Aslanian, C. B. (2001). *Adult students today*. New York, NY: The College Board.

Brändle, M., & Niedermüller, E. (1994). Intensive language courses for adults: The suggestopedic method. *Australian Journal of Adult and Continuing Education*, *34*(2), 142–148.

Buzan, T. (1990). *Use both sides of your brain: New mind-mapping techniques*. New York, NY: Plume.

Cepeda, N. J., Pashler, H., Vul, E., Wixted, J. T., & Rohrer, D. (2006). Distributed practice in verbal recall tasks: A review and quantitative synthesis. *Psychological Bulletin, 132*, 354–380.

Daniel, E. (2000). A review of time-shortened courses across disciplines. *College Student Journal, 34*(2), 298–309.

Davies, W. M. (2006). Accelerated teaching formats: A review. *Issues in Educational Research, 16*(1), 1–20.

Dempster, F. N. (1989). Spacing effects and their implications for theory and practice. *Educational Psychology Review, 1,* 309–330.

Dempster, F. N., & Farris, R. (1990). The spacing effect: Research and practice. *Journal of Research and Development in Education*, *23*(2), 97–101.

Gardner, H. (1993). *Frames of mind: The theory of multiple intelligences* (10th anniv. ed.). New York, NY: Basic Books.

Jones, M. H., West, S. D., & Estell, D. B. (2006). The Mozart effect: Arousal, preference, and spatial performance. *Psychology of Aesthetics, Creativity, and the Arts*, *S*(1), 26–32.

Lozanov, G. (1978). *Suggestology and outlines of suggestopedy*. New York, NY: Gordon and Breach.

Imel, S. (2002). Accelerated learning in adult education, training and development. *Trends and Issues: Alert No. 33*. Retrieved from http://files.eric.ed.gov/fulltext/ED462551.pdf

Meier, D. (2000). *The accelerated learning handbook*. New York, NY: McGraw-Hill.

O'Connor, J., & Seymour, J. (1990). *Introducing neuro-linguistic programming*. London, UK: Thorsons.

Rose, C. (1985). *Accelerated learning*. New York, NY: Dell.

Scott, P. A., & Conrad, C. F. (1992). A critique of intensive courses and an agenda for research. In J. C. Smart (Ed.), *Higher education: Handbook of theory and research* (Vol. 8, pp. 411–450). New York, NY: Agathon Press.

Tatum, C. (2010). Accelerated education: Learning on the fast track. *Journal of Research in Innovative Teaching, 3*(1), 33–51.

ACTIVITY THEORY

Activity theory refers to a psychological framework that is based on the concept that humans are defined by the activities they perform on objects in the real world and by the tools that are used to accomplish these activities. In addition, these activities occur within social, cultural, and historical contexts that give them meaning. After briefly discussing activity theory's origins and later models, this entry focuses on its application to human interaction with computers and other digital technologies, which can assist with knowledge seeking and active learning.

Origins

The origins of activity theory can be traced to the work of Russian psychologists, most notably Lev Semyonovich Vygotsky (1896–1934), Alexander Romanovich Luria (1902–1977), and Alexei Nikolaevich Leont'ev (1903–1979). Their work was influenced by Karl Marx (1818–1883), who defined the components of the labor process as human activity, the subject of the work, and its instruments or tools. From this philosophical basis, they explored how activity, instruments, and culture affected individual development and thinking.

Vygotsky and Luria studied how physical tools were used in the activities of humans and higher animals. Influenced by the field of semiotics, they expanded the concept of tools to include sign systems (e.g., language, numbers). Higher animals are able to use physical tools to solve problems but are constrained by their environments. Vygotsky and Luria observed how children used language to solve similar problems. Initially, children would describe their actions and reflect on experience, but language eventually freed them from the immediate environment, allowing them to think abstractly and plan actions. Vygotsky and Luria believed not only that cognition was developed through activity, but that it was also intimately connected with activity and the real world.

According to Leont'ev, activity theory can be summarized in six key ideas:

1. *Activity can be viewed at different levels of analysis.* At the highest level, an activity addresses a need. It comprises actions that are directed at goals toward meeting that need. Operations describe how actions are carried out; they specify conditions, such as which tools are used.

2. *Actions are specifically goal oriented.* The goals may not always be voluntary or the result of conscious selection. However, goals provide the motive for action.

3. *Activity is mediated.* This mediation comes from tools and sign systems. Mediation occurs in mental activity as well as in physical activity. For example, internalization of a society's modes of thinking and meanings mediate an individual's cognitive activity.

4. *Activity is to be studied with a developmental approach.* Development occurs within a society as well as within the individual. As a culture changes along with its tools, the activities of individuals will be altered and so will the mental abilities required and developed.

5. *Individual activity exists within a system of social relations*. Activity does not exist without those relations. Its form is determined by the activity of others. Society and culture form a complex network from which activities, motives, and tools cannot be separated.

6. *External activity is responsible for the development of internal mental activity*. Consciousness is a reflection of an individual's activity, his reality. Through social processes and sign systems, individuals develop and share understanding.

Engeström's Activity Theory Model

In 1987, Finnish scholar Yrjö Engeström published *Learning by Expanding: An Activity-Theoretical Approach to Developmental Research*. Engeström characterized Vygotsky's work as the first generation of cultural-historical activity theory. He saw the work of Leont'ev and others as a second generation in which collective activity was more fully explored. Engeström saw himself as part of a third generation. As activity theory reached a more international audience, Engeström and others felt a need to place greater emphasis on social and cultural influences.

In Engeström's model, all human activity is organized around four dominant functions: production, distribution, exchange (including communication), and consumption (see Figure 1). He adopted a systems approach toward activity, but one that kept an emphasis on its cultural-historical origins. Engeström's initial components were the subject (the individual), the instrument (the tool or mediator), the object (the focus of the action), and the outcome. He increased
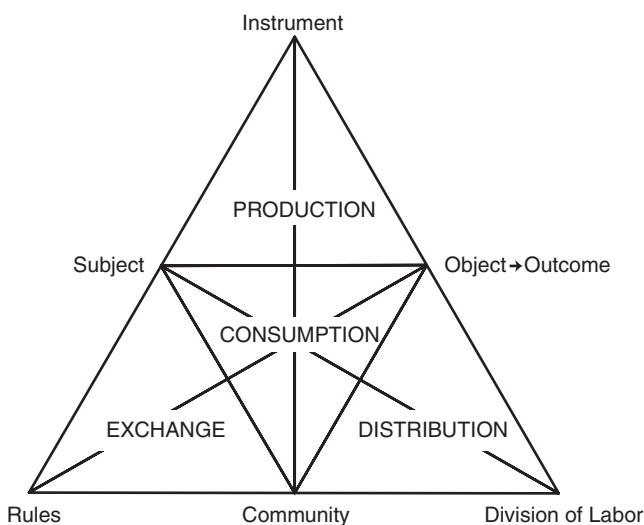
the sociocultural emphasis by making rules, community, and division of labor explicit. Community represents the social relationships that influence individual activity. Division of labor indicates the types of activities an individual may or may not pursue, whether in an industrial setting or a classroom or family. Rules are the formal and informal societal guides to behavior. The complete model represents one activity system. An individual triad of components could be examined in more depth or two activity systems could be examined in terms of how they interact or conflict.

Human-Computer Interaction and Activity Theory

In 1991, Susanne Bødker published *Through the Interface: A Human Activity Approach to User Interface Design*. The book applied the ideas of Leont'ev and participatory design to the creation of computer interfaces. Bødker's intent was to shift human-computer interaction from a paradigm where interfaces were the conceptual products of designers and technicians to one grounded in the activity of the humans using them in real contexts. This involved treating users not as objects of study but rather as active participants in the design process. In presenting various cases, Bødker argued for the validity of this design approach and the resulting interfaces. She suggested that future interface designers include early and frequent user involvement, particularly in the form of prototyping. In addition, she advised designers to anticipate greater ranges of activity situations, resulting from ranges in the frequency of use, differences in expertise and competence of users, future activity demands, and so on.

In the works, *Context and Consciousness* (1996), *Acting With Technology* (2006), and *Activity Theory in HCI* (2012), Bonnie Nardi and Victor Kaptelinin have brought activity theory to a larger audience and focused on digital technologies. An example of how activity theory may be applied to current technology research is provided by Hamid Ekbia and Nardi. They used activity theory to describe the role of players in the massively multiplayer online role-playing game (MMORPG) *World of Warcraft*. The game is described as complicated, with a steep learning curve, and minimum support. Its success, in part, is due to players becoming mediators for those seeking knowledge and game skills. The social aspects of the game encourage players to recruit friends, seek out other players, join communities, and become part of the system. Activity theory provides a useful framework for this type of analysis.

Figure 1   Engeström's structure of human activity model

Activity Theory in the Future

Despite a relatively long history, activity theory has only just begun to expand beyond its national and disciplinary boundaries of origin. However, its appeal to contemporary scholars lies in its abilities to address current issues. The concept of mediated activity works well with educational philosophies focusing on active learners and constructed knowledge. In addition, digital technologies have evolved to become more tool like and more social. According to activity theory, they have always had these properties, but discussions about how smartphones and websites shape our behavior and thinking are now pervasive. Vygotsky believed that experiments in which individuals where given artificial goals and activities would yield results not reflective of true reality. His suggested solution of focusing on authentic activity is still relevant today.

James E. Gall and Fatma Alabdullaziz

See also Behavioral Factors in Learning, Instruction, and Technology; Cognition and Human Learning; Collaborative Learning With Technology; Constructivist Theory; Cultural Considerations in Technology-Enhanced Learning and Instruction; Human-Computer Interaction; Information and Communication Technologies in Multinational and Multicultural Contexts

Further Readings

Bødker, S. (1991). *Through the interface: A human activity approach to user interface design*. Hillsdale, NJ: Lawrence Erlbaum.

Ekbia, H., & Nardi, B. A. (2012). Inverse instrumentality: How technologies objectify patients and players. In P. M. Leonardi, B. A. Nardi, & J. Kallinikos (Eds.), *Materiality and organizing: Social interaction in a technological world* (pp. 158–176). Oxford, UK: Oxford University Press.

Engeström, Y. (1987). *Learning by expanding: An activity-theoretical approach to developmental research*. Helsinki, Finland: Orienta-Konsultit.

Kaptelinin, V., & Nardi, B. A. (2012). *Activity theory in HCI: Fundamentals and reflections*. San Rafael, CA: Morgan & Claypool.

Leont'ev, A. N. (1981). The problem of activity in psychology. In J. V. Wertsch (Ed.), *The concept of activity in Soviet psychology* (pp. 37–71). Armonk, NY: M. E. Sharpe.

Luria, A. R. (1978). *The selected writings of A. R. Luria*. White Plains, NY: M. E. Sharpe.

Nardi, B. A. (Ed.). (1996). *Context and consciousness: Activity theory and human-computer interaction*. Cambridge, MA: MIT Press.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

ADAPTIVE AND RESPONSIVE WEBSITES

Adaptive and responsive websites represent a recent trend within Web design toward layouts that adapt to the device they are displayed on, allowing the same webpage to be loaded on, for example, a smartphone and a laptop yet to be displayed in very different ways. This way the same website can be optimized to the unique context of the device it is being displayed on, allowing the website to "fit" a wide range of devices; an increasingly relevant proposition in a world with an ever-increasing amount of Internet-capable devices (smartphones, tablets, laptop and desktop computers, televisions, etc.), that not only represent a challenge in terms of handling a wide range of screen sizes, but also different user input controls (touch devices, mouse and keyboard, remote control, etc.) and different usage contexts (e.g., desktop computer in an office while working, smartphone while shopping in the grocery store, and tablet when relaxing on the living room couch). Freeing the online educational information from being accessible only on specific devices is not just a central part of making educational technology omnipresent for the average consumer, it is also a prerequisite for making it accessible to demographics who can only afford the smaller low-cost devices, such as a tablet or smartphone.

Multiple Devices, One Website

The main idea behind adaptive and responsive websites is to have the same website be optimized for a wide range of contexts, with the context typically being the device's screen size. This way only a single website has to be developed and maintained, and only the layout and styles of the website are changed to support a wide number of devices. This stands in contrast to the strategy of developing separate desktop and mobile sites, where two or more completely separate front ends are built for the website to provide distinct experiences to, for example, smartphone users and laptop users. Adaptive and responsive site proponents argue that having a single website where the layout adapts is easier to maintain, as a feature will only have to be implemented once to work on all devices.

Figure 1 provides an example of a responsive website where the same website changes layout to fit the device it is being displayed on. On a laptop, the site has plenty of screen real estate and includes a sidebar with popular articles and generous article padding. On a tablet, the layout has changed and the sidebar has been pushed below the article (out of sight) and page margins have been decreased significantly. On a smartphone, font size is decreased and text no longer wraps around the image.