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Investigative Study of Wearable Computers with Optical Head Mounted Displays (OHMD) Effects on University Campuses

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Abstract: Nowadays technologies are evolving at a rapid pace, which affect human lives in all aspects. One of these advancements is Wearable Computers with Optical Head Mounted Displays (OHMD). Multiple companies have issues beta versions of this technology and will soon introduce fully operational ones into the market. Similar to any new technology, there has been speculations about the pros and cons of their use. This included health, social, and psychological aspects. However, no research has addressed the expected effects on a university campus. Consequently, this paper investigates the students, faculty, and administration perception at a Large Midwestern University in regards to four research question, namely (1) What changes could occur socially and academically for students and faculty; (2) What is the usability of OHMD for social networking and education; (3) What are the affordability level of such new technology; and (4) What are the security and privacy issues associated with such technology. The adopted research methodology utilizes a campus wide electronic survey instrument. The outcomes of the current research task provide insight that is much needed for university faculty and administrators as well as technology developers.

Key words: Wearable Computers with Optical Head Mounted Displays, OHMD, smart glasses, educational technologies

1. Introduction

Certain technologies that were thought to be a part of the future are soon going to be a part of the present. From the end of 2013 through the beginning of 2015, various companies are scheduled to release their own version of what is to be known as *smart glasses*, a new form of wearable technology that is to perform many of the same functions as a smart phone, but be worn as a pair of glasses. Google has created their own product called Glass, which can provide Global Positioning System (GPS) directions, make phone calls, take pictures and video, send messages, and browse the internet, among other things. Other companies, including Vuzix and Telepathy have also created prototypes of their smart glasses known as the M-100 and Telepathy One respectively. With the introduction of this new technology many questions arise about the potential — positive and/or negative effects it

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will have human welfare. When the telegraph was invented many had high hopes for the change it would bring, but Henry Thoreau thought differently. He said it was, “an improved means to an unimproved end....We are in great haste to construct a magnetic telegraph from Maine to Texas; but Maine and Texas, it may be, have nothing important to communicate....We are eager to tunnel under the Atlantic and bring the old world some weeks nearer to the new; but perchance the first news that will leak through into the broad, flapping American ear will be that Princess Adelaide has the whooping cough” (Thoreau & Shanley, 1971). Even though this was in reference to the telegraph, similar controversies could be raised about smart glasses.

Since the beta release of Google Glass in early 2013 many speculations and questions have come from bloggers, usability testers (Glass Explorers), and professionals in various fields. Some usability testers are working on new ideas to expand the use of smart glasses. A group known as Open Glass has discussed the possibility of using smart glasses to help visually impaired people (Dorrier, 2013). Although the potentials for smart glasses are vast, there are concerns with how it could affect the health of an individual. “Though conventional wisdom is that a poor diet and lack of exercise are the prime factors contributing to heart disease, scientists have also identified the Roseto Effect, which posits that human interaction also has a preventative influence” (Wasserman, 2013). This doesn’t mean that wearing smart glasses affect your health, but the use of them could cut back on your face to face interactions, which in turn could affect your health. Dr. Fredrickson, a professor from the University of North Carolina commented about the use of smart phones and problems they can cause with an individual’s health. “In short, the more attuned to others you become, the healthier you become, and vice versa. This mutual influence also explains how a lack of positive social contact diminishes people. Your heart’s capacity for friendship also obeys the biological law of “use it or lose it”. If you don’t regularly exercise your ability to connect face to face, you’ll eventually find yourself lacking some of the basic biological capacity to do so” (2013). Besides the health issues that have been presented, others have questioned how smart glasses will affect privacy and public safety. With the capability to take a picture just by winking an individual’s privacy could be violated. A technology journalist, Joshua Topolsky went into a Starbuck’s with a film crew, and the crew was asked to stop filming. However, they did not know that he continued to film the whole time with his smart glasses (Arthur, 2013). When it comes to public safety, the capabilities of smart glasses are largely speculation. West Virginia state Representative Gary G. Howell is concerned about how smart glasses could affect driving safety, so he has proposed a bill to ban smart glasses, such as Google Glass to be worn while driving (Griggs, 2013).

Even with all these considerations there is much to be discovered. With the release of many smart glasses in the near future, much of current research has been speculation. Research has been done on physical, health, and security issues among other things. However, an important factor to be considered are the social consequences. With a new technology such as smart glasses one thing that should be thought of, is its effect on education. Education is something that everyone is involved with in some form or another. The world of academia is ever changing with society, as one changes the other evolves to meet that change. With the introduction of smart glasses in our society it is important to understand how this technology will effect a college campus for the students and the faculty. In an effort to cover this thoroughly this paper attempts to address four research questions as a starting point on a line of research. The first being what changes could occur socially and academically for students and faculty. Second, what is the usability of smart glasses for social networking and education. Third, what are the affordability level of such new technology as well as its suitability for college campuses. Finally, on a college campus security and privacy are important to be acknowledged when a new technology like smart glasses are introduced. Consequently, the investigation of security and privacy violation threats is much needed. As a

result, the current research task provides a solid point of departure for the aforementioned line of research through investigating the students, faculty, and administration perception at a Large Midwestern University in regards to the posed question though a campus wide electronic survey instrument.

2. Background

Current research has gathered a significant amount of data so far in the area of wearable technology such as smart glasses. As explained before various companies and research groups are taking a look at the possibilities of smart glasses, and taking note of its possible affects. Open Glass, a research group is looking at many uses for smart glasses, "but the most powerful early uses of augmented reality may be for people with disabilities. The visually impaired, for example, could benefit from whispered descriptions of various items in a room or directions to avoid obstacles walking down the road — like digital braille and a virtual guide dog" (Dorrier, 2013). With what these devices could bring, it could make the world much more universally accessible. This could be a great advantage for those with a disability, but it could also significantly impact those without disabilities. One company, NTT Docomo has developed a new program for their product, Intelligent Glass. This program allows a user wearing the smart glasses to look at things such as signs, books, and restaurant menu's that are in a foreign language and the device will automatically translate, and overlay that translation into the device. This would allow anybody to read a foreign language almost instantly (Pfanner, 2013). With the advantages that could come with the implementation of smart glass technology, it is easy to get caught up in the hype, but it is important to look at technologies such as these critically.

A new technology has the potential to cause a large impact on not only society, but individual's. One implication to be considered is how will a new technology effect health. Some researchers have started to hypothesize what could happen with the release of smart glasses. As Wasserman stated, "Google Glass has the potential to make us more inwardly focused and less prone to take part in real-life conversations" (2013). A professor from the University of North Carolina performed a research on smart phones, and how they affect the health of an individual. Upon the conclusion of her research she found that a dependence on smart phones could negatively affect our ability to connect with other human beings (Fredrickson, 2013). However, Timothy Jordan, who is part of the team in charge of developing Google's version of smart glasses said in his presentation that part of Glass is to address that problem. "I mean, we all love technology and what it can give us, the ability to take and share pictures, but it feels like tech is often getting in the way more than it needs to. And that's what we're addressing with Project Glass. It's so that you can still have access to the technology that you love but it doesn't take you out of the moment" (Jordan, 2013). This is what Google has released though, it may not be the same for other smart glass producers.

With many new technologies new things are introduced to society. When smart glasses hit the market there are many safety and privacy concerns that will need to be addressed. Some of these will develop as people use them, and figure out new uses, but some policies have already been developed. One concern that has been brought up is the privacy of individuals. One ability of some smart glass models is to record video and take pictures, and since it is so effortless some people are uncomfortable with the idea of possibly being filmed without their consent. "Technology often moves more quickly than our ability to deal with its implications, and I think that's what's happening here" (Marshall, 2013). With smart glasses somebody can film something at any point or take a picture at any time by giving a voice command. There is even an app that has been developed to allow users of Google

Glass to take a picture by winking (Souppouris, 2013). With concerns over privacy, laws and bans have been created. “No recording devices (cameras, video recorders, sound recorders, etc.) are permitted to be used within any Regal Entertainment Group facility”, the admittance procedures for the Regal Entertainment Group plainly state” (Golijan, 2013). This is one of many examples that can be found restricting the use of smart glasses. When it comes to safety for the users of smart glasses some law makers are trying to get ahead of the curve to prevent injuries. Representative Gary G. Howell proposed a bill that intended to, “amend and reenact §17C-14-15 of the Code of West Virginia, 1931, as amended, relating to traffic safety; specifically, establishing the offense of operating a motor vehicle using a wearable computer with a head-mounted display” (2013). In the bill proposed, the term “wearable computer with a head-mounted display”, is a synonym to smart glasses. Google responded to the bill saying, “We actually believe there is tremendous potential to improve safety on our roads and reduce accidents. As always, feedback is welcome” (Griggs, 2013). With the release of many of the smart glass products in the near future there is still much speculation on all of these issues.

3. Research Objectives

By taking a look at the social and educational implications of wearable computers with OHMD’s students, faculty members and administrators will be better prepared to anticipate the use of such a device, and determine its effects. In order to seize these opportunities, the relevant research questions and hypotheses are summarized as follows:

Objective 1: To develop an understanding of the effects of introducing such a technology into a Large Midwestern University campus on the social and academic behavior of students and faculty.

Research Questions: (a) What is the level of acceptance of students and faculty for using OHMDs in class and outside it? (b) What are the projected uses, benefits, and/or harms associated with using OHMDs in class? and (c) What are the most important parameters to quantify for appropriate evaluation of these effects?

Hypothesis: (1) The investigation of the current perspective of university personnel regarding adopting new technologies; and (2) Measuring attitudinal parameters of students, faculty, and administrators about the use of OHMDs in class rooms including ease of data access, comfort parameters, and potential uses can provide a better definition of the domain problems investigated under this study.

Objective 2: To gain insight on the suitability of OHMDs for social networking and education within Ball State University.

Research Questions: (a) What are the current practices and time spent by students, faculty, and administrators on social networking? (b) What are the expected changes on such behavior by introducing OHMDs for use within university campuses? and (c) Are there any expected benefits from using OHMDs for educational purposes?

Hypothesis: The investigation of the students’, faculty’s, and administrators’ perceptions about the aforementioned questions will provide an understanding of the suitability of use of OHMDs in a university campus.

Objective 3: To develop an understanding of how affordability, and the need for this technology could affect the its adoption within a college campus.

Research Questions: (a) What are the factors upon which students, faculty, and administrators determine the importance of a technology? and (b) What is the dollar value that is to be associated with this technology from the perception of students, faculty, and administrators?

Hypothesis: People at different categories (social, economical, and political) have different thresholds to the affordability. Evaluating the perception of students, faculty, and administrators about the affordability concept of new technologies and identifying the dollar value association will shed more light into the extent of impact of OHMDs on university campuses.

Objective 4: To identify the security concerns related to using wearable computers with OHMDs on campus life

Research Questions: (a) What are the security concerns from students', faculty's, and administrators' perceptions related to using OHMDs in campus and class rooms? and (b) What are the security categories of concern (personal, exams, classrooms, ... etc.)?

Hypothesis: within a university campus there are a number of security concerns to be addressed with using OHMDs. Consequently, analyzing these concerns from the students, faculty, and administrators point of views will help define the overall appropriateness and suitability of adopting such technologies in a large Midwestern University.

4. Research Methodology

The adopted research methodology under the current task attempts to identify the perception of students, faculty, and administrators within a large Midwestern University about four components, namely expected changes in the social and academic life style, appropriateness of wearable computers with Optical Head Mount Devices (OHMD) for college campuses, affordability of such technology, and personal security and privacy threats.

4.1 Survey Instrument

The data required under the current research will measure two constructs. The first is behavioral aiming at identifying and evaluating the current practices of using mobile technologies within a large Midwestern University campuses by students, faculty, and administrators for social media, networking, and educational purposes. To that end, a survey instrument composed of five point Likert-type scale questions was developed to collect data related to behavior aspect in an ordinal nature. The second construct is an attitudinal one evaluating the perception of students, faculty, and administrators about the four aforementioned research questions. To that end, an electronic survey instrument including a set of 28 questions was developed. The instrument includes four section identifying the followings.

- Demographic Information;
- Current level of use of Smartphone and/or tablets for social media and educational purposes within the campus;
- Susceptibility of this domain for adopting OHMD as a new technology;
- Expected changes in social media and educational engagement levels due to the use of OHMD; and
- Affordability level of OHMD technology in the form of a dollar value.

4.2 Survey Instrument Administration

The survey for the current study was administered on a web mode through Qualtrics. The sample was recruited through mass email sent through the University email server after attaining required approvals. The survey instrument was distributed in the form of two electronic waves. The recruiting and data collection spanned

over a period of three months. The following section describes the details of the three waves.

- First Wave: An email was sent through the university's email server to each student, faculty, and administrator to attain their approval to participate in the current survey as well as to encourage him/her to do so. The email highlighted (1) intent of the survey; (2) benefits to be achieved from the survey; (3) description of the survey instrument; (4) information about the University and the PIs affiliation and personal contact information; (5) IRB information and approval; (6) confidentiality of the attained data; and (7) volunteer participation. This email included a link to survey instrument with automatic login mechanism imbedded into the link. The participant were aware and notified of this within the body of the email.
- Second Wave: A reminder email will be sent after 7 days from the first wave urging non-respondents to participate in the survey.

Through the use of electronic survey instrument, each survey participant was able to attend to the survey at their convenience using a computer. Taken into consideration that participant may not have enough time or the leniency to attend to the full survey at once, and to minimize the number of break-off, a save mode was implemented in the survey. Each participant will have the ability to stop at any point, save their answers, and attend to them at a later time. It is anticipated that the survey required between 10 to 15 minutes to be answered in full.

4.3 Subject Population and Sample Size

The subjects under the current survey consist of students, faculty, and administrators in the University. In regards to the students, the total estimated number of students enrolled in the University (undergraduate and graduate students in campus and online) is 17,920. Taking into consideration a sampling error of 5% at the 95% confidence level, a sample size of 376 students is needed. On the other hand, the estimated total number of faculty (Instruction/Research/Public Service Faculty) as of end November 2013 is 940; taking into consideration a sampling error of 5% at the 95% confidence level, a sample size of 273 faculty is needed. Whereas, at a total estimated number of administrators (Staff and Service Employees) of 2,872 and a sampling error of 5% at the 95% confidence level, a sample size of 339 administrators is needed.

4.4 Inclusion and Exclusion Criteria

To that end, the inclusion criterion for the current study is that the student, faculty, and administrators have to be enrolled and/or employed at the University.

5. Results

Over the period of three months, a total of 355 individuals participated. However, three (3) opted out of filling the survey at the stage of Informed Consent and 11 provided incomplete responses yielding a final response rate of 341 participants. Table 1 provides a detailed account of the participants demographic information.

As can be seen from Table 1, the majority of the participants were students at the age of 18–25. A further look at the students distribution highlights that it was equally distributed among different undergraduate class statuses and graduate after combining master and doctoral students. However, out of the 189 students, 133 were only taking classes on campus in comparison to 12 and 44 taking classes only online and mixed mode respectively (Please refer to Figures 1 and 2).

Table 1 Demographic Information

Item	Option	Answer	% Response
Age	1	Under 18	1%
	2	18-25	41%
	3	26-35	14%
	4	36-45	14%
	5	46-55	13%
	6	56-65	13%
	7	Over 65	4%
Gender	1	Male	44%
	2	Female	56%
Occupation	1	Student	55%
	2	Faculty	24%
	3	Administrator	18%
	4	Both (Faculty/Administrator)	3%

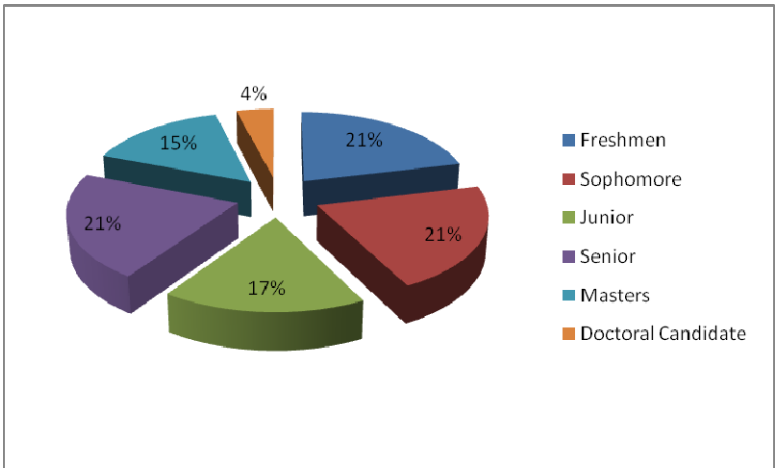

Figure 1 Respondents Distribution per Class

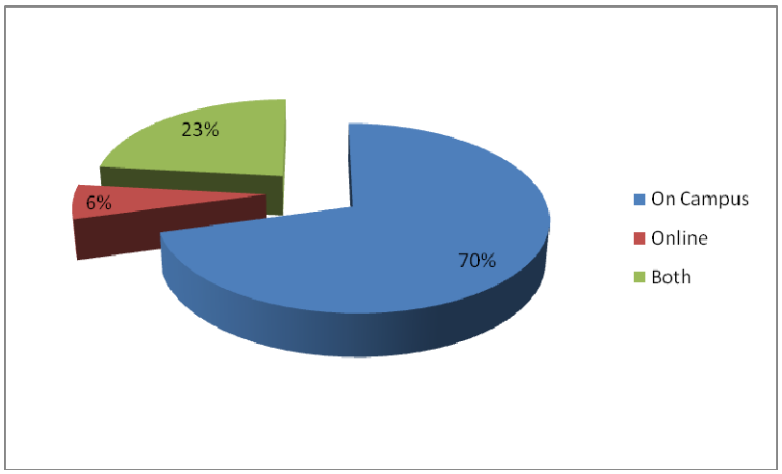

Figure 2 Distribution of Student Participants per Education Delivery Mod

In an attempt to understand the expected changes in students, faculty, and administrators behavior due to the use of OHMDs, it was necessary to develop a baseline on current practices of using electronic devices like Smartphone, tablets, and computers for social media and educational purposes. The collected data highlight the followings

- Eight seven percent (87%) of the participants own a Smartphone, IPod, and/or Tablet;
- The majority of the participants (76.43%) do not use the aforementioned technologies to record lectures and/or take notes in class; on the other hand, the majority (41.95%) stated that they use them for social media (please refer to Figures 3–5); and
- Ninety seven percent (97%) of the participant feel comfortable to use the abovementioned technologies while among friends and family member (please refer to Figure 6).

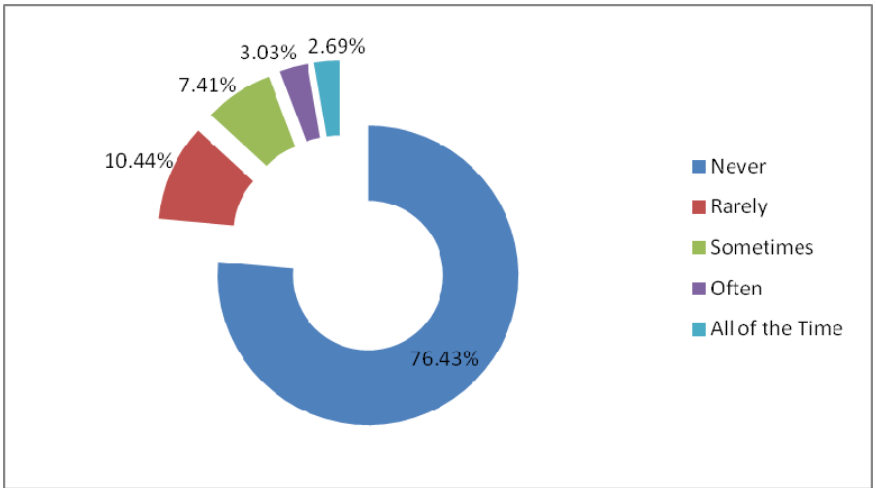

Figure 3 Percentage Distribution of the Use of Smartphone, IPod, and/or Tablet to Record Lectures

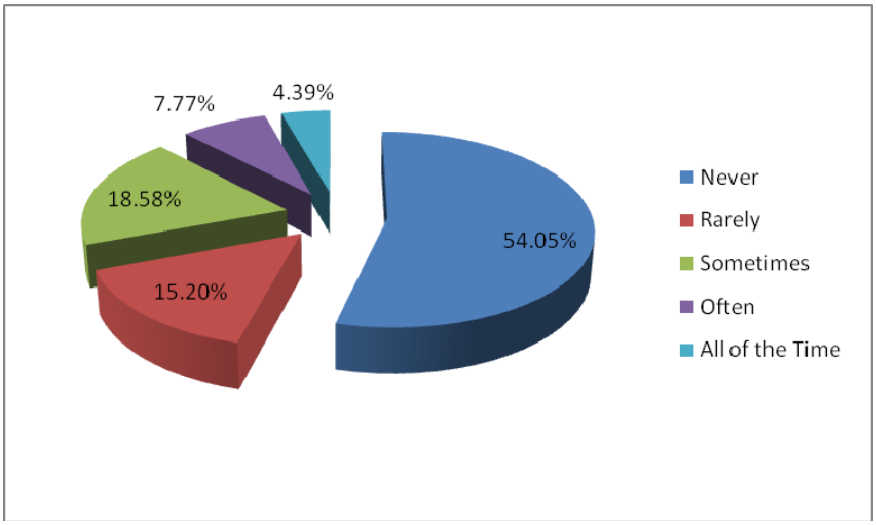

Figure 4 Percentage Distribution of the Use of Smartphone, IPod, and/or Tablet to Take Notes

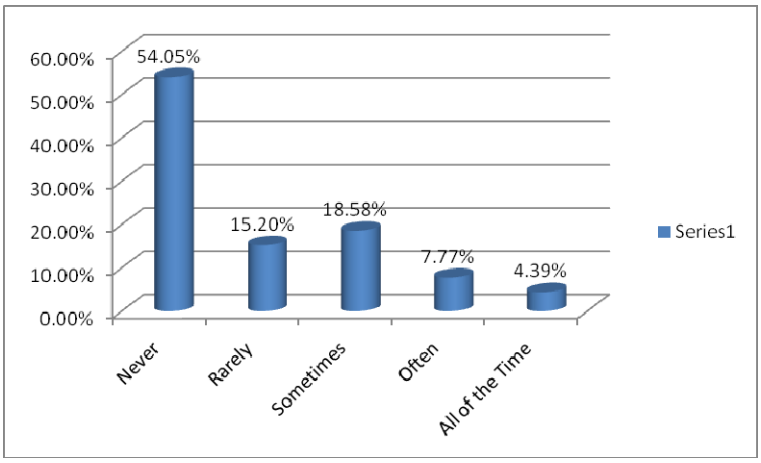

Figure 5 Percentage Distribution of the Use of Smartphone, IPod, and/or Tablet for Social Media

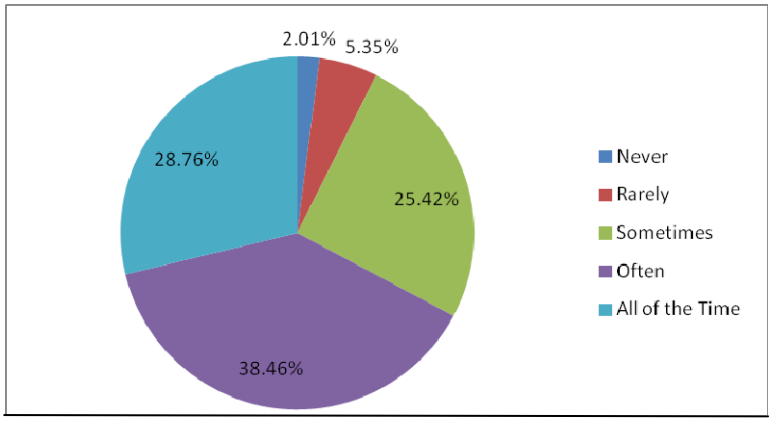

Figure 6 Percentage Distribution of the Use of Smartphone, IPod, and/or Tablet around Friends & Family Members

A closer look at the behavior of the participants in regards to social media engagement highlights that the over half (57%) use a one or more social media venue on daily bases. In addition, almost quarter of the participants (22%) use it on hourly basis. Among the different social media outlets Facebook consumed the highest participation at (95%) followed by LinkdIn, Twitter, Pinterest, and Instagram. Table 2 provides the detailed breakdown of multiple social media outlets addressed under the current research.

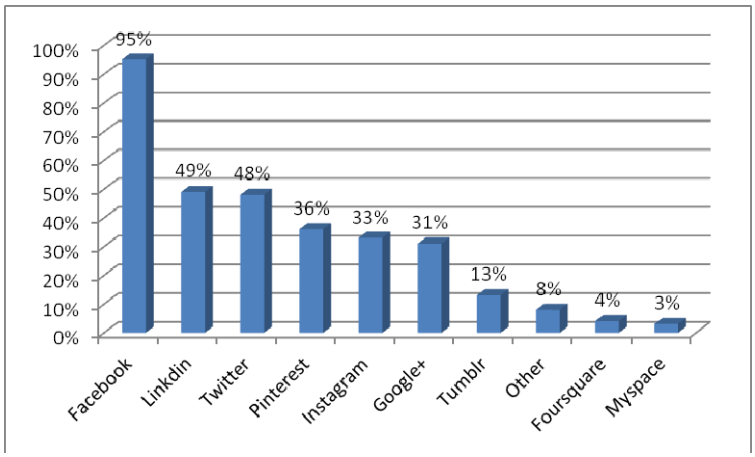

Figure 7 Social Media Response Breakdown

It was noticed that multiple other venue that were not included in the instrument were highlighted by participants. These included by order of highest participation Academia.edu, Snapchat, Blogger, MailChimp, Flckr, Gmail, deviantART, Research Gate, MMORP, Reddit, YouTube, The Berry, ifunny!, MeetMe, weebly, and hangouts.

After developing a benchmark for current practices within a university campus, the research team focused on understanding the acceptance levels as well as expected changes due to the use of OHMD technology. As a starting point, it was essential to know if participants have prior knowledge of such technology to understand their suitability to its use. Seventy four percent (74%) of participants stated that they have heard about OHMD technology before filling the survey. The survey instruments included multiple scenarios for the use of OHMD where participants were asked to indicate on a scale of 0 to 5, with 0 being the least likely and 5 being the most likely, their expected behavior. The collected data highlight the followings. Please refer to Table 2.

- Between 40%–50% of the participants stated that they are least likely to use a wearable computer with OHMD to update social media accounts, to take notes in class, to record lectures, while interacting with friends and family, while in public, and for online classes.
- When participants were asked about their level of comfort for using or being around others while using OHMD technology in public, the results were almost equally weight towards all choices within the scale with minor skew towards not likely. Please refer to Figure 8.

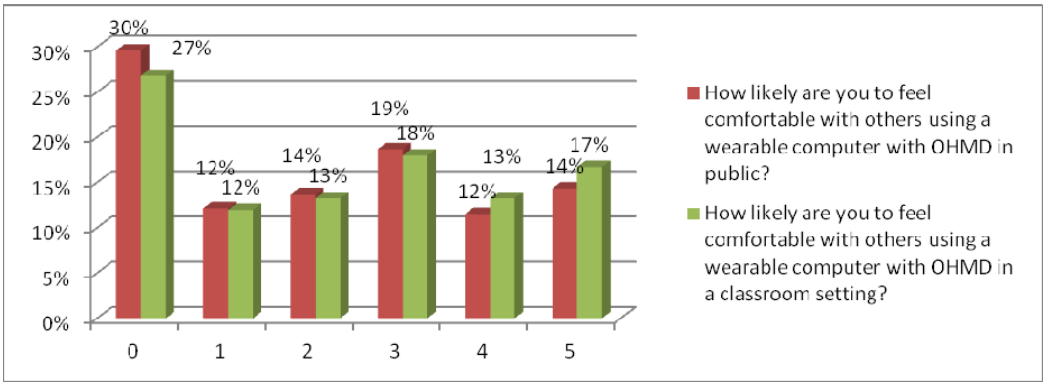

Figure 8 Percentage Distribution of Participants Preferences for Use of OHMD Technology in Public

Table 2 Behavioral Changes Due to the Use of OHMD Technology

#	Question	0	1	2	3	4	5
1	How likely are you to use a wearable computer with OHMD to update your social media accounts?	47%	16%	10%	10%	9%	8%
2	How likely are you to use a wearable computer with OHMD to take notes in class?	53%	12%	10%	13%	7%	6%
3	How likely are you to use a wearable computer with OHMD to record lectures?	50%	11%	10%	10%	10%	10%
4	How likely are you to use a wearable computer with OHMD while interacting with friends and family?	45%	16%	13%	12%	9%	6%
5	Would you use a wearable computer with OHMD while in public?	41%	12%	12%	11%	12%	13%
6	What is the likelihood of you using a wearable computer with OHMD for online classes?	44%	12%	11%	12%	12%	10%

When participants were asked about their likelihood of using OHMD at different public settings, it was noticed that there is a general consensus about the unsuitability of such technology. A closer examination of the data show highest rejection levels when on a date or a family dinner. Although the majority of participant leaned towards a least likely to use OHMD at a bar, beach, sport event, work, and school, the rejection level was less than

50%. However, over 40% highlighted that there is a high likelihood of using OHMD while at home. Please refer to Table 3 for detailed breakdown of participants responses at the aforementioned situations.

Table 3 Percentage Distribution of Participants' Preference for OHMD Use

#	Question	0	1	2	3	4	5
1	At Home	11%	6%	7%	14%	20%	41%
2	On a date	72%	16%	4%	4%	2%	2%
3	Family dinner	63%	19%	7%	6%	3%	3%
4	At a bar	48%	15%	17%	9%	7%	5%
5	At a sporting event	34%	15%	10%	15%	13%	13%
6	At work	26%	13%	13%	19%	16%	13%
7	At a beach	42%	13%	10%	11%	12%	12%
8	At school	24%	14%	14%	18%	13%	17%

To further asses the acceptability of OHMD technology, the research team attempted to establish a benchmark for the likelihood of integrating such a technology with day to day activities. Similar to cell phones and tablets, OHMD might evolve to be an essential component of the users daily lives. To that end, participants who wear prescription glasses were asked if they would integrate an OHMD with their glasses. To that end, out of the 341 participants 225 wear prescription glasses out of which 103 indicated their acceptance of OHMD integration (please refer to Figure 9).

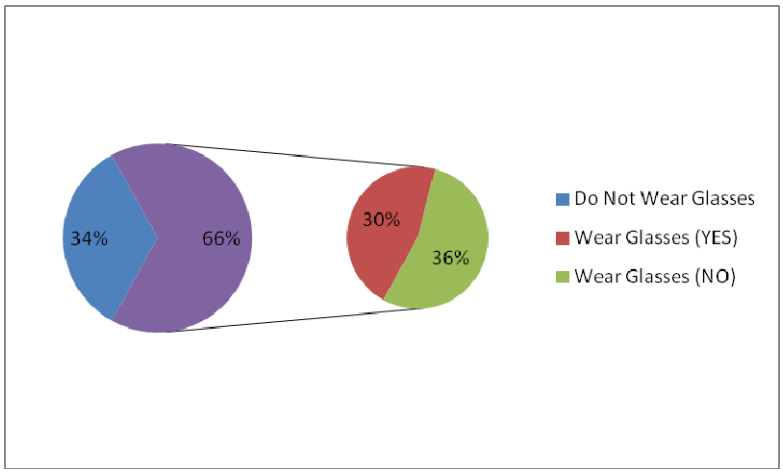

Figure 9 Percentage Distribution of Acceptance to Integrate OHMD

Since OHMD technology is relatively new, the research team attempted to get a general understanding of two items, namely (1) the expected future users opinion about respect to others privacy; and (2) level of attachment to such technology. To that end, two questions were included in the survey instrument. The first raised a scenario in which users are asked to remove OHMD while in a public establishment like restaurants. In response 92% of the participants answered yes to such situation. The second question asked about the willingness of participants to buy OHMD. The opinions were almost equally split as participants answered "NO" at a rate of 55% compared to "Yes" at 45%. The final piece of the puzzle was to establish an understanding of the users perception about level of affordability of OHMD. As a consequence, the participants were asked to assign a dollar range that they are willing to pay to acquire OHMD. To that end, six ranges were provide within the question, namely $0–$100,

$101–$200, $201–$300, $301–$500, $501–$1000, and Over $1000. It was noticed that as the dollar value increase, the willingness to buy decreased. The highest percentage of participants (47%) choose $0–$100. Please refer to Table 4 for detailed breakdown per each dollar category.

Table 4 Response Percentage Breakdown Per Dollar Category

Category	$ Amount	% Response
1	$0-$100	47%
2	$101-$200	14%
3	$201-$300	16%
4	$301-$500	15%
5	$501-$1000	6%
6	Over $1000	2%

6. Discussion

In an attempt to draw inference from the attained survey instrument results, it is essential to understand the response rate. It is inevitably clear to the research team, that the response rate was much lower than the expectations. The original design of the instrument as well as the administration procedure were devised based on the followings assumptions.

- As mentioned previously, the target population under the current study is composed of students, faculty, and administrators at a large Midwestern University. The total population size is estimated to be 21,732 based on university published records as of November 2013. Table 5 provides a breakdown of the population per category.

Table 5 Population Breakdown Per Category

1	Students	17,920
2	Faculty	940
3	Administrators	2,872

- Similar to the target population, the sample design under the current study is three folds. Each sample relates to a specific category illustrated in Table 5. To that end, the current study did not choose a specific sample from each category. On the other hand, mass emails were be sent out through the university system to members of all categories. In accordance with the common norms of survey conduct, it was expected that a 65% non-response rate might be encountered. Consequently, the sample size of Students, Faculty, and Administrators was expected to be 6,272, 329, and 1,005 students respectively. With these responses a marginal error of +/-0.049, +/-0.05, and +/-0.053 at a confidence interval 95% is anticipated for the category respectively.

A reassessment of the achieved response rate indicate that there is a low chance to extract strong statistical inference from the achieved results. Table 6 provides a breakdown of the marginal error per category at a confidence level of 95%. In other words, the outcomes of the current survey instrument cannot be used to provide generalization to opinions among all university campuses. However, the collected data are still valuable as they provide insight into the understanding of the research question. A closer look into the administration procedure of the survey provides account of such low response rate. This could be attributed to that fact that the instrument was

administered at the last month of spring semester and through the summer. It is a common practice for students (who are engaged in internships, post graduation activities, ... etc), faculty (who are involved with summer teaching and research activities), and administrators to pay less attention to mass emails from university mail servers.

Table 6 Marginal Error Analysis

#	Category	Population Size	Response Count	Marginal Error
1	Students	17,920	189	5.62
2	Faculty	940	92	7.77
3	Administrators	2,872	61	9.93

Given the aforementioned fact, a closer look at the collected data provide valuable insight to establish a solid point of departure for a research line aiming at investigating the posted research question. In regards to the current practices of students, faculty, and administrators, it has been found that the majority of participants are familiar with the use of new technologies within day to day activities. This is attributed to two facts. The first is that 87% of the participants own a Smartphone, IPod, and/or Tablet and 74% of participants stated that they have heard about OHMD technology before filling the survey. These two parameters increases the confidence of the research team that the participants are providing feedback while having adequate understanding of the survey questions and topic. It further could be deduced that the sample under investigation is heavily invested in using such technologies for social media engagement in comparison to educational activities. It could be concluded that introducing OHMD technology to university campuses will not deter that trend. The deduction is supported by the fact that (1) 76.43% do not use the aforementioned technologies to record lectures and/or take notes in class; while (2) 41.95% use them for social media; and (3) 40%–50% of the participants are least likely to use a wearable computer with OHMD to update social media accounts, to take notes in class, to record lectures, while interacting with friends and family, while in public, and for online classes. Some of the concerns, which were raised by participants, that contribute to such behavior include but not limited to;

“My intensions might be mistakenly understood”; “At this point, it is unnecessary”; “I do not want to be judged by others”; “Unlikely since it wouldn't be efficient at that task”; “That is a possibility. I could wear it while reading my textbook and speak my notes aloud”.

These comments further raise some interesting points that relates to human nature like (1) humans are always aware of their image. As a consequence, they do not want their intensions to be mistakenly understood due to the use of OHMD; and (2) as the case with multitude of new technologies, humans are skeptical about any added value or its benefits. However, this view might change with time, as the technology becomes more commonly used. As stated by Bill Gates “I believe that if you show people the problems and you show them the solutions they will be moved to act.” (Sources of Insight, 2015). In reality, this is what happened with all Smart Technologies that have become part of our daily lives.

In regards to acceptance of OHMD technology, it could be concluded that there is a long way to go before fully accepting them. Thirty Percent (30%) of the participants highlighted that they are least likely to use such technology in public places. This could be contributed to the abovementioned facts as well as a general sense that it can lead to personal privacy breach. Among the comments received by participants which support this notion are

“I don’t like the idea because they can record me without my knowledge. With a phone you can see someone

pointing it at you. I have seen people wear a OHMD and you cannot tell if they are recording or not.", "I would feel comfortable, but I would wonder what they were up to if they don't look like they are paying attention", and "I see it as a distraction and I would not be able to tell if I was being recorded, which I do not like. It feels like an infringement."

Furthermore, combining the above deduction with the fact that most participants are willing to acquire OHMD if it is less than $, provide little evidence that the technology is believed to be of significant value. The general consensus within a university campus is that OHMD provide no added value as they will not be used for educational purposes. Meanwhile, there exists other means that are readily available with participants, including Smartphone, tablets, and laptops, which could be used for other needs like social media engagement.

7. Conclusion

The objective of this paper was to investigate the expected social and behavioral changes within a university campus due to the introduction of wearable computers with Optical Head Mounted Devices (OHMD). The current research task focused on assessing the aforementioned changes within a large Midwestern University. To that end, an electronic survey instrument was created using Qualtrics and distributed via mass email to students, faculty, and administrators in the abovementioned institution. The instrument included a total of 28 questions targeting two constructs. The first is behavioral aiming at identifying and evaluating the current practices of using mobile technologies for social media, networking, and educational purposes. The second construct is an attitudinal one evaluating the perception about the need, suitability and affordability measures of OHMD within a university campus. The instrument was administered over a period of three months yielding 342 responses. The collected data instigates that

- The technology is not expected to cause changes in the general trend of behavior;
- There is not added value to the use of OHMD in contract to Smartphone, tablet and other handheld technologies within a university campus;
- There is a general consensus among participants, excluding technologically savvy persons, that the use of OHMD might result in personal privacy infringement; and
- This technology has a long way to go before achieving general acceptance for use by students, faulty, and administrators.

8. Limitations and Future Work

The current survey attained low response rate in comparison to the general expectations of the research team limiting the ability of generalizing significant statistical inference to other university campuses. However, it provided an evaluation of the adopted research methodology. It further instigates the need for detailed measurement of associations between the different research questions addressed and each specific category analyzed, namely students, faculty, and administrators. These considerations and others will be the subject of future study by the authors.

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