

INNOVATION AS THE KEY TO IMPROVEMENT IN HEALTHCARE AND EDUCATION

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Abstract

In this paper we review the principles of incorporation innovation into government-led, public systems such as the Israeli healthcare system and the Israeli education system. We suggest some recommendations regarding the benefits of introducing innovation, the “dos and don’ts” of incorporating innovation, and some metrics that can be used to monitor the progress of this process, with focus on digital technology, artificial intelligence, and big data as common themes in both fields.

Keywords: *innovation, entrepreneurship, digital tools, big data, artificial intelligence*

JEL Classification: *I10, I15, I18, I20, I23, I25*

Introduction and Literature Review

The modern world has been described as volatile, uncertain, complex, and ambiguous (VUCA) [Bennet & Lemoine, 2014]. Disruptive innovation, where processes are redesigned to increase effectiveness and efficiency, while allowing

workers to participate in the redesign processes, are the key to interventions for improving the quality of healthcare and education.

Innovation can be defined as creating or adding value through a ground-breaking idea which is exceptional in its originality and is being implemented or planned to be implemented. The main goals of innovation are to increase effectiveness and efficiency of resources, processes, activities, function, throughputs, results, achievements, and influences through a significant improvement of what exists, a solution to a problem or need, suggesting new value for an existing need, or suggesting new growth engines. Innovation could either be revolutionary or evolutionary. Revolutionary innovation is radical, courageous, and ground-breaking. Disruptive innovation creates a new market and turns complex and expensive products or services into simple and cost-effective ones. Evolutionary innovation is incremental; it improves the existing services and makes them more efficient [Civil Service Commission, 2020]. De Bono's "six thinking hats" method [De Bono, 1985] improves decision-making processes using team discussion based on role-playing: Each participant uses a different thinking: objective, emotional, critical, positive, and creative thinking, as well as meta-thinking. Other tools include Abazov's five ways to improve creative thinking [Abazov, 2015], hackathons, creating "innovation networks", innovation hubs, and accelerator programs [Civil Service Commission, 2020].

In every organization that strives to introduce innovation, entrepreneurship should be facilitated by establishing an infrastructure for innovation, with a clear vision for innovation, intra-organizational marketing, building methodologies, tools and processes, and workers' capabilities. An organizational culture of innovation should be established, and a framework for promoting innovative ideas should be set.

Resistance to change should be dealt with. People are often resistant to change because of preferences for a stable working environment and fear of the unknown. Fear of failure, lack of understanding regarding the need for change, lack of awareness to the initiatives of competitors, and lack of technological knowledge, as well as budgetary limitations and lack of resources, are all potential barriers to innovation.

Ways to overcome barriers include "selling" of change to opponents, with stress on potential gains to the organization and to individual stakeholders, involving workers in change processes, sensitivity and empathy to workers' feelings, fear and anxiety, empowerment of staff and support, and moving in small steps, rather than making giant leaps forward [Itzhakov, 2017].

Innovation in the Israeli Healthcare System

Innovation in healthcare, including better use of information technology, online communication between patients and clinicians, innovative tools to decrease bureaucracy within the healthcare system and innovative redesign of processes – are all underdeveloped. While most domains described so far heavily utilize a variety of computerized reports, there is little use of information technology to *fix* problems such as real-time alerts, decision-support tools, and integrating data from multiple sources for managers to act upon. Clinicians have no training in innovative redesign of processes, even though these could be valuable tools to improve processes. In general, the topic of innovation is not central to most Israeli hospitals.

A major part of incorporating innovation in the Israeli health care system is through digital health. Digital health has been shown to improve effectiveness, equity, patient-centered care, access to healthcare, efficient use of resources and patient safety, through improving health behavior, enhancing clinical assessment, increasing patient adherence and engagement and better care coordination. The most frequently reviewed tools include mobile apps and telemedicine, followed by text messages and wearable devices [Ibrahim et al., 2022]. The main domains of digital health currently employed in Israel are listed in Figure 1.

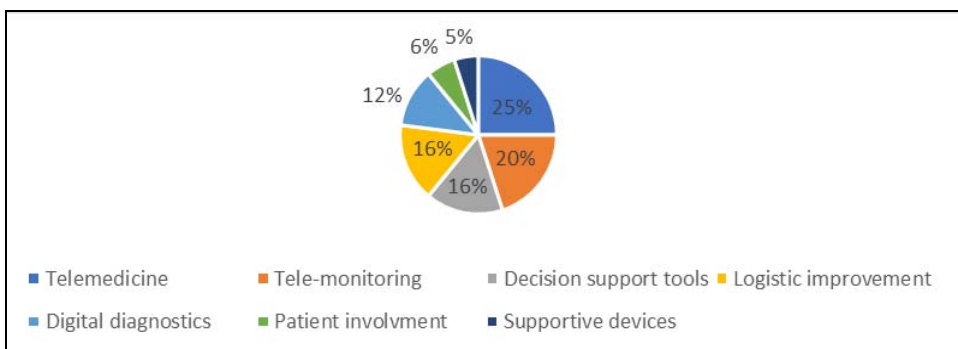


Figure 1. Digital health in Israel [redrawn from Israel Innovation Authority, 2019]

Incorporating digital health into the Israeli healthcare system could save up to 1.1 billion \$ annually, and could increase the annual economic growth by 9 billion \$, mostly from developing hospital-at-the-home, telemedicine, decrease workdays

lost, decreasing multiple unneeded medical tests, decreasing medication errors, increasing adherence to medications, etc. [Deloitte, 2016].

One of the major opportunities will be to move towards using FHIR (Fast Healthcare Interoperability Resources) standard, which will allow different healthcare organizations to access, share, and incorporate data from different information systems, to facilitate medical care, research, and the industry. Another solution is to give the responsibility for the information to the patient, who will decide about data sharing for individual care, commercial, investigational, and medical uses. This could facilitate the use of big data and artificial intelligence (AI) [Ministry of Health. 2022]

To introduce innovation into Israeli hospitals, department-level development teams should work with various stakeholders to solve burning issues and future scenarios and suggest solutions and modes of action. De Bono's model should be used to allow different points of view. Workers should be encouraged and rewarded for creative ideas. A trust-based non-judgmental infrastructure will allow workers to share their ideas, successes, and challenges. Cross-sectoral, diverse team meetings can facilitate this process. The workers' unions should be partners in this process. An example is telemedicine, which can save manpower and overhead, allows flexibility of service hour and better patient experience. The "user's journey" should be defined for patients and workers alike. The different needs of the diverse patient population served by a typical hospital should all be addressed. The patient should be made aware of the added value of the hospital. This will allow better throughput and income for the hospital. Culturally diverse populations' needs (e.g., those of Arab Bedouins, ultra-orthodox Jews, Ethiopian immigrants, Holocaust survivors and a variety of communities) should be addressed. Collaboration with local authorities should be established. For example, lectures and meetings regarding physical and mental health, with experts that will offer participant health information and applicable advice. This could improve the public image of the hospital. Topics suitable for such meetings could include obesity, domestic violence, healthy lifestyle, and mental health. The educational system and local factories could be involved. For example, initiating "health days" in large factories and establishing a workers' health promotion program for the plant. The hospital's clients, workers and suppliers, their needs and interfaces that need to be created between these three groups should be mapped and addressed with a stress on flexibility and agility. Dyer's model [Dyer et al., 1985] should be used to encourage innovation. This model stresses the need to develop several capabilities including observing, associating ideas from different domains,

experimenting, questioning, and networking. Collaboration between and within hospitals should be encouraged.

The hospitals' strategic goals should be delivered to all workers, who should be familiar with them. Future scenarios (e.g., a competitor hospital is about to be opened in the vicinity of the hospital) should be discussed with all workers, with ideas flowing from all levels.

Workers should be trained in innovation, and then ideas should be suggested for current and future challenges, those that should be implemented at the local level and those that can be copied to other hospitals, even in the future or for different health systems. Scalable tools should be developed: for example, let's assume patients with limited mobility are identified in the orthopedic surgery department and a solution is made for them – a designated nurse aid to help with mobility. This could be scaled up to other departments and health organizations.

Innovation in the Israeli Education System

Our world is characterized by technological changes that affect every area of our daily life. In its efforts to train school students for the future world of employment, the education system is required to harness technology that will help students develop the digital skills they will need in order to succeed. Students must acquire learning skills and learn how to work with each other, be active partners in the learning process and use various investigative and creative technologies. Israel is home to various educational initiatives that develop innovative technologies that seek to improve the quality of school education and learning and make them accessible to all. In addition to the technological challenges, companies in this field face the need to find investors and make their products profitable [Blonder et al., 2022; Joyti & Sutherland, 2020].

"The Innovation Authority attaches great importance to impact investments that are made with the aim of creating a measurable social or environmental return alongside a financial return," says Patricia Lahi-Engel, Senior Director of Social R&D at the Innovation Authority. "These investments provide capital that is used to create solutions to social or environmental challenges such as energy renewable, sustainable agriculture, access to basic services including health, education and affordable housing." The Innovation Authority operates several programs aimed at dealing with public and social challenges, such as the joint Israel-digital innovation program Govtech (digital government) which encourages and assists entrepreneurs and corporations offering innovative technological solutions for the public sector.

Challenges in the fields of education, health, welfare, economy, law, local government, and others [Israel Innovation Authority. 2021].

Innovative tools for teaching and improving digital literacy have a positive effect on the education system and prepare students for the ever-changing world of employment.

The quality of teaching and innovation in the field of teaching preoccupy the higher education system in Israel and in the whole world. As part of dealing with these issues, the question of the potential in implementing use comes up repeatedly daily in new technologies to bring innovation in the methods of knowledge transfer in the academy [Blonder et al., 2022].

In recent years, the use of modern technologies has become a central component of people's daily lives. Today young people, including students, manage a large part of their lives through technological "end devices" (such as: smart phones, laptops, and tablets.) These devices accompany the student during most hours of the day, during the lessons and during learning outside the classroom. Considering this situation, leading institutions in the world (MIT as a prominent example) began to emphasize the importance of implementing modern teaching technologies in the teaching and learning process at the academy, and these change the structure of the traditional lessons and even the evaluation methods that were used in the past [Bates, 2015].

The assimilation of modern teaching technologies in academic studies is of great importance for several reasons:

1. Using advanced teaching technologies can help make the higher education system more accessible, and to respond to students with different needs, including students with learning disabilities, students with physical and mental disabilities, and students with language difficulties.

2. Use of modern teaching technologies encourages meaningful and more productive learning

Among the students, a deeper understanding and strengthening of skills such as: mental flexibility, reflectiveness, and social skills.

3. The changes in access to information have led to a change in the requirements and expectations of the world of employment from academics. Companies and businesses these days are looking for graduates who can handle a lot of information. Undergraduate studies are an important step in training to analyze it and extract new information from it. The younger generation of workers in Israel. The exposure of this generation to modern teaching technologies can

contribute to the knowledge and ability of the graduates to deal with the technological changes that characterize the world today.

4. The assimilation of modern teaching technologies can help to deal with the growing need of the employees continue the process of learning and acquiring professional tools that change throughout their career, which today is characterized by multiple shifts, and not once even in "re-creation" of entire professional fields to which the employee needs to adapt.

Use of technologies providing these tools will help develop a lifelong learning system that can be integrated into the daily life of the working person. Using teaching technologies to improve teaching in the academy the use of modern teaching technologies can be done at different stages of the teaching procedure: during the lessons, in preparation for the lessons, and within the students' independent learning process.

Here are some examples of the use of technology trends in education [Khan, 2022]:

1. Virtual reality (VR) and augmented reality (AR) provide exciting opportunities for learning. Instead of just reading or watching a video about a topic, students can use VR and AR to experience concepts in 3D [Pottle, 2019; Bailenson, 2018]. The applications are almost endless, from students virtually traveling to museums and landmarks, to medical students learning the basics of how to interact with patients in an emergency department and provide accurate diagnoses. While the pandemic brought the possibilities of VR for education to the forefront out of necessity, we will continue to see VR and AR for learning expand in 2022.

2. Gamification - Teachers have been using gamification to teach concepts to students for years. It is a great way to get students engaged in material that they might otherwise not be as interested in elements of games like competition and prizes make education fun and rewarding. Many platforms bring gamification to a new level, with many online learning game options, as well as online courses with awards and certificates for completion. This can be particularly useful for keeping students engaged in learning.

3. Big data - The amount of available data is growing at an exponential rate. Higher education is already using data to track which students are engaging in material and which students are not. This provides an opportunity for instructors to provide personalized support to struggling students. Additionally, instructors can look for engagement trends with their online course activities and tweak content where engagement is low. As more education moves online, more instructors will

have access to engagement data to help unengaged students and improve their curriculums.

4. Personalization - Once instructors have historical data on students learning behaviors through internet-based learning, they can draw inferences on how each student might learn best. This allows students to take custom learning pathways that go at their own pace. With online learning comes access to student data and more personalization.

5. Flexibility - The COVID-19 pandemic forced learning institutions and course creators to be flexible in how they deliver knowledge to students. Flexible online learning is here to stay and improve in 2022.

6. Asynchronous learning and student autonomy - Higher education has been experimenting with synchronous vs asynchronous learning. This means students can choose whether to attend class at the set time or watch recordings after class whenever is convenient for them. This gives students easier access to take courses that may not fit into their work or home schedules. It also gives instructors freedom on when to record their lesson and may take some pressure off performance compared to a live lesson. Asynchronous learning will continue, especially in higher education.

7. Artificial intelligence - AI takes things to the next level when it comes to personalization in educational technologies. While educators can find insights themselves and apply those using data analysis – AI systems can take over this time-consuming work. If provided with enough data, AI creates machine-learning models that give insights and patterns as output.

8. eLearning - refers to learning that takes place with electronics – usually on the internet. The COVID-19 pandemic forced companies and education online, and that shift seems to be here to stay. Educators, course creators, trainers, and students have all had to get comfortable with online education, so much, so that some educators are taking things to the next level.

9. Diversification - Top online course creators are no longer just creating a playlist of video lessons. They are offering complementary learning content like eBooks, personal coaching sessions, memberships, and digital downloads. This is a benefit for students who get more learning materials and a benefit for course creators who can use content to attract leads or charge extra fees for the content.

10. Mobile learning - The mobile learning industry may reach over \$280 billion by 2027. Learners are looking for online education that works seamlessly on their phones and tablets, so they can learn on the go. We'll see eLearning platforms

prioritize mobile compatibility as more educators want to provide their content for mobile users.

Conclusion

Innovation does not necessarily mean additional funds. Resources could be staff's time, a different way of looking at processes, identifying my role within the organization and potential collaborators, measures of success, establishing workers' engagement, autonomy, identifying skills needed, allowing growth and development for workers, ongoing documented feedback, so that reflection can be made on meeting expectations and rewarding collaboration between departments.

Some parameters that can be evaluated regarding innovation in the Israeli healthcare or education system are:

- Anderson & King's [2002] criteria:
 - Originality scale – how ground-breaking are new ideas (new to the organization? New in Israel? New worldwide?)
 - Aimed at bringing actual benefit – economic, client satisfaction, etc.
 - Resulting from intended action, rather than random variation
 - Applicability
- Scalability – can new ideas be implemented across the system
- Training of staff regarding innovation in healthcare.
- To what extent are staff rewarded for new ideas?
- Do workers know who to turn to with new / innovative ideas?
- How often is innovation proactively sought in the organization?

We have shown how these principles can be used both in healthcare and in the education system in Israel and worldwide. The recent COVID-19 pandemic opened many opportunities which can be used in both fields to introduce innovation.

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