Education toward an Unknown Future

**The Postmodern Era**

In recent decades, Western society has undergone a series of revolutions that have altered reality in many aspects of life. In effect, these revolutions signify the transition of humanity from the modern era to the postmodern era. Aviram (2010), who describes these shifts, notes for instance revolutions in the social, employment, economical, and technological spheres.

The revolution in the social sphere means that familiar social roles are changing. For instance, the distinction between childhood and adulthood, once clear and straightforward, has begun to blur (several sources) as has the distinction between the social roles of men and women (several sources). The structure of the family unit is shifting as well. We are witnessing a transition from the familiar modern family unit consisting of two parents and their children to alternative models such as same-sex and single-parent units. The switching of family units over time has become a legitimate, accepted phenomenon (Agree, 2017; Diekman & Eagly, 2000; Diekman & Goodfriend, 2006; Eagly & Steffen, 1984; Milkie & Peltola, 1999; Prout, 2011; Valentine, 2003; Weller, 2006).

The revolution in the employment sphere affects most working-age individuals. Permanent, life-long professions or jobs were typical of the modern era. This is transitioning to temporary jobs, several simultaneous jobs, or the change of professions once or several times throughout one’s life (Berger, 2002; Bradley & Devadason, 2008; Pew Research Center, 2010; Reisenwitz & Iyer, 2009).

In terms of the economy, we are witnessing a shift from a local economy to a global economy and trade. We are now able to purchase many products via computers or smartphones, regardless of their manufacturing or distribution location, and have them promptly delivered to our homes. Manufacturers and distributers are now able to sell their products around the world using online sales platforms (Jiang, Yang, & Jun, 2013; Kraemer, Gibbs, & Dedrick, 2005; Ranganathan & Ganapathy, 2002; Savrul, Incekara, & Sener, 2014).

Other revolutions affect additional spheres of our lives, but the primary revolution of our time is technological. Computers, smartphones, and the Internet are accessible nearly everywhere today. They have completely changed the way we conduct our daily lives, create and consume information, communicate, work, care for our health, learn, teach, and more (Fettweis & Alamouti, 2014; Higgins, 2016; McNaughton & Light, 2013; Vázquez-Cano, 2014; White, 2010).

**The Education Crisis**

The education system was developed in the modern world and as such, reflects its characteristic outlooks and goals in terms of educational content, teaching, learning, and evaluation methods. This modern education system isbeing challenged by the task of teaching and educating students in the postmodern era. Much of what is taught in today’s education system is irrelevant to the daily lives of students (Barmby, Kind, & Jones, 2008; Broadfoot, 2000; Johnson, 2000; Macdonald, 2003). Teaching methods are no longer relevant to the ways in which individuals live and work in the postmodern era (Kellner, 2000; O'Neal, Gibson, & Cotten, 2017; Postman, 2009). The authority of teachers, which use to stem from their position as sources of knowledge, has been severely undermined (Cook-Sather, 2002; McGregor, 2011; Zhang, 2008) since knowledge is now accessible to anyone, anywhere through technology. In some cases, particularly when it comes to knowledge of technology itself, students are actually the ones who possess the relevant knowledge (Hicks, 2011; Joo, 1999; Prensky, 2005).

**Dissatisfaction and the Search for Internal and External Alternatives**

These phenomena, and the lack of compatibility between the public education system and the postmodern era, have led to dissatisfaction and criticism among various stakeholders including policy makers, educators, parents, and students. In some cases, this dissatisfaction does not lead to action, while in others it drives stakeholders to seek alternatives to the education system. Some of these alternatives exist within the conventional education system. For example, there are schools with a specific agenda like democratic schools, communal schools, and others. Some alternatives exist outside of the public education system, such as private schools or schools founded by parents.

One of the interesting alternatives outside of the public education system is home schooling. A growing number of parents in Western countries are choosing not to send their children to school and educating them at home instead. These parents choose home schooling for a variety of reasons, one of which is growing discontent with the education system and its lack of compatibility with current reality (Bauman, 2002; Boschee & Boschee, 2011; Collom, 2005; Isenberg, 2007; Princiotta & Bielick, 2006). These parents attempt to find an educational solution outside of the conventional education system that can solve some of the problems characterizing today’s system. Home schooling certainly mitigates certain byproducts of the education crisis, such as violence in schools or the decline in teachers’ authority. However, parents who choose home schooling are also attempting to address issues such as relevant content in the context of contemporary reality, as well as relevant teaching, learning, and evaluation methods.

**21st Century Skills**

As mentioned, many people claim that schools today do not educate in a manner suitable to contemporary reality. As education is a future-oriented action, many alternatives that attempt resolve the education crisis share a common goal: preparing young individuals to function optimally not only in contemporary reality, but in the future as well. This issue is addressed by various bodies and scholars. One approach, widely accepted among professionals in this field, holds that young students in today’s schools will require a set of skills and capacities called “21st century skills.” Scholars have generated varying lists describing these skills and some have divided them into categories of skills (Binkley et al., 2012; Jenkins, Purushotma, Weigel, Clinton, & Robison, 2009; Rotherham & Willingham, 2009; Wagner, 2008).

Here, we will present one categorization of these skills, which was developed by the Partnership for 21st Century Skills (2009). In this instance, skills and capacities were divided into four main groups. The first group, titled “Teaching and Innovation,” includes skills such as creativity, inventiveness, creative thinking, critical thinking, systemic thinking, judgement, and decision-making. In the second group, “Information, Media, and Technology,” are skills such as accessing information, evaluating information, using and managing information, creating information, communicating, and using technological tools. In the third group, “Life and Career,” are skills such as adapting to new situations, flexibility in thought and action, initiative, self-direction, time and goals management, learning and working independently, responsibility, leadership, and social skills. The fourth group, “Core Subjects,” includes literacy in language, global awareness, science, arts, history, environmental awareness etc..

**Future Studies**

It is interesting to note that the skills required for optimal function in the mid-20th century were entirely different from those necessary in the 21st century. Accordingly, it is likely that the skills needed for optimal function in the early 21st century are at least somewhat different from those that the mid-21st century will require. It is therefore only appropriate to title the above-mentioned skills “early 21st century skills” rather than “21st century skills.” There is clearly no way of knowing which skills students entering the education system today will need for optimal function in the mid-21st century.

Parents and educators interested in preparing youth for optimal functioning in the mid-21st century must try to predict the nature of this future reality. Indeed, many attempts are now being made to use scientific tools to generate probable forecasts regarding future trends. The field focused on examining future trends, referred to as “future studies,” is gaining momentum. Experts in this field use different tools to predict developments in many domains and effectively try to determine what the future will be like. Some of these tools are based on insights, such as the Delphi survey, which is designed to establish a common conclusion between experts using anonymous interaction regarding forecasts of the future. Another is the “wisdom of the crowd” method, which aggregates information from a large number of non-expert individuals. Other forecasting tools rely on complex mathematical and probability models generated by supercomputers (Passig, 2008; 2013).

Regardless of the forecasting tools being used to predict future patterns, one thing has been clear since the time of Socrates, who said, “Any discussion of what will be is neither truth nor lie, but merely prophecy…” This means that unlike the present and past, the future has no truth-value.

As it is unclear which capacities young individuals will need in the mid-21st century, educators are faced with a difficult dilemma. How can one educate for the future when the future is unknown, and the pace of change in the present is more accelerated than ever?

Is it possible that current attempts to understand which skills will be necessary decades from now have been unsuccessful, and we are in fact trying to impart irrelevant skill sets to the younger generations? Of course, this question can only be answered when the future becomes present or past, lending this process its truth-value. However, there may be skills or attributes that, despite this uncertainty, can be reasonably assumed to have significant value in the future as well.

**Learning from the Life Sciences**

To attempt answering these questions, we will refer to another field that is not directly related to education – the life sciences. In the life sciences, especially evolution and ecology, it is customary to categorize organisms by using a theoretical framework based on two main types of survival, sustenance, and development strategies: specialist and generalist. The common assumption is that specialist organisms thrive in a restricted habitat and are limited in their ability to live in different, more diverse habitats. Another common assumption is that specialist species rely on a limited range of resources in general and foods in particular. Generalist species are able to live in different, changing habitats and are not limited to one specific environment. They can utilize and consume a wide range of foods and resources (Fuller, 2002; Futuyma & Gabriel, 1988; Hutchinson, 1957; Kassen, 2002).

Many studies have examined the survival, sustenance, and development strategies of species using this theoretical framework. Among other things, these studies strive to understand the respective conditions in which each strategy is preferable. Generally, they suggest that when conditions are known, permanent, and stable, specialist organisms have the advantage, but when conditions are changing, specialists have a difficult time adapting and might even become extinct, while generalist organisms survive and thrive. For instance, studies show, partly through archeological findings, that in periods of environmental change throughout history, such as climate change, specialist organisms became extinct while generalists survived and replaced the extinct specialists (Clavel, Julliard, & Devictor, 2011).

It is important to understand that the primary distinguishing characteristic between specialists and generalists is flexibility. Generalist organisms possess a great degree of flexibility that enables them to adapt to shifting environmental circumstances. A lack of flexibility among specialist organisms prevents them from adapting their behavior, leading to their extinction when conditions change. This means that survival, development, and prosperity in an environment with unpredictable, changing conditions demands flexibility. This flexibility hinges on two conditions. The first is a behavioral repertoire from which one can choose, rather than a single mode of behavior. The second is the ability to adapt one’s behavior, using the aforementioned repertoire, to a specific environment or to certain conditions. It is important to remember that the behavioral repertoire of many organisms is inborn, as is their level of behavioral adaptability to the environment and certain conditions. They must therefore select behaviors from their inborn, available behavioral repertoires that are most suitable to a given condition.

**Educating for the Future and the Lesson Learned from Millions of Years of Evolution**

Thus, evolution teaches us that flexibility based on an inborn repertoire of behaviors and the ability to adapt these behaviors to environmental conditions, is vital to survival, development, and prosperity under changing and unpredictable conditions. Can this lesson, gleaned over millions of years of evolutionary processes, help us answer the question at the crux of this article: how can we educate toward an unknown future?

The answer is implied by the fact that educating individuals for optimal function in an unknown future demands flexibility as well. Such flexibility stems from possessing a repertoire of behaviors and the ability to selectively adapt them to one’s environment. Human beings, too, have many inborn behavioral modes, but unlike many other organisms, a considerable amount of human behavior is learned, particularly during childhood. This is where learning processes enter the picture. Expanding the repertoire of human behaviors from inborn behaviors to a repertoire that includes not only inborn behaviors, but also learned behaviors occurs primarily through educational processes. Learning enables an individual to develop new behaviors and hone their ability to adapt these to certain environments.

In order to impart flexibility to young people, or in other words to help them develop a rich behavioral repertoire and the ability to adapt behaviors to the environment, it is necessary to teach them how to learn. This means fostering their capacity to be independent learners. An independent learner is able to self-guide their learning processes. They can therefore delineate their learning goals, make a plan to meet these goals, act to complete the plan, and gain conclusions for the future based on the outcomes of their actions. In other words, in order for young individuals to embody flexibility, they must develop the attributes of independent learners. Independent learning skills will enable them to gain the necessary knowledge for developing new behaviors and for adapting these behaviors to a given environment.

Figure 1 illustrates the similarities and differences between evolution and education in terms of flexibility and learning. From the evolutionary perspective, the primary goal is to survive, develop, and thrive in unfamiliar environmental conditions. The tool by which this is accomplished is flexibility, based on an inborn behavioral repertoire and an inborn ability to adapt behaviors to a given environment. An animal possessing this type of flexibility is a generalist animal. From an educational perspective, the primary goal is educating young individuals for optimal function in an unknown future. The tool is flexibility based on an inborn as well as learned behavioral repertoire, and an inborn as well as learned ability to adapt behaviors to different environments. Individuals possessing this type of flexibility are in fact independent learners.

The significance of independence in the learning process stems from the fact that the future context and conditions of learning processes is unknown. Therefore it is necessary to ensure that individuals can learn independently, without relying on external guidance.

In summary, we can conclude that observing processes of adaptation to various environments over millions of years can lend an important and interesting perspective when considering the skills that might be necessary to individuals in the future.

This perspective indicates that among the range of important skills and capacities included in “21st century skills,” flexibility should be emphasized. In order to cultivate flexibility, it is important to impart independent learning skills to young learners. These skills will allow for flexibility (a rich behavioral repertoire and the ability to adapt behaviors to the environment), which, in turn, can enable successful coping with changing, unfamiliar conditions.

Educational systems that decide to incorporate significant learning processes that develop flexibility by cultivating independent learners, will in effect be educating for an unknown future and working to train their graduates for optimal function in such a future.

References

 Agree, E. M. (2017). Social changes in women's roles, families, and generational ties. *Generations, 41*(2), 63-70.

Aviram, R. (2010). *Navigating through the storm: Reinventing education for postmodern democracies*. Rotterdam, The Netherlands: Sense Publishers.

Barmby, P., Kind, P. M., & Jones, K. (2008). Examining changing attitudes in secondary school science. *International Journal of Science Education*, *30*(8), 1075-1093.

Bauman, K. J. (2002). Home schooling in the United States. *Education Policy Analysis Archives*, *10*, 26.

Berger, V. (2002). Employment mediation in the twenty-first century: Challenges in a changing environment. *University of Pennsylvania Journal of Labor & Employment Law*, 5, 487.

Binkley, M., Erstad, O., Herman, J., Raizen, S., Ripley, M., Miller-Ricci, M., & Rumble, M. (2012). Defining twenty-first century skills. In *Assessment and teaching of 21st century skills* (pp. 17-66). Springer, Dordrecht.

Boschee, B. F., & Boschee, F. (2011). A profile of homeschooling in South Dakota. *Journal of School Choice*, *5*(3), 281-299.

Bradley, H., & Devadason, R. (2008). Fractured transitions: Young adults’ pathways into contemporary labour markets. *Sociology, 42*(1), 119-136.

Broadfoot, P. (2000). Comparative education for the 21st century: Retrospect and prospect. *Comparative Education*, *36*(3), 357-371.

Clavel, J., Julliard, R., & Devictor, V. (2011). Worldwide decline of specialist species: toward a global functional homogenization?. *Frontiers in Ecology and the Environment*, *9*(4), 222-228.

Collom, E. (2005). The ins and outs of homeschooling: The determinants of parental motivations and student achievement. *Education and Urban Society*, *37*(3), 307-335.

Cook-Sather, A. (2002). Authorizing students’ perspectives: Toward trust, dialogue, and change in education. *Educational Researcher*, *31*(4), 3-14.

Diekman, A. B., & Eagly, A. H. (2000). Stereotypes as dynamic constructs: Women and men of the past, present, and future. *Personality and Social Psychology Bulletin, 26*(10), 1171-1188.

Diekman, A. B., & Goodfriend, W. (2006). Rolling with the changes: A role congruity perspective on gender norms. *Psychology of Women Quarterly, 30*(4), 369-383.

Eagly, A. H., & Steffen, V. J. (1984). Gender stereotypes stem from the distribution of women and men into social roles. *Journal of Personality and Social Psychology, 46*(4), 735-754.

Fettweis, G., & Alamouti, S. (2014). 5G: Personal mobile internet beyond what cellular did to telephony. *IEEE Communications Magazine, 52*(2), 140-145.

Fuller, R. J. (Ed.). (2012). *Birds and habitat: Relationships in changing landscapes*. Cambridge University Press.

Futuyma, D. J., & Moreno, G. (1988). The evolution of ecological specialization. *Annual Review of Ecology and Systematics* 19(1), 207-233.

Hicks, S. D. (2011). Technology in today’s classroom: Are you a tech-savvy teacher?. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, *84*(5), 188-191.

Higgins, J. P. (2016). Smartphone applications for patients’ health and fitness. *The American Journal of Medicine, 129*(1), 11-19.

Hutchinson GE. 1957. Concluding remarks. *Cold Spring Harbor Symposium on Quantitative Biology,* *22*, 415–27.

Isenberg, E. J. (2007). What have we learned about homeschooling?. *Peabody Journal of Education*, *82*(2-3), 387-409.

Jenkins, H., Purushotma, R., Weigel, M., Clinton, K., & Robison, A. J. (2009). *Confronting the challenges of participatory culture: Media education for the 21st century*. Cambridge, MA: MIT Press.

Jiang, L., Yang, Z., & Jun, M. (2013). Measuring consumer perceptions of online shopping convenience. *Journal of Service Management, 24*(2), 191-214.

Johnson, L. S. (2000). The relevance of school to career: A study in student awareness. *Journal of Career Development*, *26*(4), 263-276.

Joo, J. E. (1999). Cultural issues of the Internet in classrooms. *British Journal of Educational Technology*, *30*(3), 245-250.

Kassen, R. (2002). The experimental evolution of specialists, generalists, and the maintenance of diversity. *Journal of Evolutionary Biology*, *15*(2), 173-190.

Kellner, D. (2000). New technologies/new literacies: Reconstructing education for the new millennium. *Teaching Education*, *11*(3), 245-265.

Kraemer, K. L., Gibbs, J., & Dedrick, J. (2005). Impacts of globalization on e-commerce use and firm performance: A cross-country investigation. *The Information Society, 21*(5), 323-340.

Macdonald, D. (2003). Curriculum change and the post-modern world: Is the school curriculum-reform movement an anachronism?. *Journal of Curriculum Studies*, *35*(2), 139-149.

McGregor, G. (2011). Engaging Gen Y in schooling: The need for an egalitarian ethos of education. *Pedagogy, Culture & Society*, *19*(1), 1-20.

McNaughton, D., & Light, J. (2013). The iPad and mobile technology revolution: Benefits and challenges for individuals who require augmentative and alternative communication. *Augmentative and Alternative Communication, 29*(2), 107-116, doi: [10.3109/07434618.2013.784930](https://doi.org/10.3109/07434618.2013.784930)

McTavish, M. (2009). I get my facts from the Internet?: A case study of the teaching and learning of information literacy in in-school and out-of-school contexts. *Journal of Early Childhood Literacy*, *9*(1), 3-28.

Milkie, M. A., & Peltola, P. (1999). Playing all the roles: Gender and the work-family balancing act. *Journal of Marriage and the Family*, *61*(2), 476-490.

O'Neal, L. J., Gibson, P., & Cotten, S. R. (2017). Elementary school teachers’ beliefs about the role of technology in 21st-century teaching and learning. *Computers in the Schools*, *34*(3), 192-206.

Partnership for the 21st Century Skills. (2009). *Framework for the 21st century learning.* Retrieved from www21scenturyskills.org

Passig, D. (2008). *The future code.* Tel Aviv: Yedioth Ahronoth (Hebrew).

Passig, D. (2013). *Twenty Forty-Eight.* Tel Aviv: Yedioth Ahronoth (Hebrew).

Pew Research Center. (2010). *Millennials: A portrait of generation next*. Washington, DC: Retrieved from <http://pewresearch.org/millennials/>

Postman, N. (2009). *Teaching as a subversive activity: A no-holds-barred assault on outdated teaching methods-with dramatic and practical proposals on how education can be made relevant to today's world*. Delta Publishing.

Prensky, M. (2005). Listen to the natives. *Educational Leadership*, *63*(4), 8-13.

Princiotta, D., & Bielick, S. (2006). *Homeschooling in the United States: 2003. Statistical analysis report. NCES 2006-042*. Washington, DC: National Center for Education Statistics.

Prout, A. (2011). Taking a step away from modernity: Reconsidering the new sociology of childhood. *Global Studies of Childhood, 1*(1), 4-14.

Ranganathan, C., & Ganapathy, S. (2002). Key dimensions of business-to-consumer web sites. *Information & Management, 39*(6), 457-465.

Reisenwitz, T. H., & Iyer, R. (2009). Differences in Generation X and Generation Y: Implications for the organization and marketers. *Marketing Management Journal, 19*(2), 91-103.

Rotherham, A. J., & Willingham, D. (2009). 21st century. *Educational Leadership*, *67*(1), 16-21.

Savrul, M., Incekara, A., & Sener, S. (2014). The potential of e-commerce for SMEs in a globalizing business environment. *Procedia-Social and Behavioral Sciences*, *150*, 35-45.

Valentine, G. (2003). Boundary crossings: Transitions from childhood to adulthood. *Children's Geographies, 1*(1), 37-52.

Vázquez-Cano, E. (2014). Mobile distance learning with smartphones and apps in higher education. *Educational Sciences: Theory and Practice, 14*(4), 1505-1520.

Wagner, T. (2008). Rigor redefined: Even our “best” schools are failing to prepare students for 21st-century careers and citizenship. *Educational Leadership, 66*(2), 20-24.

Weller, S. (2006). Situating (young) teenagers in geographies of children and youth. *Children's Geographies, 4*(1), 97-108.

White, M. (2010). Information anywhere, any when: The role of the smartphone. *Business Information Review, 27*(4), 242-247.

Zhang, W. (2008). Conceptions of lifelong learning in Confucian culture: Their impact on adult learners. *International Journal of Lifelong Education*, *27*(5), 551-557.

Figure 1Flexibility un Evolution and in Education

**EVOLUTION**

**EDUCATION**

The Skill:

**Independent learning**

**The Goal:**

To function optimally in an unknown future

**The Processes:**

Flexibility

Mostly Inborn behavioral repertoire

Mostly Inborn ability to adapt behaviors to environmental conditions

**The Processes:**

Flexibility

Inborn **and learned** behavioral repertoire

Inborn **and learned** ability to adapt behaviors to environmental conditions

**The Goal:**

To survive, develop and thrive in unfamiliar environmental conditions