The Way to Develop a Project Mindset according to Secondary School Students

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Abstract: The 21st century has brought many changes to our lives. The pandemic and the major changes that followed have affected our daily lives. Many competences have come to the fore that were previously secondary in the world of work. These competences include project thinking and thinking in terms of projects. Project thinking is not a stand-alone concept, but a complex set of competences that encompasses a number of other competences. It includes teamwork, communication, time management, insight, flexibility or even agility and time management. A project approach is nowadays not only needed in the world of work, but many school tasks can be defined as projects, leading students to succeed in real life. The aim of this study is to present the project approach and its different dimensions, based on the perceptions of secondary school students and the results of a questionnaire survey. The paper aims to shed light on the different aspects of the project approach, highlighting the areas and directions that need improvement and which could be the key to the future.

Keywords: Project, Project approach, Education, Efficiency, STEM

Introduction

Many events in our lives can be understood as projects that we plan, organise, implement, control, if not consciously, and finally conclude with lessons learned. In order to manage these events well, we need a number of competences and background knowledge (Csiszárik-Kocsir & Varga, 2017). If we treat these events as projects and call the stakeholders stakeholders (in a narrower sense, the stakeholders are the project team), communication, problem solving, teamwork are essential, but time management is also important in many cases. Effective communication is key to collaboration between teams working on a project. You need to be able to communicate project objectives, task expectations, deadlines and potential challenges well. All this needs to be presented and communicated to everyone involved in the process. Many tasks and deadlines need to be managed throughout the project. Time management skills will help you to plan each workflow effectively, define key steps and set priorities. Projects are usually carried out in teams, so the ability to work effectively in teams is also important. You need to be able to collaborate with others, delegate tasks, share responsibilities and support team members (Varga, 2021). It is also important to manage conflict and give constructive feedback. Challenges and problems often arise during the project. It is important to identify and solve these problems, which may require flexibility, creativity and analytical thinking. However, these competences are often not innate. We learn and experience the need for them through tasks in our lives. The role of secondary education is important in this learning process, where they can learn through concrete tasks the skills and abilities that they can later use in a variety of tasks in their personal and professional lives.

Literature Review

The project has many interpretations. Its history dates back to pre-Christian times. A project is always a series of activities planned to achieve a predefined goal, planned and implemented in a given environment, based on time, cost, resources and outcome criteria (Csiszárik Kocsir et al., 2021). The project method has been known in child education since the beginning of the last century. The school founded by Anna Freud already applied the principle that "children learn best when their interests are fully engaged and they are at the centre" (Young Bruehl, 1988).

Today, the project approach is central to all aspects of life, from the school years to the workplace. When students learn using a project approach, they or a group of students are given or work on a task of their own choosing that matches their interests. The need for a project may be initiated by the task description of the learning structure, but it may also be given by the teacher or even by other groups or group members (Frey, 1982). The nature of project-based learning involves exploring new areas, formulating new scientific questions and integrating knowledge from different disciplines (Barak & Raz, 1998; Barak & Doppelt, 2000). Project-based learning is a well-known method for transferring thinking skills and creating a flexible learning environment (Doppelt, 2003). In general, it is the topics and projects that teachers consider worthwhile and that are of interest to the children involved that are the focus of students' attention (Katz & Chard, 1992).

There is evidence that project-based learning is beneficial for both teachers and students (Thomas, 2010). It is important that education systems should enable students to be more creative, communicative and problem-solving (Kafi & Motallebzadeh, 2014; Noe et al., 2017; Bani Hamad, 2017; Garai Fodor,2022). In order to meet these challenges, schools need to adapt their methods to enable students to learn creative thinking, problem solving and critical thinking. They also need to rethink teaching methods based on collaboration and innovative skills that can be useful in the future labour market and in life (Alismail & McGuire, 2015). According to Barak, the education system in general tends to direct gifted students to extracurricular programmes to help them learn and develop their thinking skills (Barak, 2002).

Students who are given the opportunity to create a prototype are involved in the design, prototyping and evaluation of the process. Through their experiences during the creation process, they understand that much depends on them, which in turn can increase their self-esteem and personal responsibility (Waks, 1995). According to Rogers (1969) and Holt (1965), the school's role is to enable students to satisfy their curiosity, develop their abilities and skills as they wish. According to Lombardi, the 21st century educational curriculum should focus on the construction of knowledge, creating new information for students that stimulates them and that is valuable or meaningful to them. Instructional material should be connected to the real world in a way that supports students' engagement, motivation and understanding of science subjects (Lombardi, 2007). By designing projects, students solve real-world problems by designing their own investigations and learning, and by applying a variety of learning strategies. In the process of learning, learners are motivated and gain valuable skills that will provide them with a strong foundation for their future (Bell, 2010).

Project-based learning puts learners in realistic, contextual problem-solving situations that are directly related to the curriculum and real-life problems. Projects allow learners to bridge classroom and real-life experiences and help them to explore the connections between phenomena. They give meaning to the problems that we encounter in our everyday lives through project-based learning, thus fostering learners' openness to systematic inquiry (Blumenfeld et al, 1991). Ideally, a project involves the acquisition of knowledge and concepts in a wide range of fields, such as science, social science, humanities or even arts.

STEM project-based learning (in science, technology, engineering and maths) is not just about a project that is linked to at least two STEM subject areas, but also includes a constructivist approach to teaching management. The activities allow students to find and define the problem while exploring the project topic (Capraro, 2013). In STEM project-based learning, teachers do not tell students everything; students work collaboratively with their peers to identify problems and develop strategies to solve them (Ozel, 2013). It has been shown that when project-based learning is taught well by teachers, students learn more. However, it has also been found that teachers who do not implement instruction effectively have a negative impact on student achievement (Han et.al, 2015).

It is important to ensure that students in schools learn important aspects of project-based learning, such as the basics of teamwork, communication, collaboration, task sharing and managing deadlines, as soon as possible. It adopts a flexible approach. It adapts to changing circumstances to ensure the success of the project and involves optimising processes to achieve the objective. Time management is also very important in the project approach. Students have to carry out a number of projects in school, it is important to learn how to set deadlines and allocate tasks so that they can be completed efficiently, effectively and on time. The project approach is also

very useful for secondary school students as it helps them to work more efficiently and effectively. If students are properly trained in effective time planning and time management at school, and if they develop their creative thinking and problem solving skills through project work, they will be more confident in the future job market.

Material and Methods

The analysis presented in the paper is the result of a questionnaire survey conducted in 2023, during which a complex, pre-tested, standerdised questionnaire was used to measure the attitudes, digital culture and project approach of secondary school students towards digitalisation processes. The research process involved students from grade 9 to 14, who are studying in vocational education and training. As a result of the survey, 508 questionnaires were returned, of which 427 were fully assessable. In the present study, we assessed the responding students' project approach, their roles in projects, their cooperativeness and their ability to work together from different aspects. The students expressed their opinions on 19 statements related to projects on a four-point scale according to how much they agreed with them. On the scale, a score of 1 indicated total disagreement and a score of 4 indicated total agreement. The composition of the sample is shown in the table below:

Table 1. The composition of the sample

	Frequency	Percent
15 years	80	18,7
16 years	112	26,2
17 years	130	30,4
18 years	73	17,1
19 years	32	7,5
N = 472		

Results

In the survey, we asked the students surveyed to examine 19 statements related to projects, teamwork and self-employment. The statements include a mixture of statements related to project roles, working, teamwork, teacher-student roles. The following statements were rated by students using a scale of one to four:

Table 2. Mean values obtained for the statements and their standard deviation

	Mean	Std.dev.
I like a challenges.	3,094	0,696
I like learning through project work.	2,714	0,789
I'm motivated by doing something I haven't done before.	2,799	0,851
When I work on a project, I like to complete the task independently.	2,864	0,891
When I work on a project task, I like to do the task in a collaborative way.	2,881	0,923
When I work on a project task, I expect my tutor or teacher to guide me or help me collaborate on each workflow.	2,883	0,880
I would dive into learning about a technology that I was not familiar with at all.	2,906	0,864
I would be happy to work in a team, in a group, where we have to work together to invent, design, and make systems work, without any prior training (knowledge).	2,862	0,955
Compared to traditional forms of teaching, a project assignment has a particularly strong emphasis on independent student work.	2,923	0,782
In a project task, group work is given a prominent role.		
The time management of projects is very flexible.	2,824	0,772
Project work fundamentally subverts the traditional teacher-student role.	2,290	0,899
I prefer to work on a project topic of my own making.	2,829	0,960
I prefer to work on teacher-generated projects.	2,489	0,897
I prefer to feel insecure when doing a project assignment.	2,302	0,937
When working on a project, I feel more focused on the task at hand.	2,920	0,749
I tend to ask for help when doing a project.	2,583	0,893
I tend to help others when doing a project task.	2,585	0,844
I am persistent when working on a project.	3,122	0,741
N = 472		

The figure above shows that the statements asked were rated by the students surveyed with an average value of between 3.122 and 2.290. The survey shows that more than three quarters of the students surveyed can work persistently on a project task, which they can carry out independently and intuitively (3.122). It is also clear that more than three quarters of them like challenges, which is a prerequisite for working on projects. A project always contains a novelty value, new situations to be solved that have never been experienced before. Not shying away from challenges is precisely to strengthen these problem-solving skills and abilities. Students also gave a high average rating for working in a group, with a mean score of 3.068, which is another key element of the project approach. Based on the statements sorted in descending order of mean scores, it can be seen that other important elements of working in a project were described with relatively high scores. It can be seen that working independently is important to students. The statements also show the importance of better focus on tasks, seeking novelty and cooperation. It is also clear that autonomy is not only shown in terms of working independently, but also in terms of coming up with their own project ideas. Students like to manage their own time in order to produce the best possible results. It is also evident that a high percentage of students like project tasks, because there they can show all their skills and knowledge, based on their own time and pace.

Among the statements with the lowest average value, the ones with negative content were the most frequent. Students least agreed that a project assignment would upset the traditional teacher-student role, nor did they agree that a project assignment could make them feel insecure. However, it was clear that they were less keen to work on topics that came from the teacher's side, and more keen to work on their own topics and ideas at their own pace.

Table 1. Correlation of statements on project thinking with the grade of the responding students

		Mean	Std.dev.	F	Sig
I like learning through project work.	9. évf.	2,388	0,921	7,355	0,000
	10. évf.	2,929	0,732		
	11. évf.	2,662	0,721		
	12. évf.	2,699	0,739		
	13. évf.	**3,031**	0,695		
	Total	2,714	0,789		
I am motivated by doing something I have not done before.	9. évf.	2,850	0,943	3,625	0,006
	10. évf.	2,884	0,825		
	11. évf.	2,600	0,784		
	12. évf.	2,808	0,844		
	13. évf.	**3,156**	0,847		
	Total	2,799	0,851		
When I work on a project, I like to complete the task independently.	9. évf.	2,725	0,871	4,215	0,002
	10. évf.	2,857	0,919		
	11. évf.	2,877	0,854		
	12. évf.	2,753	0,925		
	13. évf.	**3,438**	0,716		
	Total	2,864	0,891		
Compared to traditional forms of learning, a project assignment has a particularly strong emphasis on independent learning.	9. évf.	2,813	0,797	2,619	0,035
	10. évf.	2,938	0,763		
	11. évf.	2,846	0,840		
	12. évf.	3,000	0,687		
	13. évf.	**3,281**	0,683		
	Total	2,923	0,782		
The time management of projects is very flexible.	9. évf.	2,700	0,818	3,968	0,004
	10. évf.	2,964	0,657		
	11. évf.	2,662	0,699		
	12. évf.	**2,986**	0,874		
	13. évf.	2,938	0,914		
	Total	2,824	0,772		
When working on a project, I concentrate on the task at hand throughout the collaborative work.	9. évf.	2,800	0,770	2,575	0,037
	10. évf.	2,911	0,766		
	11. évf.	2,885	0,743		
	12. évf.	2,973	0,687		
	13. évf.	**3,281**	0,729		
	Total	2,920	0,749		

We were also curious to know how much belonging to different grades and different ages influenced the perception of certain statements. To this end, we conducted an analysis of variance using Anova's method. It was found that in only six of the 19 statements asked was age, and thus the effect of year group, on its rating observed. From the data in the table, it can be seen that of the statements whose perception was influenced by age and grade, it was clearly the oldest age group that had the highest mean scores. In only one case did we see a different picture, for the statement that related to time management in projects. Here, students in Year 12 agreed most with this statement. It can be seen that the project approach becomes more strongly evident as the grades move upwards. This is also shown by the above-average mean scores for most of the statements in grades 12 and 13.

Conclusion

The results show that the project approach is very important. Although project management education is not specifically and declaratively a compulsory element of secondary education, it is still present in the minds of students. The trend that started years ago, that young people from Generation Z are best employed in projects, has been proven once again. The late Generation Z young people who formed the sample have made clear the importance of a project approach from a practical point of view. It can be stated with absolute certainty that they like to work independently, they like creative tasks where they can solve them themselves, at their own pace. This implies that traditional forms of education must in future be replaced by project-based education, where students can solve problems independently, intuitively and innovatively, learning in a practical way. This is important because it is a huge challenge for the current education system. Curricula need to be adapted to focus on project-based teaching of subjects that develop skills and competences, thus strengthening the project mindset of students, which will clearly enhance their future employability.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

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