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ORIGINAL PAPER

Use of Fitness Bands by Teachers in the Classroom

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Abstract Wearable technologies are increasingly gaining attention. Gadgets such as Smartwatch, Fitband, Google Glass, and similar healthcare devices can be worn by the consumer and have several benefits in various contexts. This study examined teachers perception on fitness bands and if they have any benefits to classroom teachers. 28 classroom teachers were each given a fitness band for 35 days. Prior to giving them the fitness band, a pre-survey was administered. At the end of the 35 day period a post-survey was administered. Ninety-three percent of the teachers completed both the post and pre-survey in which they responded to change in teacher motivation and teaching practices due to wearing the fitness band. There were also four open ended questions that addressed benefits and challenges of using the fitness band in educational contexts. This study has implications for those considering using fitness band in an educational setting.

Keywords Fitness bands · Wearable technology · Teachers · Motivation · Teaching practices

Wearable technologies are becoming very popular. Glasses that show information through screens, and fitness bands that provide real time information are just two of the many wearable technologies becoming more popular in our culture. While fitness bands are a technology that was not created for educational purposes, research is needed to determine their educational potential. Similar to technologies like GPS that were not created for educational purposes, but are now used by many educators, and have some researchers saying that few technologies have impacted the classroom quicker than GPS (Brunsell and Horejsi 2010). As with any new technology there is a need to explore what value fitness band devices might bring into the education classroom.

It has been shown in previous studies that the use of wearable devices can change behavior, such as how looking behavior can be affected by wearing an eye tracking device (Risko and Kingstone 2010). The question can be raised, if teachers were using wearable devices would any of their behaviors change? Would the use of a wearable device such as a fitness band change a teachers' motivation level for teaching? Would wearing a fitness band change their teaching practices? In what ways might using a fitness band make an educator more productive? The purpose of this study is to explore teacher perception of benefits of fitness bands and the benefits and challenges of teachers using the fitness band in the classroom.

Literature Review

Motivation

Motivation is defined as, "an internal state that stimulates, focus, and maintains our thinking and behavior" (Merriam-Webster 2015). In simpler terms motivation is what drives us to do what we do. Much research has been done regarding motivation. Keller developed a model for looking at motivation as it relates to learning. His model, called the ARCS model, stated that attention, relevance, confidence, and satisfaction are all important factors for people to become and

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remain motivated (Keller 1987). Teachers should not assume that their audience will be motivated to learn. Instead it is necessary to gain their attention, help them see the relevance of the topic, provide the assurance that they can master the skill, and provide ways for learners to feel satisfied in their learning. With digital displays and Bluetooth links to cell phones, a fitness band can gain attention and relevance through their easy to understand interface. The fitness band can then provide confidence and satisfaction through real time data showing the attainment of goals and objectives. These attributes of fitness bands can make them a good resource for learning motivation. Administrators have noted when teachers feel better physically and better about themselves, they will perform better in the classroom (Adams 2012). For the purposes of this study it was desired to study teachers' perception of fitness band and if it provided motivation for teachers to become or stay fit, and see if this motivation affected teaching practices.

Teaching Practices

Technology can have a great impact on teaching practices. In one national survey more than half of the educators surveyed stated that technology had impacted the way they prepare to teach. "Over half of the teachers say that technology has had the largest impact on their teaching and instructional support activities, that technology helps them engage students in learning, and that their lesson plans are richer and contain timelier, more accurate information because of their access to the Internet" (Tomorrow 2006).

One of the most important factors in determining the success of a student is the overall skill set of their teacher. Teachers who connect with their students and create a supportive and inviting classroom climate tend to be more effective with all of their students. "A teacher's ability to relate to students and to make positive, caring connections with them plays a significant role in cultivating a positive learning environment and promoting student achievement" (Stronge 2002).

Good health and a positive self-image can contribute to a teacher's feeling open to connect to students. Fitness bands do have the ability to provide data that can assist in the development of a positive self-image. Research has shown self-esteem to be positively related to good health (Reitzes and Mutran 2006). There is a need for studies to investigate the role a fitness band can play changing or improving a teachers' perception of their teaching, or changing their teaching style.

Benefits

Advances in technology such as personal computers, tablets, and interactive boards, have helped teachers to become more productive in the last decade. Technology can also play a major role in helping a teacher to be effective. Simple technologies such as pedometers have been used before as part of larger studies to provide opportunities for increased physical activity (Sharma et al. 2010), and that the use of pedometers and telecommunications can encourage people to walk more (Ogilvie et al. 2007).

Studies have also shown that seeing 10,000 step street signage is associated with greater pedometer use (Eakin et al. 2007). Since fitness bands are relatively new, there is a need for a study to determine in what ways a fitness band make a teacher more effective or productive.

Challenges

Even though technology can be beneficial in the classroom, it has many challenges. When newer and more sophisticated technology arises, teachers are then forced to decide if they will lead, follow, or get behind the technology innovation (Maloy 2011). Also, it may not be appropriate to integrate some technology in all settings.

While fitness bands are very small they may have similar challenges as other technology in classroom usage. In the context of classrooms, there is a need to know what challenges lie ahead for teachers who wish to use fitness bands in the classroom.

Purpose of the Study

The purpose of this study is to explore teachers' perception from using fitness band in the classroom. The research questions that were answered from the study are:

1. What are teachers' perceptions on using the fitness band?
2. What are some benefits and challenges of teachers using the fitness band in the classroom?

Method

This study was supported by a research grant from Institute for Emerging Issues for the Beginning Teaching Matters project. Wearable fitness bands were given to 28 classroom teachers. The research project was approved by the institutional research board of the university where the project was implemented.

Participants

Twenty-eight teachers in a southeastern county of North Carolina were given fitness bands in October 2014. Demographic details were collected from the teachers during the pre-survey. Table 1 below provides teachers' background on their prior use of a fitness band, age, gender, and grade level taught.

Table 1 Participant demographics

Used a fitness band before	Age	Gender	Grade level taught
• 7 % of teachers had used a fitness band before • 82 % of teachers had not used a fitness band before • 11 % did not respond	• 46.4 % between ages 22 to 25 • 25 % between ages 26 to 30 • 3.5 % between ages 31–35 • 14.2 % between ages 41 to 50 • 7.1 % over ages 50 • 3.5 % did not report their age	• 32 % male • 64 % female • 4 % did not list their gender	• 7 % taught at the Pre-K level • 25 % taught at Elementary School level • 32 % taught at Middle School level • 36 % taught at High School level

Description of Fitness Band

There are many activity bands currently out on the market. For the purposes of this study the FitBit Flex activity band was selected. This band was selected due to its ability to track steps, distance, and calories burned. During the night, it has the option to track sleep quality and can silently waken the user if desired. On the band are lights that can track and display status of personal goals. It comes with an app that is available for Apple and Android devices (Fig. 1).

Procedure

The teachers completed a pre-survey via survey monkey in October 2014. Then they were asked to wear the fitness band for 35 days. At the end of the fitness band study the participants were asked to complete a post survey in December 2014. Although the sample is small, the response rate was higher than many online surveys (Cook et al. 2000; Sheehan 2001).

Survey

On reviewing frameworks related to wearable technologies, health, teaching practices and motivation, the authors were unable to locate a framework overlapping these areas. Hence the authors created their own survey with three key categories on wearable technologies and teaching practices.

The survey included seven Likert scale questions. The Likert scale response was on a four point scale, but the responses varied depending upon the question with $n=4$ rated as the highest, and $n=1$ rated as the lowest. The reliability of the items on the survey was low ($\alpha=.57$). This was the first implementation of the survey.

Fig. 1 FitBit Band

Four open ended questions were asked at the end of the survey on, (a) ways in which wearable technologies might make your job as an educator easier or more productive, (b) the drawbacks of using a fitness band in your job as an educator, (c) how it would benefit their health the most as a teacher, and (d) foreseeable issues that may be encountered when using wearable technologies in educational contexts. We used thematic analysis to code the open ended response items and let the themes emerge from the coding. The survey was sent to 28 teachers. We received 100 % response rate to the pre-survey and 93 % response rate for the post-survey.

Data Analysis

Descriptive statistics were used to report the survey data. Means and Standard Deviations were calculated for the seven Likert Scale items. Since the survey items used Likert scale with ordinal data, we calculated weighted means instead of averages. The open ended responses were grouped into themes, and frequency was reported for each theme.

Results

Weighted means were calculated for data from the pre-survey and post-survey. Table 2 includes the responses from the teachers on the use of fitness band.

Paired Sample T-tests were run for the pretest and posttest, and no significant difference was found between the Pre-test and Post-test, $t(6)=2.44$, $p>0.05$.

Awareness of Health and Fitness

The teachers were well aware of their health situation in both the pre ($M=3.35$) and post survey ($M=3.38$) and self-ratings were high. However, when they rated themselves in terms of fitness both the pre ($M=2.72$) and post survey ($M=2.88$) ratings were much lower. There was a slight increase in the post survey on how they rated themselves on their fitness after using the fitness band but it was not a significant difference.

Table 2 Use of fitness bands by classroom teachers

			Pre-Survey ($n=28$) M (SD)	Post-Survey ($n=26$) M (SD)
Awareness of health and fitness				
1	Please rate your current awareness of your health.	(Not aware, little aware, Somewhat aware, Very Aware)	3.35 (0.62)	3.38 (0.64)
2	How would you rate yourself in terms of fitness?	(Not fit at all, Not fit, Somewhat Fit, Very fit)	2.72 (0.59)	2.88 (0.43)
Teaching practices				
3	How do you feel at the end of a teaching day?	(Very Tired, Tired, Energetic, Very Energetic)	1.96 (0.61)	2.00 (0.63)
4	Do you think staying fit will help you be a better teacher in the classroom?	(Not at all, Somewhat, May be, Definitely)	3.60 (0.69)	3.52 (0.71)
5	Do you think using the fitness band will change the way you teach?	(Not at all, Not sure, May be, Definitely)	2.17 (0.87)	2.54 (0.99)
Interest and motivation				
6	How interested are you in being fit?	Not interested, somewhat interested, interested, Very interested	2.84 (1.22)	3.35 (0.63)
7	If given a fitness band, would it increase your motivation on getting to be fit?	(Not at all, Somewhat, Definitely, Most definitely)	3.04 (0.63)	2.62 (0.75)

Teaching Practices

There were three questions that were asked about their teaching practices. The question on how they felt at the end of the teaching day was the lowest rated item on both the pre ($M=1.96$) and post survey ($M=2.00$). The teachers strongly agreed that staying fit will help them be a better teacher in the classroom in both the pre ($M=3.60$) and post survey ($M=3.52$). However, they were unsure if the fitness band will change the way they teach.

Interest and Motivation

The teachers' interest level increased from the pre-survey ($M=2.84$) to post-survey ($M=3.35$). However, their motivation to being fit decreased from the pre-survey ($M=3.04$) to the post-survey ($M=2.62$).

Open Ended Questions

There were four open-ended questions at the end of the survey, which focused on benefits and challenges of using fitness bands. Responses have been summarized in the Tables 3 and 4 below. Questions and responses were combined for reporting. Main themes from the responses were extracted and grouped as shown in Tables 3 and 4.

Discussion

The overall post survey results showed no significant change in participant's attitudes or perceptions toward the use of fitness bands when compared with the pre survey. Participants identified a small increase in their interest to be fit on the post survey. The study results show that use of a fit band can increase a teacher's interest in being healthy. Just being aware of their body movement and activity level using this real time device did cause a small number of teachers to want to be healthier.

Through open ended comments, several respondents noted that the use of a fitness band could reduce their time away from work, and give them more energy. These respondents' comments show that they did see a correlation between being healthy and being more productive at their work places. Researchers looked into how awareness of health and fitness, motivation, teaching practices, benefits, and challenges were informed by the study.

Motivation

Survey data revealed that teachers on the pre and post survey believed that a fitness band would increase their motivation to become fit. However, there was a slight decrease shown on the posttest which indicated that some respondents were not as motivated by the fitness bands after 1 month as they thought they would be in the beginning of the study. These results would indicate that more research is needed to understand what challenges these teachers faced while using the fitness bands that would have slightly decreased their motivation. Sheingold and Hadley (1990) found that one of the factors that was integral to teachers using technology was teacher motivation and commitment to their students' learning and to their own development as teachers. While the fitness band does not have a direct impact on student learning, it has an indirect impact on the teachers' fitness and health

Table 3 Benefits of fitness band

Ways in which fitness band might make teachers job as an educator easier or more productive
• Being aware of my health (4)
• Improved health should reduce the potential for time away from work for illness (1)
• More energy and moving around the classroom (4)
• Use as a timer for activities (2)

which in turn may enable them to adopt different teaching techniques. This was also listed in the open-ended question as the wearable technology would motivate the teacher as it helps them be aware of their health, which reduces potential of time away from work due to illness.

Teaching Practices

While teachers who participated in the survey largely believed that staying fit would help them be a better teacher in the classroom, they were not sure if using a fitness band would change the way they teach. Even after 1 months' time, this perception had not altered much. Teachers were not familiar enough with the device to be able to predict if the device would have any effect on the way they teach. Ertmer (2006) stated that teachers will need access to others who had the ability to support and challenge them if a change was to occur in their actual teaching practices. The teachers in this study could have benefited from more support in the usage of the fitness bands.

Some responses from the open ended questions reflect the teacher's perception that the use of a fitness band could impact the way they move around and work within the classroom. Comments were provided that noted the teachers perceive they would have more energy and move around the classroom. If this increased energy and movement would result in a change of teaching style is unknown. Often new technologies have to be tried and tested for some time before it is clear if they will make an impact on the classroom.

Benefits

Selected teachers in the study did believe that having a fitness band could make their job easier and more effective. They believed that being aware of their health could make them better at their jobs. Improved health would reduce time away from work for illness. They also believed that a fitness band might provide them with more energy and provide them with the ability to move around the classroom more. Some teachers believed that a fitness band could also be used as a timer in their classrooms. These limited results from opened ended comments do show that several participants in the study do believe a fitness band can have a positive impact on their job performance.

Challenges

While there was a good percentage of the study population that saw no drawbacks to using a fitness band as an educator, there were some drawbacks for using a fitness band mentioned by the participants in the study. Some participants believed it might be hard to remember to put on the band before going to work, or to remember to plug it in and charge it. Since the band that was provided for the study was worn on the arm, some participants believed that it might hinder their wrist movement and get in the way of typing or writing. There are other versions of these fitness bands that are not worn on the arm, but attached to the waist. A small number of participants in the study elected to use those instead of the ones worn on the arm. Keeping the unit charged, and finding a fitness band that can be worn on waist do appear to be challenges that could be easily solved.

Others believed that the use of a fitness band might cause them to focus too much on fitness and less on teaching. Bringing too much attention to the band could cause students or teachers to become distracted and lose focus. It is recommended that teachers who use fitness bands explore ways to ensure that a fitness band would not become a distraction. These solutions could include formally introducing the fitness band to students and demystifying it.

Table 4 Drawbacks and foreseeable issues of using fitness bands

Drawbacks of using a fitness band in your job as an educator	Foreseeable issues that may be encountered when using wearable technologies in educational contexts
• Forgetting to put it on (3)	• Charging it (3)
• Forgetting to charge it and battery might die (2)	• Forgetting to wear it (2)
• Unable to get it to work (2)	• If it becomes a distraction (3)
• Hinder my wrist movement and getting in the way of typing or writing (2)	• None (9)
• Too much focus on fitness and less on teaching (2)	
• My knees (1)	
• No drawbacks (7)	

Limitations

This study did not measure the teachers' fitness steps accomplished each day, or have room for the teachers to compare the fitness achievements with their friends or colleagues. This friendly competition might have increased the teachers' motivation to pay close attention to the fitness steps.

This study contained a small sample size, and was only observed for approximately 2 months. These factors would lead to caution in generalizing these results. For future studies it is recommended to have a larger participating group.

Need for Further Research

More studies need to be done to understand why the fitness band had little effect on teacher's attitudes or perceptions to their health and teaching. Researchers believe that a survey performed at a 6 month or 1 year point may be beneficial. Researchers also noted that since participants were not required to wear the bands, it is difficult to know how much the data was impacted by those who never chose to wear them.

This study used teachers' self-reporting on a survey instrument. As this type of reporting can be a weak indicator of future performance in future studies it is recommended that student perceptions also be studied to validate any actual change in teaching. This study has implications for those considering using fitness bands in an educational setting.

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