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ELECTRODERMAL ACTIVITY APPLIED IN EDUCATION: AN INTEGRATIVE LITERATURE REVIEW

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Abstract: Electrodermal activity (EDA) is a method to investigate psychophysiological phenomena with applicability in several areas of research, and research on the use of the EDA device in education has significantly addressed student engagement when exposed to learning environments. This work aims to present an analysis of the applicability of the electrodermal activity device in the educational environment. For this analysis, we examined the effectiveness of using the electrodermal activity device in teaching/learning environments, as well as exploring methodologies frequently used in research to measure student engagement with the aid of such a device. The research method used is the integrative literature review, as the review is necessary to compile existing evidence on the use of electrodermal activity in teaching environments. It is concluded that the applications of the electrodermal activity device in teaching/learning environments are assertive, whose objective is to measure and compare the intensity of students' brain oscillations both in the traditional teaching method and in the active learning method, based on the assumption that the greater the student's brain oscillation, the better their engagement.

Keywords: Electrodermal activity. Traditional teaching. active learning.

INTRODUCTION

Electrodermal activity (EDA), also known as galvanic skin response (GSR), has the function of capturing data that does not require intervention or laboratory setup. The galvanic skin response can be mapped through sympathetic neural activity that is responsible for the involuntary actions of humans, in addition, the main utility of electrodermal activity measurements is to assess stress levels that lead to sleep disorders, heart disease, among others (MALATHI et al., 2018).

In general terms, the EDA is a method to investigate psychophysiological phenomena with applicability in several areas of research, for example, in the area of Education. Research on the use of the EDA device in education has significantly addressed student engagement when exposed to learning environments. Lee et al. (2020) demonstrated the potential of using EDA in a learning environment. To this end, they developed a classification model to identify anxiety subtypes and EDA-based machine learning models to predict nonverbal behaviors.

DiLascio et al. (2018) showed in their research that the EDA device was used to monitor students' emotional engagement in classrooms, in addition to proposing the use of resources to capture students' momentary engagement and overall arousal. According to Villanueva et al. (2018), the use of EDA as a tool in educational research can allow researchers to explore student engagement and emotions closer to real time in classrooms, this way, it is possible to improve the understanding of how students respond, through engagement, to learning activities during classes.

In short, this study aims to present an analysis of the applicability of the electrodermal activity device in the educational environment. To carry out the analysis, we examine the effectiveness of using the electrodermal activity device in teaching/learning environments, also exploring methodologies frequently used in research to measure student engagement with the aid of such a device.

METHOD

The research method was an integrative literature review to identify how the electrodermal activity device has been used in the education field. This integrative review is based on the study that Thomé et al. (2016) addressed in their research, dividing it

into eight stages through the planning and problem formulation phases; literature search; review data; quality assessment; data analysis and synthesis; interpretation; presentation of results and review update. Initially, the research considered only the term "Electrodermal Activity" combined with "classroom" and "active learning", but the number of articles was very limited, so, in order to expand the search, the terms "education" and "students" were included. ".

The articles were selected through content analysis in the Scopus, Web of Science and Google Scholar databases, and search strings were used to eliminate duplicate articles, in addition, the articles were filtered by reading the title, abstract, introduction and conclusion, in order to verify which articles were most relevant to seek information on student engagement, motivation, performance and engagement in the classroom.

In this integrative literature review, the inclusion of articles published in the last four years in the Scopus, Web of Science and Google Scholar databases was considered, that is, articles with a publication date from 2018 to 2021 were used, in addition, it is worth remembering that the articles included in the integrative literature review describe the different applications of the electrodermal activity device, with emphasis on education.

RESULTS AND DISCUSSIONS

The results of this review present an analysis of the applicability of the electrodermal activity device in the educational environment, as in the article by Di Lascio et al. (2018) on the discrete assessment of students' emotional engagement, which differentiate engaged from non-engaged students using electrodermal activity sensors, in addition, use various resources to characterize different components of emotional engagement, it is highlighted that the effects of this research

help to understand the general physiological arousal, physiological synchrony, and momentary engagement between teachers and students during the lectures reported in this article.

Furthermore, we also present the study by Leslie et al. (2019) who developed a protocol for collecting data on the electrodermal activity of students in a course by movement, seasonal temperature and sudden changes in mood, in order to compare the data in a given sample. Furthermore, it is worth mentioning that Villanueva et al. (2018), in their study, suggested that the excitation tendencies of electrodermal activity varied according to the type of instruction and confirmed that physiology in the form of skin conductance is present in classroom activities by invoking emotions.

Likewise, Christensen et al. (2018) reveal in their research that some students prefer isolation, some prefer collaboration, some prefer an instructor focus, and some prefer to focus on interaction with other students. Finally, the contribution made by this review is to present approaches related to the effectiveness of the electrodermal activity device in the area of education, also exploring the methodologies frequently used in such research to measure student engagement with the use of such a device.

FINAL CONSIDERATIONS

The effectiveness of using the electrodermal activity device in teaching/learning environments was verified by analyzing the applicability of the electrodermal activity device in the educational environment. Therefore, it is believed that such research can help educational institutions in the use of methods capable of increasing student engagement through electrodermal activity.

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