

Methodology For The Analysis Of Oxygen Saturation And Heart Rate In The Development Of Online Classes, In Children, Product Of The COVID-19 Pandemic

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Abstract: In these times of pandemic caused by COVID-19, many of the activities we carry out are changing, education is one of the main ones that changed considerably and in the face of this change, certain manifestations that normally could not be identified are taking place, such as This is the case of the pressure and stress that the students are being subjected to, due to the fact that they spend most of the day at home in a kind of voluntary confinement, added to the realization of online classes from home, With parents attentive to the class, being able to understand teachers, conducting evaluations, among others, present in students an increase in pressure and levels of stress that are commonly subjected. The methodology that is proposed is related to being able to evaluate the level of oxygen saturation and the heart rate that they are developing in the realization of the online classes, this evaluation is carried out using low-cost devices known as clocks. intelligent, the results show that depending on the age the students are able to distinguish the different pressures that are manifested in the variability of the heart rate, we can indicate that at an older age the students can distinguish these pressures, it is concluded that it is possible to perform these measurements with The following purposes, the first to be able to monitor the students if they present any symptoms of COVID-19 and second if they present any manifestation of a possible problem related to the respiratory and cardiac system, the study recommends keeping in mind the manifestations that the students are developing. students in online classes and it is very helpful to be able to assess these vital signs to to be able to assess these manifestations as a result of pressure and stress.

Keywords: Oxygen saturation, heart rate, online classes, pressure, stress, evaluations.

1. Introduction

Studies to analyze the different situations that students are being affected in the realization of their online classes, are causing the use of the technology that they have available, in this context we can find works related to the use of so-called smart watches as a mechanism for find some symptoms related to sleep apnea as well as to be able to detect some symptoms that are causing COVID-19 (Auccahuasi et al., 2020) (Rolon et al., 2020). Being able to analyze oxygen saturation as a prevention mechanism for many pathologies is a factor to consider, a decrease in oxygen saturation can trigger later problems related to behavior and brain development (Bunya et al., 2020). The change in attitudes in students who are taking their classes online from home, is proving that parents feel concerned about the way in which these changes in attitude are manifesting (Dong et al., 2020). The importance in monitoring oxygen saturation is of vital importance because a variation in its level can cause different respiratory traumas that could lead to major problems, there are studies related to being able to create databases with these problems related to the level of oxygen. oxygen saturation (Filipescu et al., 2019) (Malycha et al., 2019). This pandemic partly managed to eliminate the gap related to the way of studying, because students will not go to their schools, but from home which would lead to being able to condition the houses in benefit of the best use of online classes, there are many works where it is evident how the classes are developing and the way they are assuming it from a world perspective (Qazi et al., 2019). Studying the health of people is vital and even more the element that ensures the continuity of life is oxygen, this element can trigger multiple complications that would lead a person to be in an emergency situation, one of the measures in hospitals and with an emphasis on recovery rooms, is the evaluation of oxygen saturation as the main agent to ensure the continuity of life (Sittichanbuncha et al., 2019) (Van de Boom et al., 2020) (Zhang et al., 2019). In the development of online classes there have been changes, from the physical place where the classes are held, the way students and teachers interact, the way teachers reach educational objectives, among others. others, which shows that a change is necessary in the planning of these activities, what are called educational plans, in order to enhance the activities related to online classes (Włodarczyk et al., 2020). In the present investigation, a

methodology is presented to be able to evaluate the oxygen saturation and the heart rate at the time of carrying out the activities related to the online classes to analyze if these vary according to the levels of pressure and stress that the students are being subjected.

2. Materials and Methods

The methodology that is presented to be able to analyze the measurement of the heart rate and oxygen saturation, in the realization of the online classes, is dedicated to being able to analyze certain risk factors of some heart and respiratory diseases that the students may present, as well How to monitor the symptoms of COVID-19, although children are not out of the reach of the virus, it is important to be able to know these vital signs with the intention of being able to react to any situation regarding the health of children, which may be present in the development of online classes.

It is presented in Figure 1, the block diagram of the methodological proposal that demonstrates the applicability and benefits that can be replicated and scaled.

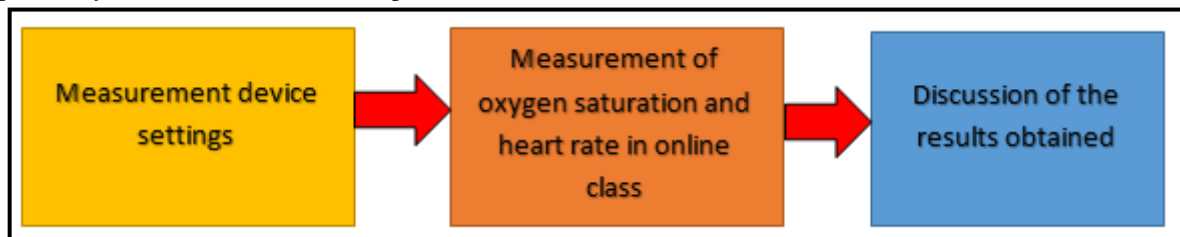


Figure 1. Description of the methodology.

2.1. Measurement device settings

The first step is to configure the device, in our case the device is a low-cost smart watch, which in addition to the tasks it performs, can calculate the oxygen saturation as well as the heart rate, these data are of the utmost importance. because thanks to them it is possible to register, measure and evaluate these vital signs. It should be mentioned that the values are not exact with respect to medical equipment, consequently these smart watches can be used as prevention mechanisms instead of mediocre diagnostic mechanisms, therefore for our methodology it fulfills the prevention purpose.



Figure 2. Configuration of the equipment in the student's arm.

In figure 2, the smart watch located in the student's spleen is presented, it is worth mentioning how it is a conventional type watch, all kinds of fear on the part of the student is eliminated and they can carry out their class normally.

Figure 3.Setting up the smart watch to measure vital signs.



In figure 3, it presents the application of vital signs, where after making a record by means of an infrared sensor for an average of 30 seconds, it shows the values of oxygen saturation and heart rate.

2.2. Measurement of oxygen saturation and heart rate in online class

The measurements of oxygen saturation and heart rate will be carried out in two particular cases, first in a 5-year-old student who is taking his classes online and a second case is the evaluation of a 15-year-old student, in both cases the environmental conditions are the same because you are in the same house doing your classes online.

2.3. Discussion of the results obtained

The third step in the description of the methodology is dedicated to being able to discuss the corresponding results in analyzing the measurements of vital signs in both students, with the intention of comparing the records and if there is any variability and in which cases it is recommended. attend the doctor for a further evaluation.

3. Results

The results presented are related to being able to evaluate the vital signs in a 5-year-old student and a 15-year-old student, in both cases before conducting the evaluation, the students present their smart watch on and ready for the evaluation:

Case 1: 5-year-old student

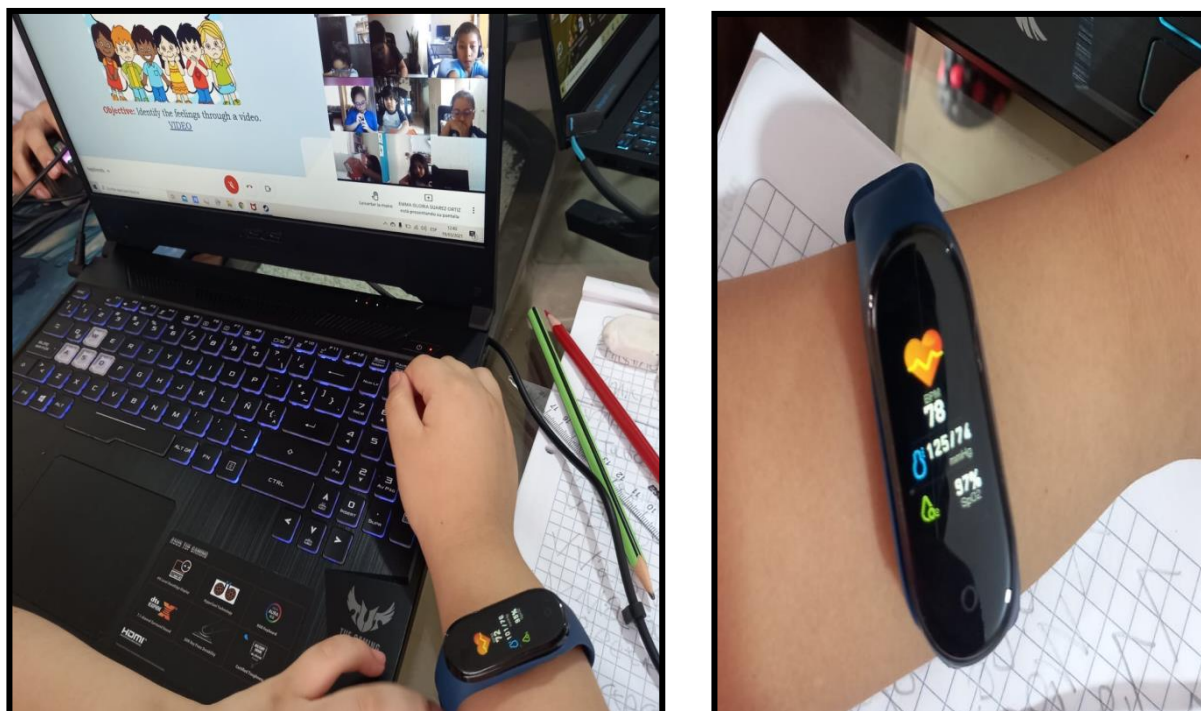


Figure 4.First evaluation, when is the English class.

The first evaluation of the 5-year-old student, the heart rate value of 72 beats per minute is recorded, and of 97% oxygen saturation, this record is made at the time of an English class where The students are participating singing in English, as can be seen, there are no complications and the records are within normal values.



Figure 5.Second evaluation, when you are answering questions.

A second evaluation is carried out, when the student is subjected to questions corresponding to the class they are taking, presenting heart rate values of 82 pulses per minute and oxygen saturation of 97%, making a comparison with the registered values, it presents an increase The heart rate of 4 pulses per minute, keeping the oxygen saturation constant, demonstrating that when students take tests or are subjected to questions, their heart beats faster.

Case 2: 15-year-old student

In the second case, a 15-year-old student is evaluated, where the same procedures are carried out in the class evaluation and when he is subjected to the corresponding evaluations. We can indicate that in this case the evaluation is carried out in the same environment and under the same conditions as in case



Figure 6. 15-year-old student stands with his smartwatch ready to be tested.

In figure 6, the student is presented with the smart watch, in a math class, in the class the class platform is presented, the student paying the maximum possible attention.



Figure 7. Application calculating vital signs.

In figure 7, the smart watch with the health application is presented, where the calculation of the heart rate and oxygen saturation in the 15-year-old student is created, this calculation is carried out for an average of 30 seconds, in the case of the 15-year-old student, he can use the health application, with this he can monitor at any time and in any class.



Figure 8.First measurement of vital sign values.

In figure 7, the result of the measurement of the smart watch is presented, in the 15-year-old student, the values indicating that he has an oxygen saturation of 99% and a heart rate of 74 beats per minute, these values correspond to the beginning of the class in a normal class development situation.



Figure 9.Second measurement of vital signs values.

Figure 8 shows a second measurement with a time interval of 30 minutes, in this second measurement of vital signs, the 15-year-old student is in the process of answering the online evaluations, which is why we have as a result of The measurement, the oxygen saturation in 98%, keeping almost constant with the previous measurement that was 99%, for the heart rate it presents a measurement of 84 beats per minute, where an increase is evidenced with respect to the previous measurement that was from 74 beats per minute, this increase of 10 beats per minute corresponds to the action that the student is performing, which is the performance of educational activities, which leads to an increase in attention and the degree of concern to meet and obtain a passing grade in your evaluation.

The discussions that we can carry out, after evaluating the methodology, is characterized in being able to use these low-cost devices such as smart watches, as a mechanism to monitor and evaluate the main vital signs that are related to support and continuity. of life with emphasis on the symptoms of COVID-19, oxygen saturation and heart rhythm, are the main vital signs to be evaluated and constant measurement is necessary so that the necessary measures can be taken if these values begin to decrease with respect to normal values.

In the health care of students, there are certain cardiac and respiratory pathologies, which are linked to the variation of emotions, such as allergies, represented when people are under pressure, the body reacts by making it difficult to breathe, as well We can identify bronchial asthma as a pathology, where when the person is subjected to certain emotional pressures, the body reacts causing asthma attacks, many of these described pathologies cannot be diagnosed or are hardly diagnosed, our research shows that the classes Online, the student is subjected to many pressures, a first is the pressure to attend the class and try to be able to capture the idea that the teacher wants to demonstrate in the class, a second pressure is to be able to develop the activities online, with the intention to obtain a good grade, the methodology shows that if we manage to evaluate constantly we can find some of the manifestations of the pathologies described and be able to take the doctor for a final evaluation.

We conclude by stating that with the use of technology, and in the application to situations of our daily life, we can take advantage of it and utilities, although smart watches are not medical equipment, their measurement values of oxygen saturation and oxygen Heart rhythm is very close with the measurements of medical equipment, being able to be used for monitoring and not for diagnosis, the methodology shows applicability and scaling, showing that in online classes certain manifestations may occur that can lead to a visit to the doctor to be able to rule out certain pathologies related to pressure and stress that children develop caused by being at home most of the day, as well as in the realization of online classes.

4. Conclusions

The conclusions reached at the end of this research are related to the demonstration of the proposed methodology, where the measurement of important vital signs such as oxygen saturation and heart rate was carried out, these two measurements are the standards in prevention and the monitoring of patients with COVID-19, but they are also the vital signs that are evaluated when studying the reactions of the body when it is subjected to certain pressures and high levels of stress, such as those developed in online classes.

It is concluded that in the case of younger students, such as the evaluated student who is 5 years old, the pressure to attend classes and perform evaluations are part of their daily activities, added to the type of classes where teachers try to take the student towards a game situation and try to be more enjoyable and fun the class, the student does not distinguish much between class and assessment. Contrary case occurs in the 15-year-old student who was evaluated, where he can distinguish between a class and an evaluation, so at the time of the evaluation he feels the pressure and stress in being able to obtain good grades, it is in this situation where the pulse heart rate increases from 74 to 84 beats per minute, which would be the direct manifestation of the emotional degree to which it is subjected in the realization of the online class. We can carry out a mapping by age to be able to differentiate the manifestations from emotional ones and their reaction through these vital signs, as well as to be able to optimize the use of the devices that we have at home, such as smart watches.

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