Mancini, F., Driouech, N., Zuccaro, M. (2024): Peer learning and knowledge co-creation in organic aquaculture: The case of FutureEUAqua Project. Agriculture and Forestry, 70 (4): 83-91. https://doi:10.17707/AgricultForest.70.4.07

DOI: 10.17707/AgricultForest.70.4.07

Francesco MANCINI*[*1];
Noureddin DRIOUECH[1]; Massimo ZUCCARO[1]

PEER LEARNING AND KNOWLEDGE CO-CREATION IN ORGANIC AQUACULTURE: THE CASE OF FUTUREEUAQUA PROJECT

SUMMARY

Organic aquaculture represents 4.6% of total aquaculture production. However, the economic results of organic aquaculture in the EU appear to be far from satisfying. Notwithstanding the above, Europe is still heavily dependent on external markets to cover seafood demand. Nowadays, fisheries and aquaculture sectors require paramount need to (i) enhance knowledge sharing, (ii) set up appropriate infrastructures and facilities (iii) increase capacity building. To overcome these needs an “active and participative” training method that allows participants to fully learn news concepts, while improving skills and capabilities, could be adopted. One of the most profitable methods is known as “Peer learning”, a form of collaborative instruction that enhances peer-to-peer interaction and leads to positive learning results. Based on this approach, CIHEAM Bari has created and led an online training course on "Sustainable, resilient and climate friendly Blue Growth of EU Aquaculture and beyond."

The course involved 357 participants coming from 77 countries. About 50 participants achieved the required score to receive the certificate as a result of the dropout phenomenon. With the ultimate goal of converting results and outputs into practical knowledge when putting the creative solution found and developed within the project into practice, the course's outcomes aimed to raise awareness of the industry by establishing a community of practice where everyone shares their technical and social knowledge.

It may be concluded that adopting appropriate technology for eLearning and innovative educational approach may fill the gap of knowledge transfer under disruptive circumstance (i.e. COVID-19 pandemic; etc.).

Keywords: Education, eLearning, Organic aquaculture, Communities of practices.

[1]Francesco Mancini (corresponding author: mancini@iamb.it); Noureddin Driouech; Massimo Zuccaro; International Centre for Advanced Mediterranean Agronomic Studies of Bari (CIHEAM-Bari), Valenzano (Bari), ITALY

Notes: The authors declare that he have no conflicts of interest. Authorship Form signed online.
Recieved:25/09/2024 *Accepted:26/11/2024*

INTRODUCTION

Marine environments are vital for ecosystem services that underpin planetary health and societal needs (Peterson and Lubchenco, 1997). They provide 16% of global animal protein, supporting significant economic activities and employment, particularly in developing countries where over 41 million people work in fish production and food security (Tacon and Metian, 2013; Finegold, 2009; Béné *et al.*, 2016). Fisheries and aquaculture play a critical role in addressing nutritional needs, especially in vulnerable communities, and driving economic development (Ferreira, Rice and Rosenberg, 2016).

With global fisheries largely exploited and production plateauing in recent years (Garcia and Newton, 1995), aquaculture has become the fastest-growing food production system, achieving an annual growth rate of approximately 9% since 1985 (Diana, 1993). Overfishing, stock collapse, maritime traffic, and water contamination makes fishery production alone insufficient to meet global food demand (Simcock, 2017). Thus, aquaculture development is seen as a strategic solution to fisheries depletion, leveraging resources already present in aquaculture systems (Longo *et al.*, 2019).

However, as aquaculture progress, it becomes essential for governments to proactively manage its potential ecological and social impacts (Finegold 2009).

In 2015, world aquaculture production reached over 100 million tons, while European aquaculture production reached 2.98 million tons of seafood, with a value over 11 billion USD. Some models predict that the amount of total fish supply will increase until 186 million tons in 2030, with aquaculture entirely responsible for this increase. (Kobayashi *et al.* 2015).

Despite the worldwide increasing production in aquaculture, organic aquaculture represents only 4.7% of the total EU aquaculture production. Moreover, the interest in organic aquaculture has grown in recent years (Lembo and Mente 2019).

So, to answer to these needs, it is urgent to form new skilled professional figure, attract new stakeholders and improve the awareness of the sector in particular: enhancing knowledge sharing and co-creation, (iii) setting up-appropriate infrastructures and facilities and (iii), increase capacity building for experts and practitioners as also underlined by Agenda2030 (SDGs 14) (Colglazier 2015) promoting good governance, best practices in fisheries and inclusive decision-making procedures.

There are different methods to create new expertise through training courses. One of the most profitable method is known as “Peer learning”, a form of collaborative instruction that enhances the peer to peer interaction and leads to positive learning results (Topping 2013). Among the advantages are the growth of students' communication and teamwork abilities, their confidence, and their capacity to direct their own education. Compared to a teacher-led setting, trainers may interact, reflect, and go deeper into ideas when working with their peers since they feel more at ease doing so.

As a result of the "collaborative-constructivist" methodology being used in the particular context of Alumni, or adult participants, favourable conditions were created for the development of a community of practice on topics of shared interest. (Driouech *et al.* 2015).

Follow-up studies are frequently employed by academic and research institutions in the context of alumni networking to review and assess the efficacy of their educational and academic programs.

This research highlights the critical importance of the online training course designed under the framework of the FutureEUAqua project in shaping new professional profiles in organic aquaculture. The course goes beyond conventional training by addressing future challenges such as growing consumer demand for high-quality, nutritious, and responsibly produced food (Driouech *et al.*, 2015).

The findings demonstrate how the course's innovative asynchronous peer-learning methodology serves as a key tool for fostering collaboration among Mediterranean countries. By bringing together participants from diverse cultural and professional backgrounds, this method ensures the effective transfer of essential knowledge and practices. This aligns with the broader perspective that agriculture curricula must be flexible and adaptable to evolving contexts to enhance the effectiveness of future graduates in the workplace.

Furthermore, this training program is foundational in addressing existing gaps in education and fostering the development of sustainable practices in aquaculture. It builds on initiatives such as the distant learning program established by CIHEAM Bari in 2010 to fulfill its mission of education and training (Driouech *et al*., 2015). The study underscores that such approaches are indispensable for equipping the next generation with the expertise needed to ensure sustainable, climate-resilient aquaculture across the Mediterranean region.

MATERIAL AND METHODS

Two newsletters were written to inform on the opportunity to take part in the online training course with the title “Call for participation | FutureEUAqua Project online Course on “Sustainable, resilient and climate friendly Blue Growth of EU Aquaculture and beyond” | Training program facilitated by CIHEAM Bari | Deadline for application 20 June 2022” (Driouech and Montenegro, 2023).

The call for application was launched in June, on CIHEAM Bari website in which to the participants were asked to provide their name, surname, email address, country of origin, organization or institution/company, position, belonging group (international organization, scientific community (higher education, research), industry/private sector, civil society, NGOs, and others), and stakeholder type.

The course, structured in 4 modules, lasted 6 weeks (from 15th June to 29th July) involving 357 participants coming from 77 countries (Figure 1) mainly from Euro-Mediterranean zone (60%).

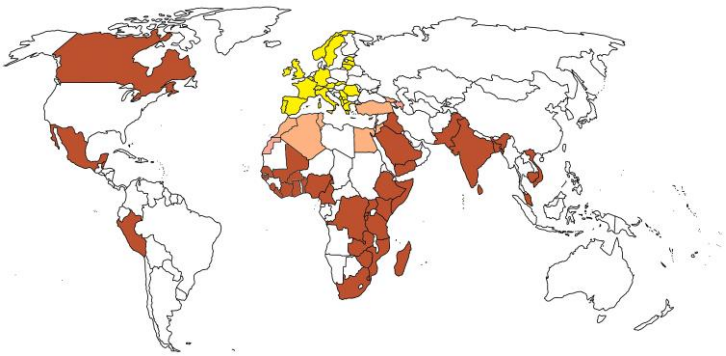

Figure 1. Map of the country participants. In yellow European region, in light orange MENA country and in dark orange other countries

The modules were divided as below:

• Module 0: Introductory eLearning methodology and process

• Module 1: Innovative feeds and feeding strategies for improving welfare & performance of fish in sustainable and organic aquaculture

• Module 2: Consumer perception and preferences regarding aquaculture

• Module 3: Regulatory framework for aquaculture in the EU, with special focus on organic aquaculture

After the course, all statistical parameters were collected such as the learning path (% attend), self-evaluation test, the best score, average time for test attempt (second), forum evidence and interactivity (number of posts) and platform access.

To proof the successful attendance of the course, it is established a threshold value in all the parameters cited above, involving a thoughtful approach to defining performance benchmarks. Begin by clearly outlining the specific objectives and criteria for assessment.

Once the criteria were defined, it was conducted a pilot test with a representative sample to gather data on the distribution of scores. Analyzed the results to determine a baseline and identify the point at which performance can be classified into different levels (e.g., below expectations, meets expectations, exceeds expectations).

Statistical methods such as percentiles, average value and standard deviations are employed to objectively set the threshold. It's essential to strike a balance that is challenging enough to encourage growth but realistic for achievable goals. Regularly review and update the threshold based on ongoing assessments, feedback, and changes in organizational priorities to ensure the self-evaluation test remains a meaningful tool for personal and professional development.

All these data are analyzed and clustered using Excel and R software in order to find a minimum threshold and established those participants deserving to

receive a final certificate of attendance and successfully achieved the course, based on the results they achieved.

RESULTS

The training course was attended by 357 people from 73 countries (Albania, Algeria, Austria, Azerbaijan, Bangladesh, Belgium, Belize, Benin, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Côte d'Ivoire, Democratic Republic of Congo, Egypt, Estonia, Eswatini, Ethiopia, France, Georgia, Germany, Ghana, Greece, Guinea-Bissau, India, Iraq, Ireland, Italy, Jordan, Kenya, Kosovo, Latvia, Lebanon, Liberia, Lithuania, Macedonia, Madagascar, Malaysia, Mali, Mauritius, Mexico, Montenegro, Morocco, Mozambique, Nigeria, Norway, Pakistan, Palestine, Perù, Portugal, Romania, Rwanda, Saudi Arabia, Senegal, Serbia, Sierra Leone, Slovakia, Somalia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Tanzania, Tunisia, Turkey, Uganda, United Kingdom, Vietnam, Yemen, Zambia and Zimbabwe).

Thus, the participants' geographic dispersion was: 23% (83 participants) from European countries (geographic Europe), 37% (130 participants) from MENA nations; 40% (144 participants) were foreign nationals, mostly from Africa.

Egypt (42), Morocco (28), Tunisia (25), Nigeria (25), Italy (17), Kenya (16), Ethiopia (12), Algeria (11), Portugal (10), Zimbabwe (9) and Jordan (9), are the top 11 countries in terms of participants.

There were a variety of stakeholders involved, including policy makers (18%), small and medium-sized business managers (32%), innovation brokers (16% of the 59 participants), and large enterprise managers (2%). The remaining 113 participants (32%) were classified as "Other," with 41 of them being researchers, students, PhD candidates, and members of the academic/education community.

A steady portion of participants—45 percent, or 160 people—belonged to the scientific community (research, higher education). Additional categories of membership included: Public Sector 13%, Industry/Private Sector 18%, NGOs 9% (with 33 participants), International Organization 6%, 'Other' 6%, and Civil Society 3%. In the case of belonging groups, the category "Other" was highly variable, making it impossible to identify other subcategories.

Participants were required to complete an assessment form at the conclusion of each module or course to rate the module and its tools. The tool evaluation required participants to rate each tool on a scale of 1 to 5, where 5 represents "very useful" and 1 represents "not at all useful." The module evaluation comprised five categories to be evaluated: fair, good, very good, and exceptional. It is important to note that all the participant-written comments were published in this report exactly as they were written, with no linguistic corrections or modifications.

CIHEAM-Bari assigned a tutor to the group with the following responsibilities: creating the lesson plans, assisting participants in the learning process, facilitating the discussion forum and interactions, answering questions or referring them to outside experts as needed (the system made it possible for any

outside expert to access the discussion forum), keeping an eye on any technical issues that arose, gathering and compiling evaluations (Driouech and Montenegro, 2023).

At the end of the course only 47 candidates successfully attended the course. In particular, 16 from European countries, 24 for MENA regions and 7 from other countries (Figure 2). The number of participants and the number of those who achieved successful attendance show a significative difference (T-test=0.036). This is due probably to the dropout phenomena.

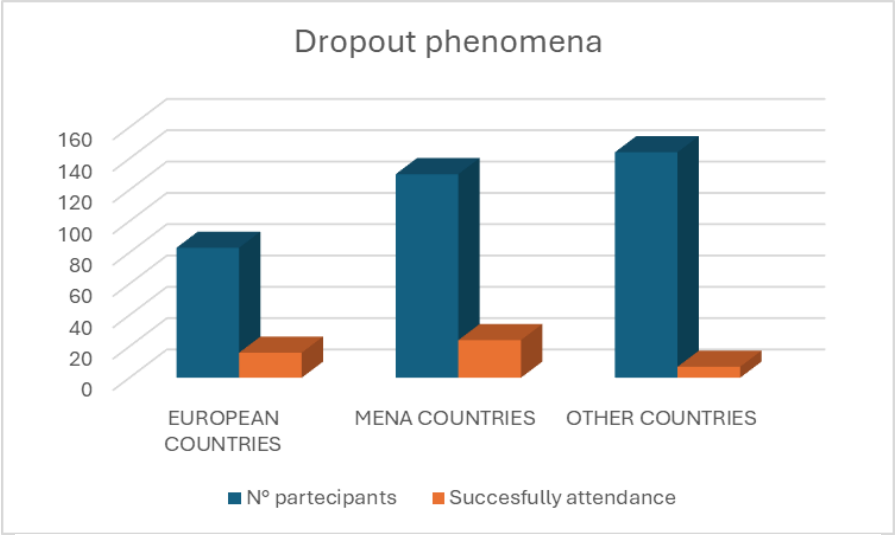

Figure 2. Number of participants (blue) and participants who successfully attendance the course divided for European, MENA and Other Countries

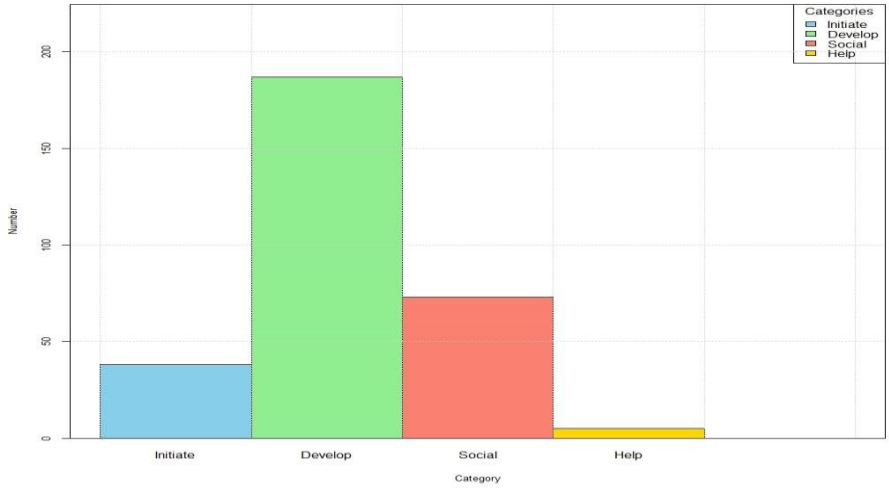

Figure 3. The 4 different types of posts: "Initiate"; "Develop"; " Social / support "and" Help"

This term is commonly used to define a situation where a student leaves his study/activity in which he/she has enrolled before having obtained a formal degree/result.

Dropout can be voluntary according to the student's perspective.

A quantitative and qualitative analysis of discussions and participants' various posts and contribution was carried out. In our case, a classification method of Hopkinson (2002) was adopted, which identifies 4 different types of posts: "Initiate"; "Develop"; " Social / support "and" Help" as illustrated in in figure 3).

DISCUSSION

The growing demand for organic aquaculture has spurred governments to regulate the industry, and standards and certification processes are being developed (Saha 2022).

Despite recent advancements in nutritional studies, the requirements for organic agriculture have only recently been established. In response to these needs, this research seeks to highlight the primary outcomes of the training course aimed at promoting the sustainable growth of aquaculture. The course particularly emphasizes meeting future challenges arising from the escalating consumer demand for high-quality, nutritious, and responsibly produced food. Additionally, discussions encompass feed substitutes and ingredient traceability (Mente *et al.* 2011). Creating new expertise in the sector is essential, and peer learning has emerged as one of the most effective methods for fostering knowledge exchange and skill development. Peer learning enables professionals to share practical insights, experiences, and innovative solutions. Studies such as Smith *et al.* (2020) underscore the role of peer learning in enhancing the efficiency and sustainability of aquaculture practices, facilitating the adoption of advanced technologies, and cultivating a skilled, adaptive workforce that ensures the industry's long-term success.

The asynchronous nature of the course allowed participants to engage flexibly, fostering active collaboration across geographic boundaries. Educational exchanges among students, instructors, and content enhanced engagement and created a sense of belonging within the learning community (Wanstreet, 2006). This collaborative learning framework encouraged participants to formulate questions, discuss problems, explain viewpoints, and develop teamwork skills, directly addressing the sector's multifaceted challenges.

Participants identified several aspects that could improve the course's effectiveness which include:

- Introducing additional tools, such as webinars and social media, to enhance interaction.
- Focusing on fewer topics or a single subject to allow for deeper learning.
- Addressing difficulties with digital tools to ensure inclusivity and accessibility.

Moreover, adult learning principles (Knowles, 1996) play a pivotal role in designing effective training for professionals. Adults prioritize self-directed, goal-oriented learning and bring a wealth of experience that enriches the learning process. Tailoring course content around problem-solving helps maximize engagement and practical application of the knowledge gained. Challenges such as the observed dropout rates also warrant attention. Factors like course timing (during participants' summer vacations) and platform limitations, such as the absence of email notifications for new forum discussions, highlight areas for improvement in future iterations. Addressing these logistical issues will enhance retention and participation.

CONCLUSIONS

The online course demonstrated its potential to transform research findings into practical knowledge, providing innovative solutions for the aquaculture sector's challenges. It successfully raised awareness within the industry, fostering a community of practice where participants shared their technical and social expertise to implement project outcomes effectively.

Overall, the research highlights the importance of collaborative approaches, particularly peer learning, in developing new professional skills and addressing the sector's needs. By enabling knowledge exchange and fostering a culture of continuous improvement, peer learning has proven to be a valuable strategy for equipping professionals to meet the demands of sustainable aquaculture.

While the course was well-received, key takeaways for future improvements include allocating more resources for course development, updating the e-learning platform, and carefully planning delivery timelines to avoid scheduling conflicts. These adjustments, combined with continued emphasis on collaborative and problem-solving-based learning, will enhance the effectiveness and impact of similar programs in the future.

The CIHEAM Bari course under the FutureEUAqua project serves as a model for how peer learning can catalyze professional development, strengthen international collaboration, and build a resilient workforce in the aquaculture industry.

ACKNOWLEDGEMENTS

The authors would like to thank IT staff, consultants of CIHEAM Bari FutureEUAqua partners, for their precious contribution to our training.

REFERENCES

Béné, C., Arthur, R., Norbury, H., Allison, E.H., Beveridge, M., Bush, S., Campling, L., Leschen, W., Little, D. & Squires, D. (2016). Contribution of fisheries and aquaculture to food security and poverty reduction: assessing the current evidence. World development, 79, 177-196.

Colglazier, W. (2015). Sustainable development agenda: 2030. Science, 349, 1048-1050.

Diana, J. (1993). Conservation and utilization of fish genetic resources in capture and culture fisheries. Case Studies of Genetic Resource Conservation in Natural Habitats. Washington (DC): American Association for the Advancement of Science, 89-103.

Driouech, N. & Montenegro, E. (2023). Deliverable D7. 6.

Driouech, N., Sisto, L., Lorusso, O. & Raeli, M. (2015). Alumni network and peer learning: experience of Mediterranean Agronomic Institute of Bari. Agriculture & Forestry/Poljoprivreda i Sumarstvo, 61.

Ferreira, B., Rice, J. & Rosenberg, A. (2016). The oceans as a source of food. The First Global Integrated Marine Assessment (World Ocean Assessment I). United Nations, USA.

Finegold, C. (2009). The importance of fisheries and aquaculture to development. The Royal Swedish Academy of Agriculture and Forestry.

Garcia, S.M. & Newton, C. (1995) Current situation, trends and prospects in world capture fisheries. FAO, Fisheries Department.

Kobayashi, M., Msangi, S., Batka, M., Vannuccini, S., Dey, M.M. & Anderson, J.L. (2015). Fish to 2030: the role and opportunity for aquaculture. Aquaculture economics & management, 19, 282-300.

Lembo, G. & Mente, E. (2019). Organic Aquaculture. Springer.

Longo, S.B., Clark, B., York, R. & Jorgenson, A.K. (2019). Aquaculture and the displacement of fisheries captures. Conservation Biology, 33, 832-841.

Mente, E., Karalazos, V., Karapanagiotidis, I. & Pita, C. (2011). Nutrition in organic aquaculture: an inquiry and a discourse. Aquaculture Nutrition, 17, e798-e817.

Peterson, C.H. & Lubchenco, J. (1997), Marine ecosystem services. Island Press, Washington, DC.

Saha, C.K. (2022). Emergence and evolution of aquaculture sustainability certification schemes. Marine Policy, 143, 105196.

Simcock, A. (2017). World Ocean Assessment. Cambridge university press.

Smith, R., Ralston, N.C., Naegele, Z. & Waggoner, J. (2020) Team Teaching and Learning: A Model of Effective Professional Development for Teachers. Professional Educator, 43, 80-90.

Tacon, A.G. & Metian, M. (2013). Fish matters: importance of aquatic foods in human nutrition and global food supply. Reviews in fisheries Science, 21, 22-38.

Topping, K.J. (2013). Trends in peer learning. Developments in Educational Psychology, 53-68.

Wanstreet, C.E. (2006). Interaction in online learning environments: A review of the literature. Quarterly Review of Distance Education, 7, 399.