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The Role of School Management in Institutional Absorption Capacity

Vloga vodstva šole pri institucionalni absorpcijski sposobnosti

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The Role of School Management in Institutional Absorption Capacity

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Abstract

This paper provides an insight into research results on network-based school management. Many findings show that while horizontal learning within schools is often strong, external links are weaker, and there are only a few educational actors able to collaborate effectively with other sectors. In this paper, we present a management practice that sees schools as a part of the socio-ecological system, able to recognise the resources of the environment and access them in the longer term. The model developed provides a clear view of the content areas and platforms for internal and external collaboration, selection filters, and dynamics.

Keywords: *innovation-ecosystem | networking | absorption capacity | management practice | case study*

Vloga vodstva šole pri institucionalni absorpcijski sposobnosti

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Povzetek

Prispevek ponuja vpogled v rezultate raziskav o mrežnem vodenju šol. Številne ugotovitve kažejo, da je horizontalno poučevanje v šolah pogosto učinkovito, vendar so zunanje povezave šibkejše in le nekaj izobraževalnih akterjev je sposobnih uspešno sodelovati z drugimi sektorji. V tem prispevku predstavljamo prakso vodenja, ki šole obravnava kot del socialnoekološkega sistema, obenem pa je sposobna prepoznati in dolgoročno uporabljati vire v okolju. Razviti model omogoča jasen vpogled v vsebinska področja in platforme za notranje in zunanje sodelovanje, v filtre za izbor in v dinamiko.

Ključne besede: *inovacijski ekosistem | mreženje | absorpcijska sposobnost | praksa vodenja | študija primera*

Introduction

What is the importance of absorption capacity in public education institutions? What effective way do we see for an organisation to support the creation, maintenance and spread of innovations? What exemplary good leadership practices could we observe in the Hungarian public education system? Among other things, we are looking for answers to these questions in our present study.

Below we present a case study that was born as a result of the research work of two Hungarian universities, Eötvös Loránd University and Óbuda University¹. The related research reached thousands of teachers and their schools in Hungary using a mixed method and examined the characteristics of organisational functioning, educational innovations, and workplace learning. In line with the literature and previous research in Hungary, the results of these works also pointed to the importance of the functioning of learning organisations and that, although many aspects of the latter were often strong among the examined institutions, the active operation of external and cross-sectoral networks represents a significantly greater challenge for schools.

In this study, we present and analyse an existing school management practice that considers the school as an integral part of the social-ecological system, which is able to recognise the resources of the social environment and access them in the long term. Our goal was to publish this model for development purposes, to clearly outline the content areas and platforms of internal and external collaborations that can contribute to a definite increase in the absorptive capacity of schools. Thus, we recommend our study primarily to school leaders, but it can also be a valuable resource for practitioners and academics in educational development.

Absorptive capacity and school management

Innovations play a decisive role in the renewal of educational systems. Meanwhile, the organisational context can be a substantial barrier or incentive for

¹ Research at Eötvös Loránd University: INNOVA research ID.: OTKA 115857, MoTeL research ID: OTKA 128738. Research at Óbuda University: STEAM research.

the creation, preservation and spread of innovations. In the organisational dimension of the evolutionary process of innovations, absorptive capacity is an important factor that comprehensively captures the internal dynamics of a given system.

The concept of absorption refers to the phenomenon of inclusion in both the natural and social sciences. In the world of educational changes and educational developments, absorptive capacity refers to the ability of development sites (schools) to consolidate resources, it describes how and to what extent schools can utilise the available external resources in such a way that they generate actual effects and prove to be sustainable. The resource involved can be money, infrastructure, technology, human power or even new knowledge and cognitive content (Bourguignon, 2006; Cohen–Levinthal, 1990; Lane, 2006).

Many theoretical explorations have been undertaken to grasp the absorption capacity; in this study we use the activity theory perspective to help identify possible investigation dimensions. We are connected to the most widespread activity theory model of the Western approach, which is associated with the name of Yrjö Engeström, a University of Helsinki professor dealing with adult learning. According to this, the purpose of the activity is to solve a task to be performed, a perceived problem, or other need, for which the participants develop new procedures during the activity (Figure 1).

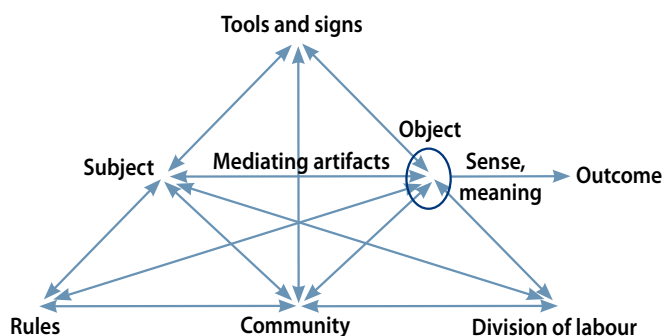


Figure 1: A general model of the activity system
Source: Engeström, 1987, p. 78.

A peculiarity of the model is that it thinks about learning as a process embedded in a system of social, cultural and technical effects. There are several versions of the model: it describes the activation process as the interaction of the first three dimensions, the acting individual (subject), the object of

problem-solving (goal, meaning) and the tools used (tools and signals). Secondly, these three poles are integrated into the force field of community, rules and division of labour. Finally, in the third, most complex framework, the connection of different activity systems is modelled.

The management of the institution plays a key role in the development of the organisation's conditions for supporting innovations, whether it is the tools (e.g. new digital technology), the rules (e.g. the appearance of experimental learning as an institutional value), the communities (e.g. project teams), or the division of labour (e.g. teamwork). In the system of actions that increase the absorption capacity of the institutional management, development attitude has a decisive influence, motives that are clearly outlined in the 4I model of transformational leadership (Bass, 1990; Marzanos et al., 2004). Where the leadership appears as the engine of renewal and development in the school, idealised influence (1) can be seen in action. With this leadership model, (2) respect for the individual is emphasised. The leader gets to know the strengths and weaknesses of the teachers and offers them tasks that match their personality, thereby opening up space for professional development based on internal motivation. (3) Inspirational motivation appears when teachers experience support for individual initiatives. Together, all of these represent (4) intellectual stimulation for teachers, which not only initiates development but also continuously maintains it, thereby putting the organisational culture at the service of the common goal.

This management model fits well with the concept of the learning organisation. Schools that can be identified as learning organisations typically rely heavily on the developing expertise of the employees, the motivating power of collective problem-solving, knowledge embedded in practice, and the potential inherent in external relationship systems (Mulford, 2005; Baráth, 2013). According to a study on learning organisations in Hungarian schools (Anka et al., 2016), schools that (1.) have well-defined values, vision and goals supported by the employees, (2.) are intensively shared by employees who share their knowledge with each other, and (3.) the employees can take responsibility for their activities and are characterised by cooperation and trust, can be considered learning organisations. The teachers in these schools (4.) have a high level of initiative and willingness to take risks, and (5.) have a strong network capital. In all of these processes, (6.) the leadership, which supports dynamic operation and focuses on learning, has a special role. In this way, schools operating as learning organisations can create workplace environments that efficiently help the teachers' professional development and learning involving cognitive and affective changes.

It is important to note that the opposite of all these can also be proven empirically, i.e. certain organisational conditions that hinder adaptation, development and innovation activities can have a blocking effect on teachers' risk-taking, innovativeness and proactivity, i.e. on the attitudes and behavioural characteristics that are often associated with the concept of entrepreneurship (Halász, 2016). In the last ten years, large-scale Hungarian innovation and workplace learning research projects (Fazekas, 2021; Lénárd et al, 2022; Anka et al., 2016; Kersánszki, 2020;) placed a particular emphasis on examining the characteristics of learning organisations. The related exploratory works examined the organisational functioning, management characteristics, internal and external knowledge sharing practices, and workplace learning routines of thousands of institutions. As mentioned above, based on research results, we see that the educational sector is generally characterised by a conscious awareness of the importance of learning organisation functioning and knowledge-intensive leadership. Leaders place great emphasis on strengthening the related factors with relatively high effectiveness, cooperation within schools and horizontal learning are often particularly strong. However, external and inter-sectoral networks are functioning poorly, and schools are rarely able to benefit from the potential of their environment.

According to the INNOVA survey (Fazekas, 2021) - which reached around two thousand Hungarian school leaders and four thousand teachers - only 2% of teachers reported that they had regularly received new ideas and thoughts from external partners (e.g. parents, NGOs, employers) in the last two years that had improved the effectiveness of their work, while 88% said that this had not happened or had happened at most once or twice. Moreover, it is interesting to note that almost half (46.5%) of the agents of the pedagogical innovations collected in the survey said that the innovation had not affected external relations with partners/customers at all. A third of the leaders said that their institution is fundamentally hampered by the environment (33.5%), that it operates in isolation from its environment and rarely adopts or shares good practices (27.1%), and that it is generally not so involved in external cooperation that supports innovative efforts to improve performance (25.2%).

In this paper it is not our purpose, nor is it possible, to go into the data collected in significant depth. It is presumable that the ability to identify and absorb resources from external relations is one of the most common deficit areas of absorptive capacity. In the above-mentioned research studies, we set the goal of a deeper analysis of the management and operational practices

of institutions that understand their own existence as an integral part of the socio-ecological system, that are able to recognise the resources of the social environment and to access them in the longer term. If leaders are able, with the involvement of external partners, to introduce new perspectives, tools and goals into the organisation, that broaden teachers' perspectives and encourage innovation, we can have faith that the potential of transformational leadership can be realised within organisations.

Tools and process of data collection

The institution presented here – Saint Nicholas Greek Catholic Primary School, Kindergarten and Primary Art School of Edelény – was noticed in 2020 by the Óbuda University's STEAM-researchers, due to its strong STEAM-focused curriculum and equipment park. The first data collection phase, which took place this year, clearly pointed out the peculiarities of the organisational operation, which logically attracted the attention of employees interested in educational innovations and workplace learning. In the following years, ELTE's educational researchers investigating pedagogical innovations and professional development paths also visited the institution, building on the initial case study with ever more profound and richer knowledge.

It quickly becomes visible to an external observer: this school is an organisation that places particular emphasis on interaction with its environment, monitoring external needs and processes and identifying and developing labour market competence needs. The organisation has acquired an impressive infrastructural and methodological richness thanks to the resources made available through its network connections, and by taking advantage of these favorable conditions, the school's definite goal is to be able to provide valid answers to the current and local labour market needs within the framework of the school.

During the case study, which was carried out with longitudinal and inter-university cooperation, we used a classic research design: we examined the most important documents of the organisation, reviewed the available competence measurement data and their analyses, collected data with our questionnaires (leader, teacher), individual and focus group interviews were conducted with students, teachers, working group leaders, leaders, and a representative of the maintainer in both in person and online formats. In addition, we conducted classroom and work community discussion observations.

Prior to visiting the school in person, we examined the organisation's key documents and digital resources (website, pedagogical program, management strategies, multimedia resources presenting innovations), and reviewed available measurement data back to 2015, the results of internal measurements and data analyses of the institution and the maintainer. An analysis of these sources focused on the positioning of the organisation, and was carried out before the main case study steps, including the first and additional data collection phases. The main tools used to collect data for the whole longitudinal case study were semi-structured interviews with individuals and (focus) groups, which most often covered the following content (see Table 1).

Table 1: Focus of the interviews

Organisational features	The history of the organisation's development (going back several decades)
	Key characteristics of the organisation and its management and how they have changed over time
	The nature of trust and emotional relationships among the teaching employees
Curriculum specifics	Pedagogical practices used, their originality and relation to the mainstream
	Changes in classroom processes over time
	Social relations and learning outcomes
Development processes	Characteristics of organisational and teacher learning (e.g. working with data, knowledge sharing, experimentation, role of experts)
	External development interventions and their impact on the school
	The school's internal innovations (e.g. frequency, areas, actors, specific improvements)
Models to be captured	The system and nature of the innovations developed (e.g. complexity, context dependency, infrastructure requirements, adaptation time)
	Testing of the pedagogical and organisational models that can be drawn up
	The expected evolution of current processes over time

In selecting teachers, we sought to diversify the respondents by disciplinary area, year level taught, innovation and digital activity, and number of years in the organisation. In selecting students, we aimed to interview students who represented both lower and upper years, children with outstanding learning outcomes and those with learning difficulties, and children from different socio-economic backgrounds. The teachers and students interviewed were also observed in classroom situations. The interviews conducted are presented in Table 2.

Table 2: Interviews conducted September 2020 - September 2022

Respondents	Type of interviews	Number of interviews (in total)
School headteacher	Individual	4
2 deputy headteachers	Individual and focus groups	5
Representative of the maintainer (school chaplain)	Individual and focus groups	3
5 working group leaders	Focus groups	2
12 teachers	Focus groups	5
17 students	Focus groups	4

During the longitudinal case study, 11 lessons and classroom sessions were visited, including some where teachers had implemented their own internal improvements, where they had organised student learning according to implemented innovative curricula, and which had not been strongly affected by different waves of development. We have tried to observe as wide a variety as possible of lessons and school sessions for the years and subject areas concerned. The table below (see Table 3) lists the lessons observed.

During the case study, we also conducted our own data collection using two large sample education research questionnaires, one on the birth and diffusion of local innovations and the other on teachers' workplace learning.

The data thus provided an opportunity to compare the organisation's operations and the nature of innovations with the original research samples, which, although not representative, gives a picture of how we can position the institution in these areas.

Table 3: Classroom observations

Age of students	Subject/ Activity	Content	Year of observation
6-7 Y	Mathematics	LEGO Maths (adaptively implemented curricula)	2020
7-8 Y	Mathematics	LEGO Math (adaptively implemented curricula)	2021
8-9 Y	English	LEGO-LET'S GO (own innovation)	2020
9-10 Y	Robotics - primary school	LEGO robots (adaptively implemented curricula)	2020
10-11 Y	Biology	T-Systems and LEGO systems (own innovation)	2020
10-11 Y	Cooking class	Integrated cross-curricular competence development (own innovation)	2020
10-11 Y	History	Battle of Nándorfehérvár - LEGO, smartboard	2021
11-12 Y	Computer Science	3D printer application (own innovation)	2020
11-13 Y	Robotics - upper school	LEGO robots (adaptively implemented curricula)	2021
12-13 Y	English	Cross-curricular competence development (own innovation)	2020
13-14 Y	Computer Science	Cross-curricular competence development	2021

The means of data collection allowed us the opportunity to examine: (1) the professional characteristics and effectiveness of the sessions organised between the Year 1 and Year 8 and in different disciplinary areas, (2) the knowledge and opinions of the teachers on educational and pedagogical theory, (3) the teachers' paths of professional development and learning (4) and the school's organisational and management characteristics. In the present case study, we focus on the latter, and within this, our goal is to analyse the characteristics of the organisational operation embedded in the network. The case study is also expected to be useful in the practice of educational development, especially within the framework of the school-development program of the Mathias Corvinus Collegium learning institute (the case study is published under this program).

The operation of the school

The institution operates in a small town in the North Hungarian Region, under the maintenance of the Greek Catholic church. It is currently the city's largest and most sought-after elementary school, even among non-denominational parents. In the past ten years, serious changes have been observed in the demographic composition of the small town as a result of the influx of middle-class strata into the area, and according to the representative of the maintainer and the school management, the “power of attraction” of the school played a significant role in these processes.

The institution was maintained by the Apostolic Exarchate of Miskolc in 2011, when the headteacher, who is currently leading the institution, was appointed to head the organisation. With regard to the current size of the school, it operates with 50 teaching employees at the site of the investigated headquarters and welcomes 700 students in approximately 25 classes. The proportion of disadvantaged students is around 10%, and children with special educational needs make up nearly 4%. The management of the school has a classical structure, the work of the leader is assisted by three deputy headteachers, and the work groups are essentially organised according to disciplinary areas and lower to upper years. It is important to note that an interdisciplinary thematic working group also facilitates knowledge sharing in the school. Strong relationships of trust are perceptible within the organisation. The period of more than ten years that has passed since the change of maintenance has proved to be sufficient to strengthen interpersonal ties.

The organisational climate favors the exchange of experience and creative planning. Based on the data collected through a questionnaire among teachers, about 33% of the teaching employees can be considered teachers who regularly try out new tools and methods, and who dare to change and accept the accompanying temporary regression periods.

“We have a lot of experience, but it is true for many of the tools we use that we were not the pioneers, but we started at the very beginning. (...) Obviously, they [teachers of other schools] come to us to observe these lessons not because we are the smartest, but because we have travelled more roads and have (both) good and not so positive experiences to share.”
(Deputy Headteacher)

Before 2011, the institution operated as a public school whose profile focused primarily on foreign language education. With the change of admin-

istration, the previous leadership-continuity was broken, and the school management was reorganised along with new values and goals. This had two fundamental pillars: on the one hand, the intention to be rooted in religious values, and on the other hand, the need for pedagogical modernisation based on network resources. The former is a logical consequence of the identity of the maintainer, it is well reflected in all the organisational documents and permeates the entire ethos of the institution. The spirituality of faith works as a strong cohesive force, but it partially masks the less pronounced but decisive organisational and pedagogical goals that oriented the institution towards a learning organisation that uses a system of modern skill development. So much so that in the official documents, we cannot come across the latter, or only tangentially. However, the intention to reflect on the needs of the modern age and the need to use scientific achievements is especially strongly present within the religious approach.

Pedagogical modernisation based on network resources, following the previous professional experience of the newly appointed leader, became an implicit organisational goal orienting the school's everyday life and movement. For two years, the leader worked as an employee of a network coordination center to support horizontal knowledge sharing; in practice he helped to spread the good practices born in the region's schools, and he supported the cooperation of the region's public education institutions with other representatives of the public education sector and actors from other sub-systems of the education sector. As a result of this professional experience, the strengthening of the school's network connections and monitoring and utilisation of opportunity windows began with the change of management.

Over the past ten years, the school has developed intensive relationships with universities, professional-methodological service providers, and market actors who approach social responsibility from the educational side. Among others, it has an intensive relationship with the University of Óbuda, which focuses mainly on IT training, H-Didakt Ltd., which offers LEGO Education teaching methods for STEM (science, technology, engineering and mathematics) educational concepts, T-Systems Ltd., which undertakes the modernisation of the school's digital infrastructure, and the Danish International School of Billund.

The institution has a spectacular infrastructure thanks to the utilisation of opportunity windows revealed through the establishing of these relationships. For example, the building has many interactive whiteboards, student laptops and tablets, a digital sandbox, a 3D printer, and a robotics device

system. These relationships play an important role in orienting the pedagogical work in the institution, implementing modernising educational developments, and inspiring local innovations. Based on the leadership responses in the questionnaire survey, we see that the former account for 70% of the organisation's developments, while the latter account for 30%. The more progressive developments concerning the curriculum started in 2015 with the introduction of LEGO methods as a response to a decrease in the number of students.

“In 2014, our numbers started to decrease, we were told that it was demographics, but we didn't believe it, we knew that we weren't doing something right and we started to think. Within a year, we found LEGO and contacted the distributor. My more innovative employees were happy to use this method.” (Headteacher)

The innovation-inspiring intersectoral relations (“boundary crossing”) are also strong within the walls of the school. First of all, the internal sharing of knowledge is active among the teaching employees; all of the responding teachers indicated that in recent years they had been part of horizontal knowledge-sharing processes within the school, which helps the intersectoral nature of learning situations, the teacher's room that “condenses” employees from many fields in one space, and the specialised online knowledge-sharing platform which is accessible without boundaries. Furthermore, pedagogical procedures that implement the development of an area by real coordination of the work of several teachers are common in the school; not only do cross-curricular solutions appear here, but also the development of an area of competence over a particularly long period time. An example of this is the recently launched curriculum innovation, which, in cooperation with the local kindergarten, plans the process of learning programming skills from the kindergarten years until the end of Year 8. In addition, concerning internal border crossing, it is important to highlight: the school now has a long tradition of involving non-teaching professionals in educational processes. For example, the system administrator with a degree in IT holds robotics classes, a employee who now has an English teaching degree joined the school as a musician in the beginning, and a staff member with a degree in economics helps the students in the school.

“In the early years, I did the financial things for the school, and little by little I got involved in the children's lives and the everyday life of the school. My colleague and I regularly talk about the children, about one-

off, individual cases, and I think our thinking is no longer different at all.” (Finance Manager)

Employees from other sectors - whose proportion can be considered high (30%) - invigorate the intellectual life of the school and are often themselves the source of enriching the pedagogical work. Thus, for example, the name of employee who was originally took on as a musician is associated with a self-developed language teaching program (LEGO-LET’S GO), while the IT employee is one of the inspirers and agents of cross-curricular solutions.



Figure 2: LEGO-LET’S GO Year 3

The new management aim was to place the pedagogical culture on several pillars, so in addition to the leading language development, local and adapted development was started in the fields of natural sciences and sports. The development of the students’ digital competencies was connected to the school’s rich ICT equipment park - as a horizontal pillar - and the church character also gave an additional focus, strengthening the students’ social competencies.

Two important directions of pedagogical processes have unfolded in the organisation: (1) The process organisation, which is considered a pioneer both in its tools and in its pedagogical approach, accounting for about 30% of the learning pathways taking place in the school within the framework of classroom and extracurricular activities; furthermore, (2) learning management, which is innovative in its tools but related to the mainstream in its pedagogical procedures, dominates roughly 70% of learning pathways.

In the former, students work in a learning environment and paradigm that is quite different from the mainstream. This learning pathway can be identified as an open system that builds on the utilisation of students' existing competencies and develops them further during the work. In this situation, student cooperation and horizontal student learning are strong, (theoretical) knowledge that cannot be applied in practice, is not present and has no value, and truly valid learning results are those forms of knowledge, at least a part of which is given by tacit knowledge that is difficult to verbalise. The school first offers students the above methods of a learning organisation within the classroom, and then through the years, more and more opportunities to practice this form of learning outside of classroom sessions become available. In the area of competence development in mathematics, for example, there is LEGO or classroom activities, while in extracurricular form there is advanced robotics.



Figure 3: Maths class in the training kitchen

“Students receive a recipe and calculate how many ingredients are needed, so they have to pay attention to the size of the baking tray, the proportion, how much is thrown away, and what is used up, they have to convert units of measurement.” (Maths Teacher)

Based on our complex method - which includes observing the students' performance of tasks, conversations that test their thinking, and the analysis of individual progress cases - the development of the students' competencies is remarkable in several areas. Such areas include foreign language competencies, abstraction skills, algorithmic thought operations, and dig-

ital competencies. The quality of the students' results is confirmed by the fact that the entire range of teachers who responded to our questionnaire, as well as the leader, indicated that, in their view, the school is more effective compared to similar organisations, and that there has been a positive shift in this field in recent years. However, it is important to note that while the national measurements for the above areas show a significant positive shift compared to the national average (e.g. foreign language measurements), the school's results in the traditional areas of measurement (literacy, mathematics) only meet or slightly exceed the average in the reference area (small urban schools). However, the institutional averages of the latter measurements also show that the institution provided a consistent pedagogical added value over the last years (2015-2021) with a small confidence interval, regardless of the composition of the year group, and regardless of the attitude and methods of individual teachers (Kocsis, 2021).

Network-based school management model

According to the school's organisational model, it maintains an active relationship with (1) actors in the local society, which, in addition to the parents, covers local labour market actors and illustrious actors from social life, (2) the academic and higher education world, (3) its maintainer, who directly influences the operation of the school, and (4) with those actors in the development of public education whose innovations are a valuable inspiration for teachers working in the organisation. The latter group includes both educational companies that offer innovative technologies, tools and methods, and institutions - including foreign organisations - that develop their local developments or that can help the institution by adapting the innovative practices developed by the school for further shaping their development, and the school's teachers for their professional development.

It is important to emphasise that regardless of the sector, when thinking about a successful knowledge management system, we typically pay special attention to the dynamics of the governing authorities, holders of academic knowledge (universities), industry players and local social actors, and connections of the Triple and Quadruple Helix model (Carayannis-Campbell, 2010). It is considered that those forms of cooperation can provide the most favorable ground for the creation of innovations, during which overlaps

between these spheres and clusters that provide space for intense, frequent, deep communication are formed (Tsui-Law, 2007).

Cooperation between the school and its partners is based on professional partnership management, perhaps the most important feature of which is that it operates the various forms of cooperation on a dual basis. Firstly, (1) it is operated through partnership arrangements outside the school, in which the school management is primarily involved on the part of the organisation. Their primary purpose is to build trust, define common mid- and long-term goals, and plan frequent, but rather smaller, forms of cooperation. These relationships can typically be described as strategic cooperation relationships, which move only slightly towards the exact assignment of customer/supplier roles, even if joint projects could justify this. Secondly, (2) great emphasis is placed on embedding external partners in the internal life of the school, during which the work of teachers and external actors is connected. A good example of this is when higher education actors, actors from local economic life, high-prestige social figures (Figure 4), or even parents hold sessions from time to time within the classroom framework.



Figure 4: Olympians at the school

Remark: the picture on the right shows one of the institution's gymnasiums with pictures of Olympians, and the two pictures on the left show actual sports meetings.

Source: Own photo and school website.

An important tool for this embedding is the forming of a common culture and language of actors connected to different sectors. A spectacular form of realising this was the STEM working group which emerged from the natural science working community through the perception of external labour market expectations and knowledge management trends. Along with the change, the community became a team that implements real collaborative learning and is far beyond functional collaboration from a formal, administrative, internal organisational unit. Now, in addition to the leader

of the work community who majored in biology and technology, teachers who majored in mathematics, physics, geography, and IT are also present with solid intensity. This interdisciplinary group of teachers works as a real professional learning community. In addition to the collaborative learning between teachers during the implementation of various projects (e.g. geography week), thanks to experiments and interdisciplinary connections, processes that can be interpreted as powerful, expansive learning take place in the school. The diversity of the team members, their experiences, competencies and diversity of approach has an inspiring and fertilising effect on the team. Thus, more and more new, unplanned and unforeseeable innovations appear in the life of the community. As a result of the transformation of external trends, the group started to develop the STEAM (STEM+ART) profile, where the natural science tool system is complemented by the arts (ART) and creates utterly new learning situations. However, not only do the external actors in the school adapt to the market approach, but the school management and the teachers also consider it important to sensitise the external partners who come into the school environment in the direction of pedagogical problems.

Among the opportunity windows revealed during cooperation with external actors, the institution typically tries to seize those that correspond to some - not necessarily stated - priorities. During our case study, we identified a total of five such selection criteria (“filters”).

“We don’t shovel everything in. There are plenty of things on the market. We see it as pointless to search and buy again and again. It is necessary to set a direction that orients the decisions in the longer term.” (Head-teacher)

The first (1) is the adaptively implementable nature of knowledge from external sources; among the pedagogical procedures and/or educational tools introduced in the school and developed by others, we did not come across any whose owner would have demanded strictly faithful implementation. Accordingly, in the case of all adapted tools and methods, we saw smaller, often classroom-level developments, but sometimes we also found innovations based on these that could already be named independently (e.g., the implementation of LEGO MoreToMath, the development of LEGO-LET’S GO). The second filter is closely related to (2) the preference for modular structures. The common characteristic of a significant proportion of the external innovations introduced in the school is that individual parts can be freely introduced, left out, and exchanged, thus favoring diverse im-

plementation. The first two filters primarily make their impact felt during the adaptation of the innovative tools and methods from educational companies, and the local developments of other schools. The third filter (3) is the implementation of tools that have a motivating force in themselves, due to which the latest information communication technologies and logical or moving tools (e.g., climbing wall, 3D printer) came to the fore.

The fourth filter (4) prioritises practices that reflect the competence demands in the labour market. Following this filter, development areas such as programming or Chinese language skills were included in the school's daily practices. The third and fourth priority areas mainly concern the opportunity windows that arise through the relationships with educational companies, the maintainer, and labour market actors.

“We saw that there is an increasing need to strengthen applied mathematical competencies, to prioritise IT knowledge, to put the children who want to find a job in such a position that they have the necessary knowledge in this field, and that they have the commitment.” (Headteacher)

Finally, the fifth filter (5) is the need to channel knowledge of an academic nature that can be practically used in school, which can cover both subject areas and educational science, organisational theory and management knowledge. An excellent example of this is the school's partnership with the university sector, or the involvement of employees in international training courses.

“We contacted higher education institutions; it was very important to acquire modern knowledge there (...) their representatives came to us, held a lecture and motivated the children.” (Headteacher)

When examining these filters, it can be seen that all elements that are typically identified as “innovation pumps” appear during the exploitation of the opportunities inherent in the environment (OECD, 2004, 2013). In addition, a network-based organisational operation that can be said to be comprehensive must also include a colorful array of tools for horizontal knowledge sharing within the school (Figure 5). The starting point for this is the background, that the development of the quality of pedagogical methods is now typically interpreted as a social process. It is considered that collaborative forms of workplace learning can promote higher-level, real learning outcomes and the development of tacit knowledge (Gilbert, 2011; Bakkenes et al., 2009).

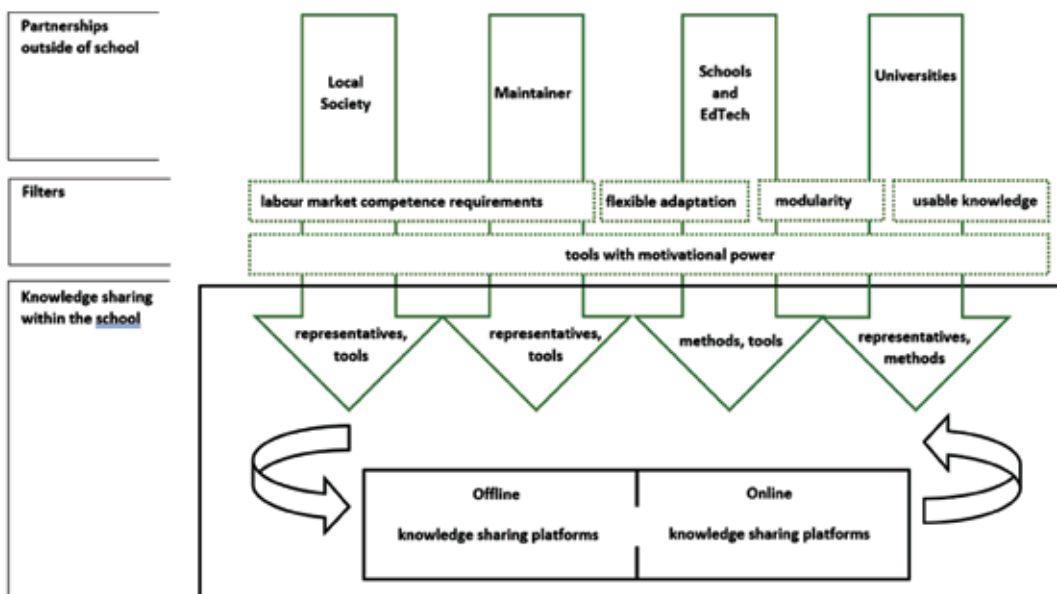


Figure 5: School management model organised on a network basis

Engeström's activity theory system was a good framework for the structured description of the organisation's networking and the resulting individual and organisational learning processes. Thanks to this framework, models emerged that are able to highlight the most important factors of a complex development process and show the dynamics between them.

All interviewees identified the headteacher as the starting point for the network embedding of the organisation and the development and professional learning processes taking place at the institutional level. The leadership behavior of the headteacher (*subject*), representing a network-building management model, responded to the need for student retention (*object*) and opened the school's social space to the maintainer, parents, local market actors and university partners (*community*). The search for partnerships has become part of the new organisational culture (*rules*), an expanded interpretation of learning where external partners appear as a source of knowledge. The headteacher played an exemplary leading role in building partnerships, while also supporting internally motivated grassroots initiatives initiated by members of the teaching employees (a division of labour) with fund-raising activities (Figure 6). This is how the LEGO-LET'S GO program started, as well as LEGO EDUCATION, for the foundation of which the major part of the costs of the study trip abroad was provided by the organiser with the

help of the school leader. Finding and building partnerships and networking and horizontal professional development and learning through them (outcome) brought spectacular results in the tool system and equipment of the entire institution, including the outstanding EDTECH modernisation (outcome).

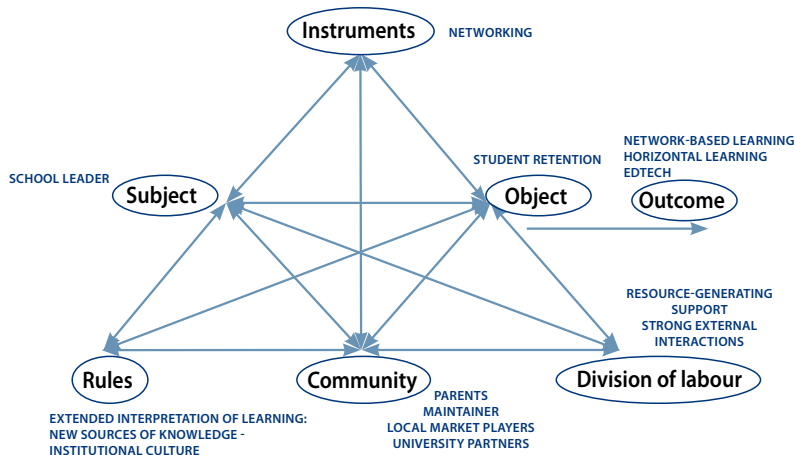


Figure 6: The activity theory model adapted to the school

Technological enrichment, the appearance of EDTECH tools, and the implementation of new procedures (instruments) can be interpreted as the second-generation source of change processes that determine organisational learning and individual professional development in this specific development history. With the emergence of new tools and educational solutions, collaborations within the school have become particularly strong both on interdisciplinary platforms and within individual fields of expertise. A good example of the former is the joint application of the EDTECH solutions introduced by the previously mentioned STEM/STEAM work community (e.g. 3D printer, robotics devices, 3D sandbox); while a good example of the latter is the innovative educational tools used within the humanities working groups (e.g. LEGO, student tablets, digital boards). The majority of the tools brought significant renewal and seriously strengthened the decisive convergence of the applied procedures in the direction of experience-based pedagogy. The tools were both sources of formal - project-based or community-of-practice - renewal processes, as well as collaborations emerging as a result of informal social connections. The latter is based on personal, friendly connections based on goodwill, so we can mostly talk about long-

term, mutually supportive micro-ecosystems, which can also be viable with more serious organisational support, external planning and organisation. The strength of these collaborations comes from the protective function against isolation, the potential to deal with problems and trust-based social relationships.

Through Engeström's activity system, it became clear how the conscious strengthening of the external relationship system can be connected to the internal formal and informal aspects of the division of labour. To open the individual from the closed system of solitary work and to place him in the wide field of organisational action, which cuts across specialised fields and is often free from external regulation.

Conclusion

For several decades, we have considered modern learning environments as those whose operation is strongly based on the flow of knowledge. Institutional management has organised themselves accordingly, and pay a lot of attention to internal knowledge-sharing, as well as to cooperation with external partners, channeling the knowledge that can be obtained there, and monitoring opportunity windows. From the point of view of the latter forms of partnership, it is critical whether the institutions are able to connect across borders. Are they open to actors related to other subsystems, or sectors? Connections outside the organisation can have a particularly stimulating effect on the creation of innovations, which we typically identify as one of the most important "innovation pumps".

Certain aspects of network-based organisational operation can be observed in many institutions in Hungary. This is due, among other things, to the fact that the development interventions taking place in the last twenty years have necessitated the presence of different forms of knowledge-sharing processes in schools and in the practices of individual teachers. In addition, this direction is typically supported by the professional knowledge and commitment of school leaders, given that it is difficult to imagine management training that does not currently place special emphasis on incentive systems for innovative professional solutions, and within this, on the operation of knowledge-sharing communities of practice, and network connections.

Among the mechanisms related to network operation and horizontal knowledge flow in a large proportion of domestic schools, internal knowledge

sharing practice is the one that can function actively. The sharing of knowledge between teachers in these places is facilitated by online and offline knowledge sharing platforms at various organisational levels. Institutions that pay much attention to such internal knowledge sharing are also usually characterised by paying particular attention to monitoring external processes and analysing and using data related to their institution.

A much narrower range of schools can use the potential inherent in external network connections to support their operations with knowledge sharing processes that enable the influx of external knowledge, including good practices developed in other schools. However, the most difficult terrain is not this form of knowledge sharing, but the active involvement in meso-level ecosystems that bring together actors from different sectors. The management of the school presented in this study applies particularly effective management techniques in this field, and we hope that modelling their practice can inspire a group of interested institutional leaders and school developers who want to open up to networking.

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