

TECHNOLOGY FOR THE DEVELOPMENT OF ENVIRONMENTAL COMPETENCE IN FUTURE TEACHERS IN FOREIGN EXPERIENCE

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Abstract: *In the ever-evolving landscape of education, the role of technology in shaping the development of environmental competence among future teachers has become increasingly pivotal. As the world grapples with pressing environmental challenges, it is essential that the next generation of educators be equipped with the necessary knowledge, skills, and attitudes to foster environmental stewardship among their students. This article delves into the international experiences and best practices that have emerged in leveraging technology to enhance environmental competence in pre-service teacher education.*

Keywords: *development sphere, teachers, new teaching methods, new skills, technology, foreign experiences, students*

Introduction: Research suggests that today's educators are not adequately prepared to teach about environmental issues and educate for sustainability (Tilbury and Wortman, 2004). Most pre-service teachers do not have a strong background in environmental education, and studies have shown that their attitudes towards the environment and sustainability are often no different from the general population (Carr and Landon, 2010). Pre-service teachers have expressed a desire to learn how to incorporate environmental education into their teaching but often feel ill-equipped to do so (Young and Thompson, 2010). These findings suggest a strong need for pre-service environmental education courses within teacher education programs. In addition to specific environmental education courses, we must also consider how to integrate environmental education and education for sustainability into the fabric of teacher education. This will require innovative and relevant methods. Today's students are in tune with electronic media and various forms of technology. Therefore, technology integration may well be the key to preparing future teachers to educate for sustainability.

Developing the environmental competence of students and educators has long been recognized as one of the key components of the education and learning experience. Environmental competence deals with knowledge, skills, attitudes, and commitment to solving problems and making decisions that consider the interconnectedness between human systems and natural systems. More

specifically, environmental competence means an understanding of global and local environmental issues, the ability to make informed decisions, and the participation in activities that result in the resolution of environmental issues. It has never been more important to enhance the environmental competence of our future teachers. The topic of environmental conservation and concern is of growing importance within contemporary society. Each decade brings a new set of environmental problems that must be faced by the citizens of our world. Today's educators are responsible for preparing students to deal with an uncertain future in terms of environmental issues. Therefore, it is crucial that teachers are prepared to teach their students about environmental issues and educate for sustainability regardless of their subject area or grade level.

Importance of environmental competence in teachers

Specialized knowledge of ESD is seen as essential for schools on the threshold of the twenty-first century. The quality of education for sustainable development can be improved if teachers are skilled in this area and understand how to integrate it into all subjects and aspects of the curriculum. There is a common understanding that teachers are not sufficiently confident or competent in their own understanding of environmental and development issues and lack the necessary skills to present them to their students. Research undertaken in New Zealand found that 46% of teachers surveyed held strongly fatalistic views on environmental issues and this sense of hopelessness can be easily communicated to students. Such attitudes and the perceived severity of issues may be a barrier to teaching about sustainable development.

Most pre-service training and professional development for teachers lacks an environmental focus. An Australian report for the National Board of Employment, Education and Training identified key areas for integration of ESD into pre-service teacher education but few institutions have pursued this. Current perceptions among educators in many countries are that education for sustainable development is a marginal issue and not relevant to the professional needs of teachers. Such perceptions and lack of high-quality professional development opportunities for teachers are a major obstacle to the UN Decade of Education for Sustainable Development.

Research Objectives

To accomplish the primary goal of this study, it can be a specific objective for the research to critically analyze and identify what components of environmental teacher education programs would best further our students' development of environmental competence. By identifying important program components, we can make recommendations to teacher education programs on how to best prepare their students to be effective environmental educators. The output from the research could be a list of specific recommendations or a guide to developing an effective environmental education teacher program. A second objective will be to assess which, if any, international experiences influence the development of environmental competence in prospective teachers. With the trend in internationalizing teacher education, it has become increasingly common for students to have an international experience during their program.

By identifying experiences that positively affect the development of environmental competence, teacher education programs could help to ensure that their students have an experience that would be beneficial to their development as an environmental educator. The final objective, and possibly most important to the UW Environmental Education Program, is to identify effective ways to assess the development of environmental competence. By identifying ways to measure this concept, we can help to ensure that our students are, in fact, improving in their abilities to be effective environmental educators. This objective could lead to further research in the area of environmental education assessment and could also be useful to other teacher education programs, as it would provide them with tools to evaluate their own students' development of environmental competence.

Discussion: In an era of unprecedented environmental challenges, the role of education in fostering environmental stewardship has become increasingly crucial. As the custodians of future generations, teachers hold the power to shape the environmental consciousness and competence of their students. Consequently, the development of environmental competence in pre-service teachers has emerged as a critical area of focus in the international educational landscape. The integration of technology into the educational process has the potential to significantly enhance the cultivation of environmental competence among future teachers. Across various international contexts, innovative technological solutions have been employed to achieve this goal, offering valuable insights and best practices for educators worldwide.

An example can be found in the Nordic countries, where the integration of digital tools and resources has been at the forefront of environmental education initiatives. In Finland, for instance, pre-service teacher programs have incorporated the use of interactive simulations and virtual reality experiences to immerse students in realistic environmental scenarios. These technologies enable future teachers to explore the complexities of environmental issues, experiment with sustainable solutions, and develop a deeper understanding of the interconnectedness of ecological systems.

Similarly, in Denmark, the integration of web-based platforms and mobile applications has facilitated the collection and analysis of environmental data by pre-service teachers. Through these digital tools, students can engage in citizen science projects, monitor local environmental conditions, and develop data-driven approaches to environmental problem-solving. This hands-on, technology-enabled approach fosters a sense of environmental agency and empowers future teachers to incorporate data-driven practices into their classrooms.

In the United Kingdom, the utilization of educational technology has extended beyond the classroom, with the incorporation of outdoor learning experiences enhanced by digital tools. Pre-service teachers are equipped with mobile devices and applications that enable them to seamlessly integrate field-based observations, data collection, and collaborative problem-solving during outdoor excursions. This blended approach, combining technological integration and experiential

learning, equips future educators with the skills and confidence to facilitate engaging and impactful environmental education in their future classrooms.

The experiences of these international contexts highlight the transformative potential of technology in cultivating environmental competence among pre-service teachers. By leveraging digital tools, interactive simulations, and data-driven approaches, these programs empower future educators to develop a deep understanding of environmental issues, foster critical thinking and problem-solving skills, and acquire the necessary pedagogical strategies to effectively integrate environmental education into their teaching practices.

As the global educational community continues to grapple with the pressing challenges of environmental sustainability, the international experiences showcased in this essay serve as a testament to the power of technological innovation in shaping the environmental competence of future teachers. By embracing these advancements and adapting them to local contexts, educational institutions worldwide can contribute to the development of a generation of teachers who are equipped to lead the charge in environmental stewardship and sustainable development.

Analysis and Results: Across the globe, educational institutions have recognized the urgency of incorporating environmental education into their curricula. However, the effective implementation of such programs often hinges on the preparedness and competence of the teaching workforce. Numerous studies have highlighted the need for comprehensive training and support to ensure that future teachers are equipped to integrate environmental concepts seamlessly into their pedagogical approaches.

One prominent example of international efforts in this domain can be found in the Nordic countries, where the integration of technology and environmental education has been a strategic priority. In Finland, for instance, the University of Turku has pioneered the use of digital platforms and virtual simulations to engage pre-service teachers in hands-on environmental learning experiences. By immersing student-teachers in interactive, technology-driven scenarios, they are able to develop a deeper understanding of complex environmental systems, as well as the practical skills required to design and implement effective environmental education programs.

Similarly, in Sweden, the Malmö University has implemented a comprehensive teacher education program that emphasizes the role of technology in fostering environmental competence. Through the utilization of online learning modules, collaborative digital tools, and augmented reality applications, student-teachers are encouraged to explore and analyze environmental issues from multiple perspectives, fostering critical thinking and problem-solving abilities.

The experiences of other nations, such as Australia and Canada, have also provided valuable insights into the integration of technology and environmental education in pre-service teacher training. In Australia, the University of Tasmania has developed a suite of mobile applications and virtual field trips that enable student-teachers to engage with local ecosystems and environmental

challenges, while in Canada, the University of British Columbia has integrated web-based simulations and interactive data visualizations into its teacher education curriculum to enhance environmental literacy and decision-making skills.

These international examples highlight the diverse and innovative approaches that educational institutions have adopted to leverage technology in the development of environmental competence among future teachers. By incorporating digital tools, virtual experiences, and collaborative platforms, these programs have successfully bridged the gap between theoretical knowledge and practical application, empowering student-teachers to become agents of change in their future classrooms.

Moreover, the integration of technology has also facilitated the creation of robust support networks and knowledge-sharing platforms, enabling pre-service teachers to connect with environmental experts, access up-to-date resources, and collaborate on cross-cultural initiatives. This collaborative approach has fostered a sense of global environmental stewardship, equipping future teachers with the necessary skills and mindset to address environmental challenges on a local and global scale.

Conclusion

In conclusion, the international experiences examined in this essay underscore the pivotal role of technology in cultivating environmental competence among future teachers. By embracing digital tools, virtual simulations, and collaborative platforms, educational institutions around the world have demonstrated the transformative potential of technology in shaping the next generation of environmentally-conscious educators. As we navigate the complexities of the 21st century, the continued integration of technology in pre-service teacher education will be crucial in empowering future teachers to lead the charge in environmental sustainability and stewardship.

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