Usage Areas of Wearable Technology

Bekir Koray Kural

150170053

Tevfik Ozgu

150180082

English 201

Ayşe Zeynep Ziya

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Thesis: Wearable technologies can be used widely to enhance the way we live. Two of the numerous usage areas of wearable technologies are healthcare and education.

I. Wearable Technology can be used for healthcare.
    A. Wearable Technology for Medical Field
        1. Effects on Parkinson disease (Bachlin et al.,2009, p. 7)
        2. Benefits on Breast Cancer (Nguyen et al., 2017. p. 3378)
    B. Wearable Technology for Daily Life
        1. The use of wearable technology to promote employees' health and wellbeing. (Henning, van de Ven, 2017, p. 123)
        2. Use of wearable technology for Health Care (Fotopoulou & O'Riordan, 2016, p. 322; Schull, 2016, pp. 321-322)

II. Wearable technology can be utilized to improve the quality of education.
    A. Elementary Education
        1. Use of Smart Watches in Elementary Education (Ul Amin, Inayat, & Shazad, 2016)
        2. Physical Education Game That Make Use of Wearable Devices (Lindberg, Seo, & Laine, 2016)
    B. Higher Education
        1. Google Glass in Medicine (Queen Mary University of London cited in Sultan, 2015; Vallurupalli, Paydak, Agarwal, Agrawal, & Assad-Kottner, 2013)
        2. Use of AR and VR in Education (Durrani, U., & Pita, Z., 2019)

It is an unambiguous fact that the technology is the one and only real basis for a better today's life and the desired bright future. It is also a fact that the acceleration of the technological improvement is at the peak of the world's history. Over the last few decades among the many areas of technology, wearable technology is highly popular since it offers mobility, simplicity and better interaction of human and computer. Mardonova and Choi stated, "Wearable devices have managed to garner a position of significance in the consumer electronics market in a short time, and are considered a new means of addressing the needs of many industries." (2018). Hence wearable technologies can be used widely to enhance the way we live. Two of the numerous usage areas of wearable technologies are healthcare and education.

The first remarkable usage of wearable technology is health care. As technology developed, people thought that it can be useful for people's health care. A great number of companies started to improve their wearable accessory's health features. Besides this, for treating some diseases, wearable technology started to take the lead. One of these treatments is to cure Parkinson disease. Parkinson disease is an illness that affects nerve cells in the brain that control movement. Patients who suffer from Parkinson disease are affected by freezing of gait (FOG). While they are experiencing Freezing of Gait, their feet are sticked to the ground. Because of that, they face the risk of falling on the ground and their quality of life decreases. In such cases, wearable technology becomes useful for patients. For example, sensors which are worn on the body can understand that FOG event will occur and stimulate patient by vibration or aural warning. Bachlin et al. expressed that less fog event became when the device is plugged in by the 5 out of the 8 patients who suffered from FOG events while training. The rest of them said that there was no difference whether they are plugged in or not. In addition, five of the patients asserted that their freezing event was brief with the device. The number of the patients who

thought that freezing event was longer when the device is logged on was 1. The other patients said that there was no difference (2009, p. 7). It is clear that using wearable technology for Parkinson disease patients is a profitable method for the treatment process. In addition to Parkinson disease, wearable technology can be useful for Breast Cancer treatment process. Breast cancer is a disease in which cells in the breast grow out of control. Nguyen et al. stated that breast cancer can be overcome by being physically active. For keeping track of patients, wearable activity trackers (WATs) was used and asked whether it is useful or not. Participants said that these devices make them careful about their physical activities. Patients began to be cognizant about spending their time actively. Since patients' data is being collected, they were more eager about being more active. In addition to this, the closer they get to the end of their target, the more ambiguous they become. Due to being followed, they increased movement of their life for example they parked cars farther or started to climb stairs in place of lift (2017, p. 3378). It is obvious that the usage of wearable technology has advantages since it makes patients more ambitious and provides them to become more active into their daily routines. It can be concluded that wearable technology for medical field is a manageable and beneficial procedure.

Apart from medical usage of wearable technology for medicine, it is also possible to use it in daily life. It is always good to move for humans since it protects them from illness and enables them to communicate better with others. Also, people can be pleasant if they are not still. As people live in today's world, currently everyone is getting still so it is required to encourage them to being active. Wearable technology is a good method for this purpose. One of the benefits of wearable devices is for employees. By using wearable devices, employees can be inspired and it is possible to make them more productive and healthier by being more active. As identified by Henning and van de Ven, since being active in daily routine provides workers to be more productive, it is offered to use wearable devices by employers. It is almost desired to associate

being physically active and other wellness activities into the employees' daily life. These programs can be useful for boosting fertility and it makes workers healthier hence it diminishes the missed days which were because of illness. These devices are a good solution for setting employees' movement goals (2017, p.123). It is easily understandable that wearable devices can assist employees to be more productive and being healthier in their daily routine. Apart from the business life, wearable technology has a lot of advantages for making people aware of self-care. Self-care is the best solution for protecting themselves from diseases. Fotopoulou and O'Riordan state:

> In use, the screen of the device worn on the body displays numerical information about fitness activity, such as steps walked, floors climbed and calories burnt. In addition to this information, the screen periodically displays messages that aim to create a sense of connection with the user, and at the same time, establish the device in its role as a sport trainer (for instance 'you can get this!'). This display of motivational messages on the device screen and on the interface, dashboard introduces a form of coaching, which is ongoing even when the device is not actually connected to the wireless interface. (2017, p. 58)

Also, as pointed out by Schull, some devices which are wearable have idle alert so the person who wears that device can be warned whether they are inactive by vibration. In addition, some wearables give attention to bodily stillness and tries to avoid user from inertness and struggle for preserving true posture (2016, p. 322). It is clear that wearable devices are profitable to have an active daily-life and to be careful about self-care. As a result, wearable technology is a good method to have an active life and to make someone mobile.

Education is an area in which the keystones for every other field is created yet technology is hardly utilized. Elementary education, where a person encounters the facts of life for the first time and starts to build up a personality, is maybe the most important phase of education yet technology is used even less. However, wearable technologies reveal a new age and in the recent decade some game changing developments are being tested to strengthen the quality of this future

constructing stage of education. A study that is conducted with 24 first grade students from China is used to assess the possible advantages of wearable devices in elementary school. Mainly, effects on the understanding of basic language skills, spelling learning skills, shape recognition skills and clock reading skills were tested. Firstly, the students were divided into two groups, experimental and control. Smart watches were provided to the students from the experimental group and they were allowed to test the watches for a few hours daily for a week to practice the functions of it. Then the class materials which include poems, spellings and shapes were saved to watches and 10 weeks later assessment phase involving the student tests were operated. The final scores verify that in some parts of tests, experimental group was much more successful than the control group. Parents and teachers also commented that the children from experimental group had more attentiveness to learning than from control group thanks to excitement and fun they have had when they use smart watches (Ul Amin, Inayat, & Shazad, 2016). Taking this study into account although it can be clearly seen that the use of wearable devices can improve the quality of the elementary education highly in many different areas using the same simple technology, a fundamental aspect, which helps to students to improve themselves directly in a physical way and indirectly in a mental way, is not covered yet and that is the physical education. Nevertheless, the future of the physical education is also looking bright. Lindberg, Seo, and Laine operated a research to estimate how accessible and rewarding is the game idea that utilizes wearable devices in physical education. 61 of the South Korean third grade elemantary school students are divided into two groups as game and control. Then, in physical education class game group had played the game called Running Othello 2 which converts classical Othello game into a fun, teaching and exercising concept with the help of NFC technology, sensors of a smartphone and Microsoft's smart wrist band while control group learned and exercised in a traditional way. According to the results, game group did much better at the post-quiz. Moreover, the students

from game group and their physical education teacher expressed in interviews that learning facts while playing is more alluring than learning them from textbooks. The intensity of the physical activity the game group participants had was also great considering the data of heart beat sensor as well as the interview statements (2016). Learning while playing is a well known successful concept and considering this research, the current success of this concept can be increased dramatically if wearable technologies are benefited. To summarize, the importance of education cannot be underestimated and serious steps should be taken to improve the quality of it and wearable technologies are the ones probably the most suitable for this purpose.

Along with the possible advantageous uses in elementary education, wearable technologies are also looking extremely profitable in higher education. Higher life quality as well as longer life expectancy is only possible with highly qualified doctors, and highly qualified doctors can only be earned with a qualified education. Towards this goal, wearable technologies can be used to improve the quality of medical education. In the beginning of 2014, a surgical operation aimed to eliminate a cancerous tissue from the liver and bowel of an old man is filmed by Virtual MedicsTM using Google Glass. It was the first international live-streamed operation that took place in UK and it was watched by 13,000 medical school students using their computers and mobile phones in more than 115 countries (Queen Mary University of London cited in Sultan, 2015, p.525). Using Google Glass in the opposite way where the student is wearing it is also beneficial. It is stated by Vallurupalli, Paydak, Agarwal, Agrawal, and Assad-Kottner that with the present methods when something unusual happens while intern is in charge, all the data transmission between intern and the expert is realized with telephone which prevents the expert from having the same information that intern has. Data transmission problem can be solved using Google Glass resulting the removal of the patient safety problem as well as the problems related to the observation of intern's performance for assessment (2013, p.269). In the

light of this research, it is clear that wearable technologies can revolutionize the current methods in medical teaching. In addition to medical teaching, overall higher education needs to be improved. Other wearable technologies that may help the outcome of higher education to rise can be AR and VR. After reviewing hundreds of research published in between 2012 and 2018, Durrani and Pita had achieved some striking results. Durrani et al. stated that all examined researches had favorable results along with the constant learning outcome. They also pointed out that in nearly 92 percent of studies -35 out of 38- integration of virtual and augmented reality technologies into education had successful results. They also added that a case where integration of these technologies ended up in an unwanted situation does not exist. Durrani et al. also indicate:

> The result shows that research on VR/AR has moved further from the phase of mere discussion or envisioning the use of VR/AR for an educational purpose to empirical exploration mostly through case study research approach or a mixture of qualitative and quantitative research approaches (2019, p.323,325).

Without doubt considering this research, it is clearly seen that AR and VR technologies are at the point of being ready to be implemented extensively to the education. In conclusion, if quality of higher education is a concern, and it should be, the best solution authorities should offer is to consider bringing wearable technologies into play.

In conclusion, it is clear that wearable technology is useful for humans' life. It provides alternative solutions for health and education. Authorities in these industries should utilize wearable technologies to enhance the quality of their services. Also, it would not be wrong to say that individuals can make use of wearable devices to facilitate their daily healthcare and learning routines. If people achieve to use wearable technology properly, it might be easier to educate and patients can be treated more effectively.

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