



## Wearable Technologies and Journalism Ethics: Students' Perceptions of Google Glass

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Technologies change the reporting landscape on a regular basis. Students must be active explorers of new technologies to think through uses for reporting. Capstone course students participated in surveys along with small group training sessions to examine whether Google Glass could be useful for journalism. Fifty-six students in two capstone journalism courses completed surveys with Likert-type scale and open-ended questions to measure (1) new technology attitudes, (2) ease of use, (3) usefulness of the technology, (4) subjective norms and (5) image. Pretest results indicate high levels of perceived usefulness of Glass for reporting, yet only one student specifically asked to use the device for a story. Two themes emerged from the pretest open-ended responses: (1) output quality questions and (2) ethical concerns. While wearable technologies have similar capabilities to smart phones recording in public, student's ethical concerns appeared to play a role in the actual use of the new device.

Reporting tools frequently change in print and broadcast newsrooms. Students who are preparing to work in this fluctuating environment must be excellent writers and possess multiple technological skillsets (George-Palilonis, 2013; Powers & Incollingo, 2016; Veglis & Pomportsis, 2014) to keep up with the ever-increasing pace of the newsroom. As new technologies emerge, some journalists and journalism educators explore how these tools might be used for gathering and disseminating news. While new possibilities such as virtual reality storytelling (Polggree, 2014), social media reporting (Bor, 2014) and data journalism (Gray, Bounegru & Chambers, 2012) have emerged as courses in many journalism programs within the United States, the use of wearable technologies for reporting has not yet been fully explored.

Because of the newness of the devices and limited availability, use of wearable recording technologies, like Google Glass (Glass), are limited to small groups of beta testers, those who are invited to purchase and test a device before it became commercially available.

This exploratory case study reports the survey results of undergraduate student journalists' perceptions of wearable technologies for gathering and reporting the news. In this case study, Glass was made available to 56 students in two capstone journalism courses, where journalism majors with varied technological proficiencies and topic interests collaborate on in-depth reporting projects. Students had the opportunity to see and use the device, but many posed questions about whether or not Glass was an ethically appropriate tool for journalists to use for reporting.

**Keywords:** Ethics, Subjective Norms, Wearable Technologies, Journalism Education, Undergraduate, Google Glass

### Literature Review

Google Glass (Glass) is a wearable technology (Pavlik & Bridges, 2013) that is worn on the face like a pair of glasses. It has an optical and touch interface and can be used to send and receive information via a wireless network connection. The device has many similar capabilities to that of a smart phone: it enables the wearer to send and receive social media information, ask directions, take pictures, record audio and high definition video from a first-person perspective. Wearers of the device can also send emails and watch videos on the optical display.

Several of these capabilities have the potential to make such a wearable tool a useful, complementary reporting technology for student and professional journalists. Some early journalism uses of the device include: recording worker protests (Druge, 2013), citizen journalist Glass videos via CNN's iReport Glass app (Zhu, 2014), and theorizing journalism reporting projects (Valleskey, 2014). Snapchat has designed a similar pair of wearable glasses, and Apple has a pair reportedly in development as well (Shead, 2017).

Similar to professional newsrooms, student journalists have a range of reporting tools and technologies at their disposal. Students also make choices related to gathering and reporting the news, by choosing specific methods or deciding to use specific equipment that enables them to gather the news and report the story. Social psychologists and educators have developed frameworks that attempt to capture these factors and influences, so that we are able to understand why someone would choose “technology A” instead of “technology B” to complete their work (Bandura, 1977; Davis, 1989; Hopp, 2013; Mishra & Koehler, 2006; Venkatesh, Morris, Davis & Davis, 2003). In 2000, scholars Venkatesh and Davis created the Technology Acceptance Model 2 (TAM 2) which outlines several factors that guide people’s technology use choices. They posited that experience, perceptions about social norms, output quality, image, ease of use and perceived usefulness of a technology were key factors in whether or not someone would use that technology for a specific task. Figure 1 shows the TAM 2 model.

According to Venkatesh and Davis (2000), ease of use and perceived usefulness are two main factors of technological adoption. If a person believes the technology will be easy to use, perhaps requiring minimal training or expertise to operate a device, then a person is more likely to try that technology. Likewise,

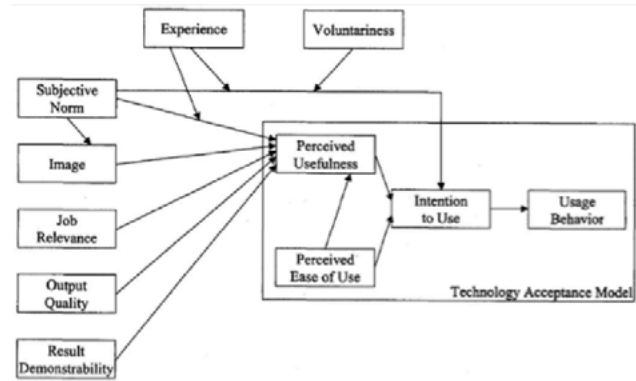


Figure 1: TAM 2 model (Venkatesh and Davis, 2000)

if that technology appears to be useful for the task at hand, then a person is more likely to use that device. For example, if a student in a course has never used video editing software before to edit a news package, the student might ask to use an entry level editing software like iMovie because it appears to be easier to use than Avid or Premiere, both of which require more training and expertise. Each editing platform is useful for the student to complete the goal or task, but one technology may appear easier to use than another similar technology. For this case study, questions about the usefulness of Google Glass were asked regarding its perceived usefulness as an information-gathering tool and as a video recording tool for news stories. Within the TAM 2 model, generally if a person considers a technology as useful and easy to use that person is more likely to incorporate it into workplace routines. The reverse is also true.

When a student uses a technology, for example a camera for recording, they are also wondering what others think about the device and how that student will appear to others. These are social influences called subjective norms and image, which, according to Venkatesh and Davis (2000) impact the perceived usefulness of a technology. If a student is out in the field recording footage with a new camera, he needs to believe that device is perceived positively by others in society and that people view him positively when he uses that camera. Then, according to the TAM 2 model, the camera is seen as a useful device. Research also indicates that student impressions of an activity or technology are impacted by the teacher’s perceptions of the device (Hopp, 2013). In this study, the researcher presented Glass as an innovative device that could be a beneficial reporting and recording technology for news reporting. Therefore, **H1** posits that subjective norm responses will positively correlate with

perceived usefulness of Glass responses and **H2**: Image responses will positively correlate with perceived usefulness.

According to Venkatesh and Davis (2000), direct experience with a device impacts the perceived usefulness of a technology. Because Glass is an unfamiliar technology with no comparable devices regularly available for journalism students, the researcher of this study puts forth that hands-on experience will also impact the perceived ease of use. Therefore, in keeping with the TAM 2 model, **H3a** posits that a positive correlation will exist between student's direct hands-on experience with Glass and their perceived usefulness of the device. Additionally, **H3b** posits that a positive correlation will exist between student's direct hands-on experience with Glass and their perceived ease of use of the device.

Because of the newness of the wearable device, it is also possible that attitudes about new technologies in general will play an initial role in student's decision-making processes about the usefulness of Glass for journalism. This is in keeping with research on prior knowledge about general topic areas of expertise influencing the incorporation of new tools and technologies (Mishra and Koehler, 2006). Self-efficacy theory posits that a person's belief or confidence in one's own abilities relates to how a person approaches a task or situation (Bandura, 1977).

Research indicates that high levels of technological self-efficacy with specific technologies directly impacts future intended usage of the same and similar technologies (Mishra & Koehler, 2006; Veglis & Pomportsis, 2014). For example, a student journalist might learn how to record the news using a particular video camera that is available at a school. The student learns how to frame interviews, white balance the camera, check audio levels, and place the camera on the tripod. All of these technical skills, while learned using one specific camera technology, can and should transfer to a new piece of similar equipment, as the process of balancing a new camera on a different tripod is technically similar. In this way, a student can utilize prior knowledge and confidence about a similar technology to approach how to learn a new technology. Yet, the reverse is also true. Low levels of technological self-efficacy can also lead to negative attitudes about technology and apprehension about using specific and future technologies. Thus, if a student does not feel confident in the use of a particular video camera, the student may not feel confident

in the use of other video cameras or video recording technologies. Which leads to **H4**: Student's general attitudes about new technologies will have a positive correlation with Glass usefulness perceptions for reporting the news.

### **Method**

During the fall of 2013, fifty-six students in two capstone journalism courses were shown 1) pictures of the device, 2) videos recorded with Glass, 3) introduced to the features of the device through description and pictures and then asked to take a survey. Students were not provided an opportunity to see the device in person or try the device before the survey in order to establish a baseline of student perceptions and expectations. The IRB-approved survey included the collection of demographic information including news reporting competencies and 5-point Likert-type scale questions regarding 1) general attitudes towards new technology, 2) usefulness of Glass for print and broadcast reporting, 3) perceived ease of use of Glass 4) social norms, 5) image and Glass and 6) open-ended questions about how the student journalist might use the device. After one week, the survey was closed and Google Glass was made available to all of the students within the courses. One student specifically asked to use the device for reporting.

After another week had passed, the researcher randomly selected and asked an additional 14 students in the courses to try the device. Throughout the semester and with approval of the course instructors, large and small group workshops and one-to-one hands-on training sessions were offered to the 15 students. Each student had the opportunity to use Glass on campus and could request to take Glass off campus. Three students requested to take the device home for further testing and those same three recorded news stories with Glass. One used the device to investigate its usefulness for sports reporting in the field while the other two used the device to record stories on cooking and healthy meal preparation within their homes.

### **Measures**

Within the survey, the general term "technology" was specifically defined as video and audio technologies currently found in broadcast and print newsrooms. One section of the survey asked students to select skills or competencies the student journalist felt were his/her area of expertise. TAM 2-based items were

presented in 5-point Likert-type scales where 1 = *strongly disagree* and 5 = *strongly agree*.

**Usefulness perception.** The usefulness measure was based upon similar questions (Davis, 1989; Venkatesh, Morris, Davis & Davis, 2003) developed to measure user impressions of new technologies: “Glass is a useful device for journalistic information gathering.”

**Ease of Use Perception.** The ease of use measure was modified from existing TAM and TAM 2 questions (Davis, 1989): “Glass is easy to understand” and “Using Glass requires a lot of training.”

**Subjective Norm Perception.** The subjective norms measure was developed from the literature (Venkatesh and Davis, 2000) and included the following: “People behave differently around someone wearing Glass.”

**Image Perception.** Based upon prior measures (Venkatesh and Davis, 2000) “I worry that people will think I’m weird when I wear Glass” was used to capture students’ self-image perception.

**Experience.** For this study, experience measures included students’ attitudes about new technology in general and perceived technological proficiency. Questions included: “I’m comfortable using technology” and “I enjoy learning how to use new technologies.” With the posttest survey, students indicated whether or not they had hands-on experience with Glass (1 = used it, 2 = did not use it).

In addition, students were asked to indicate the types of technology used in the course of everyday

reporting activities. This included the use of high-end video cameras, cell phone cameras, audio recording technologies and design software.

**Open-ended responses.** Because Glass is an emerging technology (Rogers, 2003) fraught with controversy (Liao, 2016) and the students had not seen nor used similar wearable devices for reporting, several open-ended questions were asked to capture how journalism students believed the device might be used in various newsroom environments: “How do you think you will you use Google Glass for your journalism class?” “How do you think journalists at newspaper companies could use Google Glass?” “How do you think journalists at TV stations could use Google Glass?” and “What is your opinion on the use of Google Glass for journalism?” Portions of the responses that focused on Glass for journalism were noted and used inductively to generate themes that captured the essence of the responses. The responses were then coded to identify key phrases or factors students mentioned related to reporting with Google Glass (Boyatzis, 1998; Lindlof, 2011). The open-ended questions were used as part of the study in order to discover additional unique factors for journalism students that are not accounted for within the TAM 2 model.

At the end of the semester, all students in the course were asked to complete the survey a second time to research if hands-on experience impacted any TAM 2 factors or open-ended responses. Sixteen stu-

		Writing*	Copy editing	Coaching writers	Photography	Video (shooting)	Video (editing)	Print design	Web design	Social Media	Audio
	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>
All students	55	44 (80.0%)	23 (41.8%)	14 (25.5%)	18 (32.7%)	16 (29.1%)	16 (29.1%)	6 (10.9%)	6 (10.9%)	28 (50.9%)	7 (13.0%)
Juniors	16 (29.1%)	13 (81.3%)	7 (43.8%)	3 (18.8%)	5 (31.3%)	6 (37.5%)	6 (37.5%)	1 (6.30%)	1 (6.30%)	8 (50.0%)	2 (12.5%)
Seniors	39 (70.9%)	31 (79.5%)	16 (41.0%)	11 (28.2%)	13 (33.3%)	10 (25.6%)	10 (25.6%)	5 (12.8%)	5 (12.8%)	20 (51.3%)	5 (13.2%)
Male	15 (27.3%)	13 (86.7%)	6 (40.0%)	4 (26.7%)	4 (26.7%)	4 (26.7%)	5 (33.3%)	1 (6.7%)	1 (6.7%)	6 (40.0%)	3 (21.4%)
Female	40 (72.7%)	31 (77.5%)	17 (42.5%)	10 (25.0%)	14 (35.0%)	12 (30.0%)	11 (27.5%)	5 (12.5%)	5 (12.5%)	22 (55.0%)	4 (10.0%)

\*Students selected multiple competencies

**Table 2.** Technology use by type

		Professional Video camera*	Audio Recorder	Smart-phone Video	Smart-phone Photography
	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>
All students	55	44 (80.0%)	41 (74.5%)	48 (87.3%)	46 (84.0%)
Juniors	16 (29.1%)	13 (81.3%)	9 (56.3%)	14 (87.5%)	15 (93.8%)
Seniors	39 (70.9%)	31 (79.5%)	32 (82.1%)	34 (87.2%)	31 (79.5%)
Male	15 (27.3%)	12 (80.0%)	13 (86.7%)	14 (93.3%)	13 (86.7%)
Female	40 (72.7%)	32 (80.0%)	28 (42.5%)	34 (85.0%)	33 (82.5%)

\*Students selected multiple technologies

dents completed the posttest survey of which 56.2% (n=9) had used Glass while the remaining 43.8% (n=7) had not.

**Results**

At the beginning of the semester, 55 journalism majors completed the pretest survey. Students were asked to note their perceived strengths as a journalist and could choose multiple areas of expertise. The two most selected competencies were Writing and Social Media/Marking. Table 1 indicates students' self-reported journalism strengths by the entire class, year in school and gender.

Students were also asked what technologies they had used for journalism reporting. Table 2 reports the percentages of students who had used audio equipment, professional camera equipment, and cell phone video and photography capabilities. Responses are also listed by gender and year in school.

**H1** posited that that the subjective norm response would positively correlate with perceived usefulness responses. Results indicate a statistically significant correlation ( $r = -.296, p < .05$ ). **H1** was supported. This means that a student felt Glass was less useful if s/he believed people in society treated others wearing Glass differently than those who were not wearing the device.

According to the TAM 2 framework, image influences perceived usefulness. **H2** posited that image responses would positively correlate with perceived usefulness responses. No statistically significant cor-

relations were found between image and perceived usefulness. **H2** was not supported.

**H3a** posited that hands-on experience with Glass would positively correlate with the perceived usefulness of Glass. Posttest results do not indicate a statistically significant correlation in the perception of usefulness of Glass for journalism based upon actual usage. **H3a** was not supported.

**H3b** put forth that direct experience with Glass would positively correlate with perceived ease of use. The posttest results indicate a strong correlation between hands-on experience with Glass and ease of use perceptions ( $r = .561, p < .05$ ). **H3b** was supported.

**H4:** General technology attitudes will have a direct positive impact upon Glass usefulness perceptions. Within the pretest responses, correlation analysis indicated a strong correlation between "I enjoy learning how to use new technologies" and "Glass is a useful device for journalistic information gathering" ( $r = .454, p < .001$ ). Thus, **H4** was supported.

**Open-ended responses**

Three main themes emerged within the pretest responses (1) Glass as a general "good tool" for reporting, (2) ethical concerns and (3) output quality concerns. A smaller number of students commented that Glass was a "fun toy" or "futuristic toy" that was not useful for journalism. Within the posttest results, themes two and three from the pretest were still present and a new theme emerged. Those who used Glass during the semester wrote about (1) Glass as useful for very specific types of reporting. Pretest and posttest responses are listed by theme in Table 3.

Journalism students were generally concerned that the video quality would not be sufficient for

**Table 3.** Open-ended responses by theme

Themes	Pretest		Posttest – Tried Glass		Posttest – Did not try Glass	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
Total Number of Students	55		9		7	
General good tool for journalism	22	39.2			4	57.1
Ethical Concerns	17	30.3	1	1.1	1	14.2
Output Quality Concerns	10	17.8				
Fun/Futuristic Toy	4	7.14	1	1.1	2	28.6
Contextual Use for specific stories			7	77.8		

broadcast news. This factor, output quality, is accounted for within the TAM 2 model. Seventeen students within the pretest expressed ethical concerns about using Glass for journalism. While the pretest and posttest surveys indicate that students generally perceived Google Glass as useful for journalism, some also had ethical reservations about the technology. This factor, ethics, while a core learning area for journalism students, is not accounted for within the TAM 2 model. While the open-ended questions did not explicitly ask students about ethics or about general concerns, 30.3% (N = 17) of students self-reported ethical concerns about using the technology in public to record video. Example responses include (1) “I fear that Glass will have an issue with personal privacy and become more of a spying device” (2) “I think some journalists might start using the glass to record people without their permission is the behavior isn’t checked” and 3) that using Glass to record “can distort information.”

Students with hands-on experience made observations regarding the use of the device as beneficial for only certain news contexts. This appears to be evidence of good news judgment values related to an understanding of technology as a means through which to present information to the public. For example, several student responses referred to specific story types – like use as a complementary camera for reporting, behind-the-scenes features, or as part of a personal profile stories. Of course, these are not the only responses students had related to the technology, several pretest responders wrote the device might be

useful for undercover reporting – which indicates a lack of critical awareness of the device as a very obvious and visually recognizable technology as it is worn on one’s face.

Contrary to prior research (Venkatesh and Davis, 2000; Venkatesh et. al, 2003) experience with Glass did not significantly diminish subjective norm unease about the technology. See Table 4 for pretest and posttest mean responses.

Because this study is about emerging technologies, additional research is needed to determine if the point of diffusion of the technology in society (Rogers, 2003) has an impact upon subjective norm and image impressions. At the time of the study, some major news reports about Google Glass focused on the device a means of surveillance and an invasion of privacy (Cain Miller, 2013; Greenberg, 2014; Guynn, 2014). Future studies should include additional open-ended questions to capture what the journalism students have heard about a technology to determine if positive or negative knowledge about the new device correlates with internal and external motivation factors.

### Limitations

Although correlations have been found between several of the factors listed in the TAM 2 model, causations should not be assumed from the data. Yet, while ethics is a foundational area at the very core of journalism training, it is not accounted for within current technology adoption models. Thus, additional research is needed to understand whether ethics plays a statistically significant role within student journalist decision-making processes related to the adoption of new technologies and reporting tools. Still, early impressions of wearable technology use and values for journalism are a necessary area of research that requires an exploratory case study approach. While at the time of the study Google Glass became available for anyone to purchase, a short time later Glass was pulled from the market to undergo further testing and refinement. While it is currently not available to the public, it is possible that the results in this study indicate how students might approach emerging technologies more broadly. Thus, the research captured here can be built upon through study of technologies that are in the early adoption stages.

### Conclusion

Research indicates that those who try technologies

**Table 4.** Student responses by mean scores

	Pretest	Posttest Tried Glass	Posttest Did not try Glass
	<i>Mean</i>	<i>Mean</i>	<i>Mean</i>
Glass is a useful device for journalist information gathering	3.96	3.22	4.00
Using Glass requires a lot of training	2.87	2.33	3.29
Glass is easy to understand	3.19	3.33	2.29
People behave differently around someone wearing Glass	3.75	3.78	3.86
I worry that people will think I’m weird when I wear Glass	3.22	2.67	2.86
I enjoy learning how to use new technologies	3.96	3.89	4.14

early in their education are more likely to use the same or similar technologies in their future careers (Hopp, 2013; Mishra & Kohler, 2006). If a teacher has a positive impression of a technology, and scaffolds learning opportunities using those tools, students may be more likely to utilize a device in the future or be able to envision future usages. This is important for student journalists, as they will encounter many new tools and technologies that will be used for reporting the news. In this study however, the students' perception that "people treat people differently when they wear Google Glass" did not change over time, nor did their unease about how people were treated diminish with hands-on use of the device.

Within this study, it also appears that ethics influenced whether or not students choose to use an emerging technology for journalistic purposes. Because of the results presented in this case study, the author puts forth that future research of student perceptions of technologies should include an ethics factor or scale related to the use of unfamiliar, new, and emerging devices. This will help researchers better understand the nuances surrounding student decision-making processes related to reporting tools and technologies. This factor, ethics, is not accounted for within current technology adoption models that are used to study why people use the tools and technologies they do for specific tasks. However, ethics may play a large role in student journalist decision-making processes related to the use of new technologies for reporting and news gathering. Future research studies could longitudinally explore how early impressions of emerging technologies shape student journalists' use of the same technologies within later courses or newsrooms. This case study also builds upon the pedagogical research (Powers & Incollingo, 2016) of the challenges of teaching multimedia journalism. The results here gesture towards how journalism teachers can and should work to better understand the technical *and* ethical nuances of an emerging device that may one day become a commonplace news gathering technology.

In many cases, the selection of the journalists' tools and resources is influenced by the final medium of publication. Yet video, audio, and multimedia are commonplace across print and broadcast news websites. To prepare for conceptual newsrooms and future styles of reporting that will include different technologies than those in which they are formally trained, students must also become innovative thinkers by

conceptualizing old and new journalism concepts, tools, and networks in new and as yet unforeseen ways. Within this fluctuating technological ecology, students need to learn how to transfer their skills and knowledge about one technology to the use of future technologies.

In this study, hands-on use of Glass enabled students to think through how and when to use the technology, and more importantly, when they might not use the device at all. This critical awareness was only present in the posttest responses of those who had hands-on experience with the device. Future studies about the use of emerging technologies for journalism should include hands-on experience with new devices to research if a similar use pattern and ethical concern exists for drones, 360 cameras, and other wearable devices.

### Endnotes

1. At the time of this research, only invitees were able to purchase Google Glass. The researcher of this study was an early beta tester who was invited to purchase Glass a year before its official release date. In April 2014, the device was made available for purchase by the general public; it was removed from the market for a redesign in January 2015.
2. These are but a few of the capabilities of the device, but they are the most pertinent for the discussion in this case study.
3. Course instructors gave permission for the researcher to distribute the survey during the beginning of the semester. No credit was given to students who participated in the study, nor were grades dependent upon completion of the survey, participation in hands-on learning activities or participation in the overall study.
4. One student in the course did not take the survey.

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