Chapter 46

Tablets in Primary Schools:
Results of a Study for Teaching the Human Organ Systems

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ABSTRACT

This article presents the results of a short project in which tablets were used for teaching the respiratory, circulatory, and digestive systems to 162 sixth-grade primary school students who were divided into three groups. The first group was taught conventionally using a textbook, while in the second a constructivist teaching method was applied and the teachers actively participated in the process. The third group was also taught using the same constructivist teaching method, but the instruction was technologically enhanced with tablets and an application with augmented reality features. Data was collected by means of evaluation sheets and a questionnaire. The results indicated that students in the third group outperformed students in the other two groups. As for students' misconceptions, the only notable difference was between the third and first group. These results can be attributed to students' strong positive attitude towards the use of tablets, motivation, and enjoyment, as well as to the teaching method. The study's implications are also discussed.

INTRODUCTION

The teaching of science at primary school level is a rather challenging task given that quite a lot of concepts related to science are the source of several pupils' problems (Forsthuber, Motiejunaite, & de Almeida-Coutinho, 2011). For example, the human anatomy and the systems of the human body, are subjects in which pupils have inadequate knowledge level and poor performance, while misconceptions are common (e.g., Carvalho, Silva, Clément &, 2003). On the other hand, more than a few research projects have demonstrated that contemporary instructional methods together with various Information and Communication Technology (ICT) tools have a significant positive impact on pupils' understanding of complex scientific phenomena. Alas, teachers still continue to apply conventional teaching methods, as

they consider them more effective (Wilkinson & Barter, 2016). Moreover, teachers not only find it hard to use ICT tools, but they also regard ICT enhanced instruction quite difficult to implement (Zaranis, Kalogiannakis, & Papadakis, 2013).

Due to the constant technological developments, new ICT tools have emerged with interesting educational potential. In recent years, a noteworthy number of studies examined the educational uses of mobile devices (i.e., mobile phones and tablets). Coming to the teaching of science, most of the above studies demonstrated that the use of such devices had a positive impact on pupils' learning, collaboration, motivation, and creativity (e.g., Wilkinson & Barter, 2016). Also, a number of studies examined the use of mobile devices together with Augmented Reality (AR) applications (e.g., Fokides & Atsikpasi, 2017), which also present a very interesting educational potential.

The most significant limitations of the research to date, regarding the use of mobile devices for teaching science at primary level, are the small sample sizes and the limited timeframes. This led some to support the view that we lack thorough empirical studies (Dhir, Gahwaji, & Nyman, 2013) and robust evidence of the exact impact (positive or negative) of mobile devices on pupils' learning (e.g., Clarke & Svanaes, 2014). It seems that more research is needed in order to develop an appropriate pedagogy which can support the use of such devices in schools (Clarke & Svanaes, 2014; Dhir et al., 2013). Moreover, the use of mobile devices for teaching the human anatomy to primary school pupils is sparse.

In the light of the above, it was decided to examine whether the use of tablets can have an impact on pupils' knowledge and ease their misconceptions for certain human organ systems, namely the circulatory, digestive, and respiratory ones. Towards this end, a short project was designed and implemented, having a target group of sixth-grade primary school pupils. In the sections to follow, a brief review of the literature regarding the teaching of the above systems is presented, followed by the literature review regarding the educational use of tablets and AR applications. Next, the research rationale, methodology, and the results analyses are presented. Subsequently, the results are discussed and the conclusion completes the work.

BACKGROUND

The Digestive, Circulatory, and Respiratory Systems as Teaching/Learning Subjects

The human anatomy is a subject which is included, in primary level, in many educational systems. For example, in Greece and in the UK, it is taught in the sixth grade (Hellenic Ministry of Education, 2011; UK Department of Education, 2015), while in Sweden, the relevant modules are included in grades four to six (Swedish National Agency for Education, 2011). Then again, the teaching of this subject is challenging since the relevant literature suggested that pupils' understanding of several biological phenomena and functions is problematic. This holds true for most human organs and/or systems, including the respiratory (Tracana, Varanda, Viveiros, & Carvalho, 2012), the circulatory (Gatt & Saliba, 2006), and the digestive (Garcia-Barros, Martínez-Losada, & Garrido, 2011) ones. Moreover, pupils have trouble understanding how the various organs and/or systems interact with each other (Arnaudin & Mintzes, 1985), as they consider them independent components of the body (Reiss & Tunnicliffe, 2001).

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