

A phenomenological approach to experiences with technology: current state, promise, and future directions for research

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Abstract In this paper I conceptualize experiences with technology as an object of study for educational technology research and propose phenomenology as a highly suitable method for studying this construct. I begin by reviewing existing research focusing on the construct of experiences with technology and the approaches utilized for its study. To augment this literature, I explain the phenomenological concept of experience and describe its utility for understanding experiences with technology. I propose the theoretical and methodological approach of phenomenology as a framework for developing a research agenda on experiences with technology and for unifying existing lines of research in this area. To illustrate the promise of this approach and to facilitate its application, I describe a research design consistent with the theoretical underpinnings of phenomenology, including methods for collecting and analyzing data as well as ethical and validity considerations specific to this research design. I conclude by identifying several possible research directions utilizing a phenomenological approach in educational technology to incite further research in this area.

Keywords Phenomenology · Experience · Experiences with technology · Qualitative research

Technology, broadly defined, has impacted societies and individuals in many ways, from subtle changes in everyday experiences to transformation of societies, cultures, and ways of living (Postman 1993). For example, the printing press has led to mass communication and convergence of cultures (McLuhan 1962); the mechanical clock enabled capitalist modes of production and living (Mumford 1934); and steel axes changed social structure and relationships of Australian aboriginals (Sharp 1952). Similarly, some technologies have had significant impact on teaching and learning. For example, using computers for

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writing has altered the writing process (Bangert-Drowns 1993), and Web 2.0 has introduced new possibilities for teaching and learning by offering a new way of producing and sharing information on the Internet (Liu et al. 2008; Maddux et al. 2008; Stevenson and Liu 2010). Although some caution against holding too high expectations of technology in education (Cuban 1986; Reiser 2001), a variety of technologies have become prevalent in education and thus in teaching and learning. Undeniably, the effects of technology on teaching and learning are the *raison d'être* of the field of educational technology.

Technology alters not only the outcomes of teaching and learning, but also the processes of teaching and learning and individuals' experiences with teaching and learning, including classroom interaction, classroom practices, and learning processes (Gagne 1974; Kozma 2003; Penuel et al. 2007). For example, research has established a relationship between teachers' using computers for teaching and their development of constructivist pedagogical practices (Becker and Ravitz 1999; Windschitl and Sahl 2002).

To comprehend technology's impact on societies generally and on teaching and learning more specifically, it is vital to understand individuals' experiences with technology. Jonassen's (1984) seminal argument underlined that "since experiencing a mediated event is substantively different from direct experience of an event, the resulting phenomena or conscious perceptions must be substantively different" (p. 166). Put differently, experiences with technology generally, and with teaching and learning with technology specifically, are phenomena distinct from experiences with traditional forms of teaching and learning. This necessitates studying experiences with media and technology in-depth to understand their role in and impact on teaching and learning. Research in educational technology has started to attend to the theme of experiences with technology; however, the field would benefit from formulating a clear and coherent research agenda to explore experiences with technology, consistent with a related philosophical and methodological framework for the advancement of this agenda.

Considering the importance of mediation of experience with technology (Jonassen 1984), learning as experience (Parrish 2009), and experience per se in education (Dewey 1938), this paper argues that a phenomenological approach to studying experiences provides a suitable framework for research on experiences in educational technology and can advance the field by complementing and unifying existing research in this area. Neither experience nor the phenomenological concept of experience¹ are new constructs. Indeed, the phenomenological concept of experience has been used in social science research, particularly in some fields such as psychology. However, the concept as well as the related methodology has been underutilized in educational technology research. Increased utilization of this approach would also increase qualitative research contributions in educational technology and contribute to methodological diversity in educational technology (Savenye and Robinson 2004; Thompson 2005).

This paper discusses experience with technology as a construct in educational technology research, reviews existing research of the construct, proposes phenomenology as a theoretical and methodological approach to study experiences with technology, and illustrates its utility by providing examples of future research directions in educational technology that would benefit from its application.

¹ I contrast the phenomenological concept of experience with the meaning of experience in everyday use. The former is more complex, and will be described in detail below.

Current state of the field

Research in educational technology has made important contributions to our understanding of the relationship between technology and teaching and learning. At the same time, the above discussion of technology's impact on societies and individuals highlights an area that is presently understudied; this need is amplified by reviews of the field and calls for future research. For example, Thompson (2005) indicated that we need to increase our knowledge about experiences of new teachers with technology and the influence of these experiences on their teaching practice and on student learning. Also, established technologies have not been sufficiently studied in practice (Robyler and Knezek 2003; Strudler 2003). In addition to studies focusing on outcomes of using established technologies, research focusing on individuals' experiences with those technologies could unearth more information about vital processes of teaching and learning with technology.

Furthermore, educational technology research would greatly benefit from an increased utilization of qualitative approaches, which would be valuable for exploring phenomena and their development as well as for complementing quantitative methods and validating and enriching their findings (Savenye and Robinson 2004; Thompson 2005). Using multiple methodologies in a complementary way may also benefit the field as a whole. In order to address the complexity of some topics, in addition to experimental methods and comparisons, multifaceted approaches, comprehensive and in-depth qualitative studies, and detailed description of context are needed (Robyler and Knezek 2003; Strudler 2003). Accordingly, the use of qualitative research in educational technology has been encouraged; for example Savenye and Robinson (2004) invited the contribution of qualitative researchers to expand the questions and types of inquiry existing in educational technology. However, so far phenomenology has not been offered as a research methodology in the field. Thus, this paper serves to complement existing literature encouraging and guiding the use of various qualitative research traditions in educational technology. I propose both a research agenda focusing on experiences with technology and a philosophical and methodological approach for its implementation. Before presenting the phenomenological approach to experiences with technology, I review definitions of experience and the existing literature on experiences with technology.

Experiences with technology and research in educational technology

The concept of experience advanced in this paper will be expressly contrasted to everyday use of the term; the distinction between two concepts of experience in Husserl's work will be further described below. In general use, there are two main definitions for experience: (1) the apprehension of an object, a thought, or an emotion through the senses or mind; (2) active participation in events or activities, leading to the accumulation of knowledge or skill (The American Heritage College Dictionary 2000). These definitions suggest that experience and education are intertwined. In fact, Dewey (1938) defined education as educative experience that involves intellectual and moral growth, interaction, and continuity. Similarly, Csikszentmihalyi's (1991) theory of optimal experience, based on the concept of flow—"the state in which people are so involved in an activity that nothing else seems to matter" (p. 4)—maintains that such a state is most conducive to learning. Parrish (2009) argues for a view of learning as experience, and suggests that this concept should be an integral part of instructional design. In sum, the importance of experience in education

and learning is well established, and thus experience with technology as a construct in educational technology research is worthy of and promising for a research agenda.

Literature on experiences with technology

The importance of studying humans' experiences with technology, including those of teaching and learning with technology, is evident in the prominent role the term "experience" has begun to play in educational technology (Friesen 2005) and the extant research with the theme of experience with technology. The literature investigating experiences with technology includes three main areas of educational technology research, namely studies of: (1) students' experiences with online education; (2) teachers' experiences as they integrate technology in their teaching; and (3) users' psychological experiences with computer applications.

The first stream studies students' experiences of taking courses and learning through online education. It includes studies of higher education students' experiences with and perceptions of e-learning (Concannon et al. 2005; Gilbert et al. 2007; Norton and Hathaway 2008); studies of experiences and outcomes in distance education and assessment in comparison to traditional formats (Carswell et al. 2000; Knipe and Lee 2002; Thomas et al. 2002); and studies of students' experiences resulting from specific technology applications such as interactive multimedia resources or group process support technology (Davies et al. 2005; Jones et al. 2001; Paulus et al. 2006; Wood et al. 2003).

The second stream of research focuses on the experiences of teachers, teacher candidates, and instructors with integrating technology in their teaching. It includes research on instructors' experiences of adopting a course management system (West et al. 2007) and on preservice teachers' experiences of learning to integrate technology into their teaching (Brown and Warschauer 2006; Bullock 2004; Herrington and Oliver 2000). It also includes self-studies of experiences with teaching or learning with technology, such as an auto-ethnographic analysis of an instructor's experiences of teaching with technology (Lee 2008), and chronicles of a professional's experiences of self-teaching web page design (Shackel 2004). Although the latter contribution is "a short unvarnished appraisal of one particular learning experience" (Shackel 2004, p. 645) rather than a scientific study, it serves to show the benefit of capturing and documenting such experiences.

The final stream consists of studies investigating users' psychological experiences with various computer applications. For example, research has explored affective states and quality of experience (flow) associated with using games, Internet, and multimedia learning applications (Konradt et al. 2003; Thatcher et al. 2008; Weibel et al. 2008). Another example is the development of a scale to measure a construct of subjective computer experience that reflects the thoughts and feelings ascribed to some previous or existing computing event (Smith et al. 2007).

Knowledge gaps in research on experiences with technology

The existing research on experiences with technology makes important contributions to the field; yet the close relationship between experience, education, and learning (Csikszentmihalyi 1991; Dewey 1938; Parrish 2009) would warrant a more central role for experiences in the research agenda in educational technology. The scarcity and relatively narrow concentration of research in this area is even more concerning considering that Jonassen (1984) established the mediated nature of experience with uses of educational

technology over two decades ago. Clearly, a concentrated effort is needed to cultivate research on experiences with technology and to build a research agenda.

Furthermore, of those studies investigating experiences, a majority focus either on evaluating the learning environment, materials, and/or instructional design or on assessing the quality of or satisfaction from experience (e.g., Concannon et al. 2005; Davies et al. 2005; Gilbert et al. 2007; West et al. 2007; Wood et al. 2003). Other studies concentrate on selected aspects of experience such as the outcome of learning, feelings, or attitudes (e.g., Carswell et al. 2000; Davies et al. 2005; Paulus et al. 2006). Yet, using technology has immediate, intermediate, and long-term outcomes. Parrish (2009) suggests that “an instrumental view of learning may consider only the immediately measurable outcomes of a learning experience, particularly its impacts on cognition, behavior, or performance” (p. 513) even though the emotional, social, cultural, political, and aesthetic qualities of experiences have more than immediate rewards.

According to Dewey’s (1938) concept of continuity, learning does not take place in distinct episodes; rather every experience an individual makes shapes (for better or worse) future experiences by influencing attitudes, preferences and aversions. It is this relationship between past and future experiences that forms the foundation of lifelong learning; therefore examination of experiences with technology per se and its multiple facets would enable us to understand, design, and/or influence later learning experiences. For example, design and user-friendliness of educational software applications may shape students’ attitudes and motivation toward using computers by providing for either an experience of seamless immersion into a simulated environment or a frustrating technical experience. Similarly, some applications of technology in education can promote multiculturalism, critical thinking, and social justice (Sleeter and Tettegah 2002) whereas others may, even if unintentionally, work against these goals. An example of the latter in the literature is the software *Oregon Trail*; while being powerful in its academic goals, it has been criticized for carrying some biased cultural and social messages (Bigelow 1997). Such secondary messages could have long-term influence on students through collateral learning (Dewey 1938).

In sum, studying experiences with technologies, including both the process of engaging with technologies and the educational outcomes of using them, would enable us to understand the entire range of consequences and by-products of experiences with educational technology. Even though a wealth of literature has investigated the outcomes of experience, comparatively little research has focused on the intermediate or long-term aspects of experiences with technology (including cultural aspects, aesthetic dimensions, and emotional qualities) (Astleitner and Leutner 2000; Gunawardena et al. 2003; Parrish 2009). Therefore, more research studying experience in a more inclusive and multifaceted manner and focusing on experience per se (in addition to research on outcomes of experience) is needed. The need for a broadened focus has also been recognized by others. For example, Astleitner and Leutner (2000) highlight the importance of emotionally sound instructional technology, while Veletsianos (2007) underscores aesthetics of animated pedagogical agents in learning.

Furthermore, review of the literature reveals that research on experiences with technology is not tied to an encompassing framework. A framework unifying a diffuse collection of studies can increase the contribution of a research area and enable knowledge accumulation through collective effort (Hannafin and Kim 2003). A unifying construct and framework for the systematic study of experiences with technology and a methodological framework that is consistent with that theoretical framework would facilitate the creation

of a community of scholars and a coherent body of research, which would in turn support and facilitate the research agenda on experiences with technology.

Below I review methods that are commonly used to study experiences and discuss their suitability for studying experiences with technology. To advance research on experiences with technology as educational phenomena, I then propose phenomenology as a unifying framework and methodology for a research agenda on experiences with technology. Phenomenology includes a philosophical approach to the concept of experience, a methodology to guide research design, and methods to study experiences in depth.

A phenomenological approach to studying experiences

A variety of research methodologies are commonly used across the social sciences to study experiences, such as the versatile *Experience Sampling Method (ESM)* (Csikszentmihalyi et al. 1977), which is generally concerned with breadth rather than depth of experience. In educational technology, research focusing on aspects of experience has primarily utilized various quantitative methods to analyze data collected through surveys or scales (e.g., Konradt et al. 2003; Thatcher et al. 2008; Weibel et al. 2008). Overall, analyses of quantitative data such as data collected by means of satisfaction scales focus on selected facets of experience to discover causal relationships. An important strength of these quantitative research designs is the ability to test models with which to predict outcomes of experience based on independent variables; standardized measures do not attempt to understand the subjective nature of experience and can only capture the chosen constructs.

On the other hand, qualitative methods allow studying experiences in greater depth. As is the case for research methods in general, different approaches to qualitative inquiry are suitable for different research objectives (Creswell 2007; Crotty 1998). For example, ethnographic research aims to study the behaviors of a culture-sharing group and describe their culture (Creswell 2007; Gubrium and Holstein 1997); critical approaches aim to question ideology, expose power relations, and take action for change (Crotty 1998); and deconstructionist research aims to show that things (e.g., texts, beliefs) do not have definable, determinable, or bounded meanings (Derrida 1997). Phenomenological research is a systematic attempt to uncover and describe structures of lived experience to arrive at a deeper understanding of the nature or meaning of experiences of phenomena (Giorgi 1985; Husserl 1970a; Moustakas 1994; van Manen 1990).

Some past studies in educational technology have used qualitative methods to study experiences in greater depth (e.g., Brown and Warschauer 2006; Bullock 2004; Thomas et al. 2002). For example, grounded theory (also referred to as the constant comparative method) (Corbin and Strauss 2008; Glaser and Strauss 1967) as well as other generic qualitative methods that involve coding and thematic analysis of data are among the more common qualitative methods for studying experiences with technology. The purpose and strength of grounded theory is to generate theory from data collected through emergent design; it deliberately avoids building on existing theories. A smaller number of studies used other qualitative methods such as autoethnography and phenomenography (Govender and Grayson 2008; Lee 2008). Autoethnography combines ethnographic and autobiographical intentions to study one's own experiences (Schwandt 2007). In phenomenography, which is designed to study stages of learning, the focus is on the subject of learning rather than on individuals' experiences (Marton 1981). Even though all of these methodologies have made and have the potential to further make important contributions to knowledge in educational research in their own right, only phenomenology has been

specifically designed to study the essence and meaning of experience.² Thus, it is phenomenology that is uniquely suited to building a research agenda on experiences with technology and contributing to theoretical unity in a research area on experiences in a field.

Furthermore, of the various qualitative approaches, phenomenology is notable in that it comprises a theoretical framework and method designed specifically to study lived experiences of phenomena from the perspective of those who experience them (Giorgi 1985; Moustakas 1994; van Manen 1990). Thus, research aiming to develop a deeper understanding of several individuals' common or shared experiences of a phenomenon—for example, so as to develop practices or policies—constitutes the proper domain of phenomenology (Creswell 2007).

Phenomenology is both a philosophical and theoretical approach premised on a phenomenological concept of experience as well as a research methodology consistent with this theoretical framework. In other words, phenomenology is not merely an alternative methodology but also an approach to conceptualize and study experience, with consistent philosophical foundations (Giorgi 1994). To establish what qualifies a qualitative scientific investigation as phenomenological, Giorgi (1997) pinpointed that the distinctive features of phenomenological research are to “employ (1) description (2) within the attitude of the phenomenological reduction, and (3) seek the most invariant meanings for a context.” (p. 235). A distinctive requirement of phenomenological research is for the researcher not to adopt any position on the correctness or falsity of a participant's claims regarding the views and judgments intrinsic to his/her lifeworld (Ashworth 1999; Giorgi 1997).

Phenomenology is a highly suitable approach to studying human experiences with technology for a number of reasons. Developed precisely for the purpose of studying lived experiences of various human phenomena, describing the meaning of experiences with technology (e.g., integrating technology into teaching, regularly playing video games) would squarely fit into the domain of phenomenological research. Also, phenomenology is the study of *lifeworld* (*lebenswelt*), defined as “what we know best, what is always taken for granted in all human life, always familiar to us in its typology through experience” (Husserl 1970a, pp. 123–124). Technology has become a pervasive aspect both of modern life generally and of education specifically, hence experiences with technology—and even experiences of non-use of technology for that matter—are embedded in students' and teachers' lifeworlds. Investigating individuals' experiences with established technologies that are seamlessly integrated into their daily lives is especially consistent with phenomenology.

A rigorous phenomenological study should coherently combine a phenomenological philosophical background, phenomenological data collection and analysis, and a phenomenological description of experience as its output (Giorgi 1997). Additionally, phenomenological research should be built on a well-defined concept of experience, which I will elaborate below. Therefore, I propose that the phenomenological concept of experience should become a central object of inquiry in educational technology research, framed by a phenomenological approach, and using a phenomenological methodology; this would constitute epistemological use of a method (Greckhamer and Koro-Ljungberg 2005) and the proper use of phenomenology (Giorgi 1997). However, I do not suggest that phenomenology or the phenomenological concept of experience are a panacea for all research issues in educational technology, or that phenomenology should become the dominant or exclusive approach to educational technology research. Instead, by highlighting the

² Creswell (2007), Moustakas (1994), and Starks and Trinidad (2007) provide detailed descriptions of how phenomenology differs from other specific methodologies.

importance of experiences with technology and the appropriateness of phenomenology as a framework and methodology to study experiences, I aim to illuminate the potential for studying experiences with technology and for utilizing the phenomenological concept of experience and methodology to realize this potential.

Specifically, phenomenology as an approach to studying experiences can fulfill important functions in educational technology research by (1) enabling the study of experiences with technology in-depth and in a multifaceted and comprehensive manner; (2) providing a unifying framework for a research agenda on experiences with technology; (3) providing a theoretical and philosophical framework as well as a consistent methodology and methods; (4) providing clear guidelines on sample selection, data collection, data analysis, ethics and validity, which would facilitate its adoption in the field; and (5) generally strengthening the qualitative basis of educational technology research. In the following pages I describe the philosophical bases of phenomenology and its application to research.

Phenomenology as philosophical approach

In this section I introduce phenomenology, explain its philosophical underpinnings, and elaborate on the phenomenological concept of experience. Phenomenology originated as a philosophical analysis method (Creswell 2007; Giorgi 1997; Husserl 1969); its consequent applications in various disciplines such as psychology (Giorgi 1985), nursing (Crotty 1996), and education (van Manen 1990),³ led to phenomenology as research methodology.

Every research project is an epistemological venture and as such has philosophical underpinnings—be it stated and articulated or not (Giorgi 1994; Greckhamer and Koro-Ljungberg 2005). Similarly, the philosophical background of phenomenology is intimately tied to any proper application of the phenomenological method, making it essential for a researcher to understand the philosophical underpinnings of phenomenology in order to conduct sound and rigorous phenomenological research (Giorgi 1997). Consequently, any phenomenological researcher is strongly advised to include some discussion about the philosophical presuppositions of phenomenology along with the methods in this form of inquiry (Creswell 2007).

Phenomenology as theoretical framework and methodology was developed for studying individuals' lived experiences of phenomena, rooted in the work of German philosopher Edmund Husserl (Audi 2001; Husserl 1969, 1970a, b; Moustakas 1994). It seeks reality in individuals' narratives of their experiences of and feelings about specific phenomena to produce in-depth descriptions of these phenomena. A phenomenon is the object of a conscious subject's experience as it presents itself; phenomena are the building blocks of human science and the basis for all knowledge (Moustakas 1994). Broadly speaking, phenomenology is not a single philosophy; it includes transcendental, existential, and hermeneutic traditions, among others (Audi 2001; Schwandt 1997). Husserl's original philosophy, *Transcendental Phenomenology*, is built on the interrelatedness of real-ideal duality and a search for essential structures of experience stripped from their particulars. Martin Heidegger, a student of Husserl, developed *Existential Phenomenology* (Heidegger 1962) and emphasized uniqueness of individuals, social dimension of being, one's relation to others, and one's embeddedness in a culture. Yet another contribution formulates

³ Additionally, phenomenological thinking has influenced various other approaches to qualitative research. For a review see Kvale (1996).

Hermeneutic Phenomenology, which emphasizes interpretation as opposed to description (e.g., Gadamer 1997).

These phenomenological traditions vary in their assumptions and emphases as well as methodologies for empirical application. For the purpose of this paper—to introduce the phenomenological approach to studying experiences with technology—I chose Husserl’s original transcendental phenomenology. Below, I describe details of phenomenology as research methodology, elaborate on the concept of experience, and explain methods of data collection, participant selection, and data analysis from the vantage point of transcendental phenomenology. I will hereafter refer to the approach and theoretical perspective of transcendental phenomenology as *phenomenology* for brevity. Phenomenological interview will be used to refer to a data collection method specifically designed for phenomenological inquiry, and phenomenal analysis is used to refer to the data analysis method.

Husserl’s ideas were derived from Cartesian dualist ontology of Realism and Idealism (Husserl 1982); he emphasized the essences of things and ideas while acknowledging that there exists a natural or real world before our consciousness of it. Realism maintains that things exist without humans’ consciousness of them, constituting a world of objects to be discovered and perceived. This suggests that reality precedes appearance and that appearance is not a prerequisite for reality. Idealism, on the other hand, maintains that the external world is not independent of cognizant minds. Conscious subjects and their objects are separate, yet they interact; meaning is to be found in this relationship (Kockelmans 1994).

The purposes of a phenomenological study are to understand and describe a given phenomenon in-depth and arrive at the *essence* of humans’ lived experiences of that phenomenon. Essence refers to the condition or quality of an experience that is common or universal; it is what makes an experience what it is and without which an experience would not be what it is (Husserl 1969; Moustakas 1994). Every experience is a manifestation of its essence; it is through these manifestations that we can understand the essences. Uncovering the essence of an experience is the purpose of phenomenological research, however not the essence but only its manifestations can be observed. Empirically, the essence of an experience is never completely exhausted, therefore the results of a study do not represent a universal truth, but rather the essence at a specific time and place as manifested in the participants’ experiences and as seen from the perspective of an individual researcher (Moustakas 1994). Therefore, in educational technology we can investigate individuals’ experiences with a given (aspect of) technology and arrive at the essence of the experience of that (aspect of) technology via the various individual experiences (manifestations). What remains common across cases after particulars are removed is the essence.

Phenomenological inquiry is a systematic attempt to come in direct contact with this world, uncover and describe the meaning structures of lived experience, and arrive at a deeper understanding of the nature or meaning of experience of phenomena (Lauer 1965). In doing so, it is concerned with the a priori, or intuitive basis of knowledge, looking at the world with an ‘unadulterated mind’ (Crotty 1998; Husserl 1969). Husserl argued that in a phenomenological investigation any suppositions must be suspended, thus he proposed engaging in *epoche* (or bracketing), meaning disciplined, systematic efforts to suspend one’s natural standpoint and set aside prejudgments regarding the phenomenon being investigated (Husserl 1969, 1970b; Moustakas 1994). It is understood and acknowledged that subjectivity and the role of consciousness cannot be fully eliminated; the goal of bracketing rather is to “put aside” or render “non-influential” previous knowledge regarding the phenomenon being investigated so that it can present itself in its fullness

(Giorgi 1994, 1997). In other words, the researcher is advised to engage in “deliberate naïveté” (Kvale 1996, p. 31) in order to be open to understanding all possible meanings. For example, a researcher studying the experiences of novice computer users using phenomenology, engaging in *epoche*, would bracket his/her previous knowledge about as well as his/her own experiences of being a novice computer user so as to be able to understand the participants’ experiences thoroughly and entirely, avoiding any prejudiced conclusions.

Because in a phenomenological study the important reality is what people perceive it to be, the focus is on subjective experience (Giorgi 1994, 1997; Kvale 1996) and the only evidence phenomenology seeks and accepts is conscious experience (Lauer 1965). There are no factual claims, because “pure essential truths do not make the slightest assertion concerning facts” (Husserl 1969, p. 57). Therefore, in phenomenological research how an object presents itself is more important than how an object is (Giorgi 1997). In general, phenomenological inquiry aims to obtain descriptions of experience without considering its cause or attempting to ascertain whether these descriptions correspond to an independent reality (Giorgi 1997; Husserl 1969; Polkinghorne 1989). Moreover, phenomenological inquiry does not aim for empirical generalizations, establishment of functional relationships, or development of theory with which to predict or control; instead it makes it possible to generate plausible insights, bringing us in more direct contact with phenomena (van Manen 1990). To continue the example of novice computer users, a phenomenological study would focus on the participants’ descriptions of their experiences (e.g., participants expressed anxiety about starting to use computers), rather than making a claim on how things really are (e.g., they *have* anxiety about the experience).

The phenomenological concept of experience

Within phenomenology, the word “experience” carries a very precise meaning (Giorgi 1997). The German language, in which the seminal contributions of phenomenology were written, distinguishes two concepts of experience: *Erlebnis* and *Erfahrung* (Kockelmans 1994). The former corresponds to the everyday use of the term experience in English, referring to events one participates in. Husserl’s phenomenology is concerned with the latter concept, which means “the full-fledged experience or act of consciousness in which something real is given to consciousness as what it genuinely is” (Kockelmans 1994, p. 82). While most studies with the theme of experience use it in the sense of *Erlebnis*, the research agenda I advocate would use phenomenology to study experiences with technology in the sense of *Erfahrung*. Figure 1 depicts the concept of experience in phenomenology, including its elements (rectangles, regular text) and underlying concepts (ovals, italic text); I elaborate on the concept and its elements below.

The concept of reality in phenomenology is based on the ideal-material duality; every experience has a material and an ideal component. Ideas and things are separate; however, they interact, and meanings derive from their interrelation. Phenomenological inquiry is concerned with the essences of ideas, however they can only be known through conscious experience, which has a material component.

Every experience consists of two interrelated dimensions: *noesis* and *noema* (Husserl 1969; Moustakas 1994). *Noesis* refers to the act of experience, such as perceiving, feeling, thinking, remembering, or judging. *Noema* refers to the object of action, such as the perceived, the felt, the thought, the remembered, the judged. Together, they make up the consciousness (perception, feeling, thought, remembering, judgment) of an experience. Any existing *noesis* corresponds to a *noema*, and vice versa; this essential relationship between conscious subjects and their objects is referred to as *intentionality* (Audi 2001;

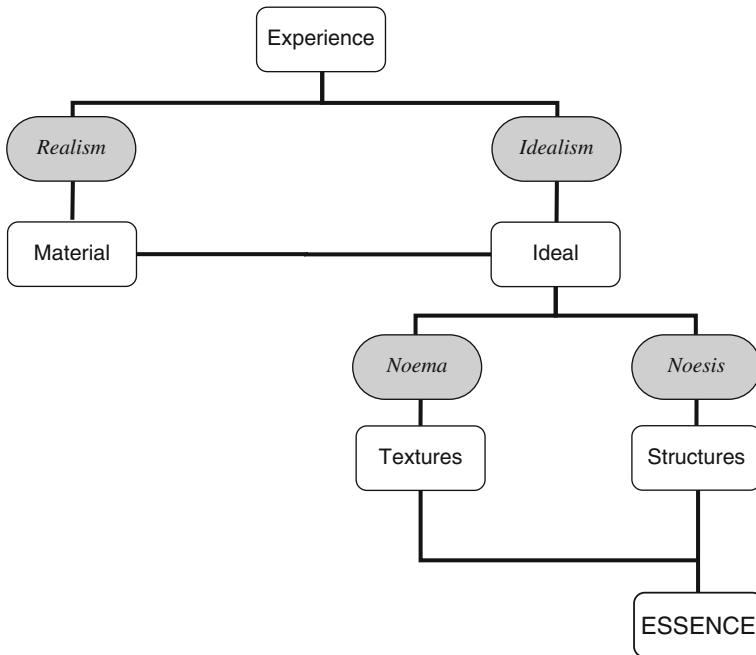


Fig. 1 The phenomenological concept of experience

Crotty 1998), indicating that the mind intends toward an object in the process of experiencing (Kockelmans 1994). From a phenomenological perspective, all experience is intentional experience; consciousness is always consciousness of an object (one cannot be conscious without being conscious of something), and the consciousness of an object requires a subject (Kockelmans 1994; Moustakas 1994). For example, Cilesiz (2009) explains that in her study, educational uses of computers at Internet cafés is the noema of the experience, and using computers educationally at Internet cafés is the noesis of the experience; these two dimensions are interrelated, neither can exist or be studied without the other.

Finally, every experience consists of textures (varying outside appearances) and structures (what might account for or underlie the textures). Every experience is a manifestation of its essence. The essence of the experience of a phenomenon can be investigated by observing its multiple manifestations through a process of imaginative variation (discussed in detail below), and can be described through an investigation of the structures underlying the textures of that essence, focusing on the commonalities of the nature of the experience (Moustakas 1994). For example, in a study of Internet chat addiction among young college graduates, one participant may spend more time chatting with strangers than he had intended so as to delay applying for jobs as a way to cope with his fear of failure on the job market. Another participant may turn to chatrooms to withdraw from her marital problems. The particular issues in each example would be textures of these participants' experiences. Both scenarios would be examples of using chatrooms as a diversion, therefore the underlying issue of diversion would be a structure of participants' experiences. A detailed description of all shared structures across

participants would then constitute the essence of the experience of the phenomenon of Internet chat addiction.

Phenomenology as research methodology

To study experiences with technology through phenomenology and based on the phenomenological concept of experience, research methods such as phenomenological interviewing and phenomenal analysis are most suitable. Participant selection, validity considerations, and ethics are also among the important elements of research design in phenomenology and contribute to the rigor of a phenomenological study. Below I describe the research methods and design that constitute the methodology of a phenomenological research study.

Participant selection

A precondition for studying the essence of lived experience is selecting research participants who have significant and meaningful experiences of the phenomenon being investigated (Polkinghorne 1989). Therefore criterion sampling—selecting individuals who fulfill certain criteria as participants (Creswell 2007)—is the most suitable method for participant selection for a phenomenological study. Careful determination of criteria for identifying potential participants with significant experiences of the phenomenon is necessary; contact visits are advised to judge whether potential participants qualify according to these predetermined criteria to partake in the study (Seidman 2006). For example, when selecting instructors for a study on the essence of the experience of integrating a content management system into teaching a traditional (face-to-face) course, in order to be sure that the participants have substantial experiences of the phenomenon a researcher may include the following criteria for qualification as a participant: using at least four different functions of the system (excluding the gradebook); using the system at least twice a week; having students post content (other than paper submissions); and having used the system for at least two semesters prior to the current one. Furthermore, it is essential that participants have the capacity to reflect on and to provide full and sensitive descriptions of their lived experiences (Creswell 2007; Polkinghorne 1989).

Additional considerations for participant selection include composition and size of the study sample. Generalizability of findings is not an objective for phenomenological inquiry, which aims to obtain descriptions of experience, therefore participants' representativeness of the general population is not a concern (Creswell 2007; Seidman 2006; van Manen 1990). To the contrary, phenomenology requires a relatively homogenous group of participants to identify and describe in-depth a shared essence of experiences within a particular group; a heterogeneous group would constitute a sampling limitation from a phenomenological perspective. To continue the previous example on studying instructors' experiences of integrating a content management system into a traditional class, one may select instructors at the same (type of) institution, at the same stage in their careers, and teaching similar subject areas. Sample sizes for phenomenological research generally are not large due to the in-depth nature of the study; while recommendations for sample size vary, a sample of 3–10 participants is usually considered appropriate (Creswell 2007; Polkinghorne 1989).

Data collection through phenomenological interviewing

In phenomenological research generally, data consist of descriptions of lived-experience, which can be collected through interviews, observations, or written self-descriptions (van Manen 1990). However, different data sources and collection methods are more consistent with certain traditions of phenomenology than others; in transcendental phenomenology, in-depth interviewing is both the most suitable and the most common method to collect personal experience descriptions (Kvale 1996). Seidman (2006) provides a framework for in-depth phenomenological interviewing that consists of a series of three open-ended interviews with each participant. This method is a combination of life-history interviewing and focused, in-depth interviewing (Seidman 2006). Although this and other phenomenologically informed interviews are used within other research methodologies (Fontana 2002; Kvale 1996), this specific interview design is informed by assumptions of phenomenology and is therefore most suitable for phenomenological research (Kvale 1996; Seidman 2006).

In this framework, “the first interview establishes the context of the participants’ experience. The second allows participants to reconstruct the details of their experience within the context in which it occurs. And the third encourages the participants to reflect on the meaning their experience holds for them” (Seidman 2006, p. 17). To enable rapport and deep reflection, 90 minutes is considered an appropriate length for each of these in-depth phenomenological interviews (Seidman 2006). To elicit participants’ experiences with a phenomenon, and their reflection on the meaning of their experiences, participants are considered co-researchers (Moustakas 1994). As co-researchers, they are asked to describe their experiences in their own terms and to give constant feedback on the researcher’s interpretations. Reflection and feedback on the part of the participants is an important function of phenomenological interviewing generally and is the main purpose of the third interview specifically. To bracket his/her subjectivity in the study, the researcher should aim to clarify any interpretations with the participants in the study.

Phenomenal data analysis

Data analysis begins with transcribing interviews verbatim (Poland 2002) and merging the data from all three interviews chronologically into one document for each participant. I introduce *Phenomenal Analysis* (Moustakas 1994) and explain the steps of analysis under three major parts: Phenomenological Reduction, Imaginative Variation, and Synthesis.

Phenomenological reduction The first step is to horizontalize the data; this involves reading the transcripts multiple times with a fresh look, and treating every statement related to the phenomenon of study as having equal value (Moustakas 1994). All statements relevant to the phenomenon being investigated should be recorded, eliminating those that are not directly related to it. For example, “I have my students contribute to a wiki at the end of each unit” and “I use the chalkboard effectively” would both be recorded as relevant to the phenomenon of technology integration (from the teacher’s perspective) regardless of whether the researcher considers using a chalkboard technology integration or not. It is advisable to use peer review at this stage by having a peer examine the researcher’s horizontalization and selection of relevant statements. The second step requires transforming the data into statements representing *meaning units* (words/phrases that represent only one meaning) by splitting statements whenever there is a transition in meaning. Eliminating repetitions and removing overlaps, the goal is to produce a list of all

the meaning units across participants, and to note which ones are present in each participant's data. The third step is the creation of *individual textural descriptions*, narratives representing a participant's description of his/her experiences of the phenomenon and consisting of the textures or particular appearances of a manifestation of the essence. Individual textural descriptions are constituted by the participant's verbatim statements representing meaning units rearranged in narrative form, with any necessary supplementary statements by the researcher inserted within brackets. Each statement by an individual expressing a meaning unit—either shared with other participants or unique to that individual—is included in his/her individual textural description.

Imaginative variation The fourth step of analysis consists of elaborating on the individual textural descriptions to arrive at the underlying structures of the experience, asking what could possibly account for the experience. It begins with reading the textural descriptions several times so as to approach the experience from different points of view, vary them, and derive possible explanations of what structures might underlie the individual manifestations of experiences. Identifying the essence of an experience requires identifying the common or invariant meanings across various manifestations of the essence of the experience. A fuller picture of the essence can be gained through imaginative variation, meaning “varying a phenomenon freely in its possible forms, and that which remains constant through the different variations is the essence of the phenomenon” (Kvale 1996, p. 53).

At this stage of analysis, the researcher is advised to engage in a “free play of fancy” (Moustakas 1994, p. 98) to explore all possibilities for structures. Making comparisons between statements within individual textural descriptions and original transcripts, whether these possible structures are consistent with the rest of the narrative should be considered, and elements that contradict the data at large should be eliminated. Then, structures of the experience that are supported by the rest of the text are combined into a consistent narrative for each participant in the researcher's words. Transforming the participants' statements in everyday language to the researcher's disciplinary terminology and concepts goes beyond mere translation to “intuiting disciplinary meanings” (Giorgi 1994, 1997). Describing the structures of the experience and reflecting the researcher's re-representation of the participant's own meanings and descriptions, these narratives are called the *individual structural descriptions*.

Synthesis The fifth step consists of identifying similarities in the textures of participants' experiences. Meaning units present in the experiences of all or most participants are identified and designated as *shared meaning units*. Consequently, individual textural descriptions are combined into a single narrative along the shared meaning units; this unified narrative is written in the third person representing the group as a whole and called the *composite textural description*. In the sixth step, essential structural elements—structures that underlie the various manifestations of experience that are common across participants—are identified. Then individual structural descriptions are integrated along essential structural elements to produce a single narrative representing the group as a whole. This narrative, elaborating on the common essential structures of the experience is called the *composite structural description*. The final step of phenomenal analysis consists of synthesizing the composite textural description into the composite structural description to create a general description of the phenomenon called the *textural–structural synthesis*. This final narrative is an in-depth description of experiences of the phenomenon, and represents the *essence* of the experience of the phenomenon.

Considerations of validity in phenomenological research

Validity in qualitative research generally refers to a study's rigor to ensure that the findings are a result of the appropriate implementation of methods and that the research produces valuable information based on its epistemology (Glesne 2006; Guba and Lincoln 1982; Lincoln 1995; Merriam 1995). The design of phenomenological research in educational technology should include important considerations of validity. This requires incorporating a range of validation techniques and procedures, some of which are general to qualitative research while others are specific to phenomenology.

An essential criterion for phenomenological validation is fidelity of the methods to phenomenology's foundational assumptions and theoretical underpinnings (Creswell 2007; Giorgi 1997, 2002; Kvale 1996). Specifically, producing worthy knowledge in phenomenological inquiry hinges upon the researcher's engagement in the epoche process, referring to the researcher's continuous engagement in disciplined, systematic efforts to suspend his/her natural standpoint and set aside prejudgments regarding the phenomenon being investigated (Husserl 1969, 1970b; Moustakas 1994). Epoche is an attempt to place common sense and previous knowledge about phenomena in brackets (hence, also called bracketing) to arrive at an unprejudiced description of the essence of an experience (Ashworth 1999; Giorgi 1994, 1997; Husserl 1969, 1970b; Kvale 1996). Bracketing does not mean an absolute absence of presuppositions, but rather an awareness and critical analysis of one's own presuppositions (Kvale 1996).

Formulating a subjectivity statement at the beginning of a phenomenological study is a useful starting point to deliberately search for and explicate one's prejudgments and facilitate the bracketing process throughout the investigation (Ashworth 1999; Peshkin 1988).⁴ Even though a researcher is supposed to engage in epoche throughout the study, it is most important to bracket one's subjectivity during data analysis. Therefore, before commencing data analysis, the researcher should revisit his/her subjectivity statement and reflect on all his/her prior experiences related to the phenomenon, in order to more consciously keep them in brackets and minimize their impact on the findings. Beyond these essential criteria, Polkinghorne (1989) and Creswell (2007) present additional specific questions to be asked when evaluating the validity of a phenomenological study.

Additionally, techniques such as member checks and peer review can reduce the impact of the researcher's subjectivity on the findings, which is a very important issue in phenomenology. Member checks, a collection of techniques for asking participants to provide feedback on the findings and/or the researcher's interpretations (Guba and Lincoln 1982; Merriam 1995), are very useful in phenomenology. Specific member check techniques in phenomenology include beginning the second and third interviews with a recapitulation of the prior interviews and soliciting feedback about the researcher's interpretations, and asking participants to review and comment on the findings and interpretations contained in the final study report. Similarly, feedback may be sought via peer review (Merriam 1995; Wolcott 1990), especially at the horizontalization stage. In this type of peer review, an independent peer checks that every statement made by participants is treated as having equal value and that only and all of the statements relevant to the phenomenon are selected, thereby ensuring that the researcher's subjectivity does not influence his/her perception of the relevant statements, and subsequently findings of the study.

⁴ Ashworth (1999), for example, provides a detailed discussion of what kind of assumptions are relevant and need to be bracketed in phenomenology.

In addition to phenomenological validation, general steps to increase validity of qualitative research should be applied. For example, it is important to maintain transparency in the reporting of qualitative studies (AERA 2006; Ragin et al. 2004). Transparency enables readers to understand the context in which the findings of the study were produced and how data were interpreted; to evaluate the findings of the study and to reach their own conclusions; and to judge the transferability of the findings to other contexts, as an alternative to generalizability (Merriam 1995; Seidman 2006; Wolcott 1990). Transparency may be achieved by disclosing the author's subjectivity statement; including detailed descriptions of the study context; explicitly outlining the steps used in the analysis process; providing an audit trail documenting how decisions such as participant selection were made; presenting samples of the data used for analyses; and reporting the limitations of the study (Giorgi 2002; Guba and Lincoln 1982; Kvale 1996; Lincoln 1995).

In addition to these recommendations, researchers should use other validity practices in qualitative research as applicable to their particular research situation and topic. Applying these various techniques to ensure validity would result in rigorous phenomenological studies and would make phenomenology a valuable addition to the repertoire of robust frameworks as well as to the methodological diversity in educational technology, thereby addressing important needs in the field of educational technology (Robyler and Knezek 2003; Savenye and Robinson 2004; Thompson 2005).

Considerations of ethics in phenomenological research

Ethical considerations are vital for any research endeavor. In addition to general ethical considerations, a few issues are pertinent in phenomenological research on educational technology. In-depth data collection by phenomenological interviews requires participants to reveal their experiences and emotions in a reflective manner. Depending upon the aspect of educational technology studied and the research questions, participants may share personal and potentially intimate details about their lives; these may include socially undesirable or stigmatized experiences such as procrastination, addiction, fear, anxiety, and vulnerability (Bullock 2004; Howard 1994; Thatcher et al. 2008). In these cases, it is especially important to protect the privacy and confidentiality of participants, because failing to do so may jeopardize their reputation and/or may be otherwise consequential. Safeguarding participants' privacy may be achieved by replacing identifying information such as references to names and locations with pseudonyms and by asking participants to read the final report to identify any vulnerabilities or any disagreeable representations.

Reciprocity is another ethical consideration that is crucial in phenomenological research. Calls for reciprocity suggest that the research act should benefit both the researcher and the researched. While sharing intimate details about one's life cannot be compensated financially, researchers are invited to reciprocate by sharing some of the perquisites stemming from their privileged and intellectual positions (Lincoln 1995). For example, a researcher studying experiences of learners of computer applications may offer to teach participants some computer skills that could be beneficial to them.

Phenomenological research in education and educational technology

The phenomenological research design described above consists of rigorous methods suitable for the study of experiences with technology. Overall, phenomenology is an established philosophical approach and research methodology. Its application to study

education topics was promoted (Bolton 1979) and it has been used to study experiences in educational research in such areas as higher education student development (Landreman et al. 2007), adult learning (Rossiter 1999), teacher education (Greenwalt 2008; Sumsion 2002), nurse education and mentoring (Lofmark et al. 2008), and science education (Ostergaard et al. 2008).

Existing phenomenological literature on experiences with technology

A review of the literature also revealed a small number of applications of phenomenology in educational technology research. For example, Howard (1994) investigated the first-time computer experience of adults; his in-depth findings shed light onto structural aspects of this experience including feelings, engagement, self-awareness, and attitudes. Cilesiz's (2009) study of adolescents' experiences of educational computer use in informal learning environments describes the essential elements of these experiences and highlights implications for adolescent development and informal education policy. Veletsianos and Miller (2008) investigated the experiences individuals have when conversing with digital pedagogical agents. Similarly, Miller et al. (2008) studied the experiences of an educator with providing hybrid distance education in an authentic, anchor-based environment.

Additionally, some previous literature contained elements of phenomenology; such studies either were based on generic qualitative methods (Garthwait and Weller 2005; Kariuki and Turner 2001) or combined phenomenology with other methods (Rutledge et al. 2007; Timmerman 2000). While these studies have made important contributions to the study of experiences, they are not examples of phenomenological research described here in the sense of epistemological use of method (Greckhamer and Koro-Ljungberg 2005) as a coherent theoretical framework and methodology. Moreover, they do not qualify as phenomenological research according to the criteria set by Giorgi (1997) to distinguish phenomenological research from other forms of inquiry; in brief, "no work can be consider[ed] to be phenomenological if some sense of the reduction is not articulated and utilized" (Giorgi 1997, p. 240). Overall, while the literature in educational technology investigating experiences with technology using a phenomenological approach and methodology is small, the existing studies illustrate the promise of a research agenda on experiences with technology.

Future research directions on experiences with technology

Experiences with technology are an important area of inquiry for educational technology. Phenomenology constitutes a suitable theoretical framework and methodology for this area of research and has the potential to address vital research questions in the field. It can be infused into existing areas of research at the core of educational technology as well as opening up new lines of inquiry. To illustrate this potential and the fruitfulness of phenomenology for an array of research areas in educational technology, I highlight several possible research directions utilizing a phenomenological approach. These areas were identified through reading recent review articles in major educational technology journals that identified areas needing further research in the field, as well as selected research articles that made recommendations for future research. An illustrative selection of those areas in which phenomenology can make a contribution and address the needs of the field are highlighted below. This selection is not exhaustive, however the recommendations are intended to exemplify the contributions phenomenology can make in educational

technology research to inspire researchers to plan and conduct phenomenological research in other areas as well.

Teachers' experiences of technology adoption and integration

Past research has established the connection between teachers' attitudes and beliefs about technology and teaching and their practices of technology integration (Ertmer 2005; Hew and Brush 2007; Pedersen and Liu 2003), as well as highlighting the importance of understanding "what teachers experience when they integrate technology in their lessons (e.g., teachers' anxieties and struggles)" (Hew and Brush 2007, p. 237). This includes a need to better understand new teachers' technology experiences and teaching practices (Thompson 2005) and the experiences teachers have at different levels of technology adoption (West et al. 2007). Phenomenological studies of teachers' experiences of integrating technology in their teaching could complement existing research and contribute to filling these knowledge gaps. For example, future phenomenological research could investigate teachers' experiences in-depth at each stage of technology adoption, thereby contributing to our knowledge of the stage theory of technology integration.

Essence of the experience of effective technology integration

A wealth of educational technology literature has focused on the integration of technology into teaching and learning, yet more research is needed to identify and determine what constitutes effective technology integration practice (Strudler 2003; Thompson 2005). Phenomenological research can complement the existing literature in addressing this need; for example, selecting teachers who have successfully integrated technology and investigating their (or their students') lived experiences of effective technology integration could help to identify the *essence* of the experience of effective practice from the vantage point of the teachers (or learners) themselves. As a reminder, in phenomenology essence is defined as the condition or quality of an experience that is common or universal; it is what makes an experience what it is and without which an experience would not be what it is (Husserl 1969; Moustakas 1994). Studies investigating teachers' and students' experiences of technology integration from a phenomenological perspective could inform us about the essential structural meanings that are present and common across instances of effective technology integration.

Experiences with new technologies in the classroom

The introduction of new technology applications into a classroom setting not only impacts learning outcomes, but also alters experiences and practices of students and teachers as well as classroom dynamics, overall increasing unpredictability in the classroom (Clariana 2009; Garthwait and Weller 2005; Windschitl and Sahl 2002). Phenomenological studies of students' and teachers' experiences with new technologies can address a variety of issues related to these changes such as classroom culture, classroom management, teacher's role, and pedagogy. For example, the introduction of 1–1 computing learning environments is an area about which we need to know more (Hew and Brush 2007). Future phenomenological research could investigate teachers' or students' experiences of coping with unpredictability in the classroom when 1–1 computing is introduced. Findings of such research could be used to develop support structures to be implemented in classrooms

along with new technologies in order to facilitate further integration of these technologies and encourage experimentation with other new technologies.

Adolescents and undesirable uses of computers

Adolescents' use of computers and media is an area of increasing interest because adolescents spend a significant amount of their free time using these technologies (Roberts et al. 2004). The largely solitary and unsupervised nature of these technology experiences has raised concerns about adolescents' potential of engaging in undesirable, unethical, and/or unsafe activities as well as developmental and academic consequences of those activities (e.g., Subrahmanyam et al. 2000, 2001). However, qualitative studies exploring the very experience of excessive computer use by adolescents are scarce, even though past research has studied this phenomenon among adults (Rheinberg and Tramp 2006; Thatcher et al. 2008; Turkle 1984). Phenomenological studies of adolescents' experiences of excessive computer use would be very promising; understanding the essence of their experience could contribute to both understanding their motives and payoffs as well as designing appropriate interventions to increase desirable computer uses while preventing undesirable ones.

Lived experiences of video games

The use of video games is a prevalent domain in children's uses of computers, however their educational potential is highly debated. Some have argued that video games have inherent design characteristics that make them suitable tools for learning (Gee 2003) and research has illustrated the qualities of certain video games as learning environments (Young et al. 2006). From an ecological psychology perspective, Young et al. (2006) emphasized the importance of users' perceptions in understanding the potential learning experiences afforded by video games. Relatedly, consulting students' experiences has been proposed as a framework for evaluating educational software (Reiser 2001; Reiser and Dick 1990). Building on these ideas, future research could conduct in-depth phenomenological studies to understand students' experiences with video games and the meaning of these experiences for them. Phenomenological studies of the essence of experiences of using video games would purely describe the users' experiences from their own perspectives, unaffected by researchers' previous knowledge and suppositions of what counts as entertainment versus education, real versus virtual, or addiction versus recreation. Such research could enable us to uncover the essence of experiences of using video games and help us understand whether they are, primarily educational or entertainment based on the experiences of users themselves; a thorough understanding of adolescents' experiences would provide an additional dimension to the debates about video games' educational potential or suitability of individual games for education.

Conclusion

The purpose of this paper was to introduce the concept of experience in phenomenology and to suggest experiences with technology as a construct for educational technology research, thereby increasing understanding of technology's influence on individuals, societies, and education. I have provided a research design and general guidelines for conducting phenomenological inquiry to facilitate its application in educational technology

research. Finally, to illustrate the promise of this approach I have highlighted several potential research areas in educational technology that would benefit from building on a phenomenological concept of experience and utilizing phenomenology as the theoretical and methodological framework.

Because phenomenology is concerned with uncovering and describing the essence of human experiences, it has the potential to offer valuable insights about the use of technology in teaching and learning; its increased application to study experiences with technology has the potential to both expand existing areas of research at the core of educational technology as well as to help create new lines of inquiry. In-depth phenomenological studies in new research areas may also generate new constructs that can then be studied using other—qualitative or quantitative—methods. In sum, phenomenology holds much potential for the field. Clearly, the purpose of this paper is not to argue for phenomenology to become the predominant approach in the field, but rather to contribute to unlocking its potential for research in educational technology, thereby contributing to the existing diversity of frameworks and methodologies in the field.

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