The Effects of Wearable Technologies on Performance:
Serving The Whole Student With Focused Attention on Health and Wellness
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**Short Description**

In an era of information overload, college students today arrive deluged with life’s burdens. Teaching content alone may be as productive as filling buckets of sand already brimming to capacity. Health and well-being are directly correlated with improved cognitive functions and learning gains (Ratey, 2008; Calestine, Bopp, Bopp, & Papalia, 2017). This study aims to examine the effects of wearable technology devices on performance when used with intentionality to focus learners’ attention on health and well-being.

**Abstract**

In an era of information overload, college students today arrive deluged with life’s burdens. Teaching content alone may be as productive as filling buckets of sand already brimming to capacity. Health and well-being are directly correlated with improved cognitive functions and learning gains (Ratey, 2008; Calestine, Bopp, Bopp, & Papalia, 2017).

Dr. Ratey, Associate Clinical Professor of Psychiatry at Harvard Medical School, an internationally recognized expert in Neuropsychiatry, posits that there is a direct correlation between physical activity and brain functionality, quoting:

“In order for man to succeed in life, God provided him with two means, education and physical activity. Not separately, one for the soul and the other for the body, but for the two together. With these two means, man can attain perfection. —Plato” (2008).

This investigation aims to examine the effects of wearable technology devices on performance when used with intentionality to focus learners’ attention on health and well-being.

*Keywords: health and wellness, wearable technology, presence, mindfulness, education*
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Where do we begin? Many students enter the classroom in the survival mode of learning (packing more sand into that already overflowing bucket), memorizing content and checking off boxes as opposed to being ready to engage in higher-order thinking skills. Before we inundate learners with more content, consider addressing the student as a whole-being. Instructional design theories such as the First Principles of Instruction (Merrill, 2002a, 2002b, 2007, 2009) offer student-centered learning solutions for instruction. When introducing content, the first step invites the students to analyze and identify the problem. This systematic process leads learners to activate, demonstrate, apply and integrate the solution, promoting real-world relevance. Now, consider having learners apply that same systematic process to identify the barriers to learning which they feel, think, and perceive within. Learners may walk into a room and be bodily present, but cluttered minds are different than their minds being present. Consider the mind on autopilot (Germer, 2004) similar to walking into a room and forgetting why. Research reflects that increasing mindfulness has positive impacts on mood and stress (Brown, & Ryan, 2003; Germer, 2004). Offering learners guided time to direct their attention to what they are thinking, feeling, experiencing, writing it down, and sharing provides the opportunity for them to clear their minds and bring them into the present, better prepared to focus. Consider the possibilities if we direct learners to set health, wellness and performance goals for themselves and then encourage them to monitor those goals with wearable devices to maintain and improve outcomes.

For the purposes of this study, wearable technologies or wearables will be defined as computerized devices designed to be worn or attached to the body to communicate information back to the wearer.

**Literature Review**

With high speed Internet access exponentially adding to a fast pace, driven and competitive society, college students’ concerns range from financial to domestic to worldwide crises spanning politics to natural disasters. If stress is not enough to cause serious distractions and health related issues, coping mechanisms such as over-indulging have profound effects on energy levels and cognition. Obesity alone accounted for $315.8 billion dollars in the United States in 2010 (Biener, Cawley & Meyerhoefer, 2017). Compound this with the fear of missing out (FoMo) (Rosen, Carrier, Pedrozà, Elias, O’Brien, Lozano, & Ruiz, 2018) adjoined to smartphone usage. For authentic learning to take place, educators must address the whole student: mind, body, emotional and social-being.

**Integrating wearables with intentionality.** The integration of technology to improve performance in education often lags behind adoption in the public market and the workforce. Ubiquitous computing is common in work environments but is often not even recognized upon entering the educational realm. Consider wearable technology devices for example. Google Glasses and SmartWatches have evolved to seamless extensions of the human body incorporating gestures to operate this technology (Reyes, Wu, Juneja, Goldshtein, Edwards, Abowd, & Starner, 2018). The accessibility opportunities this could afford could be one avenue for those in need. Athletes train with wearable clothing and analyze the data captured to improve performance. Wilson coined this as the study of *physiolytics*, “the practice of linking wearable computing devices with data analysis and quantified feedback to improve performance” (2013). The design of wearable technologies, such as heart monitors or brain readers is to detect bodily
functionality and offer data for the users to improve performance. Likewise, smartwatches inherently promote movement.

The prompting of this study arose out of the researcher’s personal experience with using wearable technologies to monitor health and wellness, specifically running marathons to improve energy and focus in order to achieve performance goals of obtaining graduate degrees. These personal merits expanded into a small study of secondary students’ use of these wearables with the goal of improving persistence in the classroom. The researcher purchased Fitbits through a grant at Indian River State College in 2014 which the participants used. Overwhelmingly, all nine participants agreed that the wearable supported their persistence to the end of class, noting improved health and wellness in areas ranging from water consumption to sleep activity to physical fitness.

The number of wearable devices and the evolution of their functionality to become more than a novelty has expanded their usage to be worn as common nature by owners today. With a study on wearables in the workforce, Dr. ÖSTE paved the way for this study to be completed in an educational setting and encouraged:

“given the constraints and the moving target as this field evolves, it is critical to start somewhere with exploring the potential of these devices in the workplace. This approach provides an opportunity to explore the hidden affordances as well as the perceived affordances of wearables as they pertain to presence in the workplace” (2016).

Thus, the question becomes:

If students are directed to use wearable technologies to intentionally set goals and monitor their health and wellness: physiologically, mentally, emotionally, and social well-being, could they improve their performance in the classroom?

It is hypothesized that if educators support the whole student by guiding them to:

- set intentional goals for their health and well-being, physiologically, mentally, emotionally, and social well-being and
- measure these goals with wearable technologies, learners’ presence-of-mind and well-being to cognitively process learning and learning engagement will improve.

Method

This study begins with a pre-investigative survey to determine what wearable technologies are being used by consumers today to improve personal performance in instructional fitness classes and to ascertain the same for college-level students. This survey first determined which devices are most commonly being worn. Responses then provided the most common intent of using the wearable devices including monitoring: physical: fitness, posture, water intake, sleep performance; mental focus; emotional well-being: stress, mood; social well-being. Lastly, this survey also recruited participants to partake in a Getting-Fit-to-Persist study to examine the effects of wearable technologies when learners use intentionality to set goals to improve their performance. An IRB was completed at The University of Tampa to assure ethical practices would be followed.

Participants

To gather a broad pool of participants, the Pre-Investigative Survey was sent out to members of the Association for Educational Technology and Communications (AECT) organization as well as the International Society for Technology in Education (ISTE) members. This survey was also the recruitment tool for gathering participants for the study. Participants in the survey met the following qualifications:

- Eighteen-years of age or older.
● Enrolled in a college course in the US and/or participate in a fitness class in the US. The researcher’s role includes:

● Phase I: To release of the Pre-Investigative Survey.

● Phase II:
  1) To provide those who opt to take part in the study, supportive research which reflects the correlation between health and wellness and performance.
  2) To directed participants opting into the study to:
      a) Set an intentional goal for themselves to maintain or improve their health and wellness.
      b) Select a wearable device to use in order to monitor their progress. (Wearables were not provided as part of this study).
      c) Participate in brief assessment measures before and after this study to be delivered:
         i) Over a period of two weeks during the first summer term and then
         ii) Four weeks during a regular fall term.

Assessments and Measures

As previously mentioned the Pre-Investigative Survey was the first phase to determine what devices and intentions were currently being used, if any.

A Get-Fit-to-Persist Survey was then developed to measure the learners self-determined performance goals for both health and wellness and classroom performance as monitored by the wearable device at the beginning and end of the study. The first study was to run two weeks in the summer. The second would run four weeks during a regular school term. To validate the instrument, ten graduate students enrolled in The University of Tampa Instructional Design and Technology program participated in the Question Appraisal System (QAS-99), The Checklist to Evaluate the Quality of Questions (Department of Health and Human Services, Center for Disease Control, 2008) to rate each question in the survey instrument. Based upon this pilot, revisions were then made to reduce technical challenges with the Qualtrics instrument the surveys were embedded in and to simplify the context of questions. For example, text boxes initially were available for input of wearable brands but it was not apparent to the testers what they were to do with the text boxes; likewise, a question which asked for participants feedback on the wearable device and brand was revised to eliminate the double-barreled question.

Quantitatively, the Mindfulness Attention and Awareness Scale (MAAS, Brown & Ryan, 2003) tested questionnaire to assure validity would be used to collect the data of learner’s presence of mind (mindfulness) at the beginning of the instruction, consecutively throughout the study, and at the end of the four week study. Qualitatively, the open-ended questions on the survey would also be used to interview participants who volunteer in order to afford them the opportunity to elaborate upon their perspective of the study.

Results

The Pre-Investigative Survey was the first phase of this study to determine what wearables, if any, adult students were using to improve health, wellness and performance. The results proved to affirm that as technology improves, more students are taking advantage of the benefits offered by these devices. Out of the thirty participants, twenty-three stated they engage in fitness classes while eleven stated they are also college students, with 91% of them being graduate-level attending universities, and spending most of their lives in the southeast of the
USA. The participants noted being enrolled in technology, music and math fields. Approximately half receive instruction through hybrid delivery, while the others are fairly divided in receiving instruction through online and face-to-face delivery methods.

Regarding the demographics, the generation who attested to using the devices is not the younger generation but overwhelmingly the older, established Generation X, from 38 to 53-years-old. See Figure 1. The age breakout was based upon the Pew Research guidelines (Fry, 2015).

![Figure 1. Results of Pre-Investigative Survey: Age of Users](image)

The gender of the users who participated in this survey reflects males outweigh the female population. See Figure 2. The majority of the respondents were from the southeast, USA. Out of 28 respondents, 10 attested to earning $42,000 annually while 13 accounted for making more than $125,000.

![Figure 2. Results of Pre-Investigative Survey: Gender](image)

The breakdown for these family household income brackets were aligned to the levels of: poverty = under $42,000; middle class = $42,000 to $125,000; and, upper class = $125,000 and above as determined by the Pew Research studies (2014)

The majority of respondents view themselves as high achievers. See Figure 3.

![Figure 3. Results of Pre-Investigative Survey: Achiever](image)
Not so surprisingly, the devices most often used were those which may be worn on wrists as supported by the market climate deluged with Smartwatch and Fitbits. Heart monitors were the next devices most commonly worn. See Figure 4.

![Wearable Devices Pie Chart]

**Figure 4. Results of Pre-Investigative Survey: Wearable Devices**

Although fitness was the greatest selection for intended use amongst participants, this survey item returned a greater distribution of several different responses. See Figure 5.

![Intended Use Pie Chart]

**Figure 5. Results of Pre-Investigative Survey: Intended Use**
**Discussion**

The amount of responses attesting to using the devices spark a few observations. First the overall amount of responses appears low but the participants were required to have an interest in wearable technology. Almost all categories of wearable devices were selected by participants attesting to a large range of intents for health and wellness. The majority of those who responded were from geographic areas with warmer climates where it is more practical for users to get out into the environment to engage in fitness goals. Based on the age majority of those who responded, the generation which uses wearables for their health and wellness overwhelmingly may actually have the most on their plate expanding beyond classes into families and careers; thus, reflecting that those who may have the least time to spare are actually finding enough value in the benefits of wearables to make room for them into their daily lives. This may also explain why the majority of respondents accounted for household incomes of upper or middle economic statuses of living. Surprisingly, the household income was majority over $125,000 but this could also explain how these participants could afford wearable devices and membership to fitness classes, clearly attesting to their value in the benefits of physical activity. Likewise, majority of respondents interested in wearables view themselves as high achievers.

**Limitations of the Study**

Initially, it was the intention for this study to be completed in the spring term, inclusive of Pre- and Post-Get-Fit-to-Persist Study Surveys and the MAAS questionnaire to be used in order to triangulate data during both the two-week study and the four-week study. The results of the Pre-Investigative Survey were delayed and since the two-week term was offered during the summer session it was determined that including the MAAS instrument would add undue stress during a condensed term. Since most wearables selected were to measure physical fitness vs. mental focus the Pre- and Post-Get-Fit-to-Persist Study Surveys were determined to be the valid collection measure vs. the MAAS instrument which is more geared to mindfulness and mental focus.

**Demographic Limitations.**
Despite efforts to distribute the Pre-Investigative Study nationwide and internationally through organizations such as ISTE and AECT, the southeast region of the States clearly was the largest pool of participants with the most interest.

**Time Limitations.**
The Get-Fit-to-Persist Study Survey results will need to be documented in a future publication as the two-week period has not completed as the date of this submission.

**Conclusions and Future Study**

This study aimed to examine the effects of wearable technology devices on performance when used with intentionality to focus learners’ attention on health and well-being. Students in the Pre-Investigative Survey demonstrated using the devices with many intentions to improve health and wellness, including: physiologically, mentally, emotionally, and social well-being, clearly determining that there is a growing interest to improve performance with these data tracking of these devices.

This study will be continued during summer and repeated in fall to determine if this intentionality of use can be extended to performance in the classroom and, if so, determine if they improve can, in fact, improve that performance. Further studies might include reapplying this study to focus on specific wearables, intent and demographics, specifically expanding outside of the southeast.
References


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