Educating for the Future – 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 well as the distinction between the social roles of men and women (several sources). The structure of the family unit is shifting as well, as we witness 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, and the switching of family units overtime as a legitimate, accepted phenomenon (Prout, 2011 ; Valentine, 2003 ; Weller, 2006; Agree, 2017 ; Diekman & Eagly, 2000 ; Diekman & Goodfriend, 2006 ; Eagly & Steffen, 1984 ; Milkie & Peltola, 1999).

The revolution we are witnessing in the employment sphere affects most working-age individuals. This revolution is characterized by a transition from permanent, life-long professions or jobs, typical of the modern era, to temporary jobs or several simultaneous jobs, as well as the exchange of one profession for another 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 local economy to global economy and trade. We are now able to purchase different products via computers or smartphones, regardless of their manufacturing or distribution location, and have them promptly delivered to our homes. This also applies to manufacturers or distributers who 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 the technological revolution. Computers, smartphones, and the internet, accessible nearly everywhere today, have completely changed the way we conduct our daily lives, create and consume information, communicate with others, 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, which developed in the modern world and reflects its characteristic outlooks and goals in terms of educational content, teaching, learning, and evaluation methods, is 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), and 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 stems from their position as sources of knowledge, has been somewhat undermined (Cook-Sather, 2002 ; McGregor, 2011 ; Zhang, 2008) as knowledge is now accessible to anyone, anywhere through technology. In some cases, particularly when it comes to knowledge of technology itself, students are actually those who possess the relevant knowledge (Joo, 1999 ; Hicks, 2011 ; Prensky, 2005).

Dissatisfaction – The Search for Alternatives – Internally / Externally

This range of phenomena, and the lack of compatibility between the public education system and the postmodern era, have led to dissatisfaction and criticism among different 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 (such as schools with a specific agenda like democratic schools, communal schools, and others), and some outside of it (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 various 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 this system today. Home schooling certainly mitigates certain byproducts of the education crisis (such as violence in schools or the decline in teachers' authority), but 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 aforementioned, many claim that schools today do not educate in a manner suitable to contemporary reality. However, even if we accept this claim, adjusting the education system to suite current reality does not suffice. As education is a future-oriented action, many alternatives that attempt resolve the education crisis share a common goal: preparing young individuals for optimal function not only in contemporary reality, but in the future as well. This issue is addressed by various bodies and scholars. One approach to it, widely accepted among professionals in this field, holds that young students in today's schools require a set of skills and capacities called "21st century skills." Different scholars have generated varying lists describing these skills and have even divided them into groups using various methods (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 conducted 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 and inventiveness, creative thinking, critical thinking, systemic thinking, judgement, and decision-making. In the second group, titled "Information, Media, and Technology," are skills such as accessing and evaluating information, using and managing information, creating media, communicating with others, and using technological tools. In the third group, titled "Life and Career," are skills such as adapting to new situations, flexibility in thought and action, initiative and self-direction, time and goals management, learning and working independently, responsibility, leadership, and social skills. The fourth group, titled "Core Subjects," includes language, global awareness, mastery of science, arts, history, government, and civics, as well as economic, civic, and environmental literacy.

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 today, in the 21st century. Accordingly, it is likely that the skills needed for maximal function today, 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," as there is clearly no way of knowing which skills youngsters entering into the education system today will need for optimal function in the mid-21st century.

Parents and educators interested in preparing youngsters for optimal function in the mid-21st century must try to predict the nature of this future reality, and indeed, many attempts are now being made to use different scientific tools in order to generate probable forecasts regarding future trends.

The field focused on examining future trends, referred to as "future studies," is gaining increasing momentum. Experts in this field use different tools in order to predict developments in many different 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 different experts (using anonymous interaction) regarding forecasts of the future, or the 'wisdom of the crowds' method, which aggregates information from a large number of non-expert individuals. Other forecasting tools rely on complex mathematical and probabilistic models and 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…" meaning 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 in question becomes present or past, lending this process its truth-value. However, are there 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 the above question in the current article, we will refer to another field that is not directly related to education – the life sciences. In the different fields of life sciences, especially evolution and ecology, it is customary to categorize different organisms (animals and plants) partly 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 specific foods in particular, unable to consume a variety of foods. Generalist species are able to live in different, changing habitats and are not limited to one specific environment. They can also utilize different resources and consume a wide range of foods (Hutchinson, 1957; Kassen, 2002; Fuller, 2002; Futuyma & Gabriel, 1988).

Many studies have examined the survival, sustenance, and development strategies of different 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 alternating, specialists have a difficult time adapting and 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, while a lack of flexibility among specialist organisms prevents them from adapting their behavior, leading to their extinction when conditions change. Meaning, 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), and the second is the ability to match 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, the evolutionary lesson teaches us that flexibility based on an inborn repertoire of behaviors and the ability to match these behaviors to environmental conditions, is vital to survival, development, and prosperity under changing and unpredictable conditions. How 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 match them to one's environment. Human beings, too, have many inborn behavioral modes, but unlike many of the organisms that have lived on earth, 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 learned behaviors occurs primarily through educational processes. Learning enables an individual to develop new behaviors and hone their ability to match these to certain environments.

In order to impart flexibility to young people (to develop in them a rich behavioral repertoire and the ability to match behaviors to the environment) it is necessary to teach them how to learn, meaning, to foster 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 matching these behaviors to a given environment.

Table 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 match 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 necessary tool is flexibility based on an inborn behavioral repertoire, and an inborn as well as learned ability to match 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, and it is therefore 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 a unique, 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, and that 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 match 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 within it.

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**תרשים מספר 1**

**אבולוציה**

**חינוך**

האמצעי:

גמישות

- רפרטואר התנהגויות מולד ברובו

- התאמה מולדת ברובה של התנהגויות לסביבה

מיומנות:

**לומד עצמאי**

האמצעי:

**גמישות**

רפרטואר התנהגויות מולד **ונלמד**

- התאמה מולדת **ונלמדת** של התנהגויות לסביבה

המטרה:

תפקוד מיטבי בעתיד לא ידוע

המטרה:

לשרוד, להתפתח ולשגשג בתנאי סביבה משתנים