


Chapter 4

From Disciplinary to Convergence Approaches in Science Teaching

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ABSTRACT

This chapter provides a dynamic approach to preparing science teachers for practice. It includes two parts: One is related to defining the key concepts of discipline, intradisciplinary, multidisciplinary, cross-disciplinary, interdisciplinary, transdisciplinary, and convergence approaches. Another is related to their practice in science. Thus, readers differ to first all key concepts from disciplinary to convergent approaches. This chapter will give inspiration to science teachers as they move from study into the classroom. This chapter aims to show a transdisciplinary approach to teach science to create a classroom for engagement with scientific thinking, problem-based approach in real world context. The authors also present some examples related to interdisciplinary STEM project and transdisciplinary STEM project. Although all these subjects are categorized under a single discipline, the science course consists of interdisciplinary studies encompassing physics, chemistry, and biology.

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INTRODUCTION

The International Baccalaureate - IB program is based in Switzerland and is a part of high school education in the world's leading countries. For instance, the IB program has been offered in the UK and the US since 1971.

The IB program has also been available in Türkiye since 1994. The IB program in Türkiye is offered in English and Turkish. For schools in Türkiye to offer the IB program, they must meet certain requirements and be authorized by the International Baccalaureate Organization. There are 90 authorized IB schools in Türkiye, 56 of which are authorized to offer the IB Diploma program. Some of the high schools that have been offering the IB program: Balıkesir Açı College, Bilkent Laboratory and International School, Private Ankara ABC Schools, Nesibe Aydın Educational Institutions (Ankara), Bodrum Private Marmara College, Private Bilkent High School, Gazi University Anatolian High School, TED Ankara College, Üsküdar American High School, Tev İnanc Türkeş High School for Gifted Students. While an IB diploma can provide direct access to universities without the need for entrance exams in other countries, in Türkiye IB diploma offers scholarship opportunities or course exemptions at universities. IB graduates are also well-prepared for university and are often sought after by employers. Some of the private universities in Türkiye that recognize the IB diploma include: Beykent University, Bilgi University, Koç University, Özyeğin University, and Sabancı University. IB diploma programs are also recognized by prestigious higher education institutions abroad (IB Diploması Veren Liseler, 2024).

“IB Mission Statement is as follows: International Baccalaureate (IB) aims to raise inquisitive, knowledgeable and sensitive young people who will help create a better and more peaceful world with intercultural understanding and respect. Towards this end, the organization works with schools, governments, and international organizations to develop seminal international education programs and rigorous evaluation methods. These programs encourage students around the world to become active, compassionate individuals who understand that other people, with their differences, can be right, and who believe in lifelong learning.” (Batıkent ABC Kindergarten, 2024)

One of the IB schools, Institut Montana Zugerberg in Switzerland applies transdisciplinary learning in their school setting (Institut Montana Zugerberg, 2024). The school presents the IB Diploma implementing transdisciplinary learning successfully into the curriculum of the elementary school. The curriculum of the Bilingual Elementary School has 6 themes, and all the subjects are linked around each theme. By maintaining consistent themes across all grades, teachers can ensure consistency and track progress over the years. The interactive and imaginative lessons encourage collaboration. Tablets are used by elementary school students to develop

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