Water as a Source of Life - From Greek Mythology to Orthodox Tradition: A Cross - Thematic Scenario

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Abstract: *Water is a valuable good, which remains inaccessible to millions of people. Many school activities and projects are carried out so as to raise students' awareness regarding water usage, sustainability, and environmental protection in general. However, water is present in everyday life and religious rituals. What is more, it was worshipped in Ancient Greece. The present five-hour didactic cross-thematic suggestion was addressed to third grade students. Students learnt about the significance of water in ancient Greek culture (deities, myths, narratives, pottery art, statues) and contemporary Christian Rituals and Sacraments (Baptism, Sanctification of water, Epiphany) by using collaborative strategies and ICT. At the end students understood the use of water in Greek Mythology as well as in the Cristian tradition.*

Keywords: Teaching scenario, water, Greek Mythology, Religious Education, Primary school

1. Introduction

The first international meeting on global environmental and developmental needs was held by the United Nations Conference in Stockholm in 1972 (European Environmental Agency [EEA], 2022). During this conference, the United Nations' Environment Program (UNEP) and Ministries of Environment were founded in several countries all over the world. Twenty years later, representatives from 172 countries were gathered in Rio de Janeiro in June 1972, in order to participate in the United Nations' Conference on Environment and Development, where several environmental issues were introduced and foundations for international agreements were laid, such as: Agenda 21, Rio Declaration on Environment and Development, Declaration on the principles of forest management (EEA, 2022).

The United Nations Organization has established the 22ndof March as Water International Day in order to inform the public, raise awareness, and apply political pressure for decision-making in regards with drinking water inaccessibility that affects billions of people. 2013 was set out as International Year of Water Cooperation and the current decade (2018-2028) was set out as "International Decade for Action on Water for Sustainable Development", highlighting global interest in the matter (United Nations, 2022).

International organizations have taken action in this field. For example, UNESCO supported the development of Water Management curricula in 2017 titled "Water management curricula using ecohydrology and integrated water resources management", which includes three volumes. These volumes are one of many suggested solutions or approaches regarding education on water (UNESCO, 2017). Moreover, UNESCO's Intergovernmental Hydrology Program (IHP) provides top research programs for knowledge development in regards with water and sustainability. During IHP-VIII (2014-2024), the program's central focus was "Water education, key to water security" (UNESCO, 2021). Furthermore, Food and Agriculture Organization of the United Nations has created activity books under the title "I am learning the steppes" which refer to climate change, ecosystems, global warming for students aged 6 to 12 (F.A.O. & M.A.F., 2022^a) as well as a teacher's guidebook (F.A.O. & M.A.F., 2022^b).

Educational systems are supposed to play an important role in this field (Amahmid et al., 2019). New curricula development and lesson planning, as far as water education is concerned, are a necessity. Countries, such as the USA, Singapore, and Australia, have started to implement water education within school project and textbooks (Gruver et al., 2009· Irvine et al., 2015· Smith et al., 2012· Australian Water Association [AWA], 2016).

In Greece, under Law 1982/90, article 11, paragraph 13, environmental education is introduced in Primary and Secondary school curriculum. Work placements as environmental education supervisors and founding environmental education centers are provided for by the same law. The main aim of environmental education is for students to comprehend how humans relate to the natural and social environment and raise their awareness on issues that derive from that relationship (Pedagogical Institute, 2022). Environmental education complements other main subjects (Geography, Environmental Studies) that students are taught in the classroom, while it provides students the opportunity to engage themselves with crucial environmental problems such as: water and environmental pollution, sustainability, climate change, flora and fauna protection. Environmental Education Centers (EEC) all over Greece (Eleftheriou-Kordeliou, 2009·Velvedou, 2022· Kalamata, 2022) inform and run projects for Primary and Secondary education students relating to water, sustainability, and environmental education. Even EYDAP (Drainage and Water Company in Attiki Region) has

developed a similar educational program named "O stagonoulis (The little drop)." In the meantime, water -as a subject- has been implemented in main school courses, such as Environmental Studies and Geography. Also, a curriculum named "Environment and Education for a sustainable development" for Pre-school, Primary, and Secondary education has been published (Institute of Educational Policy, 2022[b]).

The present cross-thematic scenario doesn't focus on proper water management and usage since these are taught in other school courses. The scenario rather focuses on the wide-ranging importance of water in culture, mythology, and religion. Planning this project was based on the learning outcomes that derive from the New Curricula for History and Religious Education (Institute of Educational Policy, 2022[a]) and on Cross-Thematic Curriculum Framework for Compulsory Education.

2. Learning Theories

Constructivism is a complex theory rooted in Philosophy, Psychology, Sociology and Education. It focuses on the student as an active learner who can transfer the process of learning in other environments, develops communicative and social skills through collaboration. Essentially, prepares the students for the real world (Bada &Olusegan, 2015). Assessment is an ongoing process of feedback, which doesn't refer to mere cognitive outcomes but rather to active participation as well as initiative and creative thinking (Irzik, 2001).

Cognitive constructivism is grounded in individual construction of knowledge and is based on the work of Piaget (Leichsenring, 2013). It highlights individual interpretation of perceptive experiences of external environment and personal construction of knowledge (Tan, 2017) and it has been criticized on the ground that it excludes other aspects of learning, such as collaboration and dialogue (Jimoyiannis, 2019). Social constructivism, mainly expressed by Vygotsky, emphasizes on the way a student learns. It focuses on the way meaning and comprehension derive from social interaction (Leichsenring, 2013), by highlighting the social interpretation of external environment and sociopolitical construction of knowledge (Tan, 2017). Vygotsky believed that sociocultural environment is crucial for the cognitive development of the individual (Blake & Pope, 2008· Pasqualotto et al., 2015). A child's intellectual development is understood only when seen within its historical and cultural framework of his/her experience. What also plays an important role is systems of signification, meaning the symbols that people have created in order to think, communicate, and solve problems (Nurkholida, 2018). Language plays a critical role in cognitive development; therefore, language teaching should be emphasized (Stasinos, 2015).

One of the cornerstones of Vygotsky's theory is Zone of Proximal Development (ZPD), a tool to measure and assess the educational potential of children (Fani&Ghaemi, 2011). Vygotsky defines ZPD as "the distance between the level of

real development (as it is defined by independent problem solving) and the level of potential development (as it is defined by problem solving under the guidance of or in collaboration with a more capable peer" (Eun, 2019). Educators play an important role, as, on the one hand they help their students shape a project's framework in an appropriate way, and on the other hand they act as role model that boost a project's completion (Feldman, 2011). It is suggested that assisted discovery, reciprocal teaching, and guided participation (a gradually minimized guided participation by the educator)are employed (Leichsenring, 2013), while the teaching methods that are suggested are dialogue, collaboration, and interaction with others, so students can construct knowledge in a collaborative way by expanding their horizons (Jimoyiannis, 2019).

In the present scenario, Project Method was used. Project Method is a constructivist approach which emphasizes on active learning (Goldstein, 2016) and researching (Krajcik et al., 2008). It is rooted in Dewey's and Vygotsky's ideas. The latter highlighted the importance of social interaction during learning (Goldstein, 2016). It focuses on the student (Maros et al., 2021), while many benefits are recorded, such as the development of critical thinking, autonomy (de la Puente Pacheco, et al., 2019), socializing and teamwork skills (Tanaka, 2022), communication, raising students' awareness on real life circumstances (Choi, et al., 2019·Kokotsaki et al., 2016), a sense of responsibility development (Maros et al., 2021), creative thinking (Duchovicova et al., 2018), empathy (Kim, 2020), while knowledge remains vibrant for a long period of time (Holm, 2011). In addition, it facilitates change in teaching methods (Maros et al., 2021). The method requires greater effort on behalf of the educator and students, limited and purposeful guidance to set students free, more time, deeper knowledge of the subject by the educator (Karantzis& Manesis, 2013), while classroom management issues come up (Dickinson & Summers, 2010).

3. Collaborative learning

Collaborative learning is defined as "a set of teaching and learning strategies that promote students' collaboration in small groups that aim at optimizing their own individual learning as well as others' (Johnson & Johnson, as mentioned in Le, Janssen & Wubbels, 2018, p. 103). Collaborative learning contributes to critical thinking development, oral speech cultivation, information exchange, interpersonal relationships development (Kordaki et al., 2019), academic performance improvement, self-awareness, and students' internal learning motivations (Slavin, 1990[b]· Johnson & Johnson, 1991), prejudice minimization (Cooper et al., 1980), altruistic behavior development (Johnson et al., 1993), student with special educational needs, learning difficulties or behavioral issues inclusion (Slavin 1990[a]).

To put theory into practice, several factors are required, such as, interpersonal and teamwork skills (Shimazoe& Aldrich, 2010· Webb et al., 2002), developing a positive environment as well as healthy relationships within the team (Buchs, et al., 2017) to

constrain discipline issues (Baines et al., 2003· Blatchford et al., 2003) and free-riders that have a negative impact on every learner's learning behaviors (Freeman & Greenacre, 2010·Joyce, 1999· Popov et al., 2012), encouraging students with low self-esteem to participate more actively without fear of rejection (Bunderson & Reagans, 2011). Moreover, transferring power from the educator to the student is also required. This is proven to be challenging, since many educators doubt students' ability to collaborate effectively within teams (Baines et al., 2009· Blatchford et al. 2003). Finally, educators highlight the necessity of having more available time (Abrami, 2004) as well as that they face difficulties when time management is concerned (Blatchford et al. 2003· Gillies & Boyle 2010).

In the present cross-thematic scenario the collaborative technique called "Think – Pair – Share" was used. The technique helps students to develop collaboration via interaction and exchange of ideas and leads in knowledge acquisition by the members of the team (Tint &Nyunt, 2015). In the scenario also used the collaborative strategy "Snowball" (also known as Pyramid) which is appropriate for themes where every member contributes an idea that is compared to other ideas and therefore enhanced (Hernandez-Leo, et al., 2005). Brainstorming was also used, a technique that applies to problems that get solved through many possible solutions in a short amount of time (Hernandez-Leo et al., 2005). Focused Listing is another technique that was used which is appropriate for cases where students have to describe an issue or a situation (Angelo & Cross, 1993· Johnson & Johnson, 1999) as well as the "Roundtable" technique, which maximizes creativity, communication and team member engagement (Kagan, 1994· Kagan & Kagan, 2015).

4. The Utilization of I.C.T.

ICT effects on educational process is significant and manifold. To begin with, some of the benefits that are recorded are more student engagement during the lesson, an increase of interest and active participation, autonomy while learning regarding time and manner of studying (Henderson, 2020), assuming responsibility for one's learning (Muhametjanova & Cagiltay, 2012), improving collaboration and collaboration skills, communication and leadership skills, which prepares students for their future professions (Das, 2019·Fikaris, 2016· Munyengabe et al., 2017). ICT can help educators as it facilitates access to an unlimited number of internet sources (Henderson, 2020), communication among them, exchange of opinions and internet material (UNESCO, 2015· van Jaarsveldt& Weasels, 2015· Tarus, 2015), lesson preparation (Burkhardt et al. 2003), communication with students' parents (Munyengabe et al., 2017· UNESCO, 2015). Several obstacles are recording when using and making the most of ICT, which are divided in two categories (Ertmer, 1999): (a) external obstacles, which concern the available equipment, funding, software, large number of students, limited available time to educate and support the educators (Goktas et al., 2013·Nikolopoulou&Gialamas, 2015· Tsai & Chai, 2012) and (b) internal obstacles, which concern with educators' beliefs

and practices on using ICT during the educational process (Aldama&Pozo, 2016), as well as an absence of "instructional planning" on the educators' behalf (Tsai & Chai, 2012). It is essential that educators reconsider the traditional roles of a teacher and a student, differentiate the way they assess students, as well as their teaching methods in the classroom (Ertmer, 1999), acquire additional training in creating educational material and differentiated activities according to their students' needs, in a pedagogical framework (Kalogiannakis, 2010· Mahmud & Ismail, 2010· Tsai & Chai, 2012).

5. The didactic cross-thematic scenario

The present cross-thematic scenario is based on the New Curriculum (Institute of Educational Policy, 2022[a]) and involves many subjects such as Language, Literature, Environmental Studies, History and Religious Education, while Art and Culture are also deployed. It is oriented towards mainly third grade students. However, other grades can implement it as well (for example, fourth grade) -with a larger number of students. Its duration is five teaching hours, but it can be implemented as a part-time project, laid out across more school days. It can also be implemented as part of a History or Environmental Studies lesson orthe skills workshop named "Global and Local Cultural Heritage".

The scenario aims for students to comprehend the role of water in ancient Greek culture (Mythology), as well as in religious Christian rituals. Learning outcomes and activities are designed and based on New Analytical Curriculum in Religious Education and History (Greek Ministry of Education and Religious Affairs, 2014, 2015).

Third grade students have previous knowledge about water cycles, water usage in everyday life, Poseidon as well as first-hand experience from religious Christian rituals and Sacraments that make use of water. In addition, students should be already familiarized with working in teams, using worksheets and assessment worksheets.

The teaching materials that were used were: a PC, a projector, worksheets, audiovisual media (such as videos, pictures, and songs), flashcards that depict themes (figures or situations) from the lesson.

The scenario cultivates essential 21st century skills, such as: communication, collaboration, creativity, decision-making, teamwork and autonomy, critical thinking development, problem solving, exchange of ideas with fellow students. Moreover, studentspresent their project, receive other students' opinions, assess themselves and others.

Students are expected to achieve the learning outcomes (LA) below:
1) Remember water cycles and learn about benefits and dangers regarding water.
2) Learn myths about Poseidon with a clear reference to intense natural phenomena.

3) Link polytheism to forces of nature and the desire to placate them.
4) Learn religious stories and compare them to stories from mythology
5) Compare characters and situations from mythology and Christian tradition
6) Recall Christian rituals and Sacraments where water is used
7) Discover the importance of Epiphany and sanctification of the water
8) Describe the ritual of Baptism and compare it to other cultures

The worksheets are available at the link

6. Description
6.1 Introduction – Preparation

The educator shows students a video that refers to water cycles, benefits, dangers, human activity, pollution, and solution regarding protecting water. After the viewing, the educator asks students to call out a word from what they saw or thought about water by using "Brainstorming"technique. The educator writes down all answers on the computer and they project them in the shape of a word cloud (https://wordart.com/). Alternatively, if a computer is not available, words can be written on the classroom board. By using students' answers as food for thought, the educator informs students that they are going to learn about water in ancient Greek culture (Mythology) and in Sacraments and Christian rituals as well.
(Activity 1, Duration 15´, L.A.,1)

6.2 Exposure to new data – Processing – Conclusions

The educator hands out Worksheets 1^a and 1^b to students. Firstly, there is a picture of the twelve gods of Olympus. Studentshave to recognize -by discussing with their seatmate- who is the god of sea, write the name, and the characteristics by which they recognized him. Afterwards, students view a presentation with some information about god Poseidon (his name, how did he become god of the sea, how is he represented in art and how is he worshipped). Then, students divided in teams will complete the second activity in the worksheet by using the "Snowball" technique (Pyramid). Firstly, each student attempts at answering by himself/herself, secondly, they collaborate with a partner by exchanging opinions, thirdly, they collaborate with a team, and they agree upon a final and commonly accepted answer that gets presented in the classroom. Finally, all the studentsdiscussin plenary.
(Activity 2, Duration 25´, Worksheets 1^a, 1^b, L.A., 2)

In worksheet 2^a and 2^bstudents are given a chart from the textbook with information about the creation of the world and gods. In this chart, previous gods and titans are added. Students study small texts. Team A works on Rivers and Oceanides (Worksheet 2^a) and Team B works on Ocean and Nereus (Worksheet 2^b). Studentshave to detect words or phrases from the text that describe water or sea, by using the collaborative

technique "Think – Pair – Share." Finally, a representative from each team presents these words or phrases in plenary.
(Activity 3, Duration 30´, Worksheets 2^a, 2^b, L.A., 3)

Inspired by the fact that Poseidon was God of the sea, students are asked to answer, if they already know, who is the Saint that protects sea and sailors according to ChristianReligion. Then, they work on Worksheets 3^a& 3^b, which include pictures and stories of Poseidon and Saint Nikolas. Each team reads one story about Saint Nikolas and Poseidon. With the use of collaborative strategic technique "focused listing", each student completes the list individually and later they discuss their conclusions with the team and complete the list with common and different elements. Finally, members of each team observe similarities and differences and draw conclusions. Results are presented in plenary and further discussion follows. Each team has relied on a different narrative and therefore is lead to different results. The educator emphasizes on different views between the two figures that were studied by the students.
(Activity 3, Duration 30´, Worksheet 3^a, 3^b, L.A. 4, 5)

6.3 Applying new knowledge

The educator uses "Brainstorm" technique and asks students to mention if they know in which Sacraments and religious rituals water is used. By processing answers, it comes up -among others- that water is used during Sanctification of the water, Epiphany, and Baptism. In case there's a student from another country with different habits and customs, their experience is written on the board, so the classroom can recognizedifferences and similarities between religions.
(Activity 5, Duration 10´, L.A., 6)

The aim now is that students delve deeper in religious use of water, so they work in teams on worksheets 4^a and 4^b. Team A takes on Sanctification of water and Team B takes on Epiphany. In every worksheet there are small texts that are studied by the students. Then, they answer questions according to the collaborative strategy "Snowball." They all discuss their answers in plenary.
(Activity 6, Duration 25´, Worksheets 4^a, 4^b, L.A., 7)

Afterwards, students from each team work on Worksheet 5 (common worksheet). They study two texts, one that refers on Sacrament of Baptism and one that comes from Mythology and talks about the plunge of Achilleas in river Stigas. By making use of the "Roundtable" technique, students answer questions, and they discuss in plenary, that water is used as a mean to make peopleinvulnerable. Then, they record something that made an impression on them.
(Activity 7, Duration 25´, Worksheet 5, L.A., 8)

6.4 Summation
The educator has prepared flashcards with themes (characters or situations) from the lesson (Worksheet 6). The flashcards face down the table. Each student chooses a card and puts it on the forehead without knowing what it depicts. The rest of the student's team have to describe the card, so the student with the card can guess the character or the situation. The student with

the card -standing in front of the board- can choose who fellow student from his/her team will help. The team that answers more quickly wins.
(Activity 8, Duration 35´, Worksheet 6, L.A. 2,3,4,5,6,7,8)

6.5 Assessment

Students answer an online <u>quiz</u>, for the final assessment. Each team answers seven questions (as many as the team members). The winning team is the one that gets more points or answer more quickly.
(Activity 9, Duration 15´, L.A. 2,3,4,5,6,7,8)

7. Conclusion

This teaching cross-thematic scenario was adjusted to two teams, seven members each, since many students were absent the day the project was carried out. Therefore, the didactic suggestion can work with more students divided in more teams. Students showed great interest in all the activities during the project. Videos, presentations, and narrations about Poseidon, Saint Nikolas, Titans, flashcards, and the quiz got the student's attention. They completed all their worksheets with enthusiasm, even the more demanding ones. The collaboration between the teams was excellent, even in difficult activities, such as Activity 3. Students presented their opinions, discussed, drew conclusions, and achieved the learning outcomes to a very satisfying degree. Activity 8, which took more time than it was estimated, was carried out on the school's playground where there was enough space for students to move around. During the final assessment, students stated that the activities were enjoyable and that they would like it if other subjects, such as Language, Mathematics, and Environmental Studies were carried out in a similar way.At the end, through the scenario, students understood the significance and the use of water as a source of life in Greek Mythology as well as in the Cristian tradition.

References

[1] Abrami, P. C., Poulsen, C., & Chambers, B. (2004). "Teacher Motivation to Implement an Educational Innovation: Factors Differentiating Users and Non-users of Cooperative Learning". *Educational Psychology*, *24* (2), 201–216. https://doi.org/10.1080/0144341032000160146

[2] Aldama, C., &Pozo, J. I. (2016). How are ICT used in the classroom? A study of teachers' beliefs and uses. *Electronic Journal of Research in Educational Psychology*, *14*(2), 253-286. http://dx.doi.org/10.14204/ejrep.39.15062

[3] Amahmid, O., El Guamri, Y., Yazidi, M., Razoki, B., Rassou, K.K., Rakibi, Y., KniniGh., & El Ouardi, T. (2019). Water education in school curricula: impact on children knowledge, attitudes and behaviours towards water use. *International Research in Geographical and Environmental Education*, *28*(3), 178-193. https://doi.org/10.1080/10382046.2018.1513446

[4] Angelo, T.A. & Cross, K.P. (1993). *Classroom Assessment Techniques:* A handbook for college teachers. Jossey-Bass.

[5] Athens Water Supply and Sewerage Company - EYDAP (2022). *Environmental Programs.* (In Greek)https://www.eydap.gr/LearnAboutWater/enviromental-programs/

[6] Australian Water Association (AWA). (2016). *Australian Curriculum: Science. The AWA Australian Curriculum Project (ACP) – from 2013 to 2015.* https://f.hubspotusercontent30.net/hubfs/14568786/Webpage/Teacher%20Resources/Water_in_the_Australian_Curriculum_Science.pdf

[7] Bada, S. O., & Olusegun, S. (2015). Constructivism learning theory: A paradigm for teaching and learning. *Journal of Research & Method in Education*, *5*(6), 66-70. 10.9790/7388-05616670

[8] Baines, E., Blatchford, P., &Kutnick, P. (2003). "Changes in Grouping Practices over Primary and Secondary School". *International Journal of Educational Research*, *39* (1–2), 9–34. https://doi.org/10.1016/S0883-0355(03)00071-5

[9] Baines, E., Rubie-Davies, C., & Blatchford, P. (2009). "Improving Student Group Work Interaction and Dialogue in Primary Classrooms: Results from a Year-long Intervention Study". *Cambridge Journal of Education,39* (1), 95–117. https://doi.org/10.1080/03057640802701960

[10] Blake, B. & Pope, T. (2008). Developmental Psychology: Incorporating Piaget's and Vygotsky's Theories in Classrooms. *Journal of Cross-Disciplinary Perspectives in Education*, *1*(1), 59-67.

[11] Blatchford, P., Kutnick, P., Baines, E., & M. Galton. (2003). *"*Toward a Social Pedagogy of Classroom Group Work". *International Journal of Educational Research*, *39* (1–2), 153–172. https://doi.org/10.1016/S0883-0355(03)00078-8

[12] Buchs, C., Filippou, D., Pulfrey, C., &Volpé, Y. (2017). Challenges for cooperative learning implementation: reports from elementary school teachers. *Journal of Education for Teaching*, *43* (3), 296-306. https://doi.org/10.1080/02607476.2017.1321673

[13] Bunderson, J. S., & Reagans, R. E. (2011). Power, status, and learning in organizations. *Organization Science*, *22*, 1182–1194. https://doi.org/10.1287/orsc.1100.0590

[14] Burkhardt, G., Monsour, M., Valdez, G., Gunn, C., Dawson, M., Lemke, C., … Martin, C. (2003). *21st century skills: Literacy in the digital age*. North Central Regional Education Laboratory and Mitiri Group. www.ncrel.org/engauge

[15] Choi, J., Lee, J. H., & Kim, B. (2019). How does learner-centered education affect teacher self-efficacy? The case of project-based learning in Korea. *Teaching*

and Teacher Education, 85, 45–57. https://doi.org/10.1016/j.tate.2019.05.005

[16] Cooper, L., Johnson, D., Johnson, R. &Wilderson, F. (1980). The effects of Cooperative, Competitive, and Individualistic Experiences on Interpersonal Attraction Among Heterogeneous Peers. *Journal of Social Psychology*, *111*, 243-252.

[17] Das, K. (2019). The role and impact of ICT in improving the quality of education: An overview. *International Journal of Innovative Studies in Sociology and Humanities*, *4*(6), 97-103. https://ijissh.org/storage/Volume4/Issue6/IJISSH-04061 1.pdf

[18] de la Puente Pacheco, M. A., Guerra, D., de Oro Aguado, C. M., & Alexander McGarry, C. (2019). Undergraduate students' perceptions of Project-Based Learning (PBL) effectiveness: A case report in the Colombian Caribbean. *Cogent Education*, *6*(1), 1616364. https://doi.org/10.1080/2331186X.2019.1616364

[19] Dickinson, G., & Summers, E. J. (2010). *Understanding proficiency in project-based instruction: Interlinking the perceptions and experiences of preservice and in-service teachers and their student*s. http://www.bobpearlman.org/newtechfoundation/Resear ch/ManorReport_UT_SanMarcos_ejs&gd%201%20.pdf

[20] Duchovicova, J., Sabo, A., Petrova, G., &Hosova, D. (2018). Stimulation of creativity as a prerequisite of permanent sustainability form personality development of gifted learners. *Ad Alta –Journal of Interdisciplinary Research*, *8*(2), 54–60.

[21] Environmental Education Center (E.E.C.) of Eleftheriou-Kordelios of Thessaloniki. (2009). *Water: sustainable management and environment.* (In Greek) http://www.kpe-thess.gr/el/programs/sustainable-manage ment-of-water/

[22] Environmental Education Center (EEC) of Kalamatas. (2022, August 5). *Water trails in nature and in the city*. (In Greek) http://kpe-kal.mes.sch.gr/programs/#07nero_fysi_poli

[23] Environmental Education Center (EEC) of Kalamatas. (2022, August 5*). "Freshwater" scientists*. (In Greek) http://kpe-kal.mes.sch.gr/programs/#07nero_fysi_poli

[24] Environmental Education Center (EEC) of Velvedu – Shiatista. (2022, August 5). *Run, Run, Run Water*. (In Greek) http://kpe-velvent.koz.sch.gr/index.php/programmata/tre xei-trexei-trexei-to-nero

[25] Ertmer, P. A. (1999). Addressing first and second-order barriers to change: strategies for technology integration. *Educational Technology Research and Development*, *47*(4), 47–61. http://dx.doi.org/10.1007/BF02299597

[26] Eun, B. (2019). The zone of proximal development as an overarching concept: A framework for synthesizing Vygotsky's theories, *Educational Philosophy and Theory*, *51*(1), 18-30. https://doi.org/10.1080/00131857.2017.1421941

[27] European Environmental Agency. (EEA) (2022, August 5). *The path to global sustainability.*https://www.eea.europa.eu/el/simata-eop-2

010/semata-2012/arthra/o-dromos-pros-ten-pagkosmia-b iosimoteta

[28] F.A.O. & M.A.F. (2022[a]). I am learning the steppes – Student's activity book. Life on the steppe. F.A.O. & M.A.F. https://doi.org/10.4060/cb8379en

[29] F.A.O. &M.A.F. (2022[b]). I am learning the steppes – Teacher's guide. F.A.O. & M.A.F. https://doi.org/10.4060/cb8382en

[30] Fani, T., &Ghaemi, F. (2011). Implications of Vygotsky's zone of proximal development (ZPD) in teacher education: ZPTD and self-scaffolding. *Procedia-Social and Behavioral Sciences, 29*, 1549-1554. https://doi.org/10.1016/j.sbspro.2011.11.396

[31] Feldman, R.S. (2011). *Developmental Psychology. Lifelong Evolution*. (E. G. Mpeseglis, Ed.). Gutenberg. (In Greek)

[32] Freeman, L., & Greenacre, L. (2010). An examination of socially destructive behaviors in group work. *Journal of Marketing Education*, *33*, 5–17. https://doi.org/10.1177/0273475310389150

[33] Fikaris, I. M. (2016).Dynamics Implementation of the Learning Theories in the teaching process. *Journal of Research in Education and Training*, *9*(2), 99–128. (In Greek) https://doi.org/10.12681/jret.9223

[34] Gillies, R. M., & Boyle, M. (2010). "Teachers' Reflections on Cooperative Learning: Issues of Implementation". *Teaching and Teacher Education*, *26* (4), 933–940. https://doi.org/10.1016/j.tate.2009.10.034

[35] Goktas, Y., Gedik, N. &Baydas, O. (2013). Enablers and barriers to the use of ICT in primary schools in Turkey: A comparative study of 2005–2011. *Computers & Education*, *68*, 211-222. https://doi.org/10.1016/j.compedu.2013.05.002

[36] Goldstein, O. (2016). A project-based learning approach to teaching physics for pre-service elementary school teacher education students. *Cogent Education*, *3*(1), 1200833, https://doi.org/10.1080/2331186X.2016.1200833

[37] Institute of Educational Policy. (2022[a]). *New Study Programs*. (In Greek) http://iep.edu.gr/el/nea-programmata-spoudon-arxiki-seli da

[38] Institute of Educational Policy. (2022[b]). *Study Program "Environment and Education for Sustainable Development"*. (In Greek) https://www.especial.gr/wp-content/uploads/2022/06/fek -2022-Tefxos-B-2820.pdf

[39] Greek Ministry of Education and Religious Affairs. (2014). *Teacher's Guide to Religious Studies in Elementary –Secondary School*. Athens: Institute of Computer Technology and Publications "Diofantos". (In Greek) http://iep.edu.gr/el/thriskeftika-odigoi-ekpaideftikoy

[40] Greek Ministry of Education and Religious Affairs. (2015). *Guide for the History teacher (3rd, 4th, 5th, 6th elementary grade - 1st, 2nd, 3rd secondary grade).* Athens: Institute of Computer Technology and Publications "Diofantos". (In Greek) http://repository.edulll.gr/1924

[41] Gruver J.B., Smith, S.S., &. Finley J.C. (2009). Water curriculum evaluation for educators in Pennsylvania. *Applied Environmental Education & Communication*, *7*(4), 164–170. https://doi.org/10.1080/15330150902744210

[42] Henderson, D. (2020). Benefits of ICT in Education. *IDOSR Journal of Arts and Management*, *5*(1), 51-57. https://www.idosr.org/wp-content/uploads/2020/02/IDOSR-JAM-51-51-57-2020.-1.pdf

[43] Hernandez-Leo, D., Asensio-Perez, J. I. &Dimitriadis, Y. (2005). Computational Representation of Collaborative Learning Flow Patterns Using IMS Learning Design. *Journal of Educational Technology & Society, 8*(4), 75-89. https://www.jstor.org/stable/jeductechsoci.8.4.75

[44] Holm, M. (2011). Project-based instruction: A review of the literature on effectiveness in prekindergarten through 12th grade classrooms. *InSight: Rivier Academic Journal*, *7*(2), 1–13. https://www2.rivier.edu/journal/ROAJ-Fall-2011/J575-Project-Based-Instruction-Holm.pdf

[45] Irvine, K. N., Seow, T., Leong, K.W., & Cheong, S.I.D. (2015). How high's the water, Mama? A reflection on water resource education in Singapore. *HSSE Online*, *4*(2), 128–162. https://hsseonline.nie.edu.sg/journal/volume-4-issue-2-2015/how-high%E2%80%99s-water-mama-reflection-water-resource-education-singapore

[46] Irzik, G. (2001). "Back to Basics: A Philosophical Critique of Constructivism". *Studies in Philosophy and Education*, *20*, 157–175. https://doi.org/10.1023/A:1010393620547

[47] Jimoyiannis, A. (2019). *Digital Technologies and Learning of the 21st Century*. Review Publications. (In Greek)

[48] Johnson, D. W. & Johnson, R. T. (1991). *Learning together and alone: cooperative, competitive, and individualistic learning.* (3rd ed.). Prentice Hall.

[49] Johnson, D. W., Johnson, R. T. &Holubec, E. (1993), *Cooperation in the classroom.* (6th ed.). Edina, MN: International Book Company.

[50] Johnson, D. W. & Johnson, R. T. (1999). *Learning Together and Alone: Cooperative, Competitive, and Individualistic Learning*. (5th ed). Allyn & Bacon.

[51] Joyce, W. B. (1999). On the free-rider problem in cooperative learning. *Journal of Education for Business, 74,* 271-275. https://doi.org/10.1080/08832329909601696

[52] Kagan, S. (1994). *Cooperative learning*. Kagan Publishing.

[53] Kagan, S., & Kagan, M. (2015). *Kagan Cooperative Learning*. Kagan Publishing.

[54] Kalogiannakis, M. (2010). Training with ICT for ICT from the trainee's perspective. A local ICT teacher training experience. *Educ Inf Technol, 15*, 3–17 https://doi.org/10.1007/s10639-008-9079-3

[55] Karantzis, I., & Manesis, N. (2013). *Lesson Plans from Primary School. From Theory to Practice*. Grigoris Publications. (In Greek)

[56] Kim, K. J. (2020). Project-based learning approach to increase medical student empathy. *Medical Education Online, 25*(1), 1742965, https://doi.org/10.1080/10872981.2020.1742965

[57] Kokotsaki, D., Menzies, V., & Wiggins, A. (2016). Project-based learning: A review of the literature. *Improving Schools, 19*(3). https://doi.org/10.1177/1365480216659733

[58] Kordaki, M., Manesis, N., &Daradoumis, T. (2019). *Learn Digitally by Playing Cooperatively. Technologically Supported, Playful and Structured Cooperative Learning*. Grigoris Publications. (In Greek)

[59] Krajcik, J., McNeill, K. L. M. C., & Reiser, B. J. (2008). Learninggoals-driven design model: Developing curriculum materials that align with national standards and incorporate project-based pedagogy. *Science Education*, *92*(1), 1–32. http://dx.doi.org/10.1002/(ISSN)1098-237X

[60] https://doi.org/10.1207/s15430421tip4104_2

[61] Le, H., Janssen, J., & Wubbels, T. (2018). Collaborative learning practices: teacher and student perceived obstacles to effective student collaboration. *Cambridge Journal of Education, 48* (1), 103-122. https://doi.org/10.1080/0305764X.2016.1259389

[62] Leichsenring, A. (2013). The influence of Piaget and Vygotsky on everyday elementary classroom teaching and learning. *Education Articles*. http://www.edarticle.com/

[63] Maros, M., Korenkova, M., Fila, M., Levicky, M., &Schoberova, M. (2021): Project-based learning and its effectiveness: evidence from Slovakia. *Interactive Learning Environments*, 1-9. https://doi.org/10.1080/10494820.2021.1954036

[64] Mahmud, R. & Ismail, M.A. (2010). Impact of Training and Experience in Using ICT on In-Service Teachers' Basic ICT Literacy. *Malaysian Journal of Educational Technology, 10*(2), 5-10. https://www.ictesolutions.com.au/media/1839/1-v10n2-rosnaini-teachers-ict-literacy.pdf

[65] Muhametjanova, G., &Çagiltay, K. (2012). Students' and Instructors' Perceptions on Use of Information and Communication Technologies during Instruction in a Kyrgyzstan University. In *IEEE 12th International Conference on Advanced Learning Technologies* (pp. 500-502). Institute of Electrical and Electronics Engineers (IEEE) https://doi.org/10.1109/ICALT.2012.93

[66] Munyengabe, S., Yiyi, Z., Haiyan, H., &Hitimana, S. (2017). Primary teachers' perceptions on ICT integration for enhancing teaching and learning through the implementation of one laptop per child program in primary schools of Rwanda. *Eurasia Journal of Mathematics, Science and Technology Education, 13*(11), 7193-7204. https://doi.org/10.12973/ejmste/79044

[67] Nikolopoulou, K. &Gialamas, V. (2013). Barriers to the integration of computers in early childhood settings: Teachers' perceptions. *Education and Information Technologies*, *20*(2), 285-30. https://doi.org/10.1007/s10639-013-9281-9

[68] Nurkholida, E. (2018). Developing authentic material of listening on higher education based on constructive learning of Jean Piaget and Vygotsky theory. *OKARA: Jurnal Bahasa Dan Sastra*, *12*(1), 59-74. https://doi.org/10.19105/ojbs.v12i1.1762

[69] Pasqualotto, R. A., Löhr, S. S., & Stoltz, T. (2015). Skinner and Vygotsky's Understanding of Resilience in the School Environment. *Creative Education*, *6,* 1841-1851. http://dx.doi.org/10.4236/ce.2015.617188

[70] Popov, V., Brinkman, D., Biemans, H. J. A., Mulder, M., Kuznetsov, A., &Noroozi, O. (2012). Multicultural student group work in higher education. *International Journal of Intercultural Relations, 36,* 302–317. https://doi.org/10.1016/j.ijintrel.2011.09.004

[71] Shimazoe, J., & Aldrich, H. (2010). Group work can be gratifying: Understanding & overcoming resistance to cooperative learning. *College Teaching, 58*(2)*,* 52–57. https://doi.org/10.1080/87567550903418594

[72] Slavin, R. E., (1990[a]). *Cooperative Learning: Theory, Research and Practice*. Center for Research on Elementary and Middle Schools, John Hopkins University. Englewood Cliffs.

[73] Slavin, R. E., (1990[b]). Comprehensive Cooperative Learning Models: Embedding Cooperative Learning in the Curriculum and the School. In S., Sharan (ed), *Cooperative Learning: Theory and Research* (pp. 261-284).   Praeger

[74] Smith, M., Heck, K., & Worker, S. (2012). 4-H boosts youth scientific literacy with ANR water education curriculum. *California Agriculture*, *66*(4), 158–163. https://doi.org/10.3733/ca.v066n04p158

[75] Stasinos, D., (2015). *Psychology of speech and language*. (Revised edition). Gutenberg. (In Greek)

[76] Tan, C. (2017) Constructivism and pedagogical reform in China: issues and challenges, Globalisation, *Societies and Education*, *15*(2), 238-247. https://doi.org/10.1080/14767724.2015.1105737

[77] Tanaka, M. (2022). Motivation, self-construal, and gender in project-based learning. *Innovation in Language Learning and Teaching,* 1-15, https://doi.org/10.1080/17501229.2022.2043870

[78] Tarus, J. K., Gichoya, D., &Muumbo, A. (2015*).* Challenges of Implementing E-Learning in Kenya: A Case of Kenyan Public Universities*. International Review of Research in Open and Distance Learning*, *16*(1), 1–10. https://doi.org/10.19173/irrodl.v16i1.1816

[79] Tint, S. S. &Nyunt, E. E. (2015). Collaborative Learning with Think -Pair - Share Technique. *Computer Applications: An International Journal*2(1), https://doi.org/10.5121/CAIJ.2015.2101

[80] Tsai, C. C., & Chai, C. S. (2012). The "third"-order barrier for technology-integration instruction: Implications for teacher education. *Australasian Journal of Educational Technology, 28(*6). https://doi.org/10.14742/ajet.810

[81] United Nations. (2022, August 5). *World Water Day 22 March*. https://www.un.org/en/observances/water-day.

[82] UNESCO. (2015). ICT in Education in Sub-Saharan Africa: a comparative analysis of basic e-readiness in schools, (25). http://dx.doi.org/10.15220/978-92-9189-178-8-en

[83] UNESCO. (2017). *Water management curricula using ecohydrology and integrated water resources management*, Volume 1. https://unesdoc.unesco.org/ark:/48223/pf0000260662

[84] UNESCO. (2021). *Water education for climate resilience in Asia and the Pacific: a regional curriculum*. https://unesdoc.unesco.org/ark:/48223/pf0000380263.locale=en

[85] van Jaarsveldt, L. C., & Wessels, J. S. (2015). Information technology competence in undergraduate Public Administration curricula at South African universities. *International Review of Administrative Sciences, 81*(2), 412–429. https://doi.org/10.1177/0020852314546584

[86] Webb, N. M., Nemer, K. M., & Zuniga, S. (2002). Short circuits or superconductors? Effects of group composition on high-achieving students' science assessment performance. *American Educational Research Journal, 39,* 943–989.   http://www.jstor.org/stable/3202451

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