

Aqua Instructor Training Program in Continuing Education

ANASTASIA SAMARA

Department of Physical Education and Sport Science,
Aristotle University of Thessaloniki, Greece

ABSTRACT

Aquatic exercise is a contemporary and recent form of somatic exercise performed in aquatic environments, albeit not yet widely taught in undergraduate studies in Greece. Continuing education in adults is even more essential in the post-COVID era. The development of groundbreaking knowledge and the need for upgrading existing knowledge and skills has led to this innovative hybrid condition. The Center for Education and Lifelong Learning of Aristotle University of Thessaloniki offered a two-month aquatic training program to graduates of Physical Education. The attendees evaluated the continuous learning experience and the professional aspects of this educational program. The aim of this study was to address the factors essential for an adult educational program, specifically for instructors of aquatic exercise. The results were very promising as most of the students embraced the program, stating that it would be particularly useful for their future professional careers.

Keywords: aquatics, sport, physical education, continuing education

INTRODUCTION

Aquatic exercise or hydrogymnastics or aqua aerobics is a new form of exercise performed in aquatic environments. Water is an ideal environment for conducting an exercise program given its various properties, including hydrostatic and hydrodynamic principles of buoyancy, pressure, viscosity, and thermal capacity. In the current literature, aquatic exercise is established as a highly regarded form of exercise as it can offer several physiological benefits, to healthy individuals as well as to chronic disease patients and from younger to older participants. Several studies have demonstrated the benefits of water-based conditioning for a variety of populations. Increases in aerobic fitness (Haynes et al., 2020; Takeshima et al., 2002; McDaniel et al., 2020), muscular strength (Kieffer et al., 2012; Takeshima et al., 2002), and functional ability/mobility (Khruakhorn & Chiwarakranon, 2021) have been observed following participation in aquatic-based exercise programs. First, water provides a safe and low impact environment for exercise. The buoyancy of the water permits movement without the added gravitational force on the joints, and the immersion of the body in it offers support and freedom of movement while negating the risk of falling (Kim et al., 2020). These features of the aquatic setting allow some people with postural instability, high risk of falling, leg weakness and gait disturbance to exercise successfully when this is unfeasible or unsafe on land (Dai et al., 2023).

Over the years, various authors have investigated whether aquatic exercise can also be considered a suitable form of exercise in the treatment of mental illness as well, with favorable results (Jackson et al., 2022, Tang et al., 2022). The effects of aquatic exercises have been also studied in chronic disease patients such as such as heart disease, stroke & renal failure (Volaklis et al., 2007; Samara et al., 2016; Matsumoto et al., 2016), with favorable results.

Being a physical activity, aquatic exercise aims to improve somatic as well as psychological health and is usually performed by an exercise physiologist or a fitness expert addressed as “Aquatic Exercise Instructor” or “Aqua Trainer.” Because is an activity and not a

sport, it started being used in other special populations such as overweight or injured people due to its mildness of impact (Delevatti et al., 2015; Brody & Geigle, 2009).

Lifelong learning or continuing education has developed in the last decades as a necessity in modern societies. The progress of science and knowledge has made continuous learning necessary rather than a luxury to be considered (Fischer, 2000). Additionally, as today's people are flooded with an extreme amount of information, in many cases more than they can manage, it is essential that this information is filtered and accessed the right way.

The general objective of the Lifelong Learning Program is to contribute through lifelong learning to the development of the Community as an advanced knowledge-based society, with sustainable economic development, more and better jobs and greater social cohesion, while ensuring good protection of the environment for future generations. In particular, it aims to foster interchange, cooperation and mobility between education and training systems within the Community so that they become a world quality reference (European Parliament and the Council of Europe, 2006).

The rapid and significant changes in the technological, economic, social, cultural field make imperative the need for updating and continuous upgrading of knowledge and skills of adults, to respond to the ever-increasing demands of their personal and working lives. The quarantine and the new reality in every person's life required a novel approach to work and education (Pacheco, 2021). The increasing prevalence of 'high technology' and the width of knowledge in new areas is also a key factor (Raja & Nagasubramani, 2018).

The need for continuing education and vocational training with the aim of supplementing, modernizing, or upgrading knowledge, abilities, and skills, was what pushed and enforced adult education.

The Center for Education and Lifelong Learning of Aristotle University of Thessaloniki is the body through which the university offers and certifies education beyond the formal education system: informal learning, initial and continuing vocational training, specialization, and further training (Ministerial Decision no. 229718/Z1/5-1-2018, Government Gazette 4/5-1-2018, τ.Β'). These programs are offered at graduates of higher education with the aim to provide expertise, knowledge and skills that enhance the professional prospects and personality of the trainees, while helping them to become competitive in the labor market. Flexibility in subject areas and ways of teaching are two of the key features of these programs. The thematic units are taught by professors, members of the university and external partners, experts in affiliated fields. The programs are conducted face-to-face and/or remotely, depending on the requirements of the subject or the needs of the trainees.

The need for continuing education has dramatically increased with the increase in knowledge production (Chow & Croxton, 2017). This expansion led to the necessity of new educational programs on new forms of exercise, for the professionals involved. The evaluation of these programs constitutes the systematic and objective assessment of success in terms of objectives and provides answers to questions related to with their effectiveness, efficiency, and importance. The aim of this study was to address the factors essential for a continuing education program and to extract the results of such a program applied last year.

METHODS

Design, Participants, and Procedures

The sample consisted of 25 adults (men $n=9$ and women $n=16$) who attended a continuing education program, regarding hydrogymnastics (aqua aerobics), in Aristotle University of Thessaloniki, Greece. This University is the largest in Greece, offering a wide range of adult education programs for several fields. The University's Education Ethics Committee gave its approval and all those attending the program were asked to give their informed consent. The

inclusion criteria were (a) to be graduates of any Department of Physical Education and Sport Science in Greece and abroad, (b) to have internet access, (c) a personal e-mail and (d) basic computer knowledge. A hybrid learning combination of synchronous distance learning for the theoretical part of the education and real-life practical education with physical presence was employed. All participants completed the courses successfully and were asked by the university to fill in a questionnaire about their learning experience.

The questionnaire is a popular tool for extracting data from the participants of a program. Questionnaires are usually completed by the trainees and trainers of the programs however in some cases - for example, in programs that are repeated or operate on a large scale - questionnaires are also filled out by other staff involved in their implementation (e.g., coordinators, management). As with all the tools described below, the areas of inquiry and the questions of the questionnaire have direct relevance to the research questions of the evaluation process and mainly with the indicators we have determined.

The questionnaire was anonymous and those willing to participate were finally surveyed with a response rate of 88%. The final sample consisted of twenty-two adults, with 18.2% within the 18-24 age range, 36.3% within the 25-34 age range, 18.28% within the 35-44 age range, and 27.3% within the 45-54 age range (Figure 1). Although all twenty-two participants had a bachelor's degree, ten (10) subjects also had a post graduate degree as well (Figure 2). Besides the demographics of the participants, the questionnaire consisted of fifteen questions about the continuous learning experience and the professional aspects of this educating program. Seventy-two percent worked in various fields and 27% of them were currently unemployed. The professional aspect was the reason for assigning in this continuing education program for all participants, for the acquisition of appropriate qualifications and connection possibilities with the labor market (Figure 3).

The parameters evaluated were the planning and the content of the continuing education program, the educational material, and the theoretical and practical lessons. Regarding the assessment of the overall quality of the program they had to answer three questions concerning (a) the educational material (b) the duration, (c) the overall impression. For the evaluation of the theoretical lectures there were three questions (a) whether the lectures were clear and documented, (b) were relevant to the objective, (c) and according/orientated to their expectations. The questionnaire for the practical lessons assessed (a) whether they were in continuation of theoretical knowledge and targeted to better understanding it (b) if it was oriented towards the possibility for the trainees to utilize knowledge in real life situations and (c) whether they were useful in professional development. The last two questions were referred to secretarial/administrative support and logistical infrastructure. All questions were closed type and given in a four-point verbal Likert-type scale, as (1) Excellent, (2) Good or Useful, (3) Moderate and (4) Poor or Not Useful at all. The participants also had to answer the reason for attending this program.

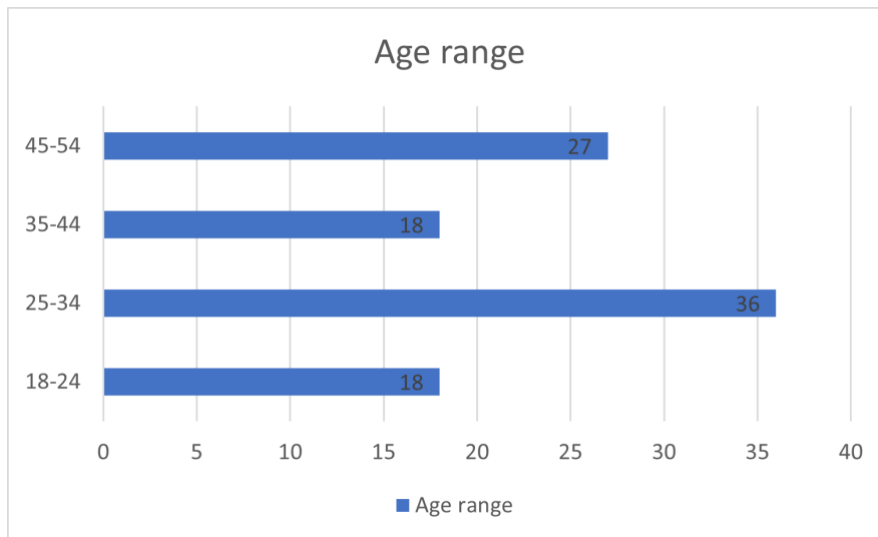


Figure 1: Age range of the trainees

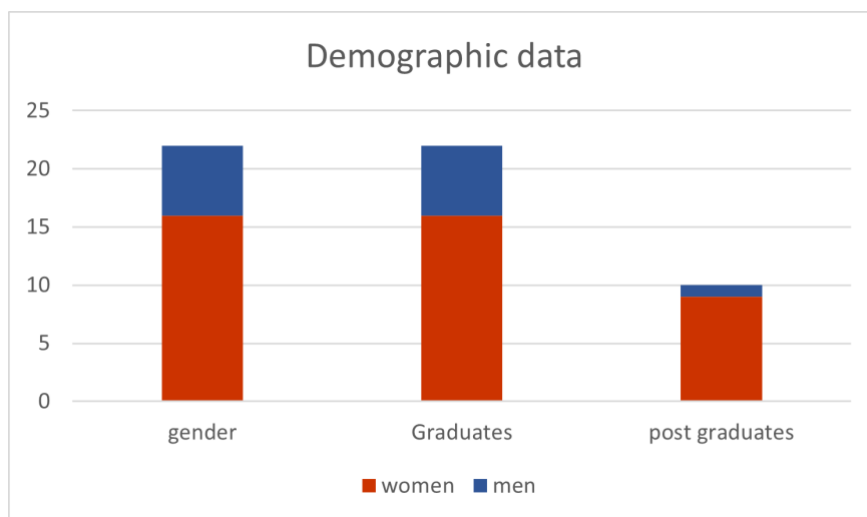


Figure 2: Demographic data of the trainees, gender, and level of education



Figure 3: Reasons for participating in this continuing education program

Statistical Analysis

Descriptive statistics such as frequencies (count, percent) were used to determine the range, and the percent of averages for the participants’ personal and post-program data.

RESULTS

Most of the participants (63,6%) considered that the distributed educational material was ‘excellent’, while 27,3% thought it was ‘good’ and 9,1% ‘moderate’. The duration of the program was evaluated as ‘excellent’ for fourteen participants, ‘good’ for six and ‘moderate’ for two of them. Their general impression of this lifelong program was for sixteen of them (72,7%) ‘excellent’, for 5 (22,7%) ‘good’ and for one participant ‘moderate’. Also, 81,8% stated that the lectures were ‘excellent’ (clear and well-documented), and 18,2% ‘good’. The same percentage of participants answered the question about the relevance of the theory to the objective. The third question on theoretical lectures as if lectures were orientated to participants’ expectations 59,1% thought they were ‘excellent’ and 40,9% ‘good’. As for the questions concerning the practical lessons, the participants answered that the courses were ‘excellent’ 19 (86,4%) and 3 (13,6%) though they were ‘good’ in continuation of the theory taught. The same percentage thought that practical lessons were targeted to real life situations. For the third question on practical lessons, 21 (95,5%) out of twenty-two in total believed that practical application was particularly useful for their professional aspects. The secretarial/administrative support was considered ‘excellent’ by 20 (90,9%) participants and ‘good’ by 2 (9,1%). Finally, logistical infrastructure was ‘excellent’ for 81,8% and ‘good’ for 18,2% (Table 1).

Table 1: The questionnaire

Questions	No (%)			
	Excellent	Good /useful	Moderate	Poor /not useful at all
Educational material	14 (63,6)	6 (27,3)	2 (9,1)	-
Duration of the program	14 (63,6)	6 (27,3)	2 (9,1)	-
General impression	16 (72,7)	5 (22,7)	1 (4,5)	-
Lectures (clear and well documented)	18 (81,8)	4 (18,2)	-	-
Lectures (relevance to the objective)	18 (81,8)	4 (18,2)	-	-
Lectures (orientated to trainees’ expectation)	13 (59,1)	9 (40,9)	-	-
Practical lessons in continuation of theory	19 (86,4)	3 (13,6)	-	-
Practical lessons in real life situations	19 (86,4)	3 (13,6)	-	-
Practical lessons useful for professional aspects	21 (95,5)	1 (4,5)	-	-
Secretarial/administrative support	20 (90,9)	2 (9,1)	-	-
Logistical infrastructure	18 (81,8)	4 (18,2)	-	-

DISCUSSION

To the best of our knowledge, this is the first research article for evaluating a continuing education program on aquatic exercise. Study results provide helpful information for the development of adult education programs that are responsive to the increasing demands of participants.

In the present study after completion of a lifelong educating program it was stated that most participants, all holders of a bachelor's degree, had of high opinion the knowledge offered. It was the first time an academic institution offered practical applied knowledge to graduates in order to fill the gap of advances in sport science.

Aqua training, also known as water aerobics or aquatic exercise, is a fitness program that takes place in a pool. It is a new approach to physical fitness that is gaining popularity and is in high demand of professionals to acquire programs and exercises and everything needed in obtaining qualifications for labor market (Archer, 2004; Balwin, 2007). There are several opportunities for employment. Aqua trainers can perform aqua fitness lessons in a variety of locations, including swimming pool facilities, sport and fitness centers, parks and recreation centers, rehabilitation centers and even during cruises. Particularly during summer months here in Greece, large hotels are required to provide water aerobics services for their clients. And despite the necessity and the countless employment options, there is no other similar program offered through Adult Education of a University.

The duration of the program was considered satisfactory by most participants. Greece's rate in adults' involvement in a learning experience is lower (3,5%) compared to other European Union countries (10,8%) (CEDEFOP 2019). Lifelong education programs can have many different applications depending on purpose, objective, and participants. Training programs are usually attended by adults who wish to increase their professional qualifications but, in many cases, have limited free time to complete them. Adults who wish to continue their education are unable to do so due to certain circumstances especially personal commitments and financial constraints (Mazanah & Carter, 2002). So, this two-months-period program was evaluated as satisfactory.

The educational material distributed, e.g., lectures and up to date references, was considered very satisfactory by the participants. Extending knowledge, improving practice, and opening new ways for employment through valid research is a necessity to all professionals as well as to aquatic exercise instructors (Kaur, 2017). 'It is precisely [nature's] deficiencies which art and education seek to make good' Aristotle 384 BC-322 BC (Hummel, 1993).

Theoretical lectures were clear and well-documented, presented relevance to objective and were oriented towards their requirements, as participants stated. In the pre-pandemic world, learning was most often onsite, in-person and co-located. This was turned upside down during the pandemic where online suddenly became the 'new normal.' To continue learning in a pandemic world, learning providers and institutions were required to rethink and reconfigure learning to more online and 'pandemic-friendly' formats (Norgard, 2021). Good lectures are well structured, with clear learning outcomes, which specify what students are expected to learn and achieve from each session (Ayres, 2014). "Clearly articulated learning outcomes can make designing a course, assessing student learning progress, and facilitating learning activities easier and more effective." ("Creating Learning Outcomes | Teaching Commons") Learning outcomes help students in building a connection between teaching and learning, taking much of the guessing from the student's attempt to learn and enabling them to truly master the content of the course.

The practical lessons during the program were in continuation of the theory taught and with the aim of better understanding it, oriented towards managing real life situations and particularly useful. Across advanced industrial economies, programs in higher education are increasingly becoming occupationally specific and universities are being seen as providers of

‘higher vocational education.’ As other researchers state, it is proposed that effective occupational preparation, and the prospects for ‘smooth’ transitions to professional practice, will be enacted by graduates who are informed and prepared, and have capacities for professional practice, including critical insights and personal epistemologies directed to those purposes (Billet, 2009). Bennetts (2001) defines lifelong learning as a tool that provides an individual with the means to develop the skills that they already possess and increase their potential to the highest levels irrespective of time and place. The designation continuing (education, training) refers to any form education or training beyond the basic (i.e., that which is necessary for the practice of a profession). For example, CEDEFOP (1996) defines ongoing vocational training as ‘continuing education aimed at the maintenance, renewal, upgrading and modernization of professional knowledge and competence’. Continuing education and training can provide numerous benefits to individuals, including career advancement, increased earning potential, networking opportunities, personal growth.

Among the answers received from the trainees regarding the reasons a participant chose to participate in an aquatic training program, the only reason was professional (either development in current working field 23% or facilitation in finding a job 73%). Aktaruzzaman and Plunkett (2016) indicated that adult learners further their education to learn new skills to be abreast with their workplace demand. Daines and Graham (2006) highlighted that 37 per cent of respondents in their study indicated that they had enrolled in education to become a better-informed employee. In line with this, Merriam and Brockett (1997) too revealed that 77 per cent of adult learners report an interest in furthering their education to be up to date with their workplace needs. They also stressed that adults who are intrinsically motivated to continue their study do so for the sake of gaining more knowledge and the desire to learn new skills which are interesting to them.

As this research shows, satisfaction on the practical application was remarkably high indicating the importance of empirical experience on relative fields. Living in an extremely competitive business environment, as modern societies are, the need for additional qualifications is imperative in labor market. Although theory is the milestone for the advancement of knowledge and on which practice applies, the participants pointed out the importance of experimental, non-theoretical lessons, especially on this subject that is conducted exclusively in the field, in the pool. While theory is important for the advancement of knowledge, practice can provide precious experience especially in physical education subjects.

Finally, in training programs, the main purpose of evaluation is to improve the program, which can be achieved through a thorough and critical evaluation of all aspects of it. This assessment, on the one hand, includes the systematic and documented collection of qualitative and quantitative data, and on the other hand, their appropriate processing and comparison with measurable indicators and criteria, which are of course based on the principles of adult education and lifelong learning (Center for Program Evaluation – US Government).

The effectiveness of the program is evaluated based on the response of the trainees to it (e.g. satisfaction with their participation in the program), the knowledge, skills and attitudes acquired by the participants in relation to the objectives of the program, the improvement of their behavior after the completion of the program (e.g. changes at a personal and/or professional level due to participation in the program).

Education is the key to a brighter future for all and investment in education and training needs to be prioritized, with attention being paid to the improvement of teaching quality and educational leadership. The fact that no other similar lifelong educational program exists in Greece, provided by the academic community, points out its importance and continuation for the transition from education to employment.

LIMITATIONS

The existing approaches to the problem of trainees' satisfaction analysis present a number of significant disadvantages, such as the lack of advanced - specialized data analysis tools and the non-respect of the qualitative form that satisfaction information is more commonly received. As a result, satisfaction analyzes do not delve into customer preferences and behavior but remain at a level of calculation of simple frequencies of descriptive statistics. Also, the lack of other similar lifelong programs on aqua training prevents comparison.

REFERENCES

- Aktaruzzaman M., & Plunkett M. (2016). An innovative approach toward a comprehensive distance education framework for a developing country. *American Journal of Distance Education*, 30(4), 211-224. <https://doi.org/10.1080/08923647.2016.1227098>
- Archer, S. J. (2004). Take the plunge: Move your personal training services to the pool and open a new underwater world to clients. *IDEA Fitness Journal*, 1(2), 108-114.
- Ayres, R. (2014). Lecturing, working with groups, and providing individual support. In *A Handbook for Teaching and Learning in Higher Education* (pp. 116-128). Routledge.
- Baldwin, K. (2007). Add water to the mix: Including aquatic fitness in your training package can enhance your clients' programs and expand your client base. *IDEA Fitness Journal*, 4(3), 33-36.
- Billett, S. (2009). Realizing the educational worth of integrating work experiences in higher education, *Studies in Higher Education*, 34(7), 827-843, <https://doi.org/10.1080/03075070802706561>
- Brody, L. T., & Geigle, P.R. (2009). *Aquatic Exercise for Rehabilitation and Training*. Human Kinetics.
- CEDEFOP – Centre for the Development of Vocational Training (1996). *Vocational training glossarium*. Thessaloniki: CEDEFOP.
- CEDEFOP – National Organisation for the Certification of Qualifications and Vocational Guidance (EOPPEP) (2019). *Vocational Education and Training in Europe: Greece* [From Cedefop and ReferNet vocational education and training in Europe database]. <https://www.cedefop.europa.eu/en/tools/vet-in-europe/systems/greece>
- Chow, A. S., & Croxton, R. A. (2017). Designing a responsive e-learning infrastructure: Systemic change in higher education. *American Journal of Distance Education*, 31(1), 20-42. <https://doi.org/10.1080/08923647.2017.1262733>
- Dai, S., Yuan, H., Wang, J., Yang, Y., & Wen, S. (2023). Effects of aquatic exercise on the improvement of lower-extremity motor function and quality of life in patients with Parkinson's disease: A meta-analysis. *Frontiers in Physiology*, 14, 1066718. <https://doi.org/10.3389/fphys.2023.1066718>
- Daines J., Daine C., & Graham B. (2006). *Adult Learning and Adult Teaching*. Welsh Academic Press.
- Delevatti, R., Marson, E., & Fernando Krueh, L. (2015). Effect of aquatic exercise training on lipids profile and glycaemia: A systematic review. *Revista Andaluza de Medicina del Deporte*, 8(4), 163-170. <https://doi.org/10.1016/j.ramd.2014.08.003>
- European Parliament and the Council of Europe (2006). Action programme in the field of lifelong learning (2004–2006). *Official Journal of the European Union*, L (327), 45–68. <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:327:0045:0068:En:PDF>
- Fischer, G. (2000). Lifelong learning—more than training. *Journal of Interactive Learning Research*, 11(3/4), 265–294. https://www.researchgate.net/publication/2511963_Lifelong_Learning_-_More_Than_Training

- Haynes, A., Naylor, L. H., Carter, H. H., Spence, A. L., Robey, E., Cox, K. L., Maslen, B. A., Lautenschlager, N. T., Ridgers, N. D., & Green, D. J. (2020). Land-walking vs. water-walking interventions in older adults: Effects on aerobic fitness. *Journal of Sport and Health Science*, 9(3), 274–282. <https://doi.org/10.1016/j.jshs.2019.11.005>.
- Hummel, C (1993). Aristotle. *Prospects*, 23, 39–51. <https://doi.org/10.1007/BF02195024>
- Jackson, M., Kang, M., Furness, J., & Kemp-Smith, K. (2022). Aquatic exercise and mental health: A scoping review. *Complementary Therapies in Medicine*, 66, 102820. <https://doi.org/10.1016/j.ctim.2022.102820>
- Kaur, J. (2017). Lifelong learning and professional development. *International Journal of Research in Social Sciences and Humanities*, 7(3), 125-133.
- Khruakhorn, S., & Chiwarakranon, S. (2021). Effects of hydrotherapy and land-based exercise on mobility and quality of life in patients with knee osteoarthritis: a randomized control trial. *Journal of Physical Therapy Science*, 33(4), 375–383. <https://doi.org/10.1589/jpts.33.375>
- Kieffer, H. S., Lehman, M. A., Veacock, D., & Korkuch, L. (2012). The effects of a short-term novel aquatic exercise program on functional strength and performance of older adults. *International Journal of Exercise Science*, 5(4), 321–333.
- Kim, Y., Vakula, M. N., Waller, B., & Bressel, E. (2020). A systematic review and meta-analysis comparing the effect of aquatic and land exercise on dynamic balance in older adults. *BMC Geriatrics*, 20(1), 302. <https://doi.org/10.1186/s12877-020-01702-9>
- Matsumoto, S., Uema, T., Ikeda, K., Miyara, K., Nishi, T., Noma, T., & Shimodozono, M. (2016). Effect of underwater exercise on lower-extremity function and quality of life in post-stroke patients: A pilot controlled clinical trial. *Journal of Alternative and Complementary Medicine*, 22(8), 635–641. <https://doi.org/10.1089/acm.2015.0387>
- Mazanah, M. & Carter, G. L (2002). *Designing and Facilitating Adults Learning*. University Putra Malaysia Press.
- McDaniel, B. B., Naquin, M. R., Sirikul, B., & Kraemer, R. R. (2020). Five weeks of aquatic-calisthenic high intensity interval training improves cardiorespiratory fitness and body composition in sedentary young adults. *Journal of Sports Science & Medicine*, 19(1), 187–194.
- Merriam, S. B & Brockett, R. G. (1997). *The Profession and Practice of Adult Education*. Josey – Bass Limited.
- Ministerial Decision no. 229718/Z1/5-1-2018, *Government Gazette* 4/5-1-2018, τ.B'. <https://kedivim.auth.gr/wp-content/uploads/2023/04/%CE%A5%CF%80%CE%BF%CF%85%CF%81%CE%B3%CE%B9%CE%BA%CE%AE-%CE%91%CF%80%CF%8C%CF%86%CE%B1%CF%83%CE%B7.pdf>
- Nørgård, R. T. (2021). Theorising hybrid lifelong learning. *British Journal of Educational Technology*, 52, 1709–1723. <https://doi.org/10.1111/bjet.13121>
- Pacheco, J.A. (2021). The “new normal” in education. *Prospects*, 51, 3–14. <https://doi.org/10.1007/s11125-020-09521-x>
- Raja, R., & Nagasubramani, P.C. (2018). Impact of modern technology in education. *Journal of Applied and Advanced Research*, 3(Suppl. 1), S33–S35. <https://doi.org/10.21839/jaar.2018.v3S1.165>
- Samara, A., Kouidi, E., Fountoulakis, K., Alexiou, S., Deligiannis, A. (2016). The effects of aquatic exercise on functional capacity and health-related quality of life in hemodialysis patients. *Journal of Clinical & Experimental Nephrology*, 1(3), 15. <https://doi.org/10.21767/2472-5056.100015>
- Takeshima, N., Rogers, M. E., Watanabe, E., Brechue, W. F., Okada, A., Yamada, T., Islam, M. M., & Hayano, J. (2002). Water-based exercise improves health-related aspects of

- fitness in older women. *Medicine and Science in Sports and Exercise*, 34(3), 544–551. <https://doi.org/10.1097/00005768-200203000-00024>
- Tang, Z., Wang, Y., Liu, J., & Liu, Y. (2022). Effects of aquatic exercise on mood and anxiety symptoms: A systematic review and meta-analysis. *Frontiers in Psychiatry*, 13, 1051551. <https://doi.org/10.3389/fpsy.2022.1051551>
- Volaklis, K. A., Spassis, A. T., & Tokmakidis, S. P. (2007). Land versus water exercise in patients with coronary artery disease: effects on body composition, blood lipids, and physical fitness. *American Heart Journal*, 154(3), 560.e1–560.e6. <https://doi.org/10.1016/j.ahj.2007.06.029>