BIODIVERSITY EDUCATION: FROM HANDBOOK TO ACTION

Aybüke Zeliha Özdemir

Ms Student, Middle East Technical University, aybuke.ozdemir@metu.edu.tr, 0009-0005-7681-243X

Chapter 1.

Introduction

Ecological unbalance and significant biodiversity loss resulted from centuries of exploitation of the ecosystem without any specific type of protection (Setti & Azeiteiro, 2016). Meanwhile, the loss of biodiversity has been highlighted as a significant worldwide environmental issue requiring acknowledgment together with other serious challenges. Thus, preserving biodiversity has been recognized as an essential step toward sustainability (Gayford,2000) To protect biodiversity, humanity must start with the basics - educating students and future generations. Biodiversity education focuses on organisms and the environments they inhabit. It bridges key concepts from education for sustainable development and environmental education, including conservation, local action, and the ability of ecosystems to sustain life in a balanced way. Biodiversity education comprehends both a scientific and a spiritual, cultural, and ethical perspective on the universe (Barker & Elliot, 2000). According to Kassas, (2002), to achieve biodiversity in education, curriculum developments should consider the following three perspectives: First one is that understanding ecological literacy, means that the living beings interaction with the human in all ecosystems. The second one is that developing a personal connection to nature is essential for working with biodiversity. Lastly ,the need to focus on compassion. The last one is that, in order to contribute to society, national information about the values including biodiversity must be conveyed. Both individuals and civil society organizations must be open to taking part in and contributing to conservation action projects . In this area, media-based biodiversity education programs integrate university courses and school curriculum. Furthermore , for both environmental education and biodiversity education there should be two goals compatible with the curriculum planning. The students—their drive, aptitude, and cultural background; and the instructors—their level of training, drive, personnel, and institutional support (Kassas, 2002). In addition, to ensure that students develop a strong ability to identify biodiversity, it is essential to provide children with early, multisensory

experiences of biodiversity in different habitats. These experiences should be engaging and stimulating, encouraging them to discuss their encounters with various creatures in nature and to use their previous experiences with biodiversity as a foundation for further learning (Helldén & Helldén, 2008). In most curricula worldwide biodiversity education is integrated in scientific subjects. In his study with science teachers, Gayford, (2000) emphasized that teachers proved to be invested in the biodiversity topic and capable of providing examples and comprehensive explanations. However, many teachers stated that they felt inadequately equipped regarding methodological expertise and they said, if there would be collaborations with the other teachers in other disciplines, they could teach this topic more holistically. In this regard, as part of the Erasmus+ United in Biodiversity project (2023 - 2025)a handbook which includes sciences, technology, engineering, arts, and maths subjects integration with biodiversity education has been created, and the following section examined.

Chapter 2.

General Information of the Handbook:

In order to accomplish the handbook, the partnership which is co-funded by the European Union, has generated a number of tools and materials to help European STEAM (sciences, technology, engineering, arts, and maths) teachers comprehend the problems surrounding biodiversity loss on a local, regional, national, and worldwide scale. The handbook includes 25 lesson plans. Climate change, habitat fragmentation, pollution, wildlife trafficking, and invasive species are the five biodiversity topics of the project, and each of these are categorized by the five STEAM areas. Furthermore, in the guideline of the handbook, it is emphasized that every lesson plan includes students' active interaction with the key ideas of the selected STEAM topic, regardless of their backgrounds or skill levels. It is suggested that groups can be purposefully divided into students with different skills and strengths in order to foster inclusivity and teamwork hence, most of the lesson plans include group activity. Thus, students may help and learn from one another simply due to this arrangement, which promotes peer learning opportunities. Moreover, it is highlighted that teachers should keep a close eye on student engagement throughout the lesson to ensure that everyone has an equal chance to be engaged and contribute.

Chapter 3.

Features & Suggestions:

In the structure part of all lesson plans, the minutes to implement the lesson plan is given thus, it provides vivid clarification to teachers throughout the lesson. Comprehensive lesson plans are available across all subjects for each of the five key biodiversity topics. The lesson plans cover the following elements: lesson focus and goals, learning objectives, materials, lesson structure and activities, and assessment. In arts lesson plans, example outputs of the creation and useful resource links are provided. Moreover, only in arts subjects, qualitative assessment has been used.

In some of the lesson plans, the range of the grade level of students is quite high. For instance, 9^{th} to 14^{th} grade gap is inconvenient, however, an explanation of how to integrate it to different levels of students is included in lesson plan structures which gives insights to the teachers. Thus, you should read the handbook till the end where you can see an appropriate level for your lecture. .

In the guideline, the handbook suggests equitable participation of students should be done by the teacher and there exists an inclusion and diversity checklist (page 6) for teachers which is quite beneficial. Differentiation is one of the crucial things during the lessons and most teachers need support in this area.Since the primary goal of the handbook is to integrate biodiversity into STEAM education, it could be further improved by including detailed suggestions for differentiation within each lesson plan.

Learning objectives mainly explains the biodiversity implementations which are expected. However, the teachers who will use this lesson plan may not have the specific biodiversity integrated curriculum. Therefore, further clarification of the learning objectives for the different subjects, such as maths or science, could be provided in the handbook.

Learning objectives and assessment tools are given in every plan which is one of the fundamentals. Especially for assessment, student' response as an example is given (page 7), this is very helpful for teachers. Additionally, if the teachers want to do quantitative

assessment it is given in the handbook as points to each learning objectives. However, it was not initiated in the maths lesson since most of the students' responses may not be displaying their true knowledge, a more comprehensive assessment part can be implemented during the actual lesson by the teacher.

Chapter 4.

Recommendations for Policymakers, Educational Institutions and Professionals

When the UNESCO' Education for Sustainable Development (ESD) goals are examined, it is highlighted that ESD should not be perceived primarily as an alternative category of education or as a separate , standalone subject. At educational institutions, it should be an essential component of the teaching and learning of the main subjects. Moreover, the learning objectives, instructional methods, and assessment strategies should be meticulously integrated to mutually reinforce one another (UNESCO, 2017). Hence to be able to implement this, policymakers should take action, governments should provide systematic integration of biodiversity and sustainability teaching across all educational levels. Achieving sustainable development in practice requires political actions that can change the present, advance autonomy and equity, and reintegrate people with the natural world while taking into account the interdependencies between the social, socioeconomic, and cultural domains (Setti & Azeiteiro, 2016). Thus it is believed that there should be implementation in national teacher training institutions. These programs should incorporate biodiversity education, providing educators with scientific knowledge and pedagogical techniques for addressing diverse ecological challenges. For the teachers who are already working in the schools, governments should provide biodiversity education training programs and certifications. In order to foster unity and prevent disjointed efforts, the ministries of education, the environment, and agriculture should integrate their biodiversity education policies. Additionally, to be able to remain informed about emerging ecological challenges, professionals could engage in lifelong learning. For instance, it is highlighted that effective education of climate change may incorporate all of the effective teaching strategies, including field excursions, flipped classrooms, worksheets, simulations, data collection, role plays, and community service projects (Monroe et. al, 2017). Further they emphasize the idea of connecting biodiversity to daily life can enhance the learning and it becomes more

relevant and meaningful. Hence, it may be beneficial to present biodiversity issues in a practical, local context to help people recognize broader global issues and create projects that enable citizens to participate actively rather than just as passive information consumers. In order to accomplish this, not only policymakers or educational institutions or non-profit organizations' professionals contribute may not be enough, they could be in collaboration to impact nationally. If society desires it, a better and more sustainable nation may soon become a reality (Klautau de Araújo, 2016). Therefore, efforts should be integrated at the institutional, professional, and policy levels to improve biodiversity education. These suggestions, when methodically put into practice, promote ecological literacy, enable everyone to reflect on the role of environmental advocates, and advance global sustainability objectives.

References:

Chris Gayford (2000) Biodiversity Education: A teacher's perspective, *Environmental Education Research, 6*:4, 347-361, DOI: 10.1080/713664696

Helldén, G., & Helldén, S. (2008). Students' early experiences of biodiversity and education for a sustainable future. *Nordina: Nordic studies in science education*, *4*(2), 123-131.

Kassas, M. (2002). Environmental education: biodiversity. *Environmentalist,* 22(4), 345-351.

Klautau de Araújo, T. L. (2016). Public policies and education for biodiversity: Brazilian challenges in a new global context. In *Biodiversity and education for sustainable development* (pp. 219-235). Cham: Springer International Publishing.

Monroe, M. C., Plate, R. R., Oxarart, A., Bowers, A., & Chaves, W. A. (2017). Identifying effective climate change education strategies: a systematic review of the research. *Environmental Education Research*, *25*(6), 791–812. https://doi.org/10.1080/13504622.2017.1360842

Setti, A. F. F., & Azeiteiro, U. M. (2016). Education for sustainable development in Brazil: Challenges for inclusive, differentiated and multicultural education. In P. Castro, U. M.

Azeiteiro, P. Bacelar-Nicolau, W. Leal Filho, & A. M. Azul (Eds.), Biodiversity and education for sustainable development (pp. 237-248). Springer. https://doi.org/10.1007/978-3-319-32318-3_5

Susan Barker & Paul Elliott (2000) Planning a skills-based resource for biodiversity education, 34:3, 123-127, DOI: 10.1080/00219266.2000.9655701

UNESCO. (2017). *Education for Sustainable Development Goals: Learning objectives*. UNESCO Publishing.

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

Co-funded by
the European Union