This paper presents a course for pre-service teachers at School of Primary Education in the Aristotle University of Thessaloniki. The course is titled Digital applications for Primary Education and aims to introduce pre-service teachers in understanding and adopting digital artifacts, media, and technologies in their educational practice in the context of STEM. Preservice teachers are encouraged to develop vital 21st century skills, which include critical thinking, teamwork, problem solving, creativity, analytical reasoning, and communication into the emerging digital world and the growing number of applications developed continuously on the World Wide Web. Pre-service teachers must be able to function and collaborate in these “brave new worlds.” These new digital and web-based learning environments provide pre-service teachers the opportunity to acquire up-to-date digital skills and competencies to create and deliver a functional and effective new school environment adapted to the new digital reality. In this new setting, their future pupils will function as digital natives. Moreover, Internet can deliver “any” digital education applications “anywhere” and at “anytime.” This approach transforms the contemporary educational model into a form of a web-based learning community that helps educators and pre-service teachers to learn from each other, to cooperate and deliver their knowledge and projects. During the course, pre-service teachers’ digital apprenticeship implies science, geography, and mathematics interwoven with technology to foster creative learning, and critical thinking, making them able to take cognitive risks, commit to experiential learning and focus on problem solving. To achieve this goal, instruction includes web-based learning in science, mathematics, and geography, on-line applications, and digital educational productions responding to the need for an integrative STEM Education. The course prepares pre-service teachers to use digital technologies in order to teach science, geography, and mathematics. There is a variety of topics for all the subjects such as the state of the art for science, geography, and mathematics on the internet, digital narratives, educational channels on YouTube, micromovies & slowmation movies, educational wikis, atlaswiki, moocs perspectives, the use of digital technologies in mathematics teaching and designing activities with them, the use of online geospatial technology and cloud mapping applications. Pre-service teachers create digital narratives using the technique of slowmation (2 photographs per second) and animate science concepts and phenomena through inspired heroes and their adventures in scripts that they develop re-contextualizing science teaching and learning. Simplifying the complicated animation technique, the slowmation narratives contribute to the comprehension of abstract science concepts as they acquire image and sound developed by non-experts. Pre-service teachers use Dynamic Geometry Software such as Geogebra which enables them to dynamically drag an object by manipulating its graphical representation directly. They also use Spreadsheet
software (such as Excel) whose benefits are related to the symbolic language and the methods for solving mathematical problems. Finally, they use expressive media such as Logo-based microworlds using programming language as a new form of expressing mathematical ideas. Pre-service teachers are introduced to geographic software (OpenStreetMap, QGIS, gvSIG, ArcGIS Online, etc) to create digital maps and use them in geography, mathematics, history, etc. Finally pre-service teachers discuss web technologies (1,2,3...), semantic web, and reflect on the use of technology, especially today's web technologies, web-based learning environments, digital environments and applications in contemporary educational practice.