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**ISRAELI PUPILS – "RECALCULATING ROUTES" TOWARDS
AN ADVANCED TECHNOLOGICAL FUTURE**

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Abstract

Waze application allows navigation towards a destination by taking the best route. Israeli pupils have various options and can consider a technological education study route as preparation for a future career that suits their skills and preferences. The State of Israel attributes great national significance to encouraging pupils to choose a technological study route, understanding that technological human capital is a strategic asset to the State's security, social and economic future. Frequent technological changes and changing needs have led to searching for ways to deal with these changes. It was found in many countries that one of the best ways of coping is through collaboration with new, updated industries. Lately, the Israeli Ministry of Education has launched significant activity through **Taasiyeda** - the Education Association of the Manufacturers Association (the largest employer in Israel). Together they operate using a unique model, encouraging pupils to choose the technological route, contributing to motivation and interest in learning, and exposing pupils to industry, allowing them to experience it in their technological high school studies. This article seeks to review this model that meets new, relevant and attractive technological challenges, allowing pupils to plan their future, graduate with a profession, a matriculation certificate, general knowledge and values that will enable them to continue studies in academic frameworks. This route contributes to development of quality technological professional human capital. This research examines education and industry partners' perceptions of the model's contribution.

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Keywords: Technological human capital, vocational technological education, experiential learning, tracking, professional training.



1. Introduction

Israeli society, like other societies, is undergoing rapid changes deriving principally from the rate of development of new technologies, based on science and rich in knowledge. New technologies have changed market structure and demands of the labor market in Israel (Mark, 2008). In addition, the vocational technological educational system has suffered ongoing budget cuts and lowering of its image. All these have led to a growing shortage of skilled personnel with technological skills, events that are likely to damage industry, put Israel's relative advantages in the areas of science and technology in danger, and harms growth ability and competitive strength of the Israeli market and economy currently and in the future (Goldstein, 2010).

Quality technological vocational education is the basis demanded to nurture human capital, social and economic development and success and constitute the spinal cord of national power (Brosh, 2016).

Concern for the future of the state of Israel, common to a broad range of population groups, and part of the argument regarding solutions to improve the quality of vocational, technological education, and finding ways to encourage pupils to choose these subject routes so as to constitute a good foundation for career planning and develop possibilities for graduates to integrated into industry in the future.

To deal with the topic, reports from a great many countries globally were reviewed including: England, Germany, Sweden, France, Australia, New Zealand, Japan, Taiwan and Singapore. It was found that all these countries in recent years have substantially increased their investment in vocational-technological education, by carrying out reforms to make it fit market and labor needs. In addition, an insight, common to all, was found - there is a critical need to include employers and industry in vocational technical education. It was clear to the countries reviewed that only close and full cooperation between, economic, industrial and educational factors can guarantee training a generation that will successfully integrate into and suit the needs of the market and industry in such a dynamic technological world (Wergen & Nathan, 2008). From comparisons with leading OECD countries, European Union reports and various international studies, we learn about the importance of the connection between industry and vocational technological education and its necessity to advance such education.

Germany stands at the top of the ladder on this issue, and presents a tradition of hundreds of years of studies accompanied by practical training in factories chosen by the government - the 'dual method' (studies combining paid work in industry and progress according to ranks of professional unions). For a large proportion of pupils, the practical training route is an opening to permanent employment in industry at the end of their studies.

In Denmark, industry and schools together determine curricula through full cooperation. The government invests a very high budget in every student in vocational education, and regard it as an investment benefiting the country, not as an expense. It is a type of tax to which every worker in the country contributes. Every student receives a salary during their studies, and in return gains experience of work in high industry and branches of economy. In Denmark, there is an ongoing dialogue between training and market needs.

For the past few decades, the Ministry of Education in Israel has been busy executing various reforms to promote vocational technological education and finding a model that will respond to arguments,

problems and difficulties with which vocational technological education has to cope (Shochen, Zehavi & Barkat, 2008). Combining vocational technological education and industry in Israel in an organized manner, is still virtually unheard of, but relies mainly on local initiatives taken by lone companies or associations that have taken upon themselves promoting the issue.

In recent years, the Ministry of Education has understood and identified that a platform to combine theoretical and vocational studies with practical aspects (focused on practical experience in industry), is an important link in realizing the key aims of vocational technological education in Israel.

Therefore, one of the most important steps taken in the past two years is to integrate Ministry of Education schools and practical experience in industry (Ministry of Education website, 2016).

To execute this task, the Ministry of Education together with the Manufacturers Association in Israel, have taken upon themselves the responsibility for dealing with this issue and have given Taasiyeda (the educational association of the Manufacturers Association) the task of executing it.

Taasiyeda (from the Hebrew words industry and knowledge) is an educational association established 25 years ago by the Manufacturers Association (the largest employer body in the state of Israel), for the purpose of promoting technological studies in schools and encouraging choosing these professions as future careers. Over the years, the association has deal with exposing young pupils (elementary and junior high schools in all sectors, and a variety of target audiences) to the world of industry and developing programs based on advanced technological knowledge so as to encourage and increase motivation to study these subjects.

In the past two years, in light of the opportunity provided to Taasiyeda, an intervention model was developed to nurture human capital by joining overall Israeli industries and high school pupils from diverse school, in a unique manner based on real and professional experience, within their study courses combining general, theoretical and not education by route. Such a unique model in which a body - an educational association operates as an integrator between two central state systems (educational system and industry) appears not to exist anywhere in the world. And therefore, as never been investigated or tested. A study is planned that will be carried out and help examine this uniqueness using Taasiyeda as a unique model contributing to vocational technological education. The study will examine the quality of actions, and effectiveness of programs in the area of nurturing technological human capital in Israel through industry.

2. Theoretical discussion

It is clear to all that vocational technological education constitutes one of the factors influencing the development of industry and economy in many countries around the world. Nevertheless, it is noticeable that this area also has a negative effect in the context of social issues. As a result of these effects, vocational education has suffered from a problematic image, less prestigious than purely theoretical education. And everyone knows that this low image makes it difficult to attract pupils with good grades to its ranks (West & Steedman, 2003).

Supporters of the importance of vocational technological education argue that its existence and importance have many positive effects on individuals and society. For example, it has been found that vocational technological education reduces pupil dropout rates from the educational system (Gray, 2002),

reduces unemployment levels and increases the chances of graduates to find employment as skilled workers in the labor market (Arum & Shavit, 1995). Supporters of expanding and strengthening vocational technological education argue that it is the state's obligation to create alternative vocational training channels for pupils who find theoretical education difficult. Kahane and Starr (1984) referred to the importance of this channel, and found that this type of education does not refer only to acquiring a profession, but principally, its contribution is in creating a sense of self-efficacy, success and realizing abilities among pupils who experience failure and frustration. In addition, they argued that it also has a social significance because this type of education enables the integration of weaker population layers into society.

In contrast, those who argue against vocational technological education in Israel and globally raise negative effects. In many countries, it has been found that there is a correlation between social classes and employment training. In these countries, those who study in this type of education are characterized as belonging to weak levels in society. In Israel too, fundamental criticisms of this education's role are its perpetuation of social classes. It is argued that vocational frameworks produce a phenomenon of tracking and inequality, and that most pupils who come into them are pupils from a low socio-economic background (Shavit & Muller, 2000) and generally have lower general education levels. Opponents have emphasized the existing danger of the educational system shirking its responsibility for progressing struggling students by placing (or tracking) them to vocational educational routes on the pretext of concern for their self-actualization. Additionally, it has been argued that study courses focusing on instilling vocational skills should be cancelled and included criticism that they are not up-to-date professionally, are irrelevant to current industrial and work trends and as they do not nurture theoretical thought and pay no attention to cognitive aspects or educational values according to Sharon (1999). This results in the fact that possibilities to study higher academic studies are blocked in practice to graduates of these schools, studies that enable being accepted to higher paid and more prestigious jobs (Harpaz, 2014).

The Israeli educational system has had to deal with these arguments for the past decades. Alongside these arguments, the state of Israel faces challenges in the area of technology, changing needs of industry and the economy, which have raised the need for the education system to be updated, refreshed and prepare for curricula changes, to more technological subjects, to be relevant, attractive and provide varied possibilities to be fit for a society rich in sophisticated technologies.

In the state of Israel, vocational and technological education for youth is divided between two government ministries, the Ministry of Education, responsible for the vocational technological learning route and the Ministry of Welfare responsible for secondary learning frameworks providing vocational-technical training for youth. In this situation, there are separate pedagogic and vocational inspection systems. The differences between levels of preparation in the two ministries are profound, deriving from different policy bases. The Ministry of Welfare's vocational training target is to train certified tradespeople where as the key target of vocational technological education is a broad technological, scientific matriculations certificate, allowing continued tertiary education. Pupils who study in the Ministry of Welfare's framework are those pupils who were expelled from an education system that did not succeed in finding a way of integrating them, who were cut off from their friends. These are pupils who were tracked to a vocational route, when it is not certain that this is what they wanted and what their talents are. These

are pupils who could not get an equal opportunity to choose a profession and get a matriculation certificate, general knowledge and values that would allow them to continue in an academic framework.

The state of Israel examined many education systems around the world and found that reforms had been undertaken in all with high government investment in vocational technological education. Reforms whose aim was to improve the level of general education given to pupils with a tendency to become professionals within the framework of vocational education, to increase the number of years of study, improve the level and quality of education in vocational technological courses, prevent dropping out and provide tools that would allow pupils employment mobility and meet changing supply and demand in the labor market.

In recent years, the Israeli education system has taken a number of steps: 28 new study courses were established, enabling pupils in technological and vocational education to receive relevant professional certificates with innovative specialties alongside full matriculation certificates, and in addition they could continue to technical and engineering studies.

The reform introduced contributed to the fact that Ministry of Education pupils could study vocational technological education subjects at schools with an image as high as a comprehensive school or an institution run by one of the leading technological authorities in the country with the quality and level required by the market. This is a framework in which pupils could acquire a broader future picture at an age where they are not mature enough to choose a future profession. A system that operates out of the belief that all pupils must get an equal opportunity and possibility to learn theoretical studies and an matriculation option combining study of interesting vocational areas in which they can express their personal talents without a tracking framework.

In addition to the aforementioned, the education system in the state of Israel recognized the importance and necessity of a link between industry and vocational technological education and since 2015, it was decided by the Ministry of Education, through the Taasiyeda association to build a systemic and institutionalized link through which pupils in vocational technological education would get real and professional experience in industry as part of their study courses, understanding that it would be difficult for individual schools to create partnerships with work places, industrial and technological factories.

The fundamental idea is to execute, with the participation of involved sides, a link with relevant industries, and lead pupils to carry out practical experience in industry, that was put together in partnership by technological course teachers and educators in industry, so that it will be an attractive choice for pupils, meaningful learning and maintain a close link with the labor market. At the same time as the pupil experience program in industry, teaches would also be trained in industry, so as to remain up to date and connected (Cointreau, 2016).

Experiential learning is a philosophy and methodology in which students, through direct experience, are meant to increase knowledge, develop talents and skills and clarify values. Significant educational psychologies have already supplied the fundamentals of learning theories focusing on experience or learning through doing in the real world (Redinger & Clarkson, 2010).

In industrialized countries, various models of programs to integrate pupils in industry or experiential learning in industry have been presented. These programs link schools to factories and organizations dealing with the technological content they study. It was found that teaching vocational technological

courses in secondary schools was better and more meaningful when in addition to laboratory learning that exists in schools, pupils experience in industry, companies and organizations is possible (Polidano & Tabasso, 2014).

This way it is possible to bring pupils closer to practical aspects and better understand and recognize the working environment in their chosen study area, and to show them how knowledge they learn is applied, how things they learn about appear, expose them to processes and varied, rich, contemporary worlds of content, to equipment and methods of working practices in factories, all this alongside encounters with professionals and acquiring industry values - initiative and vision, consistency, quality, excellence, safety (Mourshed, Farrell & Barton, 2012).

Taasiyeda was recruited to actively work with tens of factories and companies to execute the program and created effective links between factories, the education system and its pupils.

In the program framework, the team at Taasiyeda identified for every pupil in technological education, an experiential placement according to the course studied and their place of residence. Pupils come to factories during Years 10, 11 and 12 for supervised experience adjusted to their technological curriculum. During their experience, knowledge is structured so that pupils share knowledge learned at school with a factory and knowledge learned at the factory with school and carries out their final project with educators from industry.

Industries and companies accompany pupils in a process structured and anchored in school hours, a connection that leads to bridging between school curricula and what occurs in companies and industries.

Today in the middle of the second year of the program's existence, it works with 200 school, in 300 classes, among 5,200 pupils together with over 100 factories, industries and professional organizations.

Demand for the program is very high and it is evaluated very highly by education system inspectors, industrialists and their representatives.

Nonetheless, to fulfill its assignment,

- a. Greater resources are needed to expand the program to approximately 130,000 pupils in technological education
- b. Not all industries and organizations around the country participate in this important national arrangement, which requires change and progress at a policy level, some sort of enticement that will be provided to industrialists or mentors from industry - such as a tax exemption on pupils' work or some sort of benefits.

3. Conclusions

In the model operating today in the education system and with the addition of learning carried out with the cooperation of industrialist and in factories, it is possible to say that vocational technological education in the state of Israel is changing direction and providing a response to arguments heard against it in recent years. Israeli pupils are **changing route again** and can choose their desired path from a variety of existing courses, distinct from the past where the accepted way created tracking, which did not acknowledge pupils' skills or abilities. Today it is possible for pupils to see the goals facing them, to see a more interesting employment horizon through relevant and attractive learning, in schools that are neither labeled nor suffer

from a poor image, in which they can acquire general and theoretical knowledge, vocational and matriculation certificates.

Today, after many years of budget cuts and reducing the extent of technological education, one can state that there has been a change and as a result a significant improvement in the image of technological education in Israel.

Currently, mixed (quantitative and qualitative) research is being conducted with the aim of examining the views of partners (education and industry personnel) regarding Taasiyeda's contribution as an organization that connects education with industry and an organization that promotes and encourages studying a technological route.

The research will examine the uniqueness of Taasiyeda that operates this unique model that contributes to the education system in the field of nurturing human capital and technological education in Israel through industry. The research's aim is to bring about desired change and improvement in light of partners' views, and enable thought on future ways of operating needed to benefit pupils, the technological education system and human capital in the country.

The research may contribute to knowledge about Taasiyeda as an organization which acts as **an integrator** between two large public systems – the education system and the industry, in order to promote and encourage technological education in schools.

If the research findings prove that the partners consider that Taasiyeda's activities contribute to encouraging and promoting technological education, this could serve as a successful model and contribute to the willingness and possibility of establishing similar organizations in other countries.

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