# Linking After-School Programs and STEM Learning: A View from another Window

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My charge from the Coalition of Science After School (CSAS) was clear and simple: write a position paper which discusses the potential for after-school programs to serve as networks of early support, fostering youth's interest and engagement in STEM. The notion is that this interest and engagement will encourage children and youth to choose to take advanced STEM coursework, including AP classes. This perspective is supported by Patricia McClure and Alberto Rodriguez's thorough literature review (2007) suggesting that it is the lack of advanced and rigorous coursework in STEM which results in the observed disparities in participation in STEM fields by minorities including women, African Americans and Latino/as.

In their literature review, McClure and Rodriguez provide compelling evidence that the number and quality of math and science courses are "critical filters" that influence continuation in STEM education and careers and that self-esteem and self-efficacy are major impediments to women, African Americans and Latino/as pursuing STEM courses. McClure and Rodriguez also document the role that quality out-of-school time (OST) activities play in increasing students' engagement, self-efficacy, choice goals and actions, and persistence, by providing supportive environments in which students can cultivate their skills, feel competent, and experience success (Lauer, Akiba, Wilkerson, Apthorp, Snow & Martin-Glenn, 2004; Naftzger, Kaufman, Margolin & Ali, 2006).

As a person who has devoted a career to understanding and facilitating opportunities for out-of-school learning generally and out-of-school STEM learning specifically (often called informal science education, what I prefer to call free-choice STEM learning[1]), I wholeheartedly support the idea that out-of school experiences should be an essential part of *everyone's* lifelong learning journey. As McClure and Rodriguez suggest findings from research and evaluation efforts over the past several years provide increasingly sound evidence that it is not a question of *whether* OST programs actually make a difference to children and youth, but rather *why, how, and for whom* such programs are effective (Pierce & Vandell, 1999; Dierking & Falk, 2003; Fadigan & Hammrich, 2004*;* Bouffard; Little & Weiss, 2006; Naftzer, et. al., 2006; Koke & Dierking, 2007*).* For instance, a series of studies document the impacts of quality out-of-school youth programs hosted by museums and other community-based organizations/institutions. These studies demonstrate that such programs positively influence youth's critical thinking skills and behaviors, school attendance rates, technology and study skills, classroom behavior, content knowledge and academic pursuits and career goals, as well as their self-confidence and feelings of competence, creativity, interpersonal and

[1] Free-choice learning is learning guided by a person's needs and interests so it involves key components such as choice and control and attention to motivational aspects of learning, social interaction, and a strong focus on authentic, physical environments. Such learning is observed in quality classrooms and settings such as museums, science center, parks and so on.

teamwork skills, relationships with peers and family, work ethic, tolerance of others, and social awareness and responsibility (Baum, Hein & Solvay, 2000; Beane, 2000; Cosmos Corporation, Inc.;. 2000, Librero, 2005; Intrator 2006; Koke & Dierking, 2007; Luke, Stein, Kessler & Dierking, in press).

Critical factors correlated with these findings include participants perceiving that the program included supportive adults with high expectations who worked hard to establish positive relationships with them and curriculum and activities that were interesting, personalized and meaningfully related to their daily lives. These activities seamlessly incorporated active learning strategies, inquiry-based approaches, multiple grouping structures, cooperative learning strategies and time for open-ended dialogue. More often than not these programs also included meaningful connections to the community at large such as partnerships with community-based agencies or institutions/organizations. In the case of STEM-related programs specifically, partnering organizations include science-rich organizations/institutions such as universities and science societies, nature centers, science museums and science centers, zoos, parks, public broadcasting entities, STEM-related businesses and so on (Huang, 2007a, 2007b; Koke & Dierking, 2007).

Given these data, I have argued for many years that the OST field should be playing an advocacy role which supports broader views of where, when, why, how and with whom learning takes place (Falk & Dierking, 2000, 2002; Dierking & Falk, 2003) and fortunately this message is being communicated by others as well beyond the immediate informal science education (ISE) field. In 2005, the Harvard Family Research Project initiated the notion of complementary learning, advocating for the essential role that schools and a variety of non-school learning entities, such as families, early childhood programs, out-of-school time activities and programs, higher education, health and social service agencies, businesses, libraries, museums, and other community-based institutions can play *together* in supporting learning (Weiss, Coffman, Post, Bouffard & Little, 2005)..

Given this compelling data, the direction we should take seems clear—if we merely insure that every child has opportunities for quality OST experiences, ideally those that are STEM-related, we can deal with this issue. However, I have a major concern with such an approach. As we explore the potential relationships between STEM learning and OST I think it is critical to recognize that often what makes these efforts matter to children and youth is that they are *not* like school, but instead are perceived as personally meaningful, engaging and, shall I daresay, *fun*, as David Alexander suggests, "the learning that lies between play and academics (Alexander, 2000; p.1). Unfortunately, I also believe that unless STEM-related OST programs try to embody these and similar characteristics, they are likely to be unsuccessful, particularly in the long term, in fact, they can do more damage than good by reinforcing stereotypes of STEM and STEM professionals as dry and boring. My skepticism and concerns revolve around the fact that unfortunately discussions of quality OST programs, even when well-intentioned tend to follow a path of how such programs can support children and youth's achievement *in school*. Even the discussions of complementary learning can sound like the same old "supplementary" learning argument; the language carefully crafted so as not to disrupt

the status quo, ensuring that "just as schools cannot do it alone, OST programs are necessary but not solely sufficient to support learning and development (Bouffard, Little, & Weiss, 2006)."

On the surface this sounds exceedingly reasonable, however, if one reads the fine print, there is also the suggestion that if OST programs operate from a complementary learning framework they can be more "intentional" about how they connect with other institutions and entities to build shared missions and goals, share resources and ideas, facilitate stakeholder buy-in, and provide more coordinated services. Unless schools are also willing to play by these rules, which I have found in almost 30 years of experience as a middle and high school science teacher, at universities in Science & Mathematics Education departments preparing elementary and early childhood teachers and now free-choice learning professionals, and in OST institutions in roles at the interface between schools, universities and OST institutions, rarely is the case. This does not bode well for complementary learning actually occurring.

Instead my experience, and I know that of other colleagues, has been that this slippery slope more often than not leads to efforts to "align" after-school programs with school-based policies such as No Child Left Behind, high stakes testing and narrowly-defined outcomes. These programs are more likely to provide opportunities for remediation and homework help, rather than personally meaningful, in-depth and engaging experiences, and actually can result in "one size fits all" school-like kinds of programs. Given that the children that could most benefit from these experiences often are also the same children dropped off prior to the start of school this counts for a very long school day. And although these programs may help children be successful in their current grade or even in some cases enable them to matriculate to the next level, they rarely empower children and youth to pursue an interest for the pure joy of it, to understand their strengths and weaknesses as learners or to be interested and engaged in STEM learning specifically or even learning in general.

Returning to the initial thesis, if these programs have a role to play in fostering youth's interest and engagement in STEM they need to take that goal seriously and do all that they can do to attain it, both for children and youth who have the potential and interest in pursuing STEM education and careers, but equally for children and youth who have the potential and interest in being *lifelong* STEM learners through the hobbies they engage in, by encouraging their children's interest, and by being scientifically interested and informed citizens.

This is not to say that this situation is always the case. There are quality schools that appreciate complementary learning; schools in which children and youth have opportunities to engage in real-world authentic experiences, hire supportive adults who know how to encourage and facilitate children's personal interests and where OST is valued as another important component of "real," lifelong learning. There are also a few communities that embrace and "walk the talk" of complementary learning. Sadly though these are few and far between and rarely accommodate the children that need them most.

Ultimately, the problem is not one of individual schools or teachers, but rather a systemic issue, deeply rooted in our society and psyches. Despite best efforts, there still is a tendency to equate the terms learning, education and schooling as synonyms rather than recognizing that learning is a lifelong and life-wide enterprise. Taking this broader perspective enables one to appreciate learning, including STEM learning, not merely as an end goal, but ideally as an approach and attitude toward life that is rewarding and can be enjoyed throughout one's lifetime.

There is another issue also. A growing number of studies (Falk, 2001; Falk, Storksdieck & Dierking, 2007; Falk, Dierking & Storksdieck, 2007; Miller, 1998; 2001; 2002; National Science Board, 2000; 2002; 2004; Weiss, et al, 2005) demonstrate that schooling is necessary but not sufficient to support lifelong STEM literacy. For example, seventy-five percent of Nobel Prize winners in the sciences report that their passion for science was first sparked in non-school environments (Friedman & Quinn, 2006). Additionally, given that STEM knowledge is constantly changing, it is critical that everyone, STEM professionals and "regular" folk alike, are able to update their STEM understanding. Fortunately because of the aforementioned studies, we now appreciate that the public acquires science information continuously across their day and throughout their lives.

I suggest that there is an alternative way to frame this issue entirely. Nearly a decade ago, educational researcher Mark St. John proposed that the science education community rethink how to envision the entire learning enterprise, suggesting that the school and free-choice learning sectors (John Falk and I have added the work place; Falk & Dierking, 2002) be considered components of a single, larger learning infrastructure (St. John & Perry, 1994). St. John and Perry used the term *infrastructure* to describe the system of supports, conditions, and capacities that permit the smooth functioning of daily life. Infrastructures represent essential under-girding for a variety of activities, for example, the highway infrastructure facilitates transportation and an infrastructure of community services such as a fire and police department permits a community to function smoothly. The learning infrastructure in a community supports and facilitates the learning that takes place there and is vital to a nation's economic, intellectual and spiritual well-being. The basic STEM learning infrastructure already exists and is composed of schools and universities, the Internet, print and broadcast media, libraries, community-based organizations, cultural institutions, the work place, and friends and family among others. Ideally all of these educational entities work together to support and sustain STEM learning across the life span and throughout the day (Johnston, 1999).

## Some Implications of the View from Another Window

**Broader Learning Goals** The first implication of this "view from another window" is that one needs to rethink the goals of learning in general and STEM learning in particular. This suggests a broader view of learning, going well beyond a focus on content knowledge and skills, to a more holistic view of development and learning that takes into account the whole person within society, *even when considering STEM learning* (Dierking, L.D., Cohen Jones, Wadman, Falk, Storksdieck & Ellenbogen, 2002).

Personally, I resonated with the learning goals presented in McClure and Rodriguez's review, particularly approaches such as the IB learner profile (IBO, 2006), in which the characteristics of a life-long learner are delineated (inquiring, knowledgeable, thinking, communicating, principled, open-minded, caring, risk-taking, balanced and reflective), rather than compiling detailed lists of pre-requisite courses or what students need to know or should be able to accomplish at various developmental stages. This approach is appealing for two reasons: (1) the characteristics are appropriate for STEM professionals but also, as suggested, can be used to describe lifelong learners of STEM, and (2) these characteristics align well with goals in the youth development field which are considered critical components in fostering positive youth development, particularly the "Six Cs" of Positive Youth Development, a framework which draws upon existing, well-tested psychological constructs and has been empirically tested by several researchers (King, Dowling, Mueller, White, Schultz, Osborn, Dickerson, Bobek, Lerner, Benson & Scales, 2005; Lerner, Lerner, Almerigi, Theokas, Phelps, Gestsdottir, Naudeau, Jelicic, Alberts, Ma, Smith, Bobek, Richman-Raphael, Simpson, Christiansen & von Eye, 2005; Theokas, Lerner, Dowling, Benseon, Scales & von Eye, 2005). The six C's are: competence; confidence; connection; character; caring and compassion; and, contribution.

**Changing Where & When We Learn** Another implication of these ideas is that one looks for STEM teaching and learning in the "less usual" places. For example, the Institute for Learning Innovation has worked for almost fifteen years with the Astronomical Society of the Pacific (ASP), based in San Francisco, CA. With the Institute's assistance, they have been exploring and experimenting with innovative ways to tap into the vast resources of both professional *and* amateur astronomers and broker creative connections within the STEM learning infrastructure (Dierking & Richter, 1995). With funding from the National Science Foundation, ASP has involved astronomers in supporting elementary and middle school teaching in classrooms through *Project ASTRO*, facilitated *Family ASTRO*, an effort to provide fun and engaging astronomy experiences to families through a national network of museums, science-technology organizations and community-based organizations such as scouts, and now by working at the level of staff at small science centers, museums, astronomy clubs and planetariums. In total, these efforts have focused on building the capacity of the community to support astronomy learning, in school and out of school, for learners of all ages.

**Everyone both a Lifelong Learner *and* Teacher** This example points to another important implication of these ideas. The view from this window suggests that not only is every citizen a lifelong learner, but every citizen is also a lifelong educator! Whether we are 3 or 103 years of age, each of us has much to learn, and each of us has a role in helping others to learn. For years we have been bombarded with rhetoric about a teacher shortage which there may be in the school arena but in actuality if one considers the entire STEM learning infrastructure, the teacher shortage in schools may not be as severe or may be ameliorated somewhat by more creatively tapping into additional teaching resources as some communities have done by allowing business people or retired STEM professionals to serve as educational resources. Of course this approach has professional development implications; one can not just "throw" individuals into classrooms or free-

choice learning settings and expect them to be exemplary educators but it is a way to creatively think out of the box.

## Strategies

**Program and Curriculum Development** These ideas may seem far-fetched and unattainable—I acknowledge that they require major re-thinking--but in my opinion there are some concrete steps that can be taken. First, before creating any STEM program or curriculum in a school or an OST organization (or anywhere for that matter!), I believe it is essential to pull together key stakeholders from the *entire* learning infrastructure (administrators and educators from schools and the free-choice learning sector, business people, parents *and* citizens without children, STEM hobbyists, university faculty in STEM and STEM education, politicians, and so on, appreciating that there are likely overlaps in these categories). Once these stakeholders have been assembled it is important to step back and consider one's ultimate goals for STEM education. Ideally this is done at a community level be that a neighborhood, city, or county (if it gets much larger than this I have found that the process is less successful). Undertaking this approach should include thinking about the education of future STEM professionals, but also the goals for fostering *lifelong* STEM learners (STEM hobbyists, encouraging parents, and scientifically interested and informed citizens to name but a few). Thought also needs to be given to both outcome goals *and* process goals. Until STEM learning is appreciated as an approach and attitude toward life it will primarily enable and result in only short-term goals.

The goal of this process should be to improve the quality of STEM learning, in school and out of school, and foster effective communication among children and youth, their families, and teachers, administrators, informal educators, and community leaders, by:

1) Creating an inclusive and respectful collaborative process that brings teachers from classroom and informal settings, administrators from both settings, parents / guardians and community leaders together in appropriate communities of practice in which to develop a shared vision and set of goals for improving science education in their community;
2) Developing effective research-based leadership and STEM programs for *all* learners, including children and youth, but also classroom teachers; administrators, OST educators, parents/guardians and community leaders, that build new STEM skill sets and grow from the personal interests and needs of the learners involved; and,
3) Documenting and monitoring project progress, in order to refine the model and ensure that goals are accomplished and based on a foundation of rigorous research and evaluation.

Another important step towards creating seamless learning opportunities would be to identify the essential learning goals for each sector during each stage of life that would together form an integrated, holistic system for lifelong learning. As an example, John Falk and I identified the following free-choice learning goals for older children and youth, designed to complement the goals of schooling and work place learning for that age group:

1) To develop and practice lifelong learning skills in real world contexts.
2) To engage in more in-depth study of topics or areas of interest than schooling experiences generally offer.
3) To learn and interact with family and other significant adults in increasingly meaningful ways, modeling adult thinking and social problem solving including acceptance, self-confidence, self-monitoring and team play.
4) To explore and experiment with efforts to be increasingly independent and responsible.
5) To begin to master skills and interests, make initial decisions about the kind of life they hope to pursue and build, and in the process, to develop a sense of self.
6) To find supportive mentors, particularly peers and adults other than parents, who can provide guidance and supervision as youth practice and experiment with lifelong learning skills.

Potential activities for the OST arena, would be developed with these goals in mind and would be organized around youths' interests and needs, tapping into findings from a recent study utilizing data from the National Educational Longitudinal Study of U.S. eighth graders launched in 1988. One question asked was, "What kind of work do you expect to be doing when you are 30?" Robert Tai and colleagues report that among a random sample of 3,359 NELS participants who finished college, those who expected at 13 to have a science career were two times more likely to have graduated with a degree in a life science (29% vs. 18%) and three times more likely to have a degree in the physical sciences/engineering (34% vs. 10%), than those with other career expectations (Tai, et.al, 2006). Interestingly, math achievement, considered a critical filter and a major focus of today's high-stakes testing, was not as strong a predictor. Tai, et. al. conclude that ensuring that children's early exposure to science is positive and that school and OST experiences are connected to their lives and interests is critical to youth being able to envision themselves as future scientists, complementing the "possible selves" literature (Lips, 2004).

One possible example could focus on OST science experiences for middle school age youth. In order for these experiences to be positive and connected to the lives and interests of youth, the experiences could hypothetically be organized around a STEM Interest Ladder, an idea I have been toying with since arriving at OSU. In Grade 6, students could explore a variety of STEM topics in order to gain an overview of the various topics they might pursue. In Grade 7 they would begin focusing their interest on a few self-selected topics and OST activities would support their further exploration of those topics and the connections between them and what they are learning about in their STEM classroom science. They will also interact with adult mentors (scientists, graduate students, community members, parents and other adults) with expertise in these areas. In Grade 8 those youth who have become interested in STEM and have demonstrated perseverance in the area will be able to choose a STEM "major," in which to engage in in-depth learning and study. This can be one of the topics they explored in Grade 7, the

integration of those topics, or can be an entirely new topic. During this year their experiences and the mentors with whom they interact in the after school settings, during Family STEM Nights, and visits to OST settings in their community, will support their in-depth study of this topic with an emphasis on higher education opportunities and careers in the area. For those youth who have become less engaged in a specific topic of science there can be opportunities for more general exploration, as well as integrated experiences or opportunities to pursue other areas of interest.

## Professional development

Ultimately this view of the world suggests a comprehensive approach to STEM learning and education. In order to ensure that such comprehensive STEM education reform is successful, all partners need to understand what is meant by comprehensive reform. Thus in addition to developing skills in STEM content and pedagogy, any such effort needs to develop leadership skills among partners and an understanding of the ways in which the contexts of schools, OST settings, homes, communities and businesses intersect and interact. Cultural competency, parent involvement and partnership skills, as well as an understanding of the role that motivation and interest play in supporting science engagement and learning, are also critical components. Such skill sets are rarely incorporated into professional development programs for teachers in formal or OST settings (Brown, 2004; Westby and Torres-Velasquez, 2000; Falk & Dierking, 2002) and even more rarely considered essential to administrators, business leaders, higher education faculty, and parents and other significant adults involved in educational reform. However, a broad understanding of these domains is a necessary component for a successful comprehensive partnership. By working together to create an effective and comprehensive STEM learning program, an effort like this capitalizes upon the specific expertise and experience of each partner and participant. As suggested earlier, such a STEM learning program can be tailored to interest and engage youth and their families in sustained STEM learning and also meet the needs and interests of the communities involved, as identified by community members, including classroom teachers, administrators, OST educators, parents/guardians and community leaders.

Although this view acknowledges the role of all citizens as learners and educators, it also recognizes and honors the role of professional educators, both classroom teachers and OST educators. Efforts will be made to create professional development opportunities with two goals: to extend and enhance each of these educators' skills in the area of STEM content and pedagogy and to provide a forum within which classroom teachers and OST educators collaborate on the planning of STEM learning experiences bridging OST and classroom learning.

Ideally such professional development would also occur at the pre-service and graduate level of preparation, an approach we are currently undertaking at OSU where colleagues and I are creating a Science and Mathematics Education graduate program (Masters & Ph.D.) which includes concentrations in K-12 teaching, higher education and informal (free-choice) learning. The focus of the program is to prepare the next generation of learning leaders who understand the role of lifelong science and mathematics learning in sustainable communities. All graduate students, regardless of their defined concentration, take four core courses together, interacting and

establishing collegial relationships at the preparation level. Next year we will undertake a similar undergraduate initiative.

## Parent and community involvement

**Parents and Significant Adults** At the core of this view is an important and meaningful role for parents, guardians and other significant adults in children's lives. Unfortunately, much lip service is paid to the importance of parent involvement and yet the barriers to parents truly engaging in their children's learning, particularly in school, are pervasive though subtle, as demonstrated by frameworks such as the ecologies of parental engagement (Barton, Drake, Perez, St. Louis, & George, 2004; Dierking, Storksdieck, Foutz, Haley Goldman, Wadman & Kessler, 2005; McCreedy & Luke, 2005). This is unfortunate because if significant adults better understood how important positive interactions with their infants and young children were, and how to facilitate those interactions, more children would grow up in intellectually stimulating environments. At the present, large segments of the U.S. population grow up deprived, not because of a lack of interest or desire on the part of parents and significant adults, but due to a lack of parental experience and knowledge about how to optimize the learning potential of the home and connect it to their children's school experience. My research and that of others suggests that certainly not all, but many of these adults, can be empowered to better understand their roles and abilities as their children's first and most important educators, rather than feeling that the entire educational role is the responsibility of the schools or cultural institutions. Interestingly, these efforts also demonstrate that these adults enjoy participating in STEM activities and learning about STEM topics themselves. Ideally every significant adult in a child's life would be provided the support necessary to feel like competent educators rather than made to feel inadequate, as is often the case. In addition, every child would not only be a learner, but also a teacher to their parents, rather than erroneously being told and shown daily that only adults have any knowledge worth communicating.

A 5-year longitudinal study of 324 participants of the *Girls at the Center* (*G.A.C)* program, a collaborative effort between the Franklin Institute Science Museum in Philadelphia, PA, and the Girls Scouts of the U.S.A. which provided science experiences for girls and an adult partner (a parent, guardian, or other significant adult) in economically disadvantaged communities across the country, demonstrates the potential for more meaningful collaborative learning (Adelman, Dierking, & Adams, 1999; Dierking, Frankel, McCreedy & Adelman, (2002). Participants attended a series of Discovery Days at their local museum or science center, which included a hands-on workshop and related activities on a particular topic such as 'Electricity' or 'Water.' In addition, there was a full day of other fun activities, such as attending an IMAX film if there was a theatre at the museum and/or having free time to go anywhere in the museum the pair chose. At the culminating event, a Family ScienceFest, girls and their adult partners shared their science experiences with other friends and family members.

Findings suggested that the program provided valuable and much-needed opportunities for girls and adults to engage in positive free-choice science learning experiences, not opportunities that all participating families traditionally engaged in. Participants

responded very favorably to a major strategy of the program – immersing girls and adults in the activities of doing science together – observing, classifying, experimenting, and hypothesizing.

Participating girls found these free-choice learning experiences personally meaningful. Paralleling other studies, many of the girls distinguished what they called "*G.A.C.* science" from "school science," noting that they used to think science was boring and hard, especially in school. These same girls seemed to love *G.A.C.* science, suggesting for example, that it is "fun because you get to build and create things and you don't have to memorize lots of stuff that does not really make sense [to you personally]." Findings also suggested that participating in *G.A.C* not only improved girls' self-reported interest in and attitudes toward science, but also influenced their perceptions of themselves as 'scientists,' as well as their ability to recognize connections between science and everyday life.

However, the program also positively influenced adults who participated. They learned and became engaged in STEM topics and also were much more aware of the importance of science learning for girls and how to support and facilitate such learning, inside and outside of school. These outcomes persisted over time as well. Findings from a series of retrospective investigations at The Children's Museum of Indianapolis focused on the *Great Scientific Adventure Series* and *Y-Press*, two in-depth programs for pre-adolescents and adolescents, reinforce these findings (Luke, Dierking, Cohen Jones & Falk, 2002; Dierking, Andersen, Ellenbogen, Donnelly, Luke & Cunningham, 2005; Luke, Stein, Kessler & Dierking, in press). Data suggested that these two programs had lasting and meaningful impacts on participants (some impacts persisting as long as 6 years), facilitating learning across four broad dimensions – changes in perspective and awareness, social development, interests, and knowledge and skills. The programs not only influenced individual growth, but also had a marked effect on family dynamics and development and long-lasting impacts on adolescents' connections and contributions to their community (Luke, Dierking, Cohen Jones, Wadman, & Falk, 2002). These outcomes are clearly ones that any society would hope any quality education program – inside or outside of school – to facilitate.

**Community Involvement** Taking this view to the extreme, the parent-child relationship is only one facet of the social and cultural contexts of learning. A wealth of research documents that, "it does take a village," and how important mentors and facilitators in the community are in most people's lives as reinforced by the McClure and Rodriguez's review. Sometimes that mentor is a professional educator, but can also be a family member, a friend, an acquaintance, or a co-worker. All of us benefit from the guidance of others when learning and ultimately, none of us can be taught anything, we can only have our learning facilitated by someone willing to share his or her knowledge and experience with us. Many of us are fortunate enough to have found a mentor in our lives, someone who has been willing to help us achieve our potential.. All three educational sectors (schooling, free-choice learning & the work place) should strive to increase the number of mentors and facilitators they support, ultimately trying to help each participant experience the joys of being both a learner and a teacher.

## Issues to Address

This view from another window is complex and of course requires major re-thinking but although it is a challenging task, I do believe it is possible. We will have to break down some traditional, well-entrenched systems but in doing so hopefully we will discover that we have the capacity to truly achieve meaningful educational reform and meet the educational needs of all 21st Century learners. The raw material exists, the know-how exists, and certainly the need and desire exists. What we need now is the leadership and the will to make change happen.

My major concern revolves around equal access to quality schools and speaking from my vantage point, quality free-choice learning experiences. Unfortunately, many if not most of the rapidly proliferating free-choice learning experiences available to the public come at a cost, a cost that significantly limits accessibility geographically, economically and intellectually. Particularly penalized are historically under-served populations such as recent immigrants, the long-term poor, the very young, the very old, those limited by physical or mental disabilities and those living in areas with poor transportation or infrastructure,. Many of the most educationally-oriented free-choice learning institutions, including museums, public television and radio, specialty magazines and even to a degree newspapers and books, have variously been accused of being elitist, a label that is often, unintentionally warranted. This propensity to cater primarily to the affluent, mobile and well educated, is clearly short sighted, since it trades short-term expediency for the long-term security that building a broad, diverse constituency would afford. It also runs counter to the long-term needs of a broadly educated public. I look forward to discussing this issue, and I am sure many others, when we gather together next week.

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