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Development of a new mindset for eLearning Pedagogy: for the Teacher and the Learner

Tara Devi S. Ashok
University of Massachusetts Boston, tara.ashok@umb.edu

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ABSTRACT

Teaching, like learning, involves a personal journey. This researched narrative records the role of technology integration in one instructor's teaching practice, and examines how literature in the field accounts for ways eLearning technologies have kept the author and her students engaged in the process of learning. Dr. Tara Ashok of the University of Massachusetts Boston chronicles the personal eLearning tool kit she has selected for effective delivery of contents in different teaching formats. She posits the importance of developing a new mindset to adapt to emerging technologies and examines the literature and her own experiences suggesting how and why, eLearning pedagogy must include a focus on the development of a flexible / growth mindset.

KEYWORDS: new mindset, eLearning, pedagogy

INTRODUCTION

Today, I go to my class and start plugging different gadgets around the computer before I begin my lecture. I become a person cabled all around. I'm wired with a microphone which provides vocal support to allow me to address my class of 150 students sitting in an auditorium, of course, but this microphone also sends my lecture to a classroom capture system that creates an archived recording my students can reference, after the fact. Further my computer is connected to an external hard drive of terabyte size, so that I can pull up any document or animation as required just-in-time to answer a student's question. My classroom cabling routine also involves connecting an iClicker base so that I can pose a question to my students any time during the lecture to get their feedback on the concepts we are discussing in class.

When I leave the lecture hall after my day's teaching I often move to my office, where I check the status of learning in the online course I teach. My online students listen to lectures I have created as narrated slide presentations; they review videos, TED talks, and participate in synchronous web conferencing sessions and asynchronous threaded discussions. The course contents are delivered on a weekly basis with the help of a Learning Management System (LMS).

When we look at the way eLearning tools are impacting the practice of face-to-face, web enhanced and fully online coursework, it becomes imperative that we reassess the pedagogy and the mindset of teachers and learners in order to enhance students' learning outcomes in this digital era. In this paper I will describe my personal journey of evolving with the digital tools and discuss students' learning outcomes that have resulted from my incorporating eLearning strategies into my teaching practices, keeping in the foreground a review of the literature regarding questions of mindset and eLearning pedagogies.

MINDSETS

The word "mindset" has been brought to focus by Carol Dweck, a psychologist at Stanford University who talks about the power of our mindset. In *Mindset: The New Psychology of Success* Dweck writes: *"*Mindsets are beliefs—beliefs about yourself and your most basic qualities." She further states:

> Mindset change is not about picking up a few pointers here and there. It's about seeing things in a new way. When people – couples, coaches and athletes, managers and workers, parents and children, teachers and students – change to a growth mindset, they change from a judge-and-be-judged framework to a learn-and-help-learn framework. Their commitment is to growth, and growth takes plenty of time, effort, and mutual support. (Dweck, 2006, p. 238)

I have spent three decades as a teacher and researcher of human genetics and biological anthropology whose doctoral research focused on the genetics of mentally challenged individuals. Throughout this period, I have always studied the brain and the mind in order to help individuals attain their maximum learning potential. In this work I will focus on my observations of the different mindsets seen in different sets of learning groups in which I have played various roles over the years:

- Indian graduate students whom I taught before coming to the United States.
- Undergraduate students majoring in science, liberal arts and the non-biology major students learning biology at UMass Boston in both on-ground and online courses.
- The lifelong learners of the Osher Lifeline Learning Institute at UMass Boston.[1]
- Faculty members from across India who participated in a recent Institute on Global Learning and Communications
- Freshmen Success community students
- Non-tenure-track faculty members of UMass Boston attending Center for Innovative Teaching (CIT) Faculty Development Seminars[2]

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[1] For details regarding the Osher Lifelong Institute at UMass Boston visit:
http://www.umb.edu/olli
[2] For details regarding the CIT Seminars visit:
http://www.umb.edu/cit/faculty_seminars/cit_dev_seminars

UNDERSTANDING THE INDIAN GRADUATE STUDENTS' MINDSET

When I taught in India, I worked with graduate students who were the high achievers, those pursuing a master's degree in genetics. Only the best five students in the country were allowed to join the program. This was a very intense course in both theoretical and practical training for pursuing a career in genetics. Each faculty member would spend an entire day with the students. So, I worked in very close association with the students. Further, when I took them for a ten day field study to a remote area in India, we engaged in dialogue at a deeper level, discussing the ethical questions in science into the early hours of the morning while conducting experiments through the night. The students were highly motivated but equally competitive. Here to begin with, the mindset was of a fixed nature, as their final goal was to get the highest grades. My goal was to change that mindset so that my graduate students would look at genetics and life in a holistic manner. When a teacher gives tools to a student; that teacher must make that student commits to the proper use of the tools, and this is especially important in the field of human genetics.

UNDERSTANDING THE MINDSET LEADING TO MY TOOLKIT

In 1993, after a decade of teaching in India, I came to the United States to teach, relishing the opportunity to use all the new technologies available here, though not available in my native country. My dream was to make a CD for narrating the story of DNA to one and all in my own unique way, with music and audio, and animations I would create. I remember burning my first CD in 1998. I went through the era of getting my computers custom built to include all the required drives, floppy, jazz, zip and external hard disks. This seems strange today, when what does not fit on a thumb drive can all be stored in the cloud but in 1998 what we were calling multimedia workstations had to be custom built. Over the years I have continued my commitment to instructional media development, moving from audio and animations to the creation of instructional videos, first using Macromedia Director, which allowed me to produce movies and export them as executable standalone files. I then went on to create small games using this software. Despite advances in media development software, creating instructional videos and games remains time consuming, yet these media materials make it easy for me to teach difficult concepts in science. Today, I have a large collection of educational movie files I have created for different courses. I have listed my archived material in a single menu system that allows me to access media instantaneously during course meetings.

Keeping up with new technologies is a struggle. In 2005, Macromedia was acquired by Adobe Systems (Graham, 2008). The acquisition was part of trend called "convergence" that created a new generation of animation and video design tools I felt I needed to master. Though that may have been my first instance evolving as an eLearning consumer, I have since learned that whenever the technology changes, it takes me time to reorient my mind to the new tools that come into existence. Before a technology is fully understood and used, a newer version arrives on the scene, leaving me no choice but to adapt. Change will be the order of the day, but what becomes imperative is to develop and maintain a mindset which will be ready to adapt to the change in a shorter time period, keeping the mind in a learning mode eternally.

One of my proudest achievements as a media designer is my documentary movie entitled, "The Journey to the Cave dwellers of South India – A genetic study." I edited the movie using Adobe Premier under the guidance of professional video production specialists. "The Journey" documents a field trip I made to Kerala, India, to visit a tribe discovered in 1973. The movie depicts how my field team set up a laboratory in a reserved forest to collect blood samples from the members of the tribe who volunteered to contribute to the study. I show this movie to my Anthropology and Biology students to highlight the importance of ethnographic, clinical and population genetics field studies. Viewing the movie leads students to discuss certain genetic markers which were analyzed and raises ethical questions about the study of human samples in general. I have found that both my Anthropology and Biology students appreciate the fact that their own teacher had gone to a remote area to study people who were still living in caves and had brought back information to share in class.

I began my teaching career in India, in 1983. At that time, an overhead projection system was a big technological advance. The later shift to the use of data projectors meant the dawning of the age of PowerPoints, a technology still in common use, though often now maligned as a media that places a barrier between teacher and learner, limiting face to face interactions and impeding cognition (Maise, 2013; Tufte, 2003). However, I am among those who feel that PowerPoint presentations are of benefit in large classes and other appropriate situations (Doumont, 2005; Gabriel, 2008; Yu, 2014). Writing about the specific context of media used at political science conferences, Salmond and Smith (2011) criticize the typical use of visual aids, suggesting presenters should use fewer and simpler slides, further proposing that slides should contain visually rich information that illustrates a speaker's point without distracting the audience from his or her words. Following the specificity that Salmond and Smith apply to measure the effectiveness of a given presentation for a given purpose, I believe that what's appropriate in a classroom presentation depends on the subject matter being presented and entirely depends on the art of presentation of material by the speaker to the audience. The visually rich information on science subjects that I teach helps students learn challenging concepts with greater ease and, therefore, I am using PowerPoint slides unapologetically. For my online students, I have extended access to slide presentation material using Adobe Presenter tools that allow me to annotate and web publish lectures. In response to this relatively new eLearning practice I've adopted, one of my online students commented, "This is a life saver." To my thinking, that's the best defense of an established eLearning practice currently under siege.

However, I don't advocate for adoption of every eLearning technology that comes into being and in some cases my selectivity is idiosyncratic, and here I will provide an example. Today, Prezi software, which helps create presentations with zoom and transition features that break the metaphor of the 'slide", supports cloud storage of presentations, allowing presenters to download lectures wherever the content will be delivered.

However, Prezi does not match with my own proprioceptors[3] and Prezi presentations literally make me dizzy. Apparently I'm not alone in reacting to Prezi with physical discomfort. Research suggests some people do become similarly uncomfortable during presentations created with Prezi and similar, high motion presentation software (Ellis, 2013). In my teaching practice I have resisted the adoption of Prezi and the use of online virtual worlds such as SecondLife, which also feels physically uncomfortable to me. To the best of my ability, I have been intentional with regard to the set of eLearning tools I have chosen to include in the personal tool kit. In large part, that is because I have developed this toolkit for delivering contents in a personalized manner.

   In "What's in Your Teacher Tool Kit?" (Mindsteps 2012), the educational consulting group, Mindsteps Inc., advocates for solving the challenges we face in teaching using a small set of tools, rather than becoming enamored with the latest fad in education. Hence, it is not an indication of a mindset problem when an educator elects not to adopt the latest eLearning technology. A growth mindset does not require that we indiscriminately accept all new technologies on the horizon but rather that we each choose what suits our personal teaching styles.

   Ginnis cites research that indicates digital media such as animations, documentaries, and PowerPoint slides have made a positive impact on student learning outcomes (2002). In *Teacher's Toolkit: Raise Classroom Achievement with Strategies for Every Learner*, Ginnis suggest that, by learning something, the learner should come to see the world in a slightly different way; and alter his or her behavior or attitude in some way. *The Teacher's Toolkit* attempts to provide some of the means of arriving at "deep learning". Even though today there is a huge collection of media on the web to choose from, I find using my own teaching tool kit makes the delivery of concepts more personalized,. Students further feel that the teacher has put in a special effort for making their learning more comfortable and joyous and this greatly helps improve communication and connections leading to a deeper discussion on the subject matter.

UNDERSTANDING THE UMASS UNDERGRADUATE STUDENTS' MINDSET

   In my daily practice at UMass Boston I teach at the 300's level. My students are undergraduates majoring in biology and biochemistry.   I have been teaching bioinformatics in two laboratory courses, namely, Biochemistry and Developmental Biology. I help my students to navigate through the National Center for Biotechnology Information (NCBI) web site and teach them to use the BLAST (The Basic Local Alignment Search Tool), a program that generates Phylogenetic trees and other tools available to analyze the protein or genome databases. Today, bioinformatics tools are essential for any science student going into higher realms of scientific study.

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[3] Proprioceptors are receptors located in muscle and joint tissue which contribute to an individual's unique perception of motion and movement of body parts. Proprioception is closely akin to kinesthetics. Both phenomena have become important areas of study within the neurosciences.

Over the past four decades, the progress made in the field of molecular studies and in the information technology sector has been enormous. The two fields have merged to give rise to a new field Hesper and Hogeweg (1970) have termed "Bioinformatics". This interdisciplinary field develops methods for storing, retrieving, organizing and analyzing biological data along with the development of software tools to generate biological knowledge. This is the subspecialized subject area I teach to undergraduate science majors. During my bioinformatics classes I have noted how my students possess and act from one of two distinct mindsets: Students either like or dislike the analysis of the databases. Database analysis is new for their mindset. When I sometimes do teach biology to non- biology major students, these mindsets also exist. I feel challenged as they repeatedly say, "I am not good in biology, I cannot understand the concepts in biology. Somehow I must get through the semester".

These were the mindsets and statements that made me wonder how I could help students to understand difficult concepts in science. In response to this challenge, I began in all my courses to use the concept of the *office hour* time as a sacred space to help students change their mindset from a fixed perceptions to a perception of receptivity to learning. *Office hour* became the time when I could address students when they said, for example, "I am not capable of learning biology," and I could attempt to move my students to take on a flexible, growth mindset in which they might start to say, "Yes, I can learn biology." Now this special hour has become an hour to tap the inner potential of each student and to show them that they are capable of learning by providing a 'successful' learning experience. During office hours, I train the non-biology major students to read the textbook and explain the concepts to them in simple terms. If my students struggle with the best textbooks I can find, I need the same flexible mindset I ask of them to find the means to translate what I've learned and teach them the language of science within which my field communicates. Taking this concept of the *office hour* I have duplicated the protocol by recording myself reading from an eBook using the motion screen capture software, Camtasia, while highlighting the important concepts in the text. I then upload the annotated screen capture of my reading for students to access. Here I've found an eLearning solution to add to my toolkit, judiciously, to meet a particular need, play to my own strengths, and strengthen my students' weaknesses.

Briceño (2013) talks about deeper learning as an activity that requires students to think, question, pursue, and create. According to Briceño, when students engage in deeper learning, they acquire deeper understanding and skills, and become more competent learners in and out of school. Further, he contends that, for students to drive their own learning, two essential focus areas hold the most promise, namely, Learning Mindsets and Learning Strategies & Habits.

1. Briceño describes four Learning Mindsets as follows:
   - Mindset #1: A Growth Mindset: *"I can change my intelligence and abilities through effort" (*para 6).
   - Mindset #2: Self-Efficacy: *"I can succeed" (*para 9).
   - Mindset #3: Sense of Belonging: *"I belong in this learning community" (*para 10).
   - Mindset #4: Relevance: *"This work has value and purpose for me" (*para 11).

2. He describes Learning Strategies & Habits in these terms:

We have the opportunity to teach not only knowledge and skills, but also the self-management and learning-to-learn skills needed in school and life….

We must teach students how to learn. We must teach them know know-how such as:

- how the brain works. and how we can increase its capabilities,
- how to manage our learning, including how to set learning goals, self-assess, approach new subjects, manage homework, dive deeper, learn from mistakes and know what to do when things get hard,
- how to engage in *deliberate practice* to develop expertise,
- how to foster innovation and creativity,
- how to work in teams,
- how to manage emotions,
- how to develop willpower,
- how to develop desirable habits through cues, routines and rewards, and
- how to combine habits with tools to manage one's self and one's learning.

<div align="center">(Briceño, 2013, para. 13-13)</div>

What Briceño describes is the very pursuit I undertake during the office hour time I conduct to help students to learn all the above listed concepts.

UNDERSTANDING MINDSET AND THE CONCEPT OF EPIGENETICS

Here I would like to conduct a virtual office hour of sorts, to introduce the concept of epigenetics, a word coined by Waddington in 1942. Waddington understood epigenetics as the study of the "causal mechanisms at work" governing "the relation between phenotypes and genotypes" (Waddington, 2012, p. 10). Today, we talk about the concepts of epigenetics being as 'above genetics'. We have two genomes in all our body cells, each being contributed by one parent, and an epigenome, which provides instruction as to how the genome will be expressed. Metaphorically we can think of the genome operating like the hardware of a computer and the epigenome as operating like software which gives instructions to the genome to differentially express the genes. Plasticity, as the word is used in biology, refers to the ability of many organisms to change their biology or behavior in response to changes in the environment ("ResearchItaly: Biological Plasticity," 2013). Neuroplasticity describes the remarkable capacity the brain possesses to reorganize pathways, create new connections and, in some cases, even create new neurons (Doidge, 2007; Gopnic & Melzoff, 1999; Hockenbury & Hockenbury, 2007). Today, we know that our brains undergo daily renovations to adapt to our ever-changing world (Wesson, 2010). All this is understood by learning about the biology of the cell and the cell membrane. Consider this further in light of the discussion of learners and teachers' mindsets.

Science continues to apply principles advanced by Waddington to address questions about how epigenetic mechanisms can help people learn, and be creative and innovative through the process of nurturing the internal and external environments. We know that some factors such as exercise, good nutrition, peer mentoring makes a difference in learning processes. Epigenetics is all about the change of gene expression, the underlying DNA sequence remains the same but by tagging some chemical functional

groups we can change the expression of a DNA sequence. There are many scientific papers published in this field. It is at the individual level that the expression of the genes can be modulated, and this speaks to the viability of adopting an individualized, personalized learning strategy. As we develop a pedagogical framework for future courses we should keep a clear focus on the epigenetic aspects developing a mindset for learning. As Lipton (2003) has realized, rather than being controlled by our genes, our cells are controlled by their own perception of the environment.

UNDERSTANDING THE LIFELONG LEARNERS' MINDSET

Recently, I had the most interesting experience of teaching a lecture series on Genetics and Epigenetics for the Osher Lifelong Learning Institute (OLLI). The participants in this non-credit educational series were adult learners. Having taught undergraduate Biology and Anthropology students for so long, I was struck by how different the mindset of these learners proved to be. Here, I could clearly see that, after a full life career, individuals were actively engaged in learning. When I teach adult learners in my regular courses, my students are either changing careers or have just started or resumed college studies. With the OLLI students I noticed a much more flexible mindset. The sooner the learner learns to have a flexible mindset, the sooner deeper learning happens, and faster the learner finds the path to success. The lifelong learners had already had a successful career and knew how to maintain the flexible mindset they required to learn new material. Essentially, these students did not require the *office hours* construct to guide them to the learning mindset.

UNDERSTANDING THE MINDSET OF INDIAN FACULTY

Even more recently I experienced a similar epiphany about learners who possess a predisposition to adopt a learning mindset without the need for my *office hour* structure. I had not returned to India to teach since 1993. While I had delivered a few keynote addresses and had presented a few lectures in my homeland, I had neither taught nor designed educational content for an Indian audience in over 20 years until this past December, when I led a team comprising IT administrators and faculty members to conduct an International Institute. UMass Boston offered the institute in collaboration with Shaheed Rajguru College of Applied Sciences for Women (Delhi University). The topic of the institute was "New Frontiers in Global Learning and Communications," and the subject matter was extended learning on eLearning. Our delegation worked with 51 Indian faculty members from 14 different universities and 20 institutions. Participants were provided with information and presentations on various topics including Exploring New Frontiers, Emerging Technologies, Writing and Reading in 21st Century Platforms, Instructional Design Models, Social Learning Theories and Applications, Adaptive Learning Design, and Assessment. Formal instruction was followed by group project development and presentations. The overall objectives of this institute was to train faculty on how to engage students through the use of new digital technologies and change the mindset of students and other faculty members by providing the tools to enable them to cope with and contribute to the new digitized world. In addition, the event attempted to address needs for developing effective communication skills for both faculty and

students, as well as improving writing skills in English, the *lingua franca* of the world today.

The teachers attending this institute had very little experience with eLearning tools prior to attending the institute and had no prior experience in online teaching. These Indian faculty members teach for colleges in which the only delivery format is face-to-face instruction and institutions with university-mandated sets of syllabi provided for all to follow. Nevertheless, within a short period of training, the participating faculty members were able to develop and present outstanding group projects demonstrating mastery of the digital tools and were able to create an online course. This was possible because the learners were already motivated and their mindset enabled them to learn quickly. During the institute we did cover concepts of epigenetics and neuroplasticity which may also have helped in some biological way to make the minds of these learners more creative, innovative and receptive to new concepts. Having kept tabs on members of the institute over the past three months since my return to Boston, I am delighted to learn many are in the process of incorporating the use of Wikis and LMS course shells into their teaching practices.

UNDERSTANDING THE MINDSET OF THE FRESHMEN SUCCESS COMMUNITY

The questions remain how to approach my primary learning population of undergraduate science students, who do not possess the predisposition for a learning mindset. Above we examined among Briceño's concepts Mindset #3: Sense of Belonging: *"I belong in this learning community*." It may be that learning community proves the most important element of the toolbox to foster the learning mindset. I myself recently joined a new learning community when I began teaching freshmen biology students who belong to a success community connected to the UMB College of Science and Mathematics (CSM) Student Success Center (SCC), a program established in 2008-2009[4]. The Center fosters belonging through programing that includes a peer mentoring program. Working through SCC, I began a project involving students in pure observation and provided each student with an iPad to collect unique observations seen in nature. At the end of the semester, students had collected valuable observations which they presented in the form of group projects. My goal in this project has been to nurture the minds of these STEM beginners in an effort to set them on the path to successful inquiry. My preliminary observations regarding their levels of engagement with the learning suggest they may achieve the deep learning Ginnis describes.

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[4] See Student Success Center - University of Massachusetts Boston at for details regarding the full services of the CSM SSC: http://www.umb.edu/academics/csm/student_success_center

UNDERSTANDING THE MINDSET OF UMASS BOSTON FACULTY MEMBERS

I have proposed that faculty members as well as students require the learning mindset and I extend that to suggest that faculty members therefore require the same belonging within a learning community I describe in a student context, above. This spring, I participated in such a learning community as the facilitator of a seminar for the non-tenure-track faculty members of UMass Boston. This has been a unique experience during which I have interacted with my colleagues on a weekly basis addressing issues around pedagogy, when teaching with and without technology. Eight faculty members were participating from different disciplines in this seminar in which we addressed topics similar to those covered in the Institute I led in Delhi, though at UMB this learning community convened for a semester long interaction. We viewed and discussed the various aspects of bringing about innovation in our individual classrooms. As I interacted with fellow members of the faculty I engaged in the process of understanding the mindset of teachers from different disciplines. The members of this group learned from the strengths of their colleagues. To begin the seminars, I uploaded all materials into an LMS course shell so that faculty members would be able to use the LMS from the important perspective of a student. Here I will note that I perceive the mindset of students in my fully online courses to be quite different from that of students in my on-ground courses. While in face to face classes students can be passive participants, my online students have to communicate through the threaded discussion platform. Most of my online students jump into the weekly modules on a regular basis and keep to the discipline of finishing the work on time.

Some faculty members in the seminar I led found it easy to jump into the learning. Some had already been using the LMS for their course enhancement. A few were actually teaching online courses and therefore had had to use the LMS extensively for their course delivery. However, for others who were just becoming familiar with the delivery system, our group operated as a peer mentoring program not unlike the mentoring service provided to UMB CSM students through the Student Success Center discussed above. Placing the teacher in the role of learner, and mentoring the teacher-learner through peer and facilitator support is one way my institution is helping to establish the mindset Briceño promotes.

I noted above my concern for the mindset of students in my on-ground courses, stating specifically that they are inclined to behave as passive participants, observing that my online learners are, through their use of threaded discussions and synchronous conference sessions, more highly engaged in their learning. Though eLearning options exist for on-ground students, of course, my concern has been to engage on ground learners during our regular course meetings. Here I would like to address my use of clickers in the classroom, an eLearning technology I have adopted in an effort to increase student participation during class meetings.

MINDSETS REGARDING THE USE OF CLICKERS

Clickers are hand-held remote devices with buttons that students push to answer multiple choice questions. That sounds unremarkable, but in my experience, clickers have enabled my students to become active class participants, and that is remarkable. I find that once I pose a multiple choice question to a lecture hall full of students, they engage in a hustle and bustle until my declaration of the answers established by the science we are studying. The literature suggests my experience is commonplace. Research by Osterman (2007) suggests clickers make traditional lectures feel qualitatively different and that the use of clickers helps students become more actively engaged in the classroom learning process. Kenwright (2009) has asserted the important attribute of clickers is the immediate feedback and assessment they provide to both the instructor and the students. Hatch, Jensen & Moore (2005) found clickers helped instructors to assess student knowledge immediately and to help identify problem areas and misconceptions that could be addressed before students had left the classroom harboring misconceptions. Keough (2012) published a review of 66 studies of student perceptions and/or outcomes associated with the use of clicker technologies which tracked eight general student perceptions/outcomes: actual performance, satisfaction, perceived performance, attention span, attendance, participation, feedback, and ease of use. Overwhelmingly these studies found benefits to the use of clickers in both student performance and student outcomes, as shown in Table 1, directly below.

Actual performance	Overall, the findings indicate significant increases in performance when clickers are in use (p. 826).
Satisfaction:	Overall, the findings indicate students experience high levels of satisfaction when clickers are used (p. 827).
Perceived performance:	Overall, the findings indicate students perceive that the use of clickers increases their performance (p. 827).
Attention span:	Overall, the findings seem to provide strong evidence for contributing to student attention span (p. 827).
Attendance:	Of … 9 studies, 7 found significant increases in attendance when clickers were used as compared with attendance rates in similar classes without clicker use (p. 827).
Participation:	With this one exception, the findings indicate high levels of student participation when clickers are in use (p. 828).
Feedback:	Overall, the findings indicate students perceive that clickers provide a high level of feedback (p. 828).
Ease of Use:	Overall, the findings indicate that students find clickers easy to use (p. 828).

Table 1: Overall findings from Keogh's review of 66 studies in eight categories of assessment of students' uses of clickers

Keogh's review makes the clicker story seem simple success narrative but other studies reveal that the achievement still depends upon reflective teaching practice. Connor (2009) found one of the biggest challenges for teachers using clickers was to craft meaningful, thought provoking questions at an appropriate level for the students. I've

found that to be case for the past few years I have been using clickers to increase student participation and engagement in the lecture hall classes I teach to over 100 students. However, the results of my own preliminary research suggest that most students value our use of clickers to some degree. From a simple poll I administered to 50 students in my Biology 101 course taught spring 2014, I found that 30% of the students felt that clickers in our classroom practice were "very useful," 48% felt clickers to be "somewhat useful," while 22% rated clickers to be "not useful at all" to our classroom practice. Illustration 1 below provides these results in bar graph format.
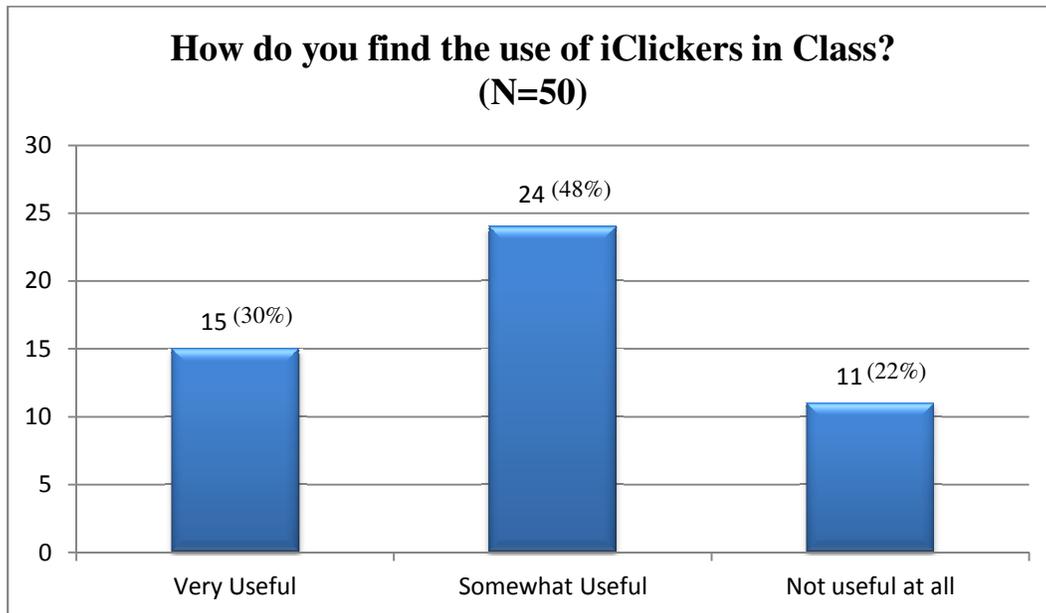
Illustration 1: Student ratings of usefulness of clickers

Recalling that my *office hour* protocol is designed to help improve learners' mindsets by removing their sense of being overwhelmed by complex textbook language and scientific concepts, I further polled my students to learn if they felt the use of clickers reduced the degree to which they felt intimidated by learning during class meetings. 46% selected "yes" as their answer to the question, "do you feel less intimidated answering questions using the clickers;" 40% indicated they were "somewhat" less intimidated; 14% indicated "no, not at all" did clickers lessen their level of intimidation with learning during my lectures. Illustration 2 below provides this date in bar graph form.

Do you feel less intimidated answering questions using the iClicker? (N=50)
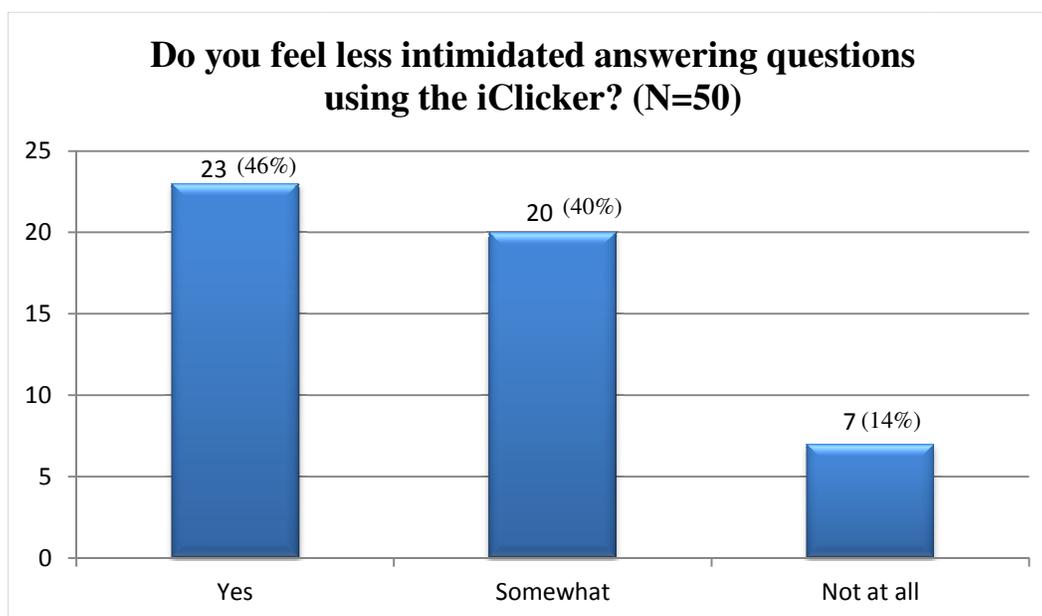
Illustration 2: Student perceptions regarding clickers' capacity to lesson feelings of intimidation

Although it is generally assumed that clickers are best suited for use in large classes (Mollborn and Koekstra, 2010; Peterson, Kilpatrick and Wobbkenberg, 2010), I have once in the past used clickers in a small class setting, and found them to be equally effective for promoting class participation in the small groups. This is not especially surprising. Established and recent studies support the contention that clickers can add value to small as well as large classes (Caldwell, 2007; Sevian and Robinson, 2011). Beckert, Fauth & Olsen (2009) conducted a simultaneous study comparing the use of clickers in a small upper-division level course and a larger lower-division level course. The researchers actually found that members of the smaller class had slightly higher favorable ratings of the clicker use than members of the larger course.

CONCLUDING REMARKS

The writing of this field study has provided me with the occasion to examine my own eLearning practices and the basis for those practices. At the same time I have mapped my teaching against literature on the use of the technologies I've used and brought to the forefront reports of how the landscape may be changing, calling into question my readiness of mindset to adapt. Recent trends in the literature show that educational institutions are attempting to adopt practices that support flexibility, inclusiveness, collaboration, authenticity, relevance, lifelong learning, and are extending institutional boundaries, and promoting global interactions; the acquisition of meta-cognitive knowledge and skills are all on the rise (Felix, 2005). Role reversal will be the order of the day, with the teacher becoming the learner and the learner becoming the teacher in a short time span.

In a detailed report within the Higher Educational Academy project entitled "Flexible Pedagogies: preparing for the future," Gordon (2014) discusses how the learners can pace, place and mode their learning, leading to a personalized learning experience. He suggests that learners can choose a wide range of devices and platforms for learning. With so much flexibility, new issues surface for the institutions including concerns regarding plagiarism and other serious management issues. It would be easy to turn away from this landscape, hunker down and say, good enough. I question, though, if teachers of the future have the choice to say, 'no thanks; I do not need all these technologies?' Perhaps adoption will remain a matter of free will, but I intend to follow the Darwinian principle regarding survival of the fittest. Whether a teacher wants to go tech or not, students are on the move with great speed, either because the IT industry has gone so far so swiftly that the common citizen is already wired in different ways, or because eLearning tools really have made great strides in helping to deliver difficult concepts in easier fashions. Here again different scenarios can emerge; one might be that the teacher is more tech savvy compared to the students or another that the students in class are more prepared. We have today a mixed bag of people, be they the teacher or the learners. Therefore, I predict that, in order to relate to the students, a teacher will have to know at least the basics of the new technologies. Otherwise the teaching and practice will not go hand in hand when a teacher tells the students to learn subject matter new to the student, while the teacher shows no capability to learn new technologies. Thus, in today's world we all have to develop a new mindset to be able to adapt to a new digital era. I believe the teacher's eLearning pedagogy must include this flexible, growth oriented learning mindset, an epigenetic approach.

Looking at my teaching journey through the years, I conclude that technology has kept me engaged in the process of learning. Now more than ever, though, I feel the need for an overt pedagogy of eLearning that acknowledges that teachers and learners must embrace the mindset to adapt.

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