


Chapter 4

The Utilization of Digital Educational Content in the Teaching of Sciences in Elementary School as Impactful Learning Experiences

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ABSTRACT

This chapter deals with the importance of teaching science in elementary school, investigates the readiness and self-efficacy of teachers to teach it, approaches the importance of professional development of teachers and their participation in targeted professional development programs regarding the teaching of science, refers to the modern didactic approaches to teaching science in elementary school focusing on the utilization of digital educational content, explores the different role that this reserves for the teacher and the student, and highlights through specific research and examples the impactful learning experiences and the benefits that this offers in the learning process of the elementary school.

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Science concerns the study, interpretation, and understanding of the laws that govern the natural world, the study of organisms and processes that cause changes in the environment, and includes the subjects of Physics, Chemistry, and Biology. Hence, the teaching approaches chosen by the teacher must familiarize the student with scientific literacy and with inquiry-based learning methods and practices, which contribute to the cultivation of scientific thinking skills, and the discovery of knowledge. These activities are effective when they involve students in actions that are meaningful to them, activate their imagination, curiosity, and interest, entertain and satisfy them, motivate them to act independently, and ultimately train them to act responsibly in matters concerning daily life (Bryce et al., 2011).

The construction of new knowledge is closely related to already existing knowledge which forms the basis on which the new knowledge will be structured (Ausubel, 1968). That is why the “ideas” that students bring to school, even from kindergarten, should be used, even if they are wrong, with the ultimate goal of their educational transformation. In addition, students form representations based on their everyday experiences of the phenomena of the natural world, and it is often the case that concepts, as they perceive them, display characteristics that are incompatible with scientific knowledge (Kampeza & Ravanis, 2012). In this frame, the teachers choose educational materials, teaching practices, and activities that allow the students to be able to act in relation to their previous knowledge and themselves to understand their misconceptions, in order to be persuaded to transform them, compliment them, or replace through processes of cognitive conflict (Kampeza & Ravanis, 2012; Tzovla & Kedraka, 2020a). Teaching approaches such as the project method, inquiry-based learning, cooperative teaching, the utilization of Digital Technologies, and experiential learning (National Research Council, 2012; Tzovla & Kedraka, 2020), contribute to this by reserve the student an active role and making him a participant in the learning process, offering him impactful learning experiences. In this frame, students themselves can control variables, measure, explore options, make experiments, implement ideas, manage situations, take actions, and decide and determine outcomes. These impactful learning experiences have a double benefit for the students both because they give them the role of knowledge producers, and because through them they cultivate observation, creativity, inventiveness, analytical and combinatorial thinking, problem-solving, drawing conclusions, and reflection.

TEACHERS AND SCIENCE

Davis et al. (2006) in their literature review of research on the challenges faced by science pre-service students and newcomers’ teachers advocate that they have a low understanding of science. Furthermore, they note that the negative experiences

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