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Cuisine and Education: The Applied Gastronomic Sciences as a Tool in Food Literacy

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ABSTRACT:

The use of cuisine in educational contexts is the field of research and action of the Pollenzo Food Lab (PFL) of the University of Gastronomic Sciences (Italy), one of the nine groups from five European countries members of the Learn4Earth Strategic Partnership. Four of them where schools of different grades, with pupils with a broad age range (5-16). Since food production and consumption practice have a relevant impact on climate, environment and health, Learn4Earth aim is to develop innovative methodologies, approaches and practical activities to provide teachers and young students with key skills on food literacy. Through the study of food it is possible to engage students through direct and emotional involvement and simultaneously achieve two objectives: to connect the different disciplines addressed in school by offering an interpretation key anchored to experience (therefore more accessible and understandable) and to support the development of greater awareness towards individual, collective and planetary health.

The educational path developed for each school was build using the gastronomic sciences applied to cuisine and food transformations at four different levels:

1. The knowledge of the food product as a link with the productive and agroecological dimension of food;
2. The study of the transformation process based on product knowledge, the needs of use and the limitations of the transformation context of it;
3. The recipe as the meeting point between tradition, individual and community identity and as a communication and caring tool (individual and planet health);
4. The menu as a story and community involvement point in the educational path.

The developed approaches could be used in different countries and the applied dimension makes it possible to guarantee a high degree of inclusiveness in access to knowledge, minimizing the disparities represented by cognitive, cultural and social specificities. Moreover it also strengthens students' confidence in each other's abilities and welcomes the

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differences as a growth tool for the whole group and allows to experience a scientific approach based on curiosity and practices.

Index Terms— Applied Gastronomic Sciences, Food Literacy, Health, Sustainability.

INTRODUCTION:

A. Macro-contextualization and the need for food literacy

The present research derives from the need to address contemporary issues related to food, such as the urgency of suggesting coherent long-lasting solutions for environmental protection and the need to implement a social consciousness about the impact of food choices on the health of the individual and all of society [1].

In this context, the design of models aimed to provide effective actions for the education and literacy of new generations about food is now more essential than ever.

These interventions are functional in making the new generations active actors in the processes of rethinking, disseminating and implementing food behaviors consistent with a One Health perspective [2]. To do this, the centrality of gastronomic sciences applied to the culinary arts is claimed.

B. Food and cooking as tools: the role of schools and canteens

The school, a natural institution deputed to the dispensing of education to students, is one of the highest agencies of socialization for the individual, along with the family, the media and the peer group [3]. In this framework, it stands as a game changer in the challenge to the individual's orientation in the world of food consumption. Moreover, a large body of literature proves how intervention during a crucial moment of formation and sedimentation of future habits in individuals, is of great utility in curbing unhealthy dietary behaviors (indicated as the cause of non-communicable diseases such as cardiovascular disease, diabetes, hypertension, and obesity) [4]. Therefore, the school, due to specific intrinsic logics such as sharing among students a sense of belonging to the class group and the possibility of designing long-term educational pathways, sees the classroom, as well as the cafeteria and the school garden, as the primary places in which to implement food literacy initiatives.

C. The Learn4Earth project and the role of applied gastronomic sciences

The Erasmus+ Learn4Earth project, a European Union Strategic Partnership (started in October 2020 and ending in August 2023, www.learn4earth.eu) has sustainability, education and food literacy as its primary objectives. Learn4Earth involves organisations and schools from five European countries: Denmark, Italy, Slovenia, Spain and the United Kingdom.

The Learn4Earth project has been acting as a catalyst for the translation and implementation of educational methods. These methods were directed, in their experimental design, to heterogeneous school groups (5-16 years old), with a perspective of scalability and

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replicability in similar school contexts in different countries. The Learn4Earth project, through the directions of the Pollenzo Food Lab of the University of Gastronomic Sciences in Italy (PFL, Unisg), has made it possible to testify the value of applied gastronomic sciences in the design of educational pathways in this area. The PFL developed a multidisciplinary approach to be used in food literacy that takes into account the instances belonging to the different disciplines that faced and applied in the gastronomy field.

METHOD:

Within the L4E project, in the implementation of widespread and effective interventions for nutrition education, at the methodological level it was crucial to consider food and related practices (cooking) as much as the object of the educational intervention as the tool itself to achieve the goal.

In designing the strategies, a method was developed linking each of the four identified case studies. If in fact, at the micro level, in each of the four experimental conditions it was chosen, as described below, to address a specific issue, at the macro level each of the four are exemplary and functional in composing an organic methodological framework that is exportable and scalable.

For the design of strategies for interventions, the following outline was followed in each experimental condition, differing in contest (UK, Denmark, Spain, Slovenia) as well as age group of students involved.

- **Motivation and emotional engagement**

The starting point for each design was the shared identification of the problem: what investigation is being conducted by the class and what motivation triggers the specific research for the individual and the group? A clear understanding of the reasons for the learning journey is a prerequisite for the emotional and active involvement that enables internalization and activation of creative processes in devising solutions

- **Research**

The second phase was characterized by the collection of information necessary to understand the problem: the in-depth study materials needed to elaborate the experimentation were collected. Said information was gathered through consultation of various sources and also involved discussion with experts, professionals and others members of the community in order to get a different perspective as a prerequisite to understanding complexity.

- **Experimentation**

The applied dimension (practices) makes it possible to ensure a high degree of inclusiveness in access to knowledge, minimizing the disparities represented by cognitive, cultural and social specificities [6]. It also strengthens students' confidence in their respective abilities and

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welcomes difference as a means of growth for the whole group. The processing of knowledge through kitchen activities allows students to experience a scientific approach based on curiosity and practices with a dual purpose: to strengthen understanding and to stimulate innovation.

- **Creative generation**

Through theoretical understanding and experimental practices, new design is made possible that brings back group leadership and a sense of individual responsibility. The last part of each path was the meta-analysis of experience and the proactive dimension made possible by the knowledge acquired: what can be achieved with what has been discovered? How can the acquired knowledge be shared and prove useful to others?

At the same time, the directions of work undertaken in the four experimental conditions reflected one of the many possible levels of the gastronomic sciences applied to cooking and food processing:

- **Product:** knowledge of the raw material as a connection with the agro-ecological production dimension of food and the values related to it. The study of the raw material coincides with the stage called "Motivation and emotional involvement" [5].
- **Process:** the study of processing procedures based on the encounter between the knowledge of the product, the needs of use and the limitations of the processing context [5]. The study of the process coincides with the stage called "Research."
- **Recipe:** the definition of a preparation as a meeting element between tradition, individual and community identity and as a tool for communication and care (health of the individual and the planet). The study of the recipe coincides with the phase called "Experimentation."
- **Menu:** the development and implementation of the menu as a narrative and community involvement in the educational pact [6]. The study of the menu coincides with the phase called "Creative Generation."

RESULTS / APPLICATIONS:

During the first L4E in-person meeting held in Copenhagen on November 8, 9 and 10, 2021, the PFL met with representatives of different schools involved in the project. During this meeting, the ways of collaboration and support needed by each reality were defined: each school shared the application scenario of the educational projects, the trans-disciplinary educational objectives and the topics of greatest interest from an educational point of view. Some themes turned out to be relevant for the totality of the schools and were therefore chosen as a framework for intervention and connection between the specific planning: vegetable consumption and knowledge of production (school garden), healthy and sustainable diet, prevention and reduction of food waste. The first working hypotheses were subsequently

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implemented through a series of individual online meetings that allowed the PFL to detail the projects, to provide the necessary documents and insights, to propose solutions to the issues that emerged and follow the activities through each step. In the second in-person meeting at the University of Gastronomic Sciences in Pollenzo (Sept. 20-23, 2022), the schools shared their respective paths and dissemination actions as well as outputs were planned within the educational communities. The educational methodologies and formats were tested within the PFL. The results of the educational actions and methods used are detailed for each school and country in the following paragraphs.

A. UK: Product

In the English school, a reality in which for several years there has been a school garden capable of supplying the in-house canteen, the need was to focus on the first stages of the food chain, delving into the production, logistics and first processing of the vegetables produced. The goal for the school was to relate the work done on the themes of seasonality and plant biodiversity to the development of an ecological consciousness, capable of recognizing the repercussions of individual actions on the environment and society and thus stimulating a sense of responsibility in children. Given the context and the possibility of building an educational action straddling production (vegetable garden) and processing (canteen kitchen), teachers decided to work on food **products** as a prerequisite to its recognition as an object of value.

In UK children were asked to analyze and measure the most quantitatively relevant vegetable were wasted both in the field and in kitchen through surveys and targeted interviews with staff. This led them to relate the productive work (made up of effort, labor, and waiting time) experienced in garden activities to the externalities of the gastronomic processing required to prepare their meals. During the online meeting with the PFL, the children were asked to explain the reasons for the waste and to try to relate them to their preferences and behavior during meals. In winter, potato waste was found to be the most significant. Once some points about the edibility and healthiness of the product had been negotiated (recognizing the importance of cleaning procedures and finding out what changes occur during storage and preservation of this solanaceous plant), it was asked why, although suitable for consumption, it was not enjoyable to eat the potato with the skin on. The reasons found had a high degree of specificity, indicative of a good result of guided sensory analysis: the skin was found to be hard, fibrous, bitter, and with flavours of earth. The children were then asked whether, in their opinion, it was possible to change the undesirable sensory characteristics through the cooking process and whether they thought it was important to try to develop gastronomic strategies that could avoid wasting this part of the potato. In this way, the educational activity was validated and chosen by the children themselves, who recognized its value: discarding part of the potatoes they had laboriously grown turned out to be a mission of great importance for both the individual and the whole group. Recognizing that the possibility of action and change depended on their attention and food choices reinforced protagonism and

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responsibility. The Pollenzo Food Lab developed the informational material to enable students to learn more about the potato product, understanding its chemical composition and relate them to the characteristics identified as unpalatable. Some cooking suggestions were also provided to overcome the problems unpleasant taste, aroma and texture. The children conducted some classroom experiments to deepen their understanding of the food product – in particular of starches and fiber - and worked together with the canteen kitchen staff to test some techniques. The final result were oven-dried potato skin chips spiced with chives grown in the garden as well. This recipe became the sensory embodiment of a whole educational journey and was recognized as such by the children who wanted it at every official occasion so they could tell, supported by the successful tasting they created, about the work they had done.

Some students of the course in Applied Gastronomy at the University of Gastronomic Sciences in Pollenzo were involved in the process of elaborating the materials and gastronomic proposals to support the other vegetables, thus coming to constitute an interesting example of peer education in which the **product** - as much in its contextualization within the environmental and cultural system as in its scientific knowledge - is the drive capable of stimulating affection and triggering participatory processes of change.

B. DK: Process

In Denmark, the educational pathway moved from the need to integrate and extend the "Sprout Vagon" experience: a project that had enabled the study of the plant life cycle through the creation and observation of a seedbed. Among the critical issues noted by the teachers and children there was the time of harvesting and the perishability of the product: once sprouted, the plants students had taken care of, had no immediate purpose and their fragility risked hampering the efforts made. The motivation was therefore already well delineated and entrenched: it was, on the one hand, to support -and where possible increase- the value of the product, preserving its characteristics, as well as to identify a **process** capable of increasing its shelf life without requiring excessive inputs (money, energy) for the school context.

The Pollenzo Food Lab therefore provided a map of the main botanical families of common consumption, reporting the characteristics of each in terms of composition and functional and nutraceutical properties and indicating the threshold chemical-physical parameters for a transformation that would maintain their attributes. This information was useful in assessing which of the transformation processes might prove most suitable in relation to the type of product and transformation objectives. Also in the case of the Danish schools, the choice of process was the result of a participatory process that allowed for the emotional and personal involvement of each actor. The students then devoted themselves to the study of the drying **process**, including through the in-depth materials provided by the Pollenzo Food Lab: the relationships between drying temperatures and exposure times; the shape and size of the

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product; free water content; and air flow and direction. Though drying requires few inputs, consideration was aimed at identifying the characteristics of a facility that would not require a high investment or constant energy input. In this way, it was possible to relate the product to the contextual needs of the consumer and the transformation process, as well as to criticize the process itself in order to implement it in the specific ecological context: that of the school.

C. Spain: Recipe

The Spanish schools, a Catalan institution grouping students from 6 to 18 years old, had as project output the creation of a recipe book as a tool for disseminating the methodologies and results of the different working groups. Being at once a collection of texts related to gastronomic transformation and a tool for communication and sharing, a reflection on the meaning and role of the **recipe** could not be ignored. Once analysed and grouped by seasonality, the produce grown by the Spanish classes within their school garden was compared with the vegetables grown and studied in the other institutions involved in the project. This made it possible to identify 8 vegetables familiar to all the students involved. Then from these, recipe research was constructed by a working group of students from the upper classes. This group was formed on a voluntary basis: for all the students, the topic of nutrition and a healthy, sustainable diet was relevant, so they took it upon themselves to involve their peers in the research and to coordinate the work of their peers in writing the cookbook. The Pollenzo Food Lab supported their work by sharing a timeline and setting a series of online appointments for the shared development of survey tools and formalization.

The first project step was characterized by the involvement of classmates and families: a recipe collection model was defined, identifying all the information that would be relevant in terms of product, process and cultural contextualization. Students developed a useful presentation to engage and motivate both classmates and parents and were responsible for explaining the project in each class: this made it possible to collect 100 recipes involving the use of the 8 identified vegetables. In a second meeting, the criteria for selecting the recipes were discussed: since the cookbook is a work that is a carrier of values and educational content, it was important to define what message would be carried. The students in the working group defined, through guided discussion, a series of selection parameters that led to the choice of the 40 recipes contained in the final cookbook. The third meeting, finally, was dedicated to the shared creation of a recipe template useful for containing all the theoretical and practical information for the creation of the dish, which was at the same time effective in transmitting the values of a cuisine oriented to the health of the individual and the planet. This last meeting represented the possibility of a meta-analysis of the course in relation to the objective: how to collect the information; how to reprocess it; and how to give it a form capable of summarizing operational prescriptions and theoretical-philosophical reflections in a single body [4]. The practical act (in this case the making of a meta-cooking product: the **recipe**) allows for timely experience and an active part in both the formation of knowledge and its application. The students thus continued the work of rewriting and translating into

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English, coordinating the graphic work of their classmates and the production of images to facilitate the reading and understanding of the content. Finally, the Pollenzo Food Lab was responsible for re-reading the texts to check the consistency of the quantities and the validity/replicability of the processes reported.

D. Slovenia: Menù

For the Slovenian schools involved, the choice was to focus on the moment of consumption and to use the cafeteria and lunch context as the field of action. The meal is a service offered in many schools but is often perceived as a moment disconnected from teaching and educational activities. In this case it was used as a starting point for a reflection on food lifestyles and their impact on the health of individuals, communities and the planet. In fact, the **menu** is the result of a series of ecological negotiations in which nutritional, economic, logistical and processing needs are intertwined, but its actualization and success are measured only in the relational dimension, when the planning meets the user in its enjoyment/acceptance.

The Pollenzo Food Lab supported the teachers in identifying the planning stages, which were articulated according to the model applied in all the countries involved in the L4E project. In the first phase, students were involved in analyzing and measuring the amount of waste found in the lunchroom baskets, determining which preparations and products were wasted the most and trying to come up with hypotheses to explain the cause. The quantities of bread and yogurt, because they are present in the supply every day, are difficult to estimate in advance, while turnip, although very present in Slovenian culinary tradition, was recognized as unappealing to younger students because of its distinctive aroma and flavor. These three products were therefore the object of a twofold re-evaluation operation conducted along the lines of tradition and innovation. The tools applied in this operation were: information gathered through a research on Slovenian gastronomy, in which traditional recipes involving the use of these ingredients were identified, and, subsequently, creative experimentation workshops held by students of local hotel schools for other students. In this way, the preparations belonging to the culture of the area were collected to create a system and then tested and revised in relation to the contemporary. The menu that resulted from this work is in effect a complex system, representative of the local ecosystem through time and responsive to present needs. This **menu** also assumed a relational responsibility, as it includes the "other" and is based on the perspective of the future. Recipes, once approached, must be able to nourish the other in a balanced way in the immediate term and must preserve the health of the community and the local area in the long term as well. In this sense, the menu represents the last phase of the educational journey: the educational action can be opened to include the whole community, students can be transformed into teachers, and the language of the senses can guarantee, universally, the transmissibility of the message. The storytelling and dissemination of the path, in fact, was entrusted to two workshops open to the public in which students raised awareness of food waste issues; re-signified tradition as a possible source of

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creativity and stimulation; taught culinary techniques to ensure the replicability of the message; and, finally, validated their work through sense and taste testing.

CONCLUSION:

Gastronomic transformations are made possible by a body of knowledge that pertains to different disciplines; however, cooking in turn generates a complex system of knowledge, characteristic of what is developed at the intersection of different instances and worlds. Applied gastronomic sciences can therefore be employed as evidence to support the study of disciplines that are part of the school curriculum or become an object and a tool, constituting a key to understanding complexity and learning responsibility.

The L4E project with its possibility of punctual experimentation in European schools of different levels and grade levels made it possible to systematically test the applied dimension of gastronomic sciences and to evaluate the impact of its use within educational contexts.

All the schools involved, while carrying out different and often complementary activities, followed the same methodological model: activation and emotional involvement, research, experimentation and creative generation. All schools also identified the **product** as the driving force and the link to the ecological context of production; questioned the science and understood the reasons behind the **process**; applied, tested and validated their **recipe**; and finally translated what they learned into a broader outcome, a **menu** -real or metaphorical- that was able to re-read, tell and engage.

The results that emerged highlighted the community reach and social impact of using cooking as a learning tool. The whole work done, not only prove it possible to structure educational pathways that enabled the educational objectives of the different disciplines to be met, but demonstrated that through cooking students understood and internalized the links between food, health and sustainability.

Experiencing complexity and being protagonists in it allowed, finally, the children and young students involved to develop a sense of responsibility and community belonging. Awareness of their own direct involvement translates into care and a willingness to share knowledge and emotions, thus ensuring that beneficial cascade effect that extends to the entire local community.

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