, 166 students coming from 3 upper secondary schools of the Teramo province. The core group of beneficiaries remained the same during the whole duration of the programme. This continuity improved the educational and methodological approach adopted and chosen in order to sustain the students' transversal competence acquisition as foreseen in the National Qualification Framework (http://www.cedefop.europa.eu/files/8608_en.pdf) implementing the European Qualification Framework (http://www.cedefop.europa.eu/files/5566_en.pdf).

Class lectures, guided visits to IZSAM laboratories, student's alphabetisation to social networks and e-cloud tools, development of communication outcomes for the peer-to-peer dissemination of scientific information, were carried out to achieve the project goals.
Intermediate individual evaluations (at the end of each year) were performed to monitor competence achievements. A final certification was issued at the conclusion of the whole project by the school.
Table 1 describes the transdisciplinary and transversal competences and their related descriptors.

Table n. 1. Transdisciplinary and transversal competences and descriptors

Knowledge	**Skills**	**Responsibility and autonomy**
Critical awareness of specific knowledge, autonomous problem solving; sense of responsibility towards others *e.g., development of newsletters and blogs focused on the technical topics*	Social interaction, availability to collaborate with the group of peers and adults, team working *e.g., by using Google Drive as a tool for sharing didactic materials and edit draft documents elaborated by the groups of students with Google Docs*	Self-management ability in the framework of a working context; autonomous decision making *e.g, to be able to fill in autonomously questionnaires and diaries linked to the D.E.ME.TR.A. research project*

3. Results

The overall achievement of the three-year project was the transmission to the participating students of multi-layered, transversal competences based on acquired new knowledge and soft-skills, all related to the scientific domains in which IZSAM is active.
The main project outputs are:

- one public Facebook profile, administered by the IZSAM project team;
- two blogs, developed in Wordpress: "The digital science" and "Science is life";
- two logos (Figures 1 and 2);
- three newsletters (Figure 3);
- one video titled "Alimentarsi bene per vivere meglio";
- forty-six questionnaires related to household food consumption habits
- forty-three weekly diaries on food waste.

Figure 1. "The digital science" logo

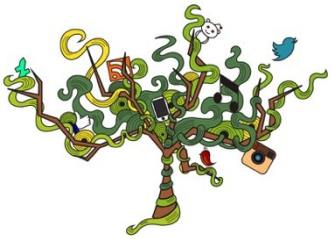

Figure 2. "Science is life" logo

Figure 3. Newsletter “Alimentazione e sport: cosa mangiare?”

The questionnaires and the diaries were carried out in the framework of DEMETRA. The students were introduced to the research instruments, and then asked to use them at home for interviewing household members who regularly take care of administering food in the house, from purchasing to keeping to cooking, and for keeping track of any kind of food – fresh or not – that, over seven continuous days, was destined to garbage. The diaries were, in fact, used to measure the amount of food wasted in the students’ households; they were also asked to keep note of the reasons for throwing away the wasted food.
The added value of this initiative is related to the active role played by the students in a “real” research project, with the support of the Institute veterinarians, veterinary epidemiologists, and biologists. In fact, they were able to use qualitative and quantitative tools with a scientific approach, adopting impartiality, accuracy, and fairness principles in data collection.

4. Conclusions

This experience was appreciated by the students and the teachers’ staff. The assigned tasks were performed as requested demonstrating the efficacy of the so-called learning-by-doing method. The three-year initiative supported students’ independence in developing digital communication plans to address scientific messages.
The encouraging results showed that science-based communication can raise students interests and develop their communication skills, especially when it is rooted into topics that practically affect the students’ life, such as economic sustainability and food safety. If some reticence was perceived in the use of some social tools such as Facebook, felt more as a device for “private” communication, students appeared freer and more comfortable with the design and testing of other communication tools such as the video and the newsletters.

The revision system used by the project experts facilitated progressive learning and gradual acquisition of autonomy, as well as the students’ capacity to work side-by-side with a network of adult researchers.

Last but not least, from a methodological perspective, the experiment to adopt training methods based on the peculiarities of the adult learning style for upper secondary school students was a successful experience in terms of appreciation by the beneficiaries and learning achievements. It encourages further application of this approach in similar contexts to prepare students to entering the labour market.

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