Instructional Design Revelations: Intelligence, Learning, and Leaving No One Behind

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ABSTRACT

Today, training requires a fundamental shift that has not been seen since the advent of the Second World War. The need to train broad cross-sections of the general population for homeland defense is once again paramount. The objective has spurred a new look at what we thought we knew about human intelligence, multi-media presentation, learning, and how we measure the results. The paper begins with Flynn's intelligence paradox, the mid-70's dip in SAT scores, and data from the US patent office to debunk the traditional notion of intelligence. Citing work from a rather eclectic group of learning research sources, the paper develops practical guidelines to get the most effective training out of CBTs (Computer Based Trainers). The research cited ranges from the theoretical to practical and includes cognitive capacity research by the Internet 2 consortium, human network adaptation models developed by NDU (National Defense University) to break up terrorist cells, and Attention Deficit Disorder (ADD) clinical research. In addition, performance and retention insights from the design of the television show "Blue's Clues" provide some surprising applicability. Then, the author moves from amusingly theoretical to eminently practical by concluding that not all CBTs are alike in their ability to instigate behavioral change and describes specific features that CBT designers and evaluators can consider that enhance adaptability and retention for broad segments of the population.

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Dr. Blizek is a Program Manager at SAIC near Washington DC where he heads up the division's Computer Based Training efforts. He brings with him a solid foundation of some 18 years in simulation and training at both Boeing Phantomworks and Lockheed Skunkworks. As Technical Director at Litton he worked with MIT and University of Maryland members of the Coalition of Advanced Internet Development (UCAID) researching Internet 2 capabilities applied to multi-media training and information management. He is a TASC Institute Fellow and recently received his Doctorate from Regent University. Dr. Blizek is looking forward to life on the other side of the chalkboard.

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A CHALLENGE REVISITED

Today, proficiency and training programs face a fundamental shift not seen since the advent of the Second World War. The attack on American territory at Pearl Harbor roused fears of attacks on the U.S. mainland. Civilians volunteered to coordinate defense efforts in their local areas and massive education programs were created to support the civilian defense corps. Civil defense schools ran the gambit from air raid and chemical warfare response to the protection of industrial and public buildings. The emphasis of these programs was to reach and instruct the entire population, regardless of gender, background, education, or culture. The educational effort was based upon the understanding that the civil defense infrastructure was only as resilient as its weakest link.

Today, in the post 9-11 era, the need to train broad cross-sections of the general population for homeland defense is once again paramount. According to the FBI, the terrorist threat is real and is within our own communities. Very similar to World War II, the ability to defend our society is only as strong as our weakest link. However, unlike 1942, our infrastructures are far more complex and integrated, and the power of readily manufactured weaponry is extensive.

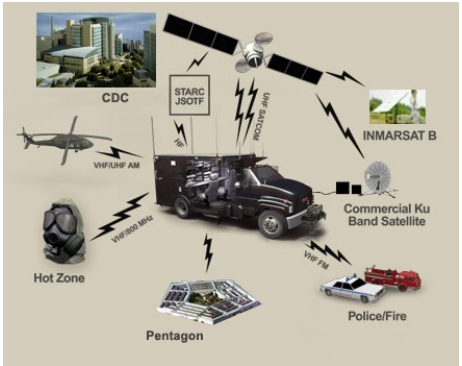

Figure 1. NAVAIR SCR's Unified Command System (UCS) is representative of the modern day challenge of preparing first responders.

A case in point was the objective given to us by the US Navy's Special Communications Requirements Division (SCR). SCR has developed a multi-band communications vehicle named the Unified Command Suite (UCS) that can quickly reestablish critical communication infrastructure links should a WMD (Weapons of Mass Destruction) incident occur within the United States. Operated by units of the National Guard, the UCS ability to link field detection, rescue, and mitigation activities with the Pentagon, Centers for Disease Control (CDC), state and regional National Guard assets, as well as local firefighter, police, and civic command centers, is an essential first responder asset.

First responder personnel performance must be held at optimal levels 24/7. What makes the development of CBTs for these UCS crews challenging is the diversity of crewmembers coming from all fifty states, possessing a wide variety of backgrounds ranging from military special operations to local firefighting and law enforcement. Additionally, periodic rotations, result in wide variances in operational competencies. Thus, training the UCS crews is a microcosm representation of the challenges of preparing mass populations. Unlike traditional military training where segments of the population are screened for minimal intelligence, the emerging home security objective, in general, and the UCS CBT effort, specifically, has spurred a new look at what we thought we knew about human intelligence, multi-media technologies, and learning, and how to measure the results.

FLYNN'S PARADOX: RETHINKING INTELLIGENCE

James Flynn, a political scientist, observed in the 1980s that an average increase of 3+ IQ points occurred per decade. The increase was found in virtually every type of intelligence metric, across a wide variety of groups in some 20 countries, and spanned the complete century-long record of testing. Flynn also found that when the intelligence tests were recalibrated for the period

during which they were raised, the aged scored just as well as the young. These were not surprising insights, except for one observation. While one might expect that rising intelligence measures would be clearly evident in tests that emphasize culture or education differences, the opposite was found to be true. The increase in IQ was most striking for metrics measuring the ability to recognize abstract, non-verbal patterns. In fact, traditional school knowledge showed little or no progress throughout the century (Flynn, 1984).

When Flynn presented his findings, he admitted that it was hard to believe that his own generation is significantly more intelligent than his parent's. In his study, compared to the previous generation, the number of people scoring at genius level increased more than twenty times! Flynn reasoned that we should be witnessing a cultural renaissance too great to be overlooked. Now, let's be honest. When was the last time in rush hour traffic that you felt you were among geniuses? As for parents, could it be true that your teenager really does know it all? The rejection of these premises may mean that something else, more profound than mere accumulation of data, is happening inside people's heads. Alternatively, Flynn suggests that what has risen is not intelligence but an abstract problem solving ability (Flynn, 1999). Even more profound than Flynn's paradox is that his explanation for the paradox could be right.

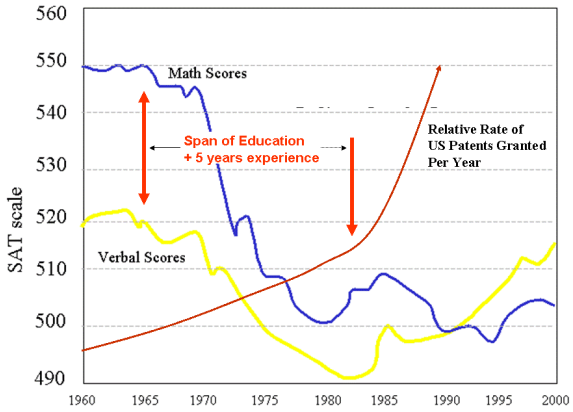

Figure 2. The disparity between SAT scores and innovation call into question our traditional notion of intelligence and the way it is measured.

DROPPING SAT SCORES AND RISING INNOVATION

Evidence supporting Flynn's explanation can be found in the record of SAT scores. Between 1964 and 1980, the average SAT score declined dramatically by some 70 points. Shortly after, the Congressional Budget Office discovered a close match between test scores and birth cohorts confirming what many of our parents believed about us all along. Their children were getting dumber, not brighter, right? Not quite. Consider that if early-to mid-1960 born Americans represent the low ebb of intellectual prowess, how does one account for the steep rise in creativity (measured in granted U.S. patents) that started some fifteen years later in the early 80s, and continues to this day (Florida, 2002)?

It gets even stranger. Strauss and Howe (1991) suggest that such variation may be cyclic, based upon a 94 year, four-part generational cycle. While their causal model seems to support the variation of SAT scores on a generational perspective, it also hit a stumbling block. SAT scores did not match the intelligence trends quite as predicted. Citing the drop in 1964 born students' SAT scores and the associated social upheaval accompanying their coming of age, they noted that the SAT score drop should have occurred some ten years earlier. Rising from the ashes of contradictions and conjectures, we are left to consider the following conclusions:

- Flynn's paradox deconstructs the traditional association between intelligence and competency (also called intellectual propensity).
- At this time, we don't understand intelligence enough to define it, let alone measure it.
- Cognitive propensity rather than absolute intelligence is a more meaningful metric of personal ability.

Therefore, it is respectfully suggested that instead of a focus on intelligence, learning theory and curriculum development should be refocused on the variation of learning propensities as the root of ability from era to era and individual to individual. This is the key to educating general populations and where instructional developers should begin.

THE CASE FOR LEARNING PROPENSITIES

Howard Gardner's, *Frames of Mind: The Theory of Multiple Intelligences*, which came out in 1983, generated a revolution in education. Gardner proposed seven intelligences – linguistic, musical, logical, mathematic, spatial, bodily kinesthetic, interpersonal, and intrapersonal. Not to be outdone, Joy Guilford proposed 120 intelligences and later expanded the taxonomy to 150. Taking one step forward and three steps back, Rita Kenneth developed a learning styles inventory of 24 elements that took forthcoming research in the right direction but then noted that the elements combined to create some 41,472 possible combinations (Silverman, 2002). From a practical perspective, could we possibly be measuring with a micrometer and cutting with an axe? I propose that we are. So, before we delegate learning theory to our genius-oriented teenagers, let's consider a more practical taxonomy.

Research conducted over the last two decades suggests that there are essentially two basic learning styles in the mass population that need to be considered in curriculum development: visual and auditory (Springer, 1998). Most people favor one or the other, although some are equally strong in both modalities. The difference, according to Orstein (2002), is primarily between a sequential way of perceiving the world and a simultaneous way. In computing terms the difference is between serial and parallel processing.

The Familiar Auditory –Sequential

Auditory learners are referred to as auditory sequential. Audio-sequential learners usually think in words. That is, words become their medium of thought. For them, thinking and inner dialogue may be so closely intertwined that they may have a hard time understanding that some people think differently. Visualization may be hard for them and meditation laborious. In addition, the auditory-sequential learner is profoundly influenced by time, but is less aware of spatial relationships. In the traditional classroom, these are our star pupils and are the individuals demonstrating what we have traditionally called high intelligence. Understandably, due to their own educational success, auditory-sequentials tend to gravitate to the academic community and may be a principle reason that public education methodologies are predominantly auditory-sequential oriented (Silverman, 2002).

The Visual-Kinesthetic

Kinesthetic learners (those who use physical movement and muscular feedback), on the other hand, are referred to as visual-kinesthetic and have a very different way of doing things. Such learners employ a larger recognition of patterns, intuition, sense of proportion, the imaginative vision, the original and unexpected approach, and the apt connection between apparently unrelated things as their salient abilities. Using the sequential left hemisphere of the brain, visual-spatials have extraordinary awareness of where they are in space, or how the elements of design fit together in space. Once visual-spatials see how the whole system fits together, they seem to teach themselves. These people (roughly 30% of the population) have been systematically devalued as greater challenges for traditional educators. For them, the three R's may be difficult to master. Instead of learning step-by-step, these people are whole learners, who need to see the big picture first in order to learn the details. In addition, they can't hold too many details in short term memory. They get confused if they don't see how these details relate to each other or to previous learning experience. They simply get lost if they can't form a picture in their mind – they need an outline of that picture so that they can add the details. While you can expect auditory–sequentials to give the one right answer, you never know what visual-spatials will give. They often give unscorable answers on standardized tests, seeing possibilities that the test developer never imagined. They see commonalities in uncommon things. They have the ability to free associate, to see patterns, and to look at things from a different perspective. They are very different and, to a degree, difficult to instruct and yet, they are consistently superior at transposing what they have learned to new situations and circumstances (West, 1991). Once trained (perhaps oriented is a better term), they are valuable to strategy development, impromptu innovation, and conduct under dynamic or ambiguous circumstances. They are essential contributors to homeland security as well as any innovation-driven enterprise.

The confusing aspect of visual-spatial processing can be best understood if one realizes that what our society considers "easy" is usually sequential, and what it considers "hard" depends upon the ability to coordinate many complex variables simultaneously. Therefore, individuals who excel at sequencing will master simple sequences with ease, but may have difficulty visualizing how all

the parts work together. The opposite is true of individuals who are sequentially impaired, but who can visualize complex systems with no difficulty.

And herein is the challenge for curriculum designers. Some of us are so deeply accustomed to a linear view of intelligence and potential that we may find it nearly impossible to believe that certain persons may find advanced subject matter quite easy, while they find some elementary subjects quite difficult. Yet, for some of the most brilliant and creative minds, this is precisely what we find (West, 1991). Creating avenues for learning that accommodate both learning propensities is the key to curriculum design for the masses. But, how can this be done?

LESSONS FROM BLUE'S CLUES

Certainly, to proceed down the existing road is to commit ourselves to a conceptualization of learning that is, to some degree, incorrect – perhaps, even flawed. If this is the case, then how do we instructional designers make practical use of this learning duality insight? The performance and retention insights from the design of the television show "Blue's Clues" holds some surprising applicability for us.

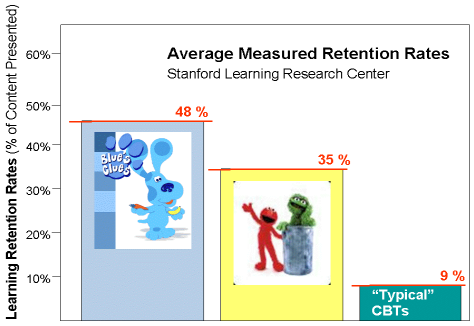

Figure 3. The superior retention rates achieved By Blue's Clues and Sesame Street, as compared to most CBTs, indicates there is much we can gain from the research that went into producing them.

Despite the adult perception of Blue's Clues as the most excruciatingly boring children's program ever devised, it is also the most researched educational program in history. Originally conceived by Sesame Street director Daniel Anderson, its superior retention ratings (48%+) to any other training format places it in a class by itself (Figure 3). So, as difficult as it is to brief the Commander that your approach for his training program is based, in part, on a cancelled children's program, it is in the spirit of progress that we note three surprising insights into the way people (both children and adults) learn through electronic media (Henson, 1993).

The first lesson is that the more a person is engaged in watching something - intellectually and physically – the more memorable and meaningful the content becomes. Anderson noted on Blue's Clues' predecessor, Sesame Street, that when Kermit would draw a letter with his finger, children would place their finger on the TV screen and mimic the trace. Several pilot shows confirmed that what holds students' attention is not flash and glitter, it is intellectual engagement, when possible, and that engagement should include behavioral as well as cognitive action. This lesson has two implications. First, informational content should feature instructors on-screen talking directly with the camera, engaging the student with interspersed hands-on visualizations, instructional animations, and graphics. Second, and more important, the instruction should include personal cognitive expression by the student - by voice and or hands-on activity. For example, in our UCS CBT, we presented an instructional video and a hands-on simulation simultaneously so that the kinesthetic learner could "act out" the task as it was being taught. As a result, the information is reinforced visually, aurally, and behaviorally. While this seems straight forward, there are additional considerations. Ask any adult about Blue's Clues and he or she will likely comment on the length of extended pauses as Steve, the boyish host, waits for his audience to answer a question. It's long because young children don't see the world in the same way we adults do. To them, much of the world is abstract. Think of it. The names of even everyday things are symbolic audio representations to children. There are double meanings of nouns or expressions and these are especially confusing because, children lack the immediate dual association of certain words that we adults have mastered. The same principle pertains to adults. Because every one has different competency levels for synthesizing information (Kenneth's 42,000 learning combinations not withstanding), the rate and type of information in each of the channels must be controllable by the user. For example, the curriculum should not describe a sequence of directions to a left brained visual-spatial at the same speed you feed a right-brained audio–sequential learner. One is differently equipped to take in such information than the other, so allow the user to select his own

pace. Because it takes the left- brained individual time to process each step into a visual representation before he can move to the next instruction, you can give him a pause, segment the curriculum accordingly, or present interactive conceptual visualizations that build upon his existing knowledge base. In our application, we gave the user the ability to pause and process at his discretion, noting that, as we will see, time on task does not necessarily reflect proficiency (Lesser, 1975).

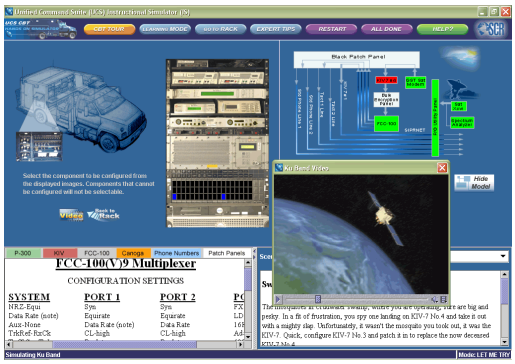

Figure 4. Although the interface may look complicated, CBTs that allow selection of learning modalities produce higher retention rates in users.

An important second lesson from Blue's Clues regards repetition. What researchers found is that there is a progression to repetition of content that enhances learning. Blue's Clues researchers noticed that a segment of Sesame Street featuring James Earl Jones reciting the alphabet was particularly well received by viewers. The segment had nothing unusual in itself, but as the segment was repeated over and over again during the course of a season, children would shout out the name of the letter after Jones did. After a couple of repetitions of the scene, kids would blurt out the letter before it was announced. After more repetitions, children would anticipate each letter before it appeared. As Sam Gibbon, instructional researcher for Blue Clues wrote, "It was a revelation to us, they were sequencing themselves through the piece. Each phase exercised new associations starting with identification, categorization, and eventually sequence." (Gladwell, 2000) The key is that if multiple layers of understanding are presented for a given task, adults will master the content through repetition – each time gaining deeper mastery based upon the learning styles they favor and then progressing to their more difficult learning modes. As seen in Figure 4, our UCS CBT presented the lesson in several simultaneous ways, ranging from a system's view, a component action perspective, to instructional follow-along. The multi-facetted presentation allowed the user to choose his sequence of learning, starting with his favored learning style -- whether it was top-down or bottom-up. The resultant behavior forced us to re-examine SCORM standard of tracking time on task as a measure of gained proficiency. Specifically, we have found that:

1. The user tended to repeat the same lesson several times,

2. Each time the user repeated the lesson, he employed or emphasized a different presentation channel (visual, audio, etc.) until he achieves the proficiency he deemed required.

3. In accordance to the Blue's Clues data, the resultant retention rates achieved in our UCS CBT were significantly higher than straight repetition alone, regardless of the channel used.

Of course, no one likes repetition for its own sake. Whatever the subject, it has to be complex enough to allow, upon repeated exposure, for deeper and deeper levels of comprehension. At the same time, it can't be so complex that the first time around it baffles the student.

The third lesson from Blue's Clues is that the learning experience is a matter of presenting a story of discovery. I know this comment sounds like something from a PBS pledge drive. However, the advice has some very practical ramifications. First, in order for the story to make sense, it must be presented in the proper order. The experience needs to start out easy for the user while he gains confidence in his ability to use the CBT environment. Then the CBT should get progressively harder and draw the student into the program content. Second, to our surprise, the proper concept of what is harder is not the conventional definition most people use. The concept of difficulty that translates to improved competency is not the complexity of the content (launch a thousand ships with one word or, conversely, paint a thousand words with one picture) that matters. Difficulty is the complexity the user has in engaging the content. If the user is kinesthetic and the task is primarily cognitive, then the experience should start off kinesthetic and progress to cognitive through several

intermittent visualization and aural phases. Repeating the material in progressively complex presentations, but in accordance to a wider variety of learning modes, we have found enhances knowledge transfer to new situations. Similarly, audio-sequentials should not be expected to perform complex visualizations or leaps of intuition from the start without some intermediate preparation (Springer, 1998).

Figure 5. By presenting progressively more complex representations of the same concept, users are more compelled to repeat the lesson and gain a deeper understanding of the principles taught.

An example of how these insights may be employed is shown in Figure 5. In our UCS CBT, we provided content in a variety of ways including reading, schematics, lecture audio, visual demonstration, and participation. Optimal progression was achieved by allowing the user to choose which mode best suited him while challenging him with scenarios that demanded a more comprehensive understanding and utilization of the material.

LEARNING NETWORK MODALITIES

The ultimate goal of homeland security is, of course, not just to prepare individuals, but to prepare communities of first responders. Champy (1995) noted that the more robust the social exchange process (i.e. communication), the more likely optimal operational efficiency will be achieved – no matter in what environment the organization finds itself. Translated into issues of national security, research conducted out of the National Defense University indicates that the adaptation of learning communities (terrorist cells, as well as our own organizations) can be enhanced or hindered by impacting only a few critical communication points within a given human network. The reason for this sensitivity is because cultural adaptation occurs in non-linear geometric patterns (Sanders) and those patterns are composed of three different types of human agents that Malcomb Gladwell describes as Mavens, Connectors, and Persuaders. Each actor type makes a unique and essential contribution to the behavioral adaptation of any large organizational structure (Gladwell, 2000). To effect the activities of these lynch pins of community behavioral adaptation is to effect the entire community and it is this network nature of communities that impacts what is left in and what is left out of a given instructional design.

The Mavens

The word "Maven" comes from Yiddish and means "one who accumulates knowledge." Mavens have become the focus of many economists since their ability to collect and pass on information is thought to be one of the key psychographic phenomenon effecting modern commerce. Linda Price at the University of Nebraska cites Mavens as important communication links in that they are collectors of useful knowledge and are then self-motivated to distribute that know-how throughout the organization. As Price describes them, Mavens are not just passive collectors of information. They are compelled to help others by presenting what they have learned and concluded. In essence, they are socially motivated to distribute new knowledge. Mavens are important to cultural change and are described by Price:

> "They are unique in that they have the knowledge and skills to start word-of-mouth epidemics. What sets Mavens apart, though, is not so much what they know, but how they pass it along. The fact that Mavens want to help for no other reason than because they like to help, and their activity turns out to be an effective way of getting attention and reinforcing strong communication links - even at long distances."

Price conducted structured interviews to identify critical common characteristics of Mavens. From over 120 interviews, Price characterizes Mavens as follows;

- They are individuals who possess a lot of information and are naturally outgoing.
- They will help others in the marketplace.

- They distribute four times as many coupons as the general population and always read the fine print on contracts.

- They typically ask three to five times as many questions regarding a single purchase. They read consumer magazines such as "Consumer Reports" and are apt to write in with corrections when necessary.

The Price studies conclude that Mavens make up less than 3% of the general population, come from all walks of life and careers, and yet may influence as much as 70% of the retail economy. In designing CBTs, the Maven's impact is often overlooked. In our UCS CBT application, we are working to enhance their ability to investigate and to innovate new ways to use their resources, and tell people what they have learned. In our next release, we are developing an embedded simulation-scenario generator. The menu driven utility allows users to express configuration solutions they have developed for real world deployments and to distribute them (a la' viral marketing concept) to the rest of the user community. The scenario files consist of text description, equipment utilized, and associated configuration settings that are in human readable XML. The scenario can be downloaded into the simulator where it is presented as a solution set or an exercise. The users, in return, can practice, modify, append, or comment back to the author and/or community. In this way, it links Mavens among themselves as a sub-community, as well as with the user community at large. It provides a three way mode of communication with feedback and discussion for refinement and clarification in a way that allows Mavens to communicate easily without ambiguities and with great detail. Even though it has not been released, our user community has expressed great enthusiasm for the idea, which tells us something of the need for such a utility.

The Connectors

In the late 1960s, the psychologist, Stanley Milgram, conducted an experiment to quantify how information moves through a culture. Using a sample of 160 individuals residing in the midwest, Milgram requested that each participant send a chain letter to a friend or acquaintance that might be able to get the letter closer to a specified stockbroker at an unknown address in Boston. To Milgram's surprise, he found that most letters reached the proper destination in five or six moves. More importantly, he noticed that most letters passed through the same few individuals time and time again. As Milgram found, the human network is greatly asymmetric by a few individuals and that much of the connectedness of any organization rests in a very small percentage of the population. The nature of these components is that they possess extraordinarily large "libraries" of weak links (Granovetter, 1995) to other organizational members. Milgram called these agents "Connectors."

Whereas the scenario generator was developed to enhance the Maven's use of their data-pull communication style, we noted a separate and distinctive function regarding Connectors. Connectors know how to direct (data-push) information. Since Connectors are not knowledge experts like Mavens, we have assumed that they spread predominantly meta- data or "heads-up" information from one remote community network to another. For Connectors, our implementation approach is a simple matter of integrating the user's e-mail messaging utility of choice and, in that way, making use of their extensive distribution lists of weak links.

The Persuaders

While Mavens are the human databanks and mentors that present the message of change, and Connectors are the social transmitters that spread the message throughout the organization, Gladwell posits that there is a third actor in social adaptation. Gladwell describes these agents as the individuals that persuade others to take action using the learned knowledge that they have on hand. The concept of Persuaders comes from William Condon's research on cultural micro-rhythms and interactional synchrony. During the late sixties and early seventies, Condon performed a series of experiments in which he decoded 1/45 of a second video segments of two-way conversations between a wide variety of combinations of individuals. He concluded that persuasive individuals utilized over 200 forms of timed synchronizations of volume, pitch, facial, and hand gestures, posture, and eye movements to enhance the transmission of human emotion (Condon, 1982). Further work by Hatfield, John Cacioppo, and Richard Rapson concluded that a small, but important, percentage (roughly 5 to 8%) of the general population consistently out-persuaded their peers by employing physiological differences in facial musculature to express

emotions and feelings (Hatfield, Cacioppo, Rapson, 1994). According to Hatfield, these people have special personalities and are physiologically different from the general population.

The ability to express emotions and transfer feelings is to motivate individuals by a dyadic of complex and subtle personal interaction (Blau, 1967). For CBTs, and electronic media in general, the challenge of enhancing the activity of of Persuaders is a tough one. Unfortunately, only one way face-to-face, automated communication is available, which negates the entirety of Condon's mechanism of persuasion. To succeed is to overcome several technical barriers. First, while the ability to monitor voice inflection is a technological capability available today, the problem rests in the proper interpretation of the inflection patterns. Interpretation becomes difficult for machines because the outcome is highly context dependent – a step still being hatched in research labs around the country. A second limitation is the synchronization of facial micro-rhythms and resides in two parts. The use of biometric facial identification as a starting point to detect facial nuances may be a plausible approach. However, the detection and classification reliability rates of such systems may remain too high to generate a consistent interpretation of the message being sent. Another limitation is that the detection, classification, contextual interpretation, and presentation of these facial cues must occur in real time on the order of microseconds. Finally, even if we could develop a reliable algorithm at the appropriate speeds, the current state of the art avatars do not seem to employ the needed complexity or visualization subtleties required for a plausible application (UCAID, 2003). The above laundry list of shortcomings is not meant to be nah-saying. Instead, it points out that the use of avatars, which is becoming increasingly common in CBTs and electronic advertising, despite its claims, should be considered largely ineffective with regard to the Persuader function. The use of avatars is a case of knowing what to leave out and where not to focus one's development dollars.

CONCLUSION AND THE LOOK AHEAD

So where does all this leave us when the bulk of us leave Orlando? First, I posit that there is a broad variety of credible insights coming from a diverse community that includes DoD National Research Council studies, forty years of academic study on leadership thought, Next Generation Internet development, and even research supporting the Homeschool community. Despite the fact that these insights come from vastly different origins, there are some surprising correlations that have direct impact on how we design better learning experiences. With regard to training and preparing our communities for tomorrow's challenges, at this time it may pay to question the established doctrines of our field. Second, it is hard to argue with success. Even though the data, at the time of this writing, is preliminary, it is also very encouraging with classically defined retention rates three times higher than those suggested by Stanford's Learning research center as typical of CBTs. The finding seems to match well with our own, less rigorous, comparisons to the CBTs in our WMD response community. In short, we, our customer, and our user community think we are on the right track. Finally, we have shown that the implementation of these insights does not require exotic application technologies such as contextually sensitive interfaces, semantic consistent data base interpreters, or other similar effects. The resulting improvements in learning performance for individuals and their respective communities are readily available today for all. Like all human enterprises, to succeed takes a questioning mind and the perseverance of a challenging spirit. It is a very exciting time in our field.

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