Chapter 34
From Wearing to Wondering: Treating Wearable Activity Trackers as Objects of Inquiry

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ABSTRACT

Wearable technologies represent a rapidly expanding category of consumer information and communications technologies. From smartwatches to activity tracking devices, wearables are finding their way into many aspects of our lives, changing the way we think about ourselves and the world around us. The rapid adoption of these tools in everyday life hints at the possibilities these devices may hold in school and other educational settings. Drawing on examples taken from a five-year study using wearable fitness tracking devices in elementary and middle school classrooms, this paper presents two examples of how wearable devices can be appropriated for use in school settings. These examples focus on instances where students turned activity trackers into objects of inquiry using data from familiar activities.

INTRODUCTION

Wearables represent a rapidly growing category of information and communications technologies (CCS Insight, 2015). From smartwatches to activity tracking devices, wearables unobtrusively capture and collect large amounts of data relating to aspects of wearers' experiences that were previously unavailable. Using sensors, like accelerometers, wearables can quantify a user's activity (e.g., steps, sleep, breathing) and make it available for inspection. The subsequent analysis of these data can change the user's sense of self and their relation to the world around them (Lee & Drake, 2013a). Prior to the introduction of

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wearable technologies, these data required active intervention on the part of the individual to capture and track relevant data—manually measuring distances traveled, logging places visited, etc.

Given the potential wearables have for producing personally-relevant data and their increasing social recognition, it is only a matter of time before these devices find their way into school and classroom settings. To use these devices to their full potential, teachers and researchers must work to understand the opportunities and challenges presented by using these devices in schools. For multiple years, the authors (along with a team of researchers, teachers, and designers) have worked with 5th and 6th grade classrooms in the United States to understand how the use of personally-relevant data from wearable activity trackers affects students' engagement with and appropriation of statistical content and practices. Over the course of the study, the authors developed, tested, and refined a statistics curriculum and video recorded and analyzed classroom interactions in order to examine how students leveraged their familiarity with activity in making sense of data from wearables. We have seen familiar activities inspire students to pursue lines of inquiry, develop inclusion criteria, and provide context for their interpretation of data (Lee, Drake, Thayne, & Cain, 2015).

Other publications by the authors have focused on using students' own activities as objects of inquiry—how using activity tracker data can help students better understand these activities (e.g., Lee & DuMont, 2010). The aim of this chapter is to examine how students' use of activity tracker data to better understand the tracker itself—how well activity trackers capture and quantify activity—can be a productive strategy for fostering evidence-based discourse in classrooms. Through presentation of the classroom examples below, the authors argue that students' knowledge of familiar activities can be used to foster skepticism towards wearable devices that leads to productive inquiry in a statistics unit, including the eventual resolution of that skepticism through evidence-based discourse. Each of the examples shows a different way that students may use activity data to critically examine the functionality of the wearables and how the students resolve their questions. In the first example, students test whether the trackers they are using are accurate enough for use in other inquiry activities. The second example involves students investigating whether and how well their devices can track a particular activity and how that ability affects their interpretation of previously collected data.

BACKGROUND

In an effort to reverse US students' underperformance in science, technology, engineering, and mathematics (STEM) topics (OECD, 2014) and increase interest in STEM careers (President's Council of Advisors on Science and Technology, 2010), researchers and educators developed the Next Generation Science Standards in part to encourage students' engagement in scientific practices rather than simply memorize facts (Achieve, Inc., 2013). Among the practices encouraged by the NGSS are: 1) Asking questions and defining problems, 3) Planning and carrying out investigations, 4) Analyzing and interpreting data, 6) Constructing explanations, and 7) Engaging in argument from evidence (Achieve, Inc., 2013, Appendix F). Each of these practices is important to the accomplishment of productive inquiry. However, students can struggle with inquiry curricula for a variety of reasons, including difficulties asking appropriate questions, inexperience with school-based inquiry learning, and underdeveloped representational and interpretive skills (Elby, 2000; Kanari & Millar, 2004; Krajcik et al., 1998; Kuhn, 2007). Research in statistics education has also noted that students' ability to engage in meaningful inquiry requires an understanding of variability as a natural part of measurement (Petrosino, Lehrer, & Schauble, 2003).