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Article

A participatory approach for sustainable local food development: Evidence and digital perspectives from a rural area in Italy

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Abstract: The main objective of the study is to discuss the application of a participatory approach that involves the community of a small rural area in Italy to develop and maintain a sustainable local food system based on a very ancient and high-quality typical local bean. The efficacy of the approach in terms of the active involvement of local actors (farming communities, local administration, social associations, and civil society) and knowledge transfer for preserving the local food culture has been demonstrated. Possible improvements to the approach through digital technologies for stimulating the effective engagement of teenagers have also been discussed.

Keywords: participatory strategy; knowledge transfer; local food; sustainability; green social laboratories; co-creation events; digital technologies

1. Introduction

Food has always been tied to local culture as it is an essential cultural element that binds people together, enforces a shared sense of identity, and strengthens the sense of community and belonging (Wojciechowska-Solis, 2022). Due to its fundamental role in promoting food security, economic stability, and wholesome nourishment, local food is also crucial for sustainability (Trolio et al., 2016; Vasa et al., 2020). At the same time, it is also perceived as healthier, unprocessed, and with fewer food preservatives, leading to a lower environmental impact (Barska et al., 2020). The active involvement and collaboration among local actors (farming community, local administration, social associations, and civil society) is necessary for developing and maintaining a sustainable local food system and stimulating the knowledge transfer for preserving the local food culture (Md. Sharif et al., 2018a; Mohd Zahari et al., 2011; Nor et al., 2012). The knowledge transfer includes agricultural, cultural, and social practices that are deeply intertwined with local food systems (Enthoven and Van den Broeck, 2021).

In this perspective, this paper describes the application of a hybrid participatory approach (HPA) that involves the community of the small rural town of Arsoli, in Rome's metropolitan area, to develop and maintain a sustainable local food system based on a very ancient and high-quality typical local bean (named "fagiolina arsolana"). The HPA consisted of several face-to-face participatory events and activities (i.e., Open Day event, training activities, co-creation events, and a qualitative survey) to stimulate the knowledge transfer and the co-design of a social farm. These events and activities involved 118 people (about 10% of Arsoli's population) from the farming community, local administration, social associations, and civil society, mostly elderly and children. The low teen participation was emphasized. The study was

carried out as part of the SOCIAL4FOOD project (https://cnrirpps.wixsite.com/social4food) funded by the European Institute of Innovation and Technology.

Two research questions are addressed in this study:

RQ1: Is the HPA able to effectively stimulate the knowledge transfer for sustainable local food?

RQ2: How to enhance the engagement and participation of teenagers in the food knowledge transfer process?

The following is a summary of the study's contributions. First, the study illustrates how the HPA helped to make the community of Arsoli, mainly the young generations, aware of the importance to promote the culture and knowledge transfer of the traditional sustainable practices of the "fagiolina" production. Moreover, the study confirms the effectiveness of the HPA (i) to stimulate the transfer of knowledge necessary for developing and maintaining a sustainable local food system, and (ii) to actively involve local actors (farming community, local administration, social associations, and civil society) to preserve local identity and the sense of belonging to the territory. The results also highlighted an important limitation consisting of low participation of teenagers in face-to-face events and activities. To mitigate this weakness, a further contribution of the study consists in defining some possible refinements of the HPA using digital technologies. Specifically, several kinds of digital tools (e.g., game-based learning environments, eventually extended with virtual/augmented reality, discussion forums, and online co-creation platforms) are integrated into the participatory process to attract teenagers' interest and nudge their empowerment towards sustainable local food. The paper is structured as follows. After introducing the related works in the field of sustainable local food sector (Section 2), the participatory events/activities organized in the six stages of the HPA are described in Section 3. In Section 4, the results of the implementation of the different face-to-face events/activities are illustrated. Section 5 provides a discussion on the improvement of the HPA through digital technologies. Finally, Section 6 concludes the paper.

2. Related works

Local food knowledge is an important asset of communities as it is a core component of human heritage. Starting from the definition of local knowledge given by Huambachano et al. (2022), local food knowledge can be defined as "knowledge relates to all stages of local food provisioning held by a defined group of people passed down from one generation to the next". The sustainable local food sector embodies different categories of knowledge associated with food, including agro-ecological knowledge (where and what type of food is produced), understanding of food production, processing, and distribution (Anggraeni et al., 2022), as well as cultivation and production knowledge (Gartaula et al., 2020). The knowledge in each of these categories can be gained both formally, from structured curriculum-based learning programmes, and informally, from people's routine behavior in their homes and communities (Reyes-García, 2010).

In this work, particular attention is focused on sustainable local food knowledge

informally transferred in a community environment. Passing down sustainable local food knowledge significantly prolongs the shelf life of the ethnic food identity and cultural heritage (Cole, 2010). In the literature, several studies investigated how to facilitate the transfer of sustainable local food knowledge (Diaz-Sarachaga, 2020; Huambachano et al., 2022; Popescu, 2019). Huambachano et al. (2022) proposed to develop knowledge networks in which young people are both active recipients of knowledge and part of a continuum of learning built from relationships with nature, humans, and institutions. Popescu (2019) experimented with training programs to transfer agricultural knowledge among young farmers and small farms. The study conducted by Diaz-Sarachaga (2020) demonstrated the efficacy of a participatory approach based on the Delphi method. The method is applied to engage community members, mainly young families, in the co-creation of food heritage initiatives and to document the traditional food practices in rural communities in Spain. These studies showed the importance of involving communities in the knowledge transfer process for sustainable local food preservation. However, there is a need for further research in this area, particularly devoted to exploring the potential of participatory approaches to effectively stimulate the knowledge transfer and active engagement of teenagers. To address this need, this study applies a participatory approach used within the SOCIAL4FOOD project (https://cnrirpps.wixsite.com/social4food/en) for the effective implementation of the knowledge transfer needed to maintain the tradition of the "fagiolina arsolana". However, different from the participatory approach used in Diaz-Sarachaga (2020), in which the Delphi method is adopted for co-creating food heritage initiatives, in our study, the combination of design thinking and learning-by-doing was proposed for activating local food knowledge transfer.

3. Materials and methods

The HPA, based on the combination of design thinking (Plattner, 2013) and the learning-by-doing (Freire, 1982) approaches, consists of six stages as described in D'Andrea and D'Ulizia (2023a). Design thinking encourages citizen participation in specific experiences and practices with local food mainly thanks to its effectiveness in involving people in defining a more accepted solution that satisfies their needs. The principles of learning-by-doing are suitably employed for stimulating the transfer of traditional food knowledge thanks to its advantage in strengthening community capacity building and problem solving.

For the different stages of the HPA, the following face-to-face participatory events/activities have been organized (see **Figure 1**): (i) Open day event, where participants were involved in both the storytelling of growing and cooking experiences and the elicitation of ideas for passing on the experience and skills from local elders to children and teenagers; (ii) training activities (i.e., green social laboratories and a culinary competition), where young people gained experience and skills necessary to preserve the "fagiolina arsolana" while also learning about the traditions and typical recipes of this locally grown food; (iii) co-creation events, where participants shared ideas for the implementation of a social farm; and (iv) a qualitative survey to assess the efficacy of the HPA.

Every participant in the study gave their informed consent before beginning any

of the events or activities. Moreover, informed consent for participants under 18 years old was obtained by their parents before the events/activities began. Anonymity and the right to withdraw participation from the activities without giving a reason are also recognized as specified in the letter of information distributed together with the informed consent.

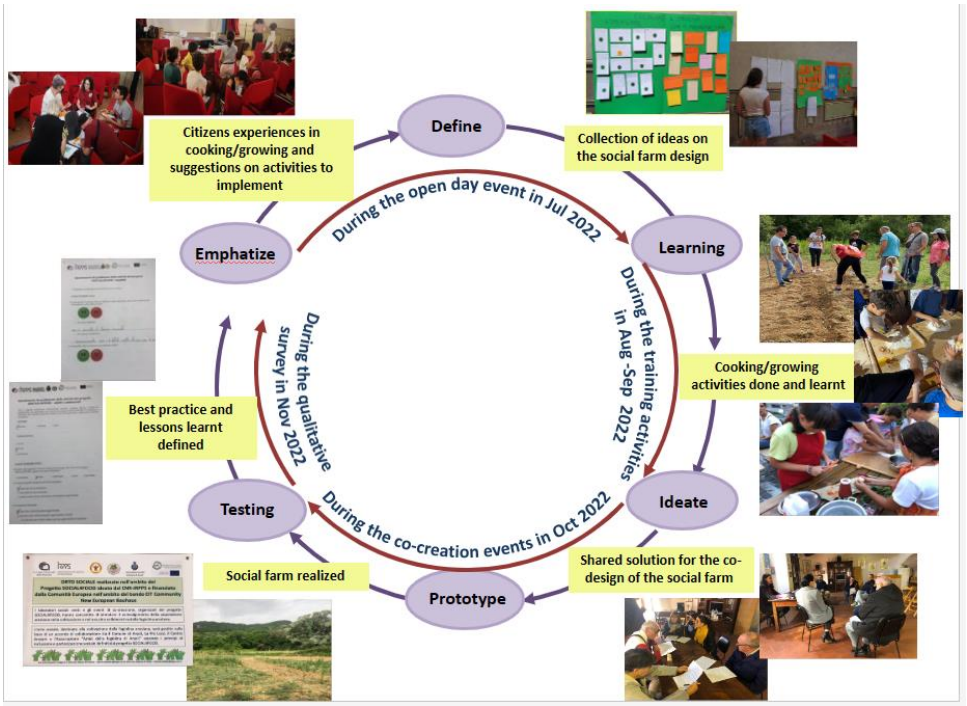

Figure 1. The face-to-face participatory events/activities organized in the six stages of the HPA.

For each face-to-face participatory events/activities, different methods have been used for collecting data from participants (e.g., experiences, ideas, suggested solutions, and opinions) summarized in **Table 1**.

Table 1. Methods for data collection used in the participatory events/activities of the HPA.

Event/Activity	Method for data collection	Target Groups	Participation Rate
Open Day event	Five triggering questions (TQs) TQ1) What has been your most relevant growth experience with the "fagiolina arsolana"? What challenges did you face? What were the advantages? TQ2) What is the most relevant culinary experience you had with "fagiolina arsolana"? What were the good and bad things about it? TQ3) How to pass on the experience and skills necessary for the traditional growing and cooking of the "fagiolina arsolana" from local elders to children and teenagers? TQ4) How can we encourage local teenagers, especially the younger immigrants, to get involved in the collaborative cooking and growing of the "fagiolina arsolana"? TQ5) How should the social farm be organized? By whom should this be done? How should the assignments be completed?	Civil society (adults and teenagers), farmers, representatives of the social entities	22 participants (19%)
	Two TQs TQ6) How would you like to learn about the "fagiolina arsolana" growth process? TQ7) How would you want to learn how to prepare "fagiolina arsolana"?	Civil society (children)	16 participants (14%)

Table 1. (*Continued*).

Event/Activity	Method for data collection	Target Groups	Participation Rate
Training activities	Experience notes	Civil society (children)	38 participants (32%)
Co-creation events	Four multiple-choice questions (MQs) MQ1) How would you like to organize the social farm? MQ2) Who should be involved? MQ3) How should the tasks be performed? MQ4) How could the harvest be exploited?	Civil society (adults and teenagers), farmers, representatives of the social entities	12 people (10%)
Qualitative survey	Questionnaire 1 It is composed of 4 sections: Section I-questions on the perception about the organisation of the events (green social laboratories, culinary challenge, and co-creation events); Section II-a self-evaluation of the acquired knowledge and abilities and the satisfaction with the process and the shared solution of the social farm; Section III-questions about the events in terms of usefulness, difficulties, acquired knowledge, and participants' collaboration; Section IV-questions about overall satisfaction with the project activities.	Civil society (adults and teenagers), farmers	51 people (43%)
	Questionnaire 2 It is composed of 4 sections: Section I-questions on the perception of the events (green social laboratories and culinary challenge) in terms of amusement; Section II-questions about the organization of the events (duration and number); Section III-a self-evaluation of the acquired knowledge and perceive difficulties; Section IV-questions on the general satisfaction with the participatory strategy.	Civil society (children)	21 people (18%)
	Interview IQ1) What is your overall opinion on the participatory strategy? IQ2) How does the Arsoli community gain from the participatory strategy? IQ3) Have you encountered any negative aspects or difficulties in carrying out the activities? If so, what could be improved? IQ4) Do you believe that carrying out the participatory approach again in the upcoming years is appropriate? IQ5) Do you think the participatory strategy can be applied to neighbouring local communities?	Representatives of the social entities	4 people (3%)

A detailed description of the different face-to-face participatory events/activities carried out in each stage of the HPA and related methods for data collection is provided in the following sub-sections.

3.1. Open day event

The open-day event covers the first and second phases of the HPA. Two distinct sections have been planned for the event: one for adults and teenagers and the other for children. Participants were involved in both the storytelling of experiences on the growing and cooking of the "fagiolina arsolana" and the elicitation of ideas for passing on the experience and skills from local elders to children and teenagers, stimulating the involvement of local teenagers as well as organising the social farm.

During the session for adults and teenagers, participants were asked to answer TQ1 and TQ2 in **Table 1**, according to their experiences. After the collection of experiences, all participants were involved in the elicitation of ideas for passing on the experience and skills from local elders to children and teenagers, stimulating the involvement of local teenagers as well as organising the social farm. Participants,

divided into four groups (A, B, C, and D), were asked to answer TQ3, TQ4, and TQ5 in **Table 1**, according to their ideas. In the session for children, the method applied consisted of the following activities: storytelling of experiences with emotional definition, collection of tips, and drawings. Two rounds of storytelling have been organized: the former for the experiences in the cultivation of the "fagiolina arsolana" and the latter for its cooking. After the collection of experiences, all children were involved in the second phase of the collection of tips. TQ6 and TQ7 in **Table 1** were asked to children.

3.2. Training activities

The third and fourth phases of the HPA are covered in the training activities. They consisted in green social laboratories, where participants learned the cultivation techniques and the cooking process of the "fagiolina arsolana", and a culinary challenge, where participants compete against each other in the creation of a typical local recipe by implementing the acquired knowledge. Three distinct green social laboratories—"I learn how to grow the fagiolina," "I learn how to cook the fagiolina," and "I learn how to harvest the fagiolina"—were set up, wherein interested people, teens, and local elders shared their knowledge and skills. Moreover, the culinary challenge was held during the "fagiolina festival" involving several groups composed of participants in the green social laboratories who tried their hand at cooking a typical recipe.

3.3. Co-creation events

The co-creation events cover the fifth phase of the HPA. Two different co-creation events have been organized for the implementation of a social farm, a multifunctional agriculture and community-based social and healthcare service for life-long education and other endeavours that contribute to social inclusion (Borgi et al., 2020). The social farm will improve the well-being and quality of life of the Arsoli community by offering a calming environment, away from the pressures of daily life that aid in stress relief.

Starting from the needs and ideas for the co-creation of the social farm gathered during the Open Day event, every attendee of the first co-creation session was requested to complete a questionnaire regarding the social farm's structure, the people to engage, the tasks to carry out, and how they would use the harvest. The questionnaire was composed of MQ1, MQ2, MQ3, and MQ4 in **Table 1**, aimed to deepen the TQ5 submitted to participants during the Open day event. The options available for each MQ have been defined according to the most common idea voted by the various groups of participants in the open-day event. After that, a collaborative solution for the social farm's co-design has been provided. Moreover, a group of "Fagiolina Ambassadors" has been appointed to stimulate citizen and stakeholder engagement and participation. For the appointment, representatives for each target group involved in the project (children aged 8–12 years, teenagers, elders, citizens, and local farmers) have been selected according to their commitment to the SOCIAL4FOOD training activities.

In the second co-creation event, the shared solution regarding the farm's

organization was shown to the representatives of the four organizations—the Municipality of Arsoli, Pro Loco of Arsoli, the Social Elderly Center of Arsoli, and the local farmers belonging to the association "Amici della fagiolina arsolana"—who will be in charge of managing the social farm in the upcoming years.

3.4. Qualitative survey

The final stage of the HPA consisted of the qualitative survey. To assess the efficacy of HPA, two questionnaires—one for adults and teenagers and the other for children—were administered. It was requested that each participant complete the surveys. The questionnaires were created and printed in Italian language.

The survey administered to adults and teenagers (refer to **Table 1**) comprised a variety of items, including multiple-choice, Likert-type scales, as well as open questions.

The questionnaire for adults and teenagers consists of 19 items grouped under four different sections, as illustrated in **Table 1**, plus a preliminary and an introductory section. The preliminary section comprises elicited personal information of respondents including age and gender, while the introductory section contains questions aimed to analyse the participant's expectations, learning contents, and addressed topics.

The questionnaire for children (Questionnaire 2 in **Table 1**) consisted of 12 items grouped under four different sections, as illustrated in **Table 1**, plus an introductory section containing yes/no questions and in some cases open-ended questions aimed to analyse the children's satisfaction with the project activities.

The interview was conducted in Italian and administered to the representatives of the four social entities involved in the project. It consisted of 5 questions (IQ1, IQ2, IQ3, IQ4, and IQ5 in **Table 1**) investigating the advantages, difficulties, and replicability of the project's results.

4. Results and discussion

In this section, the results of the implementation of the different face-to-face events/activities described in Section 3 are illustrated, along with a final discussion of the obtained results.

4.1. Results of the open day event

The event, organised in July in the town hall, was attended by 38 people (16 children, 12 citizens, 6 elders, 3 teenagers, and 1 local farmer—14 women and 24 men).

4.1.1. Results of the session for adults and teenagers

The session for adults and teenagers was attended by 22 people (14 men and 8 women). Respondents were required to provide answers to the five questions (TQ1–TQ5) presented in **Table 1**. Note that not every participant responded to the questions.

Considering TQ1 and TQ2, most of the participants (8 participants—36%) had direct experience in the growing of the "fagiolina", while 5 participants (23%) did not have any growing experience, 2 participants (9%) had direct experience in the growing of other agricultural products, and other 2 participants (9%) had a non-direct

experience but they observed people growing the "fagiolina". Only 4 participants (18%) had direct experience in the cooking of the "fagiolina", while the other ones only had experience in tasting recipes with the "fagiolina" (8 participants—36%) or observing people cooking the "fagiolina" (3 participants—4%).

Among the difficulties encountered by participants during these experiences the most cited ones were the lack of knowledge (6 respondents—27%), problems related to the environment, fauna, and clime (4 respondents—18%), followed by the shortage of the "fagiolina" (3 respondents—14%) and the lack of involvement of young people (3 respondents—14%). Among the reported difficulties, even if with a lower response rate, there were also the physical effort, the product properties (hard skin), the poor valorization, and the low economic return (each one received 1 response—5%). While among the positive aspects, the most cited by participants were the sense of belonging to the community and the territory (5 participants—23%) and the importance to pass on the tradition of the "fagiolina" (4 participants—18%). The "fagiolina arsolana" is a typical product so it is intrinsically linked to the territory and the community of Arsoli, which indicates not only a physical place but a lot of attributes (such as history, knowledge, experience, and processing techniques) that have their roots in the tradition that is important to pass on to new generations. Other positive aspects highlighted by 9 participants (41%) are the contact with nature, physical activity, and some properties of the "fagiolina" (e.g., digestibility/taste). Among the reported positive aspects, even with a lower response rate (3 participants—14%), there was also stress reduction, socialization, and economic revenue.

Considering TQ3, TQ4, and TQ5, the implementation of agricultural practices in the lands was the most common in the various group's ideas that emerged for passing on the experience and skills. In particular, the most voted ideas were devoted to organising events for illustrating the different phases of the cultivation involving young people in a practical way followed by the importance of setting up dedicated training events promoted by the municipal body and local schools, and the importance of involving the elderly for teaching the agricultural practices to young generations (see **Table 2**).

The organization of events open to the public involving young people was the most recurrent idea proposed by the various groups for stimulating the involvement of local teenagers. In particular, the events could be organised by farmers that illustrate the different phases of the "fagiolina" growing by promoting at the same time knowledge of the history of the "fagiolina" to the youngest for their practical implementation. Moreover, the spreading of the "fagiolina" tradition on social media as well as the implementation of school camps for creating synergy between old generations and new farmers have been suggested.

For the organisation of the social farm, the most voted idea was to involve local associations, mainly composed of elderly people with strong experience but also young people including people with disabilities that help in the growth of the "fagiolina". The importance of stimulating the collaboration of all the participants (mainly people with disabilities and young people) has been underlined together with the need to buy tools to improve and expand cultivation in the following years.

Table 2. Elicited ideas collected during the Open Day event from adults and teenagers.

TQs	Elicited ideas
TQ3	Implementing agricultural practices in the lands for illustrating the different phases of the cultivation Setting up dedicated training events promoted by the municipal body and local schools Involving the elderly in teaching agricultural practices to young generations.
TQ4	Organising events where farmers illustrate the different phases of the "fagiolina" growing by promoting at the same time knowledge of the history of the "fagiolina" to the youngest for their practical implementation Spreading the "fagiolina" tradition on social media Implementing school camps for creating synergy between old generations and new farmers.
TQ5	Involving local associations mainly composed of elderly people with strong experience. Encouraging everyone involved in the initiative to work together Buying tools to improve and expand cultivation in the following years, Including everyone who desires to work in rural areas

4.1.2. Results of the session for children

The session for children was attended by 16 children (8 boys and 8 girls).

Concerning the storytelling of the experiences in the cultivation of the "fagiolina arsolana", most of the participants (11 children—69%) had direct experience in the growing of the "fagiolina", while 3 children (19%) had direct experience in the growing of other agricultural products (e.g., corn, tomatoes, eggplant, and zucchini), and only 1 child (6%) did not have any growing experience or had a non-direct experience (observation of people while growing the "fagiolina").

For the experiences in the cooking of the "fagiolina arsolana", 7 children (44%) had direct experience in the cooking of traditional foods (e.g., hand-made pasta and typical sweets), while the other ones had a direct experience in the cooking of the "fagiolina" (4 children—25%), a non-direct experience (observation of people (e.g. grand-mother) while cooking the "fagiolina" (2 children—12%)) or did not have any cooking experience (1 child—6%).

The growing and cooking experiences have been positively evaluated by children. The majority of participants were happy (10 children—63%) or very happy (4 children—25%) to have lived the experience, while only 1 child (6%) was very sad or indifferent. This data has been extracted from the smiles that each child applied to his/her written experience (according to their level of satisfaction).

In the second phase of the collection of tips, all children were asked to answer TQ6 and TQ7 in **Table 1**. Answers given by children are shown in **Table 3**. In particular, a total of 21 responses were collected for TQ6. The most common idea proposed by children was organizing laboratories/courses with friends/relatives (8 children—50%), followed by cultivating a vegetable garden with relatives (6 children—38%), friends (3 children—19%), or a farmer (3 children—19%), and listening to passionate people with experience (1 child—6%). Concerning TQ7, a total of 16 responses have been provided. The most common tip proposed by children was organizing laboratories/courses/lessons (7 children—44%), followed by having a cooking experience with friends/relatives (4 children—25%) and elderly people (3 children—19%) and observing experienced/passionate people (2 children—12%).

Table 3. Elicited ideas collected during the Open Day event from children.

TQs	Elicited ideas
TQ6	• Organizing laboratories/courses • Cultivating a vegetable garden • Listening to passionate people with experience
TQ7	• Organizing laboratories/courses/lessons • Having a cooking experience • Observing experienced/passionate people

4.2. Results of the training activities

The training activities, organised in August and September 2022, were attended by 118 people (38 children, 57 citizens, 13 elders, 3 teenagers, and 7 local farmers—79 women and 39 men). In the following sub-sections, the results of the laboratories and the culinary challenge are described in detail.

4.2.1. Results of the green social laboratories

The activity of the social laboratory "I learn how to grow the fagiolina" started with the knowledge transfer of cultivation techniques of the "fagiolina arsolana" from the elderly to participants using storytelling techniques. Elders explained to participants the different cultivation phases of the "fagiolina arsolana" (land preparation, sowing, covering the seeds, and the building of the "conocchie", i.e., support scaffold for the growth of the plant). After the explanation, participants were actively engaged in the different phases of the cultivation activities.

During the social laboratory "I learn how to cook the fagiolina", local elderly ladies transferred knowledge on a typical recipe, named "ciciarchiole" (i.e., hand-made pasta with a sauce prepared using the "fagiolina arsolana"), to participants using storytelling techniques. Participants were followed by local elderly ladies, who illustrated the different phases of the cooking process (preparation of the sauce, preparation of the hand-made pasta, and final baking). Then, participants were actively engaged in cooking activities.

In the social laboratory "I learn how to harvest the fagiolina", elderly farmers transferred the harvesting techniques of the "fagiolina" to participants using storytelling techniques. After participants were actively engaged in harvesting activities.

At the end of each laboratory, participants were divided into groups to discuss their concrete experiences by highlighting the difficulties and the positive aspects related to the performed experience. Moreover, it was asked to take notes about the concepts and knowledge acquired during the concrete experiences (experience notes).

The difficulties and positive aspects that emerged from the green social laboratories are shown in **Table 4**. From the analysis of the discussions, the participants highlighted the following difficulties in the growing of the "fagiolina arsolana": sticking the "conocchie" into the ground, high effort, difficulties in the use of the hoe, and in general all the tools necessary for sowing the bean. Conversely, they highlighted the following advantages: the contact with nature, having learned the Arsoli culture, the use of agricultural tools, and the cultivation of the bean, and the digital detox.

Table 4. Difficulties and positive aspects emerged from the concrete experience.

Laboratory	Difficulties	Positive Aspects
First laboratory "I learn how to grow the fagiolina"	• Use of the hoe • High effort • Sticking reeds into the ground	• Learning the Arsoli culture • The use of agricultural tools • The contact with nature • Digital detox
Second laboratory "I learn how to cook the fagiolina"	• None	• Fun • Seeing and understanding the process used to make the homemade pasta and sauce
Third laboratory "I learn how to harvest the fagiolina"	• Separate the beans from the skins • Shelling the beans • Harvesting the pod from the plant	• Contact with nature • Physical activities

4.2.2. Results of the culinary challenge

The culinary challenge was attended by 34 people (20 citizens and 14 children). It consisted of a competition in the creation of the typical local recipe of "ciciarchiole" following the instructions learned during the laboratory "I learn how to cook the fagiolina". Five heterogeneous groups (adults and children) composed of 6 participants have been created. The ingredients for the preparation of pasta and sauce, a pastry board, a rolling pin, and an electric stove for the cooking were provided to each group. A couple of hours have been given to make the recipe. A jury composed of 3 people evaluated the recipes realized by each group and declared the winner.

4.3. Results of the co-creation events

The first co-creation event was attended by 19 people (7 children, 4 local farmers, 4 citizens, and 4 elders—7 women and 12 men). Participants were asked to respond to questions MQ1, MQ2, MQ3, and MQ4 (except for children). Note that not every participant responded to the questions.

Considering the MQ1, most of the participants (7 people—58%) chose the option related to the creation of cultivation groups of volunteers who take care of a parcel of state-owned land. Pros and cons have been also underlined by participants as shown in **Table 5**.

Table 5. Difficulties and positive aspects emerged from the concrete experience.

Available options	Number of votes	Pros	Cons
Establishment of a small social cooperative that can use its resources in the cultivation of all local products	1	• More cooperation among involved people	• Social cooperatives require too much bureaucracy and demand from the involved people
Creation of cultivation groups of volunteers who take care of a parcel of state-owned land	7	• More freedom and autonomy of choice • It can represent the first solution to which the establishment of the small social cooperative follows	• None

For the MQ2, the most chosen option was local agricultural associations (6 votes),

followed by young and unemployed people who want to get involved and work in the countryside (4 votes) and elderly people and local associations (3 votes).

Considering the MQ3, local associations were considered the most relevant entity to be involved in the organization of the social farm (4 votes), followed by the most experienced people (3 votes), with the contribution of all citizens (3 votes).

Finally, for the MQ4 all participants shared the idea to use the revenue for the purchase of agricultural equipment to enhance and broaden the "fagiolina arsolana" cultivation in the upcoming years.

The second co-creation event was attended by 8 people (2 children, 1 local farmer, 4 citizens, and 1 elder—6 women and 2 men).

During the event, the shared solution about the organization of the social farm emerged during the second co-creation event (specifically people to involve, tasks to perform, etc.) has been illustrated to representatives of the four entities responsible for the management of the social farm in the coming years (the Municipality of Arsoli, Pro Loco of Arsoli, Social elderly center of Arsoli and local farmers of the association "Amici della fagiolina arsolana"). A preliminary version of a collaboration agreement containing the activities for the management of the social farm which each entity is responsible for, as emerged during the first co-creation event, has been discussed.

4.4. Results of the qualitative survey

The outcomes of the two questionnaires and the interview are explained in detail in the next subsections.

4.4.1. Results of the questionnaire for adults and teenagers

The questionnaire (Questionnaire 1 in **Table 1**) was filled in by 51 respondents (35 women and 16 men), with 2 teenagers, 40 people with age 19–59, and 9 elderly people.

Results showed that the participant's expectations on the participatory strategy have been satisfied for most respondents (26 respondents—51%), of them eight were extremely satisfied and eight were very satisfied. Learned contents were already known by most of the respondents (49%) who wanted to deepen them, while the addressed topics were sufficiently thorough for all the respondents.

Considering the organisation of the events, the number, duration, and location of the events fully satisfied all the respondents. All participants have gained new skills and information (21 respondents, or 41%, stated they have learned enough), 17 respondents (33%) much knowledge, and 13 respondents (26%) very much knowledge), mainly in the use of the "fagiolina" for preparing salty and sweet recipes.

Participation in the co-creation events has been considered very much useful for sharing ideas by 18 respondents (35%), much useful by 16 respondents (31%), enough useful by 12 respondents (24%), and not very useful by 5 respondents (10%). Moreover, the majority of respondents (46 participants—90%) said that they had actively contributed to the co-creation of the social farm, among which 18 people (35%) contributed very much, 13 people (26%) much, and 15 people (29%) enough. All participants were delighted with the shared solution for the management and organization of the social farm.

The green social laboratories, the culinary challenge competition, and co-creation

events have been considered very interesting by 30 respondents (59%), very interesting by 15 respondents (29%), and enough interesting by 6 respondents (12%), and the majority (59%) applied the acquired knowledge for preparing the recipes learned during the laboratories. No difficulties in performing the proposed activities have been encountered by all participants, who also underlined a very positive participants' collaboration.

A high level of general satisfaction with the participatory events resulted from the answers (47 respondents—92%), among which 21 people (41%) were very satisfied, 14 people (27%) much satisfied, and 12 people (24%) enough satisfied. Only 4 respondents (8%) were few satisfied. Finally, a good level of usefulness in re-proposing the activities in the next years was reported by 45 respondents (88%); in particular, 26 respondents (51%) considered it very useful to repropose the activities, 17 respondents (33%) very useful, and 2 (4%) enough useful.

4.4.2. Results of the questionnaire for children

Twenty-one kids completed the questionnaire (questionnaire 2 in **Table 1**). A high level of children's satisfaction with the participatory strategy resulted from the analysed responses. Every child enjoyed the suggested activities and thoroughly appreciated the labs and culinary challenge. The most appreciated laboratory was the cooking one (15 children—71%), while during the culinary challenge, children had the most fun preparing the hand-made pasta (14 children—67%) and sauce (7 children—33%) with their friends. Only children (14%) indicated the least appreciated activity that is the slide presentation illustrating the activity implementation.

All the children would like to take part in a greater number of laboratories and challenges and considered the available time for the activity implementation adequate.

No difficulties to perform the proposed activities have been encountered by all children. New knowledge and abilities have been acquired by all participants, mainly in the use of the "fagiolina" for preparing traditional recipes (16 children—76%).

Finally, all children appreciated the opportunity to have a social farm for growing the "fagiolina" together with their friends, elderly people, and local farmers. All children underlined a very positive collaboration both with their friends and elderly people.

4.4.3. Results of the interview

Considering IQ1, IQ2, IQ3, IQ4, and IQ5 in **Table 1**, all the representatives of the social entities involved in the project underlined the benefits of the HPA, as seen by the interview snippets included in **Table 6**.

Table 6. Some excerpts of the interviews with the representatives of the social entities involved in the project.

IQ1	Mayor of Arsoli: By involving a range of target audiences, from young children to senior citizens, the participatory activities produced crucial synergy between the social entities.
	President of Social elderly center of Arsoli: Very positive because local traditions must be handed down in order not to be lost.
	President of Pro Loco of Arsoli: The participatory events have reawakened the interest in the "fagiolina arsolana", a very ancient product that the Pro Loco, local associations, and the Municipality of Arsoli have been promoting for some time. I believe that the participatory strategy was significant because it drew even more attention to this typical bean
	President of the Association of local producers "Amici della fagiolina di Arsoli": Positive. Participatory events allowed stimulating the population and mainly young people to hand down the culture and traditions of Arsoli.

Table 6. (*Continued*).

IQ2	Mayor of Arsoli: The greatest benefit was the involvement of the population which allowed for greater attention from citizens to this typical product. President of the Social elderly centre of Arsoli: The participatory events supported and promoted the activities necessary to carry on the tradition of this typical product. President of Pro Loco of Arsoli: The participatory events attracted the attention of children and teenagers, the less involved groups in the past experiences, on whom it is necessary to work for carrying on the tradition of the "fagiolina arsolana". President of the Association of local producers "Amici della fagiolina di Arsoli": Long-term benefits will be realized because fostering interactions between kids and senior citizens "sows" the culture and a sense of belonging to the territory. That allows the tradition of this typical product, which has been produced in Arsoli for over 500 years, to be handed down.
IQ3	Mayor of Arsoli: With the help of the municipal government, the Pro Loco of Arsoli, and the Association of local farmers, who were ready to welcome the benefits of the participatory strategy, everything went perfectly. President of Social elderly centre of Arsoli: Everything went well, it was a constructive participatory strategy. President of Pro Loco of Arsoli: No, I cannot find any negative aspects because the participatory events have been implemented in a very professional way. The difficulties were related to the post-lockdown climate which made it difficult to involve people. President of the Association of local producers "Amici della fagiolina di Arsoli": There were no negative aspects, it was a pleasure to collaborate with the children and teenagers. The social entities of our area, such as schools, could be more involved to give more value to the event results.
IQ4	Mayor of Arsoli: The transmission of popular culture is a crucial element that needs to be repeated. In this regard, we are signing a collaboration agreement among the municipal administration, the association of local producers, the Pro Loco, and the social elderly centre. President of the Social elderly centre of Arsoli: The transmission of popular culture is a crucial element that needs to be repeated. President of Pro Loco of Arsoli: I think it was a positive experience. New ideas were exchanged through the round tables and collaborative activities, and they should be repeated in the upcoming years. President of the Association of local producers "Amici della fagiolina di Arsoli": It's critical to keep using the participative approach to provide opportunities, especially for the younger generation.
IQ5	Mayor of Arsoli: The towns in our area are rich in typical products and local traditions linked to a peasant culture that can be fostered. President of the Social elderly centre of Arsoli: It is important to make the tradition of the "fagiolina arsolana" known to all the neighbouring towns. President of Pro Loco of Arsoli: The neighbouring municipalities ought to implement the strategy's outcomes. However, this is difficult, as underlined by similar experiences we had in the past. It is important to try again, involving children and teenagers also with the help of the schools. President of the Association of local producers "Amici della fagiolina di Arsoli": From an agro-food point of view, our territory is rich in typical products that should be stimulated because they can represent an excellent opportunity for work and social growth.

4.5. Discussion of results

The development of sustainable local food systems at the local scale requires a bottom-up approach that relies on the participation of the community, motivated by the community to raise the likelihood of a favorable result (Hallström et al., 2019; Moallemi et al., 2021).

The results of the HPA implementation underlined this important aspect. Indeed, it brings a broader range of perspectives and ideas from the farming community, local government, social associations, and civil society (mainly children, teenagers, and elderly people) that contribute jointly to the development of local food knowledge and the planning of sustainable food systems. Multiple stakeholders were involved in the training activities and co-creation events envisaged by the HPA for the collection of experiences and needs, ideas elicitation, active engagement to do and learn, formulation of practical solutions, and collaborative realization of the social farm.

One of the main success points of the HPA is its capacity to bring the youth to have a conversation with the elders that produces a useful method of transferring to

them the local food culture. The youth realized that they could learn a lot from the wisdom of the elders. Therefore, the project provided a wonderful learning experience for the beneficiaries (mainly children) but also the teachers (elders and local producers).

The HPA also allows sustainable local food preservation through the transmission of knowledge, in line with the results of some studies that highlighted how food provides opportunities for knowledge transmission (Md. Sharif et al., 2018b; Quintero-Angel et al., 2019; Sutton, 2001). Specifically, the concept of "embodied apprenticeship" defined by Sutton (2001) is at the base of the transfer of food traditions. This idea holds that knowledge is passed down and obtained by a direct engagement in the "doing/learning cooking" activity. A similar experiential approach has been followed in the definition of the HPA.

Moreover, the use of a hybrid methodology that integrates design thinking and learning-by-doing strengthens the results of studies in the food sector that use only one of these two methodologies (Hughner et al., 2021; Shimek, 2018; Short, 2006). Specifically, design thinking has been successfully applied during the launch of food products for exploring the global challenges of sustainable food production (Shimek, 2018). The authors highlighted several benefits arising from the application of this approach mainly linked to its capacity to create a more collaborative and effective team, increasing empathy between individuals and accelerating the process of innovation. Analogously, Hughner et al. (2021) applied a learning-by-doing approach to making young people aware of the problem of access to healthy food. The results of their study underlined that the active involvement of young people increases their awareness and interest in the issue of food accessibility. A further study (Short, 2006) recommended to use of a person-centred approach where the focus is on the person performing or learning the cooking experience by considering his/her beliefs, attitudes, and expertise. Similarly to these studies, the HPA offers young people the opportunity to increase learning engagement in an experiential setting by contributing to the empowerment of food knowledge transmission, as demonstrated by the questionnaire and interview results. The answers to the questionnaires, indeed, highlighted a high level of general satisfaction (for adults) and fun (for children) during the participatory activities and a positive opinion on the addressed topics, which, for each respondent, have been adequately comprehensive. All the participants have gained new skills and information. All the representatives of the social entities involved in the project emphasized the advantages of the HPA as well, highlighting the positive experience of the HPA's implementation to the Arsoli community and suggesting that it be a good practice to be duplicated in nearby locations.

Notwithstanding these significant advantages, the main problem with the HPA's implementation was the low participation of teenagers in the training sessions. The main reason was the high number of school and extracurricular commitments, as told by the 3 teenagers involved, that affected the voluntary and active participation in social and cultural activities, like those organized by the project.

5. HPA refinements through digital technologies

To stimulate effective engagement and participation of teenagers, it is essential

to understand the behaviors and characteristics of young people in communication and participation and tailor the engagement strategies and digital tools accordingly (Park, 2023). Specifically, younger generations are considered "digital natives" thanks to their high exposure, experience, and comfort in using technology. Therefore, the use of technology can foster youth engagement in being active citizens in their communities. Moreover, Park (2023) highlighted youth's behaviors and characteristics that can influence the definition of a communication and engagement strategy targeted at youth. We start with some of these youth's behaviors and characteristics for defining possible refinements of the HPA and possible digital tools that can be used to implement these refinements, as shown in **Table 7**.

Table 7. Possible refinements of the HPA linked to the main youth's behaviours and characteristics and digital tools to implement them.

Youth's behaviors and characteristics	Refinements of the HPA	Digital tools
● Requesting prompt and immediate responses	● Introducing instantaneous communication facilities	● Discussion forums ● Social media groups
● Preferring easily accessible, friendly, and innovative content	● Introducing visual-oriented and interactive materials ● Providing multimodal access and interaction with the contents	● Virtual/augmented reality ● Multimodal interactive environments ● Digital storytelling
● Expecting short-term and concrete consequences of participation	● Providing immediate and specific results after participation	● Co-creation platforms
● Being motivated by rewards	● Introducing gamification and challenges	● Game-based learning environments

Therefore, an evolution of the HPA toward effective engagement and participation of teenagers should consist of the integration of the digital tools identified in **Table 7** in the different phases of the HPA, as shown in **Figure 2**.

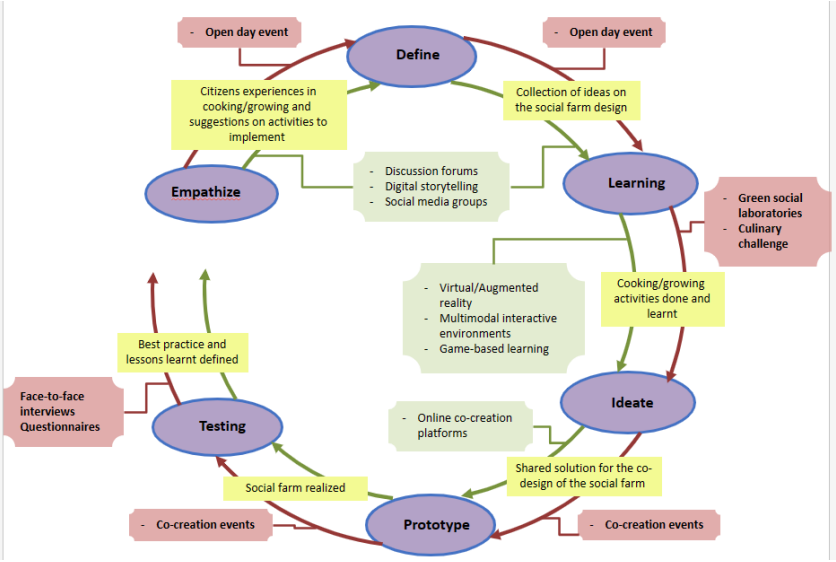

Figure 2. The evolution of the HPA integrating digital tools for stimulating an effective engagement and participation of teenagers.

During the first and second phases of the HPA, discussion forums, digital storytelling, and social media groups should be integrated to stimulate the dialogue

and the sharing of learning experiences. Discussion forums provide asynchronous environmental tools that have the potential to enhance interactions between younger generations and local farmers by allowing them to build peer-to-peer relationships and discuss relevant sustainable local food topics (Galikyan and Admiraal, 2019). Teenagers can create discussions by engaging herself/himself in dialogue with local farmers in a collaborative and cooperative setting. This stimulates social interactions and knowledge sharing. The practice of digital storytelling uses digital media to tell stories by combining visuals, images, text, and animation, for creating a powerful narrative multimedia experience that can engage and educate audiences. Compared to traditional storytelling methods, digital storytelling offers a number of advantages (Choo et al., 2020). Within the HPA, it allows personal stories to be told from teenagers' personal experiences and a particular point of view, and this creates a powerful experience for them. Moreover, digital stories can be shared easily through social media platforms or websites such as YouTube; this makes it easier for people to access and share information without attending an event. Due to their widespread use and societal influence, social media groups have garnered more and more attention on a global scale (Ahmed et al., 2019; D'Andrea et al., 2013; Guzzo et al., 2013). These resources are regarded as well-known and reputable platforms for developing pathways for the exchange of knowledge (Caschera et al., 2018), where teenagers can share posts, pictures, and comments about their experiences on the growing and cooking of the "fagiolina arsolana".

During the HPA's third and fourth stages, virtual and augmented reality, multimodal interactive environments, and game-based learning should be integrated within the training activities for implementing the learned knowledge by interacting with easily accessible, friendly, and innovative content. Virtual reality environments resemble real-life settings, while augmented reality goes one step further by presenting an enhanced version of reality (Maas and Hughes, 2020). Virtual/augmented reality is a promising addition to the traditional learning space due to its immersive nature, ability to share information in new and engaging ways, and potential to offer virtual experiences that can mitigate barriers from time or distance. Virtual/augmented reality offers enormous potential to the HPA by enabling experiences that can transcend physical space limitations and creating educational opportunities that enrich traditional face-to-face training events. Augmented/virtual reality experiences can engage teenagers in hands-on learning in a variety of animated programs that simulate the cultivation and harvest of the "fagiolina arsolana" where the interactions between 'humans' and 'avatars' allow an alternative way to acquire the skills and competencies. The advantages of multimodal interactive environments are strictly linked to the use of the integrated multiple interaction modalities (e.g., speech, sketch, handwriting, etc.) that enable users to benefit from communication more similar to human-human communication (Caschera et al., 2015; D'Ulizia et al., 2008; D'Andrea et al., 2010; D'Andrea et al., 2017; Grifoni et al, 2021). Multimodal learning creates an exciting learning environment, which makes the knowledge to be transferred more easily accessible and the interaction more attractive by leading to increased engagement from teenagers. In game-based learning, material is presented through a virtual environment that helps local teenagers understand the concepts to be transferred (Caschera et al., 2013). The learning process based on digital games can stimulate curiosity by creating

attractiveness in the visual space, which, in turn, increases teenagers' satisfaction (Meijer and Boon, 2021). Using game-based learning in the HPA will develop skills and competencies in growing and cooking techniques while focusing on the game activities stimulating creativity and fun.

The co-creation events in the fifth phase of the HPA should be organized both face-to-face and using online co-creation platforms. These platforms, supported by information and communication technologies and rules of exchange, provide resources for flexibly engaging users in the creation of solutions (Ferri et al., 2020). This kind of platform was first developed for the marketing sector to enable the interaction between firms and their consumers in developing products/services (Ferri et al., 2014; Ferri et al., 2012; Grifoni et al., 2014; Guzzo et al, 2012). Within the HPA, co-creation platforms will stimulate the participation of teenagers and stakeholders in the planning of sustainable local food systems by producing also a mutually valued outcome for the implementation of the social farm. The use of these co-creation platforms opens the innovation process up also to teenagers' voices that are normally difficult to be involved in.

6. Conclusions

In this paper, the results of the HPA followed in the SOCIAL4FOOD project are discussed. The HPA had a great social impact (D'Andrea and D'Ulizia, 2023a). Specifically, the Arsoli community was able to build a process of inspiration, contamination, and idea sharing, mostly between older and younger generations, thanks to the participation of citizens and important stakeholders in both the training and the co-creation activities. The green social laboratories allowed the maintenance and recovery of traditional agricultural knowledge and the sustainable practices of the "fagiolina" production through the knowledge transfer of the typical recipes of the "fagiolina" and the experiences and skills needed for its growth; together with the culinary challenge they also fostered social relationships and the aggregation opportunity, dramatically reduced by the Coronavirus (COVID-19) pandemic and the widespread use of smartphones and other digital technologies that lead people to detach themselves from nature. Finally, the co-creation of the social farm provided social inclusion opportunities to people fostering a feeling of belonging and community and raising the standard of living by providing a calming environment.

A limitation of the study was the small sample size of target groups involved in the participatory activities, which is not representative of the population for statistical analysis, and that prevents the efficacy of the HPA from being generalized. Moreover, the SOCIAL4FOOD project focused on a small rural area with limited geographic and cultural scope.

The low rate of teenager engagement in the training activities was a significant HPA constraint. To solve this limitation, future studies should be focused on developing effective engagement strategies addressed to teenagers. In this perspective, the activities planned within the different stages of the HPA need to be further developed. Specifically, they have to be integrated with digital tools to stimulate the engagement of teenagers. This digital perspective of the HPA needs further reflections

and insights on the use of specific tools that ensure accessibility, inclusivity, and compliance with privacy and data protection requirements.

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Institutional review board statement: Regarding Ethics Committee or Institutional Review Board approval, our study does not require this kind of approval, because written informed consent has been collected from participants. The SOCIAL4FOOD project, indeed, required the definition of a Data Management Plan (DMP), approved by our funding entity (the EIT Food—European Institute of Innovation and Technology), in which the following ethical aspects were specified: "Informed consent (both for adults and minors) for data sharing and long-term preservation will be included in the qualitative survey. If any sensitive data is collected it will be separated and kept secure. Moreover, the results of the qualitative survey will be anonymized to comply with the General Data Protection Regulation (GDPR)." Therefore, according to the DMP, written informed consent has been collected from participants in all the activities of the SOCIAL4FOOD project (including the survey), or from a parent/guardian in the event the participant is below the local age of consent.

Informed consent statement: Informed consent was obtained from all subjects involved in the study.

Data availability statement: The data presented in this study are available upon request from the corresponding author. The data are not publicly available due to privacy restrictions, according to the informed consent signed by the participants.

Conflicts of interest: The authors declare no conflict of interest.

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