Learning and Teaching in our Digital Age

Professor Dr. Will Barratt[1]

[1]Professor Emeritus of Educational Leadership, Indiana State University, U.S.A

Abstract

Contemporary research and practice will be used to explore learning and teaching in schools, colleges, on-line, and in the complex world of interpersonal and digital teaching experiences. Focusing on the individual experience of learning declarative and procedural knowledge provides a means to build more effective teaching experiences. Suggestions for developing learning-centered, digitally based, and digitally enhanced education will be proposed.

Introduction

We all learn. Sometimes learning is easy, and sometimes learning is hard. We all teach. Sometimes teaching is easy and sometimes teaching is hard. As a teacher I need to remember that learning and teaching are not the same. Knowing what to teach and what to learn are different. Knowing how to learn and knowing how to teach are different. As teachers we prepare our students for life-long learning only when we help them learn how to learn.

First, we should examine three basic questions: What is learning? What is teaching? What is the digital age? Learning is the acquisition of knowledge and skills as the result of experience. Teaching is creating experiences that lead to learning knowledge and skills. The digital age is about digital content delivery, digital content collection, and digital relationships. These definitions are the authors and have proved useful in understanding the education industry.

It is fashionable to write about e-Learning, however when you look at what is presented it is all about e-Teaching, which is quite different. Learning and teaching are not the same. Teaching does not mean that students are learning. In our digital age, the formal and informal education industry provides wonderful experiences designed for learning; MOOCs, TED Talks,

digitally enhanced classrooms, distance education offerings, books, podcasts, and YouTube are among the well-known providers of teaching. Learning, however, is personal. Only the individual can learn. All of the teaching requires a learner.

Exploring Learning – Knowing What and Knowing How

First, we need to understand learning. Psychological research tells us that there are two kinds of knowledge, declarative, knowing what, and procedural, knowing how. A quick Google Scholar search identified over 17,000 articles published on this topic since 2014, and over 600,000 web links. Having two types of knowledge, basically having two ways that our brains work with information and interact with the world, makes learning and teaching more complicated. Declarative knowledge is about the what of the world, is verbal, is conscious, is things like how many states or provinces there are, how many bones in the human body, how many planets in our solar system. Procedural knowledge is about the how of the world, is non-verbal, is unconscious, is sometimes called skill, is things like riding a bicycle, critical thinking, language, and creativity.

Learning declarative knowledge, what something is, is about filling long term memory with facts. Rote memorization is commonly used. Memorization with connections is a great way to enhance declarative learning, for example the English language alphabet song combining music, rhythm, and words. Mnemonic devices based on associations are available to the learner. Repetition is often used. If used in appropriately timed repetition works well for learning declarative knowledge.

Teaching declarative knowledge, basic facts, employs lectures and fact sheets. Lists of formulas to memorize are standard fare: formulas for the volume of a cone, for chemical composition, for ROI calculations, for Mean and Standard Deviation. The transmission of facts is a basic part of the educational industry.

Learning procedural knowledge, how to do something, requires learning by doing. The writers on procedural knowledge often use riding a bicycle as an example of procedural

knowledge. Bike riding is not something that we can learn from a book. Reflective practice is what helps us learn how to do things.

Teaching procedural knowledge typically involves internships, projects, problem-based learning, case studies and other examples of practice. Supervision, structured experiences of increasing complexity, and opportunities to reflect on their learning are central to teaching procedural knowledge. Successfully teaching procedural knowledge requires a deep understanding of the procedure to be learned.

Digital Then and Now – What We can Learn from the World around Us

My first computer came with a paper manual for DOS 1.1, filled with facts. The teaching in the digital world back then was about facts, about declarative knowledge, about learning the commands to do what we wanted. Now, when you buy a new phone, there is a small quick start guide and then you are on your own. Teaching and learning in the digital world has changed. Video games, perhaps the cutting edge of software and learning, don't come with manuals, but rely on the process of discovery as you play the game and level up. We need to know how we learn digital skills. Teaching new technology is currently about letting you learn process by exploring. This lesson in teaching and learning has not been moved into the classroom.

Learning is the result of experience. As a teacher I am in the experience business. I create a learning environment. Listening to me talk is one kind of experience, analyzing a case study is another kind of experience. Learning and teaching declarative knowledge is very different than learning and teaching procedural knowledge. Think for a minute about learning facts (using the manual) and learning skills (engaging in the process) in our digital age. We teach facts in a different way more than we teach skills. We teach the names of each state or province different from the way we teach riding a bicycle.

There is a debate in English language education about declarative teaching, for example learning by memorizing vocabulary and strict grammar rules, or procedural teaching, for example learning by speaking, listening, reading, and writing. The research shows that language is best

taught, or rather that students learn best, in an experiential environment. Language tests now have questions on speaking, listening, reading, and writing. Serious language tests are not about grammar and vocabulary. Why are so many language classes about grammar and vocabulary?

Declarative knowledge goes out of date quickly. Knowledge decay is a real thing and the half-life of facts deserves a serious look. The half-life of knowledge in education is hard to estimate, but a good guess is that half of the facts that we teach students in college will be out of date in 5-7 years. Arbesman's (2012) book title is self-explanatory: "*The Half-life of Facts: Why Everything We Know Has an Expiration Date"*.

More Complexity

There is always more detail, always a larger picture, always more connections, and always a lot we don't know. Learning is both cognitive and affective. After all we each have a single integrated brain. We learn best in an emotionally positive environment (Medina, 2010) according to research, and learn worst in an emotionally negative environment. So, why is school no fun? Why does Bloom (1956) get cited on the cognitive domain much more than Krathwohl, Bloom and Masia (1964) get cited for the affective domain? Putting these two domains in separate books is counter to everything we know about brains.

Research with the University Learning Outcomes Assessment (Barratt and Frederick, 2018, Frederick, M.A., Sasso, P. A. and Maldonado, J. M., 2018) provides a lot of detail on the experiences related to positive learning outcomes. The simple summary is "It's the relationship". Relationships between students and others on campus are correlated positively with learning outcomes. The focus on the relationship tells us a lot about the campus learning environment. Relationships are based-complex interactions involving both cognitive and affective parts of our brains.

Digital relationships, computer mediated communication, are central in our lives now through phones, SMS, and social media. E-Learning, or more properly e-teaching, seems to place

more emphasis on the cognitive component of the teaching experience than on the affective component of the learning environment.

Inputs, Process, or Outcomes

Astin's (1991) simple Inputs-Environment-Outcomes model from program evaluation serves as a lens to ask a question about education. Stufflebeam's (2008) Context-Inputs-Process-Product work similarly well as an analytical lens for schools. Does your school value Inputs for learning, the Environment/Process of learning, or the Outcomes/Product of learning? Look at what is measured and reported and you will discover the answer to that question. For the most part the process of learning, the person participating in experiences contained in the learning environment, is the critical part of education, and is most widely ignored.

What would a school look like if the emphasis were on the process of learning, rather than inputs and outcomes? What would inputs, like curricula, teaching materials, etc., be like if the emphasis were on process? What would the outcomes assessments be like if the emphasis were on learning processes?

Learning Centered Schools

What would schools be like if they were focused first on student and teacher learning? One feature of a learning centered school would be an emphasis on basic skills for learners. This emphasis includes skills in formal learning environments like classrooms, in on-line environments, and in informal settings. Boileau (2018) noted that the majority of learning happens outside of class.

Becoming or Being? Growth Mindset

Dweck (2006) wrote about growth mindset, which is one way to look at learning. If we focus on growth and learning rather than focus on staying the same, our lives change and we learn more. If we believe ourselves to be stable then the world moves on and passes us by and we don't

learn. If we believe ourselves to be in the process of becoming, rather than being or stable, then we learn, grow, and change. I recently learned the word liminal. It means to be in a stage of transition, standing on a threshold or something new while embracing something old. My visual metaphor for being liminal is to be standing in a doorway, with a foot in each space, or standing at a crossroads.

You cannot step into the same river twice. This old adage recognized that a flowing river is in constant change. In fact, you cannot step into the same river once. Change flows around us, and stepping into the water changes the flow in that moment.

Life in our digital age moves pretty fast, and we need to keep up. Don't be angry at people using social media, they are trying to keep up with the news. Social media is about learning declarative knowledge. Gossip, news, and information are all declarative knowledge. Social media and digital news outlets are designed to focus you on declarative knowledge. Where, then is the procedural knowledge channel? In our digital age, where do we go to learn critical thinking, new software, a new language?

A final question: What are each of us doing to provide people with procedural knowledge learning experiences in the digital world? Some people create digital Professional Learning Communities, some people write computer games, me, I write blogs.

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Author

William R. Barratt, Ph.D.

Professor of the School of Graduate Studies, Roi Et Rajabhat University

Professor Emeritus, Indiana State University E-mail: will.barratt@indstate.edu