


RESEARCH ARTICLE

Teaching about edible insects: design and insights from the summer school “Insects as food: From farm to fork”

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Abstract

Summer schools for university students represent a strategic educational format that facilitates intensive, short-term learning on specific topics. This approach was exemplified during the summer school “Insects as Food: From Farm to Fork,” coordinated by the Czech University of Life Sciences, Czechia, in collaboration with four partner universities from Italy, Germany, Poland, and the Netherlands. The summer school program aimed to deliver comprehensive, interdisciplinary education on the insect food chain by integrating theoretical knowledge with practical experience. The main activities of the summer school included a virtual part (lectures) and in-person activities (lectures, student group project, and excursions). The syllabus was designed to cover the predominant aspects of the insect food chain, from insect physiology and insect production to food product development, safety standards, and legislative considerations. For group projects, students conducted sensory evaluations of cookies formulated with various inclusion rates of insect flour from four insect species. Based on their findings, each group designed a unique concept for a novel insect-based food product and presented it at the end of the summer school, followed by a guided discussion. Post-course student self-evaluations provided insights into the students’ perception of different educational activities and indicated that summer school activities were effective in increasing their knowledge about edible insects. The results suggest that such an educational event could also contribute to broader knowledge dissemination and increase the acceptance of edible insects as a food source.

Keywords

intensive learning – novel food – pedagogical practices – short-term study – university

1 Introduction

Insects are a valuable source of nutrients for food and feed applications (van Huis, 2020). Edible insects are characterized by a high production rate, a low carbon footprint, and the potential for industrial-scale production across diverse geographical regions (Hubert, 2019). Furthermore, certain insects can be reared on agricultural and organic side streams, contributing to a circular economy (Cadinu *et al.*, 2020; Sogari *et al.*, 2023). Over the past decades, a vast pool of traditional knowledge and an ever-growing pool of modern knowledge about production, processing, and consumption of insects has been collected and generated (Costa-Neto and Dunkel, 2016). The importance of edible insects as a food source has also been acknowledged; for example, FAO advocates the use of insects to ensure global food security (van Huis *et al.*, 2013). In the European Union, insects are considered a novel food, and progress in legislation, including approval of some edible insects as safe for human consumption, has recently been made (Żuk-Golaszewska *et al.*, 2022). Despite their potential for human consumption, the acceptability of edible insects in Western countries remains low (Grabowski *et al.*, 2022; Mancini *et al.*, 2024; Mishyna *et al.*, 2023; Ros-Baró *et al.*, 2022).

Educational activities are essential for promoting insect consumption and can be organized at various levels, from primary schools and universities to training farmers and the general public (Rumpold and van Huis, 2021). The integration of educational lectures with practical experience, such as tasting insects, is considered a driver for the large-scale adoption of insect consumption (Petersen *et al.*, 2020). At the university level, the topic of edible insects may be addressed through dedicated courses or integrated as a part of a course. For instance, at Wageningen University and Research, the course *Insects as Food and Feed* introduces students to the entire insect value chain, from production to consumption, through a combination of lectures, case studies, laboratory work, and tasting sessions. At Hannover University of Veterinary Medicine, edible insects have been part of the curriculum for over a decade. Today, students receive a lecture on edible insects and may choose from two optional training courses: one addressing insects as a food source from a food hygiene perspective and another focusing on primary production and herd management. This course has received positive feedback from the students and the public (Schaarschmidt, 2022). In terms of training non-academic students, training units have been

designed for apprentices to become technical veterinary assistants and animal keepers. Since summer school at the University of Pisa in 2021, students from various degree programs (human nutrition, animal science, and veterinary medicine) have received lectures on insects as a novel livestock production system. The course on the production of insects as food and feed will be offered at the Czech University of Life Sciences Prague, starting in 2026.

Alongside traditional university courses, short-term educational programs such as summer schools are increasing in popularity (Lakkala *et al.*, 2017). Summer schools offer intensive learning experiences on specific subjects and typically employ various teaching methods (Rejeb *et al.*, 2024; Shotton, 2015). These programs usually include three interlinked major components: lectures, practical work, and excursions (Lakkala *et al.*, 2017). Using online feedback forms at the end of summer schools is a common practice to evaluate students' learning experiences (Lakkala *et al.*, 2017). Such feedback can be used to assess teaching strategies and serve as a foundation for planning follow-up educational activities. Beyond education, summer schools enhance the internationalization of students (Amante and Rodrigues, 2025). Several summer schools dedicated to edible insects have been previously organized, for example, by the University of Pisa (online summer school *Insects as Food and Feed* 2021).

Summer schools can be supported through Blended Intensive Programmes (BIPs) under the Erasmus+ program, which supports education, training, youth, and sport. A BIP is a short, intensive program that combines a compulsory virtual component with short-term physical mobility, thus providing a blended learning experience. The duration of physical mobility usually ranges between 5 and 30 days (European Commission, 2025). The development and implementation of BIPs require collaboration among at least three higher education institutions. Key steps in developing BIP-based summer schools include defining clear learning outcomes and developing a coherent blended curriculum. The educational activities of the summer school should follow the principle of constructive alignment to ensure consistency and logical alignment between learning objectives, learning activities, and assessment methods (Biggs, 1996). Incorporation of formative feedback during the summer school enables continuous assessment of learning progress, allows to identify and address knowledge gaps in real time, and also facilitates understanding of study materials (Morris *et al.*, 2021). To the best of our knowledge, the specific design of BIP-based

summer schools focusing on edible insects has not yet been published. However, such documentation could provide valuable guidance and recommendations for future educational initiatives in this emerging field.

In 2023, the first edition of the summer school “Insects in food”, supported by the BIP, was organized by Ghent University, Belgium, in collaboration with several European Universities. A follow-up summer school, “Insects as food: From farm to fork” was coordinated by the Czech University of Life Sciences Prague, Czechia, and took place in 2024. This paper aims to present a case study of the course design built on the principles of constructive alignment and to critically evaluate the use of a summer school format as an educational approach for teaching about edible insects. To gather insights into students’ motives for participating in the summer school, their perceptions of the educational activities, and future intentions regarding insect consumption, data were collected through a self-reported post-course questionnaire.

2 “Insects as food: From farm to fork”

General organization of the summer school

The summer school “Insects as food: From farm to fork” was held at the campus of the Czech University of Life Sciences Prague (CZU), Czechia, in collaboration with University of Veterinary Medicine Hannover (TiHo), Germany; University of Pisa (UniPi), Italy; Wageningen University and Research (WUR), the Netherlands; and Warsaw University of Life Science (SGGW), Poland. The summer school was supported by the BIP (Blended Intensive Program) under Erasmus+. The program comprised a virtual part (September 4, 2024) and an in-person part (September 9–13, 2024) for a total of 3 ECTS (European Credit Transfer System).

Promotion of the summer school was carried out across all five involved universities using various channels, including email announcements and posters. The promotional materials included information about the summer school topic, location, dates, the opportunity to apply for Erasmus+ funding to support travel and accommodation, and the number of ECTS credits students would earn upon completion of the summer school. Eligibility criteria required participants to be enrolled in any university-level program, regardless of their specialization.

Aim and learning outcomes

The aim of this summer school was to introduce students to the fundamentals of the edible insect value chain, from production to consumption, through an integrated blend of theoretical and practical activities. The intended content-based learning outcomes of the summer school were formulated with the use of Bloom’s taxonomy (Krathwohl, 2002). By the end of the summer school, students were expected to be able to:

- (1) Describe and analyse the use of edible insects for food, feed, and non-food applications.
- (2) Summarize and evaluate insect rearing methods and assess key safety and quality considerations in insect production.
- (3) Explain the principles of edible insect processing and perform sensory analysis of a food product containing edible insects.
- (4) Assess current consumer perceptions of insect consumption and discuss future developments in the field.
- (5) Design and present an original concept of an insect-based product, integrating key aspects of production, processing, safety, quality, and marketing.

The summer school program was designed to deliver an integrated curriculum consisting of lectures (virtual and in-person), practical demonstrations, sensory evaluations, group project work, excursions, and guided discussions (Figure 1). Integrating practical experience with insect biology, food production, and related topics was previously indicated to be a key for adapting insect consumption (Petersen *et al.*, 2020). All educational activities were developed according to the principles of constructive alignment to ensure coherence between learning outcomes, teaching methods, and assessment, as described below.

Summer school content

Virtual part: This summer school held a half-day virtual part one week before the in-person activities. The virtual part served a dual purpose: introducing students to each other and the lecturers, and providing an overview of key elements of the insect food chain. The virtual part consisted of seven lectures (Table 1), excluding the welcome session, which took 15 minutes; the lectures lasted 30 minutes, including 5 to 10 minutes for discussion. The first lecture, “Insects as food and feed: introduction into the topic”, provided an overview of the benefits that insects as food and feed may offer. It also highlighted the most promising species for large-scale farming and emphasized the necessity

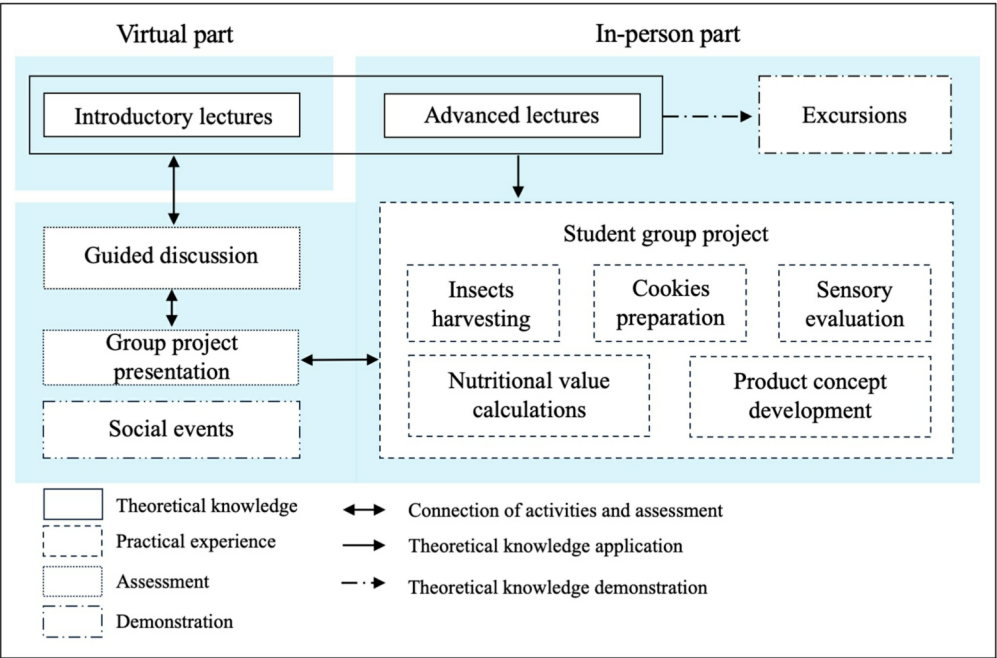


FIGURE 1 Outline of main activities of the summer school.

TABLE 1 Overview of the virtual part activities of the summer school “Insects as food: From farm to fork”

Type of activity	Title
Orientation	Summer school welcome session and round table introduction of the students
Lectures	Insects as food and feed: introduction into the topic Sustainability and environmental benefits of edible insects Nutritional value of insects Insect-based foods Acceptance of edible insects Risks and legislation connected to insect consumption Insects as pet food

of optimizing rearing technologies to fully exploit the edible insects’ potential. Another lecture, “Sustainability and environmental benefits of edible insects,” reinforced the importance of developing optimal technologies for insect production. This lecture focused on the sustainability and life cycle assessment of insect production. Without such advancements, insect production risks remaining economically unfeasible or/and environmentally unsustainable. The lecture “Nutritional value of insects” addressed the nutritional composition of insects, including the factors that influence it, as well as protein quality and digestibility. Subsequent lectures, “Insect-based foods” and “Acceptance of edible insects”, explored the variety of products that can be produced using insects or insect meal and their acceptance among consumers. During the “Acceptance of edible insects” lecture, Inknoe ClassPoint program was used to inter-

act with the students and engage them in the topic. Students were surveyed about their prior experience in eating whole insects and products containing insects, their preferences for future consumption, and their emotional responses toward edible insects. Additionally, during the lecture, students were introduced to several factors influencing consumer acceptance, and students identified three of the most important factors in their opinion. The lecture “Risks and legislation connected to insect consumption” focused on insect-related food hazards and the measures in place to address them under EU food legislation. Finally, the students were introduced to insects in pet food (lecture “Insects as pet food”), a growing market that faces less consumer resistance compared to human consumption. This lecture outlined the advantages and disadvantages of insect-based pet food, underscoring its potential in this sector.

TABLE 2 Overview of the in-person part activities of the summer school “Insects as food: From farm to fork”

Day 1	
Lectures	Insects as agents of global change (45 min) Rearing crickets and locusts (45 min) Rearing mealworms: from lesser mealworm to superworm (30 min) Rearing black soldier flies (30 min) Animal welfare – does it apply to insects? (45 min)
Excursion	Campus tour: Aquaculture, Brewery, Experimental farm and Reptile breeding room at CZU
Group project	Individual work on group project and visit in Insectarium at Dept. of Zoology for harvesting insects (120 min)
Day 2	
Lectures	European laws and regulation regarding insects as food and feed (45 min) Processing of edible insects into food ingredients (45 min) Effect of treatment and drying on the properties of insects (45 min) Microbiological safety of thermally treated insects (15 min)
Group project	Preparation of insect cookies (180 min)
Day 3	
Lectures	Introduction to the world of sensory analysis (30 min) Sensory analysis of crickets and mealworms by experts and laymen (45 min) Czechs and insects: what the eye does not see, the heart does not grieve over (30 min) Sensory analysis of meat analogues with processed insects (30 min)
Excursion	Food pavilion excursion (60 min)
Group project	Sensory testing (3 × 20 min)
Group project	Evaluation of sensory results, preparation of the group project presentation (180 min)
Day 4	
Lectures	Non-food applications of insects (60 min) Dietary iron in edible insects (60 min)
Group project	Presentation of the student projects (60 min) Evaluation of the student projects (30 min) Open discussion with lecturers (60 min)
Day 5	
Excursion	Insect farm, Zoo Tour

In-person lectures: The BIP offline section provided students with an in-depth outlook on the edible insect value chain, which was also tailored to their practical projects in the summer school (Table 2). On the first day, the lectures focused on insect rearing as promising protein alternatives (crickets, grasshoppers, mealworms, black soldier flies). The second day was dedicated to the post-harvest operations. In the morning, students attended lectures on the European legislation regarding insects as food and feed, as well as application of traditional and novel processing techniques for edible insects. In the afternoon, the student practical section started with the baking of insect-fortified cookies.

On day 3, the students were introduced to the basics of sensory science and conducted sensory analysis of

insect cookies. Afternoon lectures covered case studies on the application of edible insects in food products: burgers and insect beer. Day 4 focused on specialized aspects of insect production, including non-food applications and the dietary iron of edible insects. The lectures were followed by a panel discussion where Mentimeter was used. Topics such as marketing strategies, policy challenges, obstacles, and future directions in the insect farming sector were thoroughly discussed.

Group project: Since education can benefit from exposing students to entomophagy (Petersen et al., 2020), the summer school included a group project with a practical component to facilitate experimental learning (Figure 2). Lecture content on food product



FIGURE 2 Group project activities during summer school “Insects as food: From farm to fork”: (1) baking cookies with edible insects for sensory testing, (2, 4) sensory tests, (3) baked cookies for the sensory tests, (5–6) final group presentations.

development and sensory analysis was aligned with the practical part of the summer school.

To ensure diversity in scientific backgrounds and avoid grouping students from the same university, they were divided into four groups using an interactive game. Each group has received an assignment to prepare and conduct sensory analysis of cookies with different addition (0, 5, 10, 15, 20%) of powder made from one insect species (yellow mealworm (*Tenebrio molitor*) larvae, house crickets (*Acheta domesticus*) adults, desert locust (*Locusta migratoria*) adults, and mix of subadults and adults of discoid cockroach (*Blaberus discoidalis*)). Students collected and analysed sensory data and used the results for their final presentation. As the second part of the assignment, each group developed an original concept of a new food product based on the assigned

insect species. The students were required to apply course knowledge to justify the product concept and also develop a marketing strategy for a specific consumer group. The practical part was concluded with students on the final day of the summer school, with each group presenting the results of the sensory test and their new product concept. Each group prepared Power Point presentation and gave a talk of approximately 10–15 min, followed by a guided discussion during which other students and teachers could ask additional questions.

Assessment strategy: To complete the summer school, students were required to participate fully in all scheduled activities, including both virtual and in-person parts. The assessment strategy consisted of several elements: active engagement in guided discussions, mean-



FIGURE 3 Excursions and social activities during summer school “Insects as food: From farm to fork”: (1–3) Insect rearing facilities, (4) Rooftop social event.

ingful involvement in group project activities such as insect harvesting, cookies preparation, sensory evaluation, and nutritional value calculations; contributions to the preparation and delivery of group project presentations. The quality of each group’s work was evaluated by the lecturers based on the relevance and accuracy of the content, the depth of the analysis, the clarity and structure of the presentation, and the group’s performance during the follow-up discussion. Although no formal grading or standardized rubrics were applied, the combination of these criteria ensured a transparent and fair evaluation process.

Excursions: Following the first day of lectures, students visited the CZU rearing facility (Figure 3), where they practiced the basics of insect handling, including the daily maintenance of the colonies, harvesting, and sacrificing. On the third day, students visited the Food pavilion of CZU.

Students also visited an edible mealworm farm in the Plzeň region, Czechia, which is recognized as the largest insect farm in the country. The CEO of the company guided the students through the farm, offering insights into the production process, followed by an in-depth discussion on various topics. Key points of the discussion included the feasibility of insect production, Central European consumers’ willingness to purchase insect-based products and frass fertilizers, and the marketing and legislative challenges faced by the industry. The practical aspects and innovations leading to the

improvement of the rearing process were also outlined during the excursion. Lastly, the students had a chance to taste local insect products.

Social activities: Students were encouraged to participate in various voluntary activities. On the first day, frozen crickets and mealworms were provided to the students, which they used to prepare their own insect-based dishes. Among others, students prepared insect vegan burgers, insect pita bread, insect bruschetta, or simply fried the insects in a pan or heated them in the microwave, experimenting with various flavourings and spices. Students also participated in a guided tour of Prague’s popular landmarks and hidden gems of downtown. Finally, after the project evaluation and termination of the official programme, the students had an opportunity for informal discussions with the lecturers during a rooftop barbecue (Figure 3).

Post-course questionnaire

On the final day, an online feedback form was shared with all school participants. This approach is commonly used in social and psychological studies to gather subjective data on attitudes, motivations, and perceptions of the participants (Singleton and Straits, 2017). The questionnaire consisted of open- and closed-ended questions with single and multiple-choice answers using Microsoft Forms. The questionnaire included questions related to participants’ demographics, familiarity with insect consumption, prior education about

edible insects, motives for joining the summer school, perceived usefulness of various educational activities, self-assessed familiarity gain about edible insects, opinions about the structure, content, and organization of the summer school, and willingness to consume edible insects in the future. The participation was voluntary and anonymous. The questionnaire ran between September 13 and 19, 2024.

3 Results and discussion

Participants: demographic and prior exposure to edible insects

A total of 25 students attended the summer school program, of whom 16 completed an online feedback form. Although students were enrolled at the five participating universities, several additional countries of origin were represented. Of the students 62% were pursuing a postgraduate degree, while 38% were enrolled in BSc and Veterinary programs. Among the respondents, 50% studied veterinary science, 44% food science, and 6% entomology. This distribution reflects the academic focus area of the partner universities and dissemination strategies used in promoting the summer school. Approximately 70% of students reported prior participation in educational activities related to edible insects. In this case, students mainly joined an entire course or part of a course dedicated to edible insects at their universities. Two of the 16 respondents had previously attended a public lecture about edible insects or insect-tasting events.

Before attending the summer school, 44% of respondents had never tried edible insects, 38% had tried them 1–2 times, and the remaining 19% had consumed edible insects a few times. These findings highlight the limited

exposure of participants to insect consumption, which is consistent with general trends among European consumers (IPIFF, 2024). Regarding familiarity with edible insects as feed and pet food, 30% of the respondents who own pets reported using insects in pet diets.

Motives to participate in the summer school

Students indicated several motives for participating in the summer school (Figure 4). The primary motives were the “opportunity to visit another university” (count: 11) and “gain knowledge about edible insects for educational purposes” (count: 10). These motives align with the objective of the BIP program to foster student mobility and with the aim of this summer school to provide education about the edible insect chain. Additional motives included “gaining knowledge about edible insects for personal development” (count: 8) and “...for future career development” (count: 4). Interestingly, none of the students indicated earning course credits as a motive for participation.

Students were informed that the summer school would cover various aspects of edible insects, from production to consumption. The results showed different levels of interest in the proposed topics, likely reflecting the diversity of study programs and interests among participants. The most popular topic for the students was “food with insects” (count of answers: 9), followed by “insect production/rearing” (count of answers: 8), “insect processing into food ingredients” (count of answers: 7), and “sustainability aspects of insect production” (count of answers: 6). The topic “legislation” attracted the least interest (count of answers: 1) that can be related to low familiarity of the students with the regulatory frameworks and their importance for the development of the edible insect industry.

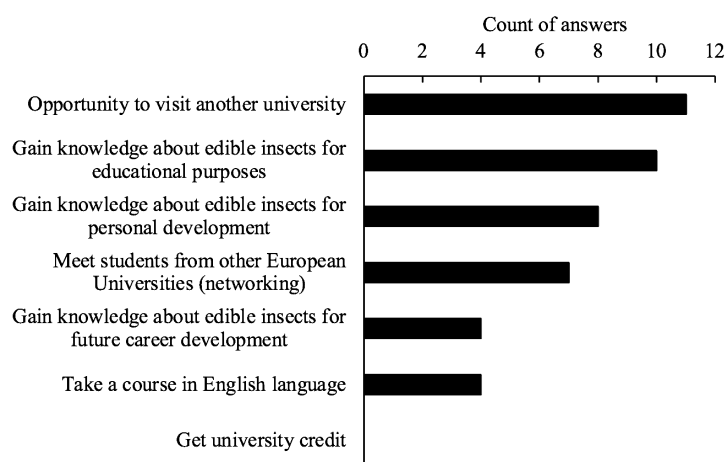


FIGURE 4 Motives of participants to join summer school “Insects as food: From farm to fork” ($N = 16$, multiple answers possible).

Familiarity with the topic of edible insects before and after summer school

Most participants self-reported low familiarity with the topic of edible insects before the summer school (Figure 5), selecting either “not familiar at all” (5 responses) or “slightly familiar” (6 responses). After the summer school, all students indicated some degree of familiarity with the topic of edible insects, with most selecting “moderately familiar” (6 responses) and “very familiar” (6 responses). These results reflect the positive impact of the educational activities implemented during the summer school.

Perceived usefulness of summer school activities

All participants considered the content of the virtual part useful to varying degrees: 38% rated it as “moderately useful”, 44% as “very useful”, and 19% as “extremely useful” (Table 3). The virtual part was also intended to prepare students for in-person activities and lectures. Students evaluated this preparatory role from “somewhat sufficient” (31%) to “mostly sufficient” (38%) and “it was highly sufficient” (31%). Based on open-ended

responses, a few students considered the virtual part unnecessary; however, due to the requirements of BIP program, it remains a mandatory element of the summer school. Since it is well-documented that students may have limited attention span during online education (Lodge and Harrison, 2019), it is recommended that the virtual part be split over at least two days and kept relatively short. The online part should include both lectures and interactive activities such as online surveys, whiteboards, or quizzes. These elements have been shown to increase student engagement and help prevent boredom and loss of interest – main challenges in online education (Martín-Sómer *et al.*, 2024).

Students found in-person lectures more useful than online ones, with 56% of the respondents rating them as “very useful” and 38% as “extremely useful”. This preference may reflect deeper topic coverage, live interaction between teachers and students, and opportunities for immediate feedback and clarification.

The content of the practical part of the summer school was evaluated by participants (Table 3) as useful, with ratings ranging from “moderately useful” (19%) to “very useful” (50%) and “extremely useful” (31%). In the questionnaire, students were also asked to assess activities of the practical part using a list of descriptors (Table 4). Most students agreed at varying degrees that the practical activities were “interesting” (94%), “fun” (87%), “educational” (94%) and “engaging” (81%). The engaging nature of the practical activities was further supported by the fact that no participants described them as “boring” or “disappointing”. Moreover, 57% of respondents considered the proposed practical activities “new”, that reflect limited prior experience of working with edible insects before the summer school.

Lecturers’ observations suggest that student groups be formed at an early stage of the summer school. Early group formation can facilitate collaborative learning, improve team dynamics, and allow students sufficient time to develop and refine their group project strategies. Furthermore, it will create more opportunities for students to build connections.

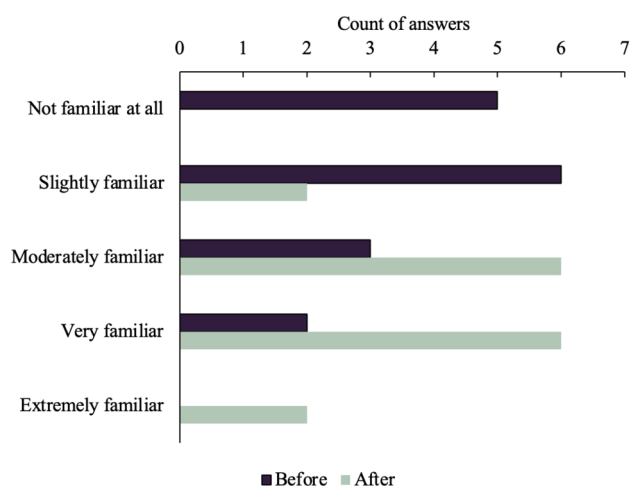


FIGURE 5 Familiarity with the topic of edible insects before and after summer school “Insects as food: From farm to fork” (count of answers, $N = 16$).

TABLE 3 The usefulness of the content of different educational activities to gain knowledge about edible insects during the summer school “Insects as food: From farm to fork”,

Educational activity	Not useful at all	Slightly useful	Moderately useful	Very useful	Extremely useful
Virtual lectures	0 (n = 0)	0 (n = 0)	38 (n = 6)	44 (n = 7)	19 (n = 3)
In-person lectures	0 (n = 0)	0 (n = 0)	6 (n = 1)	56 (n = 9)	38 (n = 6)
Practical work	0 (n = 0)	0 (n = 0)	19 (n = 3)	50 (n = 8)	31 (n = 5)

% of respondents from total; n, number of respondents.

TABLE 4 Perception of practical part of the summer school by the students

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Interesting	0 (n = 0)	0 (n = 0)	6 (n = 1)	38 (n = 6)	56 (n = 9)
Educational	0 (n = 0)	0 (n = 0)	6 (n = 1)	44 (n = 7)	50 (n = 8)
Fun	0 (n = 0)	0 (n = 0)	13 (n = 2)	31 (n = 5)	56 (n = 9)
Engaging	0 (n = 0)	0 (n = 0)	19 (n = 3)	44 (n = 7)	38 (n = 6)
New to you	6 (n = 1)	19 (n = 3)	19 (n = 3)	13 (n = 2)	44 (n = 7)
Stressful	6 (n = 1)	38 (n = 6)	25 (n = 4)	31 (n = 5)	0 (n = 0)
Disappointing	38 (n = 6)	44 (n = 7)	19 (n = 3)	0 (n = 0)	0 (n = 0)
Boring	31 (n = 5)	50 (n = 8)	19 (n = 3)	0 (n = 0)	0 (n = 0)

% of respondents from total; n, number of respondents.

Students' opinion about excursions

As part of the summer school, a visit to an insect farm was organized as the main excursion activity at the end of the program. Of the respondents 75% considered it a valuable addition to the summer school, while 19% partially agreed and 6% (1 respondent) disagreed. Field excursions are widely considered as important learning experiences for university students. For example, previous research has shown that farm visits by veterinary students result in the segmentation of knowledge and attitudes to livestock welfare and, in general, are important tool in veterinary education (Ventura *et al.*, 2021).

Effect on attitude toward insect consumption

According to participants' responses, the summer school had a positive influence on students' attitudes toward insect consumption. In particular, 75% of respondents indicated that they "maybe" plan to introduce edible insects into their diet (or consume more insect-based foods), while 12.5% responded positively ("yes"). Although the effect of different educational activities on intentions and willingness to consume edible insects was not explored, it can be an interesting area for future research. Previous studies demonstrated that the effectiveness of educational interventions on willingness to consume insects largely depends on the demographics of the participants. For example, a correlation between knowledge about edible insects and openness to eat them has been shown for consumers from Romania (Zugravu *et al.*, 2023), but the willingness of adolescents in Germany to consume insect-based food was not significantly increased after teaching "Entomophagy and Sustainability" units (Szczepanski *et al.*, 2022).

Increased knowledge may also encourage participants to act as advocates for edible insects. Fifty-six percent of the respondents stated that they would likely suggest edible insects to others in the future,

whereas 38% were uncertain and chose "maybe." Summer schools typically involve a limited number of students and thus cannot be considered as a direct outreach tool for promoting entomophagy on a broad scale. However, such schools are effective instruments for intensive education of small and motivated groups of students. In the long term, participants may continue their engagement with the field of edible insects and encourage others. It is supported by the results from students' feedback, where 50% of respondents indicated that they would certainly consider joining other activities related to edible insects in the future and the remaining 50% expressed potential interest.

Overall, the proposed design of the summer school met the participants' expectations (94% of the respondents). In addition, students agreed that content, organization, and networking met their expectations (81.75 and 81%, respectively).

It should be noted that this study has certain limitations, primarily due to the absence of a pre-course questionnaire and the reliance on retrospective responses for some studied aspects. Incorporating a pre-course survey in future research could help minimize recall and response-shift biases, thereby providing more accurate baseline measurements. This addition would also enable a deeper understanding of participants' motives for joining the summer school and offer clearer insights into changes in their attitudes toward insect consumption and their knowledge acquisition throughout the program.

4 Conclusion

This study presents a case of course design within a blended learning framework as an educational approach for teaching about edible insects. The summer school

“Insects as food: From farm to fork” combined theoretical and practical components, addressing various aspects of the edible insect value chain. Post-course self-reports provided insights into students’ motives for participation in the summer school, self-assessed gains in familiarity with edible insects, and intentions regarding future insect consumption. The findings suggest that short-term, blended summer schools represent an effective educational format for education and engagement in the field of edible insects.

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Conflict of interest

The authors declare that they have no conflict of interest.

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