

Framing the Digital Transformation of Educational Institutions

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Abstract. *Digital transformation, as a new trend of organizational development, changes the way work is being done from the technological and operational point of view. Educational institutions (EI) need to adapt to this new paradigm and other upcoming trends in order to give the new generations right knowledge and skills to cope with the new challenges that are coming with these trends as well as to make their own work easier, faster, more efficient and effective. Methodological frameworks should help guide organizations to digitally transform and they can be used with the aim of making the change right. In this paper we analyse two well-known digital transformation frameworks in order to frame the digital transformation process of EIs within them with the aim to guide them to achieve the goal of increasing their digital maturity.*

Keywords. Digital transformation, Methodology, Framework, Education

1 Introduction

Digital transformation is a trend that was already addressed in the 1990s and again in the mid-2000s, with a focus on the business process digitalization (Digital Transformation: History, Present, and Future Trends, 2016).

The increasing digitization of business processes by new ICT requires developing new business models for organizations to remain competitive on global markets. When applying this fact to the non-profit sector, especially to educational institutions, this means that EIs need to transform their activities in order to achieve goals related to the expectations: of their stakeholders in terms of realizing their mission, of providing high-quality public services, of delivering key performance indicators regarding the cost- mission implementation and of other non-profit specific targets.

In Croatia, the digital maturity of primary and secondary schools differs from region to region, from school to school, and its level can be measured by five

dimensions: Leadership, planning and management, ICT in learning and teaching, Development of digital competences, ICT culture and ICT infrastructure (Begičević et al, 2017). With the aim to research the current state, introduce new EI processes and improve existing ones, introduce ICT related improvements related to the operations in schools as well as the teaching processes, including the support of contemporary ICT, a project e-Schools: Establishing a System for Developing Digitally Mature Schools (pilot project)" was performed from 2015 to 2018 (e-Schools, 2018).

The project had two main parts: the investigation and informatization of operational / business processes of schools and introducing an ERP system for better data processing and the investigation and informatization of teaching and learning processes including computer equipment and digital educational content, wireless Internet and the education of and support to teachers in the implementation of e-classes.

The goal of our paper is to investigate what are the main determinants of digital transformation and how EI's can implement those determinants in their digital transformation.

2 Insights about publications related to Digital transformation methodologies

This research reviewed available literature on Digital transformation methodologies in order to summarize existing findings in this research field. Special focus has been put on the methodologies published in scientific publications. The next section presents the methodology of literature gathering and conducting a short insights analysis.

The literature gathering process started with the identification of the relevant databases for this research. Relevant databases that were selected are Scopus and Web of Science (WoS). The search was conducted based on the combination of keywords "Digital transformation" and "methodology". The

search has been conducted in April 2018 and it received results containing 53 hits in Scopus and 27 hits in WoS. The results showed duplicated entries as 17 of 27 publications from WoS were found also in Scopus, i.e. in both databases. Main trends were recognized as same and since our intention is to show only trends in this field, we put our focus on Scopus publications due to the greater number of publications in total.

The results show that although digital transformation was used as a term since 1979, its current meaning of transforming businesses by relying on contemporary ICT has a growing trend since 2014.

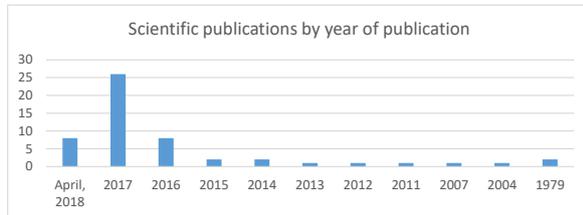


Figure 1. Digital transformation methodology publication by year of publication (SCOPUS)

This short publication gathering study also gave insights about subject area in which digital transformation is a topic of research. The following figure shows that the most publications were related to the computer science and to Business, Management and Accounting. This reveals the digital transformation domain, namely its orientation towards business and IT.

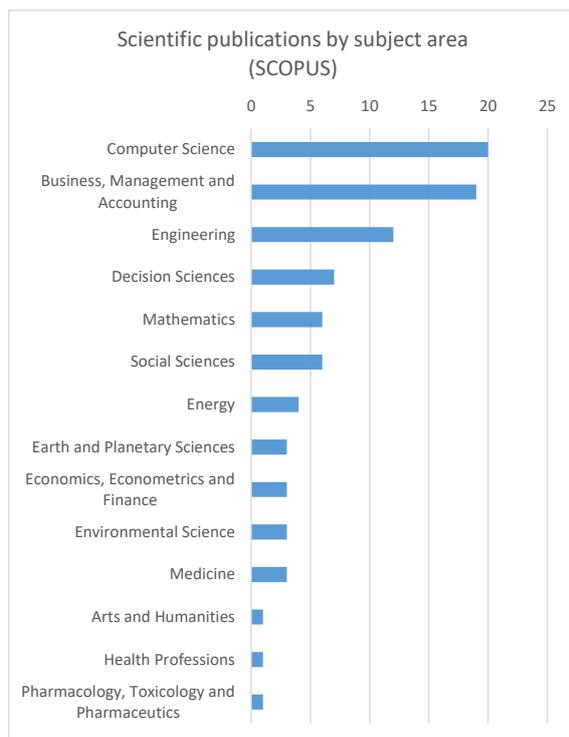


Figure 2. Digital transformation methodology publication by subject area (SCOPUS)

For a more detailed topic refining we analysed keywords and created a “wordcloud” visualization showing keywords that occurred 3 or more times (Figure 3). The keywords analysis implies the orientation of DT to various initiatives and can be used as a map or possible pool of targeting measures or goals confirming our understanding that digital transformation is not triggered exclusively by technological possibilities, but moreover it is being inspired by business needs and then supported by appropriate technologies afterwards.



Figure 3. Digital transformation methodology publication by keywords (SCOPUS)

Our short insights include limited literature insights in only one high-quality database. Due to that fact, this literature review cannot be considered as comprehensive but it shows indications about this trend of going digital. It also gives some light about the authors’ understanding and interpretation of this new paradigm.

Also it shows that the number of publications has grown in the past few years which is an indicator that the field is still in its developing stage, meaning that the maturity is not yet reached. Further research in this field could investigate types of publications and the more detailed report on case studies about digital transformation.

3 Research Methodology

Digital transformation frames should help companies digitally change their work and / or the results of that work. Frames are methodologically developed by theoreticians and practitioners and their aim is to provide guidance and guidance through the transformation (Tomičić Furjan & Kuhar, 2018).

Schallmo et al. (Schallmo et al., 2017) defines digital transformation as follows: “The DT framework includes the networking of actors such as businesses and customers across all value-added chain segments, and the application of new technologies. As such, DT requires skills that involve the extraction and exchange of data as well as the analysis and conversion of that data into actionable information. This information should be used to calculate and evaluate options in order to enable decisions and/or initiate activities. For increasement of performance and reach of a company,

DT involves companies, business models, processes, relationships, products, etc.”

Some methodological dimensions about how EIs could take part in digital transformation or guidelines on how such organizations could digitally transform their processes is in focus of existing research. Many concepts of digital maturity of EIs have been identified and translated into different frameworks (Begičević et al, 2017, p. 360) which are aimed to be implemented for achieving higher level of digital fluency in the fourth industrial revolution (WEF, 2017).

With the intention to encourage openness in education innovation, especially in introducing new approaches, models and technologies that support the increase of digital literacy (WEF, 2017), we analyse two well-known digital transformation frameworks from the industrial sector. Replication of frameworks that have been developed at or well accepted in practice into the educational sector could reveal possible scenarios that are feasible for digital transformation of EIs.

The first selected framework is the Digital transformation compass, introduced by Westerman, Bonnet and McAfee (Westerman et al., 2014, p. 173). The Compass, with defined activities in areas that cover the whole life cycle of digital transformation, is based on findings from a global survey on hundreds of companies across different industries conducted by the authors, is very practice oriented, and therefore was chosen for analysis in this paper.

The second framework is the Business model canvas, developed by Osterwalder (Osterwalder et al., 2014, p. 16). Business model canvas as a tool is not exclusively reserved for framing the digital transformation. Its aim is to help develop a company in any form of digital change. This framework was selected because of its wide implementation in practice of over 5 million users (Business Model Canvas), as well as for the fact that authors of this paper have experience in the use of the Canvas in other projects (Digitrans method framework, 2018).

These frameworks will act as our frames for specifying EI's digital transformation by identifying key determinants aiming to achieve the goal of increasing EI's digital maturity. The two selected frameworks are presented in section 3.1 and 3.2, while the Framing of EI's digital transformation is given in section 4.

3.1 Digital transformation compass

The digital transformation compass, as a framework that should help organizations digitally transform, was developed by Westerman, Bonnet and McAfee (Westerman et al., 2014, p. 173). The methodology described in this framework was developed based on experiences and best practices established by the 'digital masters'. Digital masters are large companies in traditional industries that use digital processes to improve their business.



Figure 4. Digital transformation compass
Source: (Westermann et.al., 2014, p.174)

The compass, (shown in Figure 4) leads organization through steps to be performed, grouped in four areas, each one of them dealing with the different dimension of the transformation:

1. FRAME - Framing the digital challenge is the first area of digital transformation and includes activities of building and rising awareness, especially that of the leaders in the company, of digital potentials and of how they can translate the AS-IS state into TO-BE vision.
2. FOCUS - Focusing investment is the second area, and it means that the organization has to get the transformation funded and sponsored by the right people/sources and that it has to be defined by the right activities and governance.
3. MOBILIZE – Mobilizing the organization includes organizational and cultural change on all levels by all employees.
4. SUSTAIN – Sustaining the digital transition deals with the question of how to stay on top as a digital master.

Each area has three steps which lead the company through the process of digital transformation. The companies may have already taken some of the digital initiatives, and they have to determine what they are still missing and concentrate on doing that.

3.2 Business model canvas

Business model canvas was developed by Osterwalder and it is based on his earlier work on Business Model Ontology. It is a template for capturing value for the organization (Osterwalder et al., 2014, p. 16).

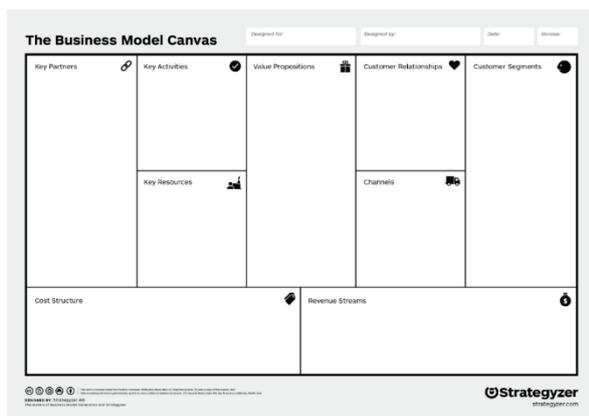


Figure 5. Business model canvas
Source: strategyzer.com

Business model canvas (shown in Figure 5) consists of nine elements that represent the companies' way of creating, delivering and capturing value (Osterwalder et al., 2014, p. 17).

4 Framing EI's digital transformation

In this chapter, previously demonstrated frameworks have been applied in the context of EI as our theoretical proposal of possible scenarios of DT. In Table 1. the analysis was made on how to use the digital transformation compass as a guide for educational institutions which want to digitally transform. The 12 steps in digital transformation compass are listed and explained in column 1, and how to interpret them and perform in EIs in column 2.

In Table 2. the analysis was made on how to create a new business model in educational institutions that want to digitally transform using the business model canvas. The 9 elements from the canvas are listed and explained in column 1, and what they represent in digitally transformed EIs in column 2.

Table 1: Framing EI's digital Transformation according to DT Compass

Step in the digital transformation compass (Westerman et al., 2014, p. 174)	Implementation in EIs
Build awareness of digital potential, threats and opportunities to the leaders in the organization – they have to feel the need to change	Principal, head of any organisational unit, a visionary teacher, EI advisory agencies, ministry or any educational support organization - whoever the initiator of the change is, needs to get the other leaders and decision makers on board. Organizing internal workshops, webinars, idea dissemination events and conferences is a good way to present the advantages of digital technologies when further implementing them to the educational sector.
Define your starting point related to strategic assets and digital competencies	The most important strategic asset of a school are teachers with their capabilities and competencies to implement the change, and together with the physical assets like appropriate classrooms, networks, computers etc., as well as the intangible ones, like organizational culture and fundamental values, they all build the starting point of the digital change. It is important to know where the EI stands now in order to determine where it wants and can go.
Create a shared vision , digital and known by all leaders in the organization – define the <i>what</i> you want to achieve	With the starting point in mind, the vision of the digitally changed EI has to be created and communicated to all participants already on board. Their need to understand, approve and live the vision every day, in order to distribute the idea further to other employees.
Translate your vision into action , by defining strategic goals and a roadmap of activities to be performed - define the <i>how</i> you want to achieve it	When the vision is created and the EI leaders know where they want to be in the future, it is time to define how to get there. This is done by operationalising the vision through strategies, goals and activities. The goals have to be related to EI's customer (students, their parents, future employees and the society) and by keeping its value change in mind as well as the improvement of operations which is done by EI's employees themselves. Both of the mentioned "stakeholders" are equally important, and therefore they should be involved in the process of defining goals and in the activities for achieving them.
Build your governance through mechanisms to steer digital transformation	Once the roadmap is set and everybody in the EI knows what to do, it is important to ensure that all the activities "lead" to the same direction and that they "stay" on the proposed path. For that purpose, it is important to define additional steering roles – responsible persons for the achievement of goals, as well as shared units that should help dealing with the joint challenges.

<p>Fund the transformation by building a balanced portfolio of investments</p>	<p>Although EIs are non-profit organizations, they should shape the next generation society makers and therefore the education system improvement should not depend on costs, digital transformation always brings some costs. Usually, in EIs, the costs are related to the building of digital infrastructure, the education of teachers and administrative staff to use new technologies, for digital and online teaching materials, as well as all related and occurring costs during the transformation. Due to that it is crucial to involve as many stakeholders as possible and to get them engaged in the transformation process regardless of their local, regional, national and international level of operation.</p>
<p>Signal your ambitions, define the advantage of going digital to every employee</p>	<p>The top team of leaders already on board has now a significant task to get everybody else on the “ship”. This should be done at the earliest stage of the transformation as possible, through every available channel – meaning at school board meetings, internal educations and other formal events as well as through teachers’ chats, during the morning coffee breaks and other informal happenings. Every teacher, accountant, sociologist, psychologist or other expert in the EI needs to know what is supposed to be done, understand what are the benefits for them personally from the new way of getting the job done and how their change contributes to overall digital strategy operationalization.</p>
<p>Earn the right to engage from the employees that co-create the solution and make it happen</p>	<p>All employees will be familiar with the new digital change, but that does not mean they all are going to follow and live the vision, strive to achieve the goals and perform the activities that are set. It is important to find the champions among employees, identify good examples and practices and encourage and motivate others to “be like them”. EIs always have teachers who are building bridges with students, promoting a good atmosphere in classrooms and who are generally very well accepted by students, let others learn from them. Additionally to the best practices, it is important as well to give the opportunity to the “not that good“ ones to talk about and deal with their issues and problems without any judgement or negative consequences.</p>
<p>Set new behaviours and evolve culture by using new technologies to change the organisational culture</p>	<p>In order to strengthen and increase the influence of good practices of the champions, new technologies need to be available and used by everyone so the “word can be spread” faster, reaching everyone. New technologies include new applications as well as new ways of using them, and they will be accepted and used by everyone only if they are well adopted to their purpose. The best content management system with the greatest number of possibilities for storing and sharing digital learning materials will not be accepted if it is complicated to use. Try to avoid contra productive activities such like these ones which are increasing instead of reducing operations time and costs.</p>
<p>Build foundations skills with a digital platform for in-house knowledge exchange and a competence development plan</p>	<p>Building skills that will enable employees to implement digital technologies in their everyday work starts with the determination of the difference or the gap between the ones they already use and the ones they need to acquire. A competence development plan for teachers as well as for the support processes staff, that includes internal and external education programmes, has to be created. A good digital platform can help exchanging the new knowledge and also give everyone access to up to date information about the progress of the transformation.</p>
<p>Align incentives and rewards for those who achieve the goals first</p>	<p>The best have to be rewarded, in order to motivate others to be more agile, adaptive and dedicated to their goal achievement. At this step a customer evaluation could be useful. The leaders should give the students the opportunity to validate their teachers work, and reward the best ones.</p>
<p>Measure, monitor and iterate the progress of digital transformation and adapt if needed</p>	<p>Measuring single employees’ success can be motivating, but also it can be experienced as control and pressure, if it is not connected to the objective results of the work that is being done. It is important to set a measurement and monitoring system of results that lead to the accomplishment of the defined vision. The results should be measured periodically, and the activities defined in the roadmap of change should be revised if the goals are far from being achieved. It is important when everybody is on the “same ship” that is keeps sailing to the right direction.</p>

Table 2: Framing EI's digital Transformation according to Business model canvas

Element in the business model canvas (Osterwalder et al., 2014, p. 16)	Implementation in EIs
Key partners include the network of partners that help getting the job done	Key partners of EIs are all decision making and funding institutions that in some way influence the work of EIs (like the ministry on the national level, the founders on regional or local level), suppliers (of student meals, teaching materials and books, assets – also IT assets, and services like transportation of students, accommodation etc.) and other support organisations. Key partners should share a common idea of EI's digital transformation.
Key activities that are the most important and have to be done good	The most important activities in EIs are teaching, learning for better teaching and evolving in performing educational processes for new trends and challenges that the digital era brings. It is important to encourage and motivate employees in order to become best, or near to the best.
Key resources that are required for performing the key activities	The most important resources of EIs are teachers and other support processes staff with their capabilities and competencies to perform the new activities and work on the development of their skills in order to implement the change. Skills that are missing have to be built through a detailed competence development plan for teachers as well as for the support processes staff that is created and performed. Other, physical assets (appropriate classrooms, networks, computers etc.) and intangible assets (suitable organizational culture and corresponding fundamental values) are required as well in order to ensure that the new knowledge and skills can be used for the transformation.
Value propositions include products and services that create value for the customer	The services which are provided by EIs are important to the society because knowledge and skills help students to cope with the new challenges that are coming with new trends. The change is affecting EI employees as well, by making their own work easier, faster, more efficient and effective. These values are of strategic importance to every EI and they have to be assessed. Every teacher, accountant, sociologist, psychologist or other expert in the EI needs to know what is supposed to be done and what is the new or better value for the students that comes with the transformation.
Customer relationships defines the type of relationship as well as the acquisition process of new customers	Relationships that are established between the EIs and their primary customers, the students, as well as their parents, are assuming trust in the fact that they are doing their jobs in the best possible way. In the primary education there is no acquisition process, but in the secondary education the digital maturity of the school, its efforts in applying new technologies and new ways of teaching can bring a competitive advantage for the potential students and build a stronger relationship to the current ones.
Channels include the way of communicating the value propositions to the customers	The value proposition should be communicated as soon as possible, through every available channel – meaning at school and student board meetings, in classes and other formal events as well as through informal happenings. Organizing external workshops, webinars, idea dissemination events and conferences is a good way to present the communicating the value propositions to the customers from other segments.
Customer segments that the organization is aiming to reach with the new product or service	EIs primary customer segment are students. Other customer segments are related to the wider society participants like future employers, higher education institutions, and other stakeholders.
Cost structure including all costs that can occur in the transformation process	In EIs there are several cost categories: related to the building of digital infrastructure, the education of teachers and administrative staff to use new technologies and for digital and online teaching materials. Besides these direct costs indirect costs are also relevant to overall transformation costs (like costs of promoting and communicating the change, infrastructure maintenance costs and other).
Revenue streams that are supposed to get the new value financed	Public EIs are mainly nationally financed from the state budget, but there are possibilities to enrich the funds for digital transformation by public or private funds, donations and sponsorships. It is possible to get additional funds from institutions on the local, regional and national level, as well as to apply to international funds if possible.

Remaining question for further research and analysis is how to ensure sustainability of digital transformation of EIs in terms of ensuring funding and maintenance regarding costs that will occur throughout the transformation process. These issues need special attention and efforts to address them.

The European Commission funds a variety of activities on research and innovation for digital learning under several programmes, including Horizon 2020, previously funded through areas of Technologies for learning and skills (2016), Technologies for better human learning and teaching (2015) and Advanced digital gaming/gamification technologies (2014), (Research and Innovation for ICT in education).

5 Discussion

Previous tables 1 and 2 show that concepts of digital transformation that are well known in various business industries can be mapped and applied to an educational environment. Operatively, educational institutions can replicate implementation efforts and guidelines from the business/ industry sector for supporting processes that are performed in a similar way in educational institutions. This research was conducted with the goal of developing possible scenarios for digital transformation of educational institutions within the project “e-Schools: Establishing a System for Developing Digitally Mature Schools” (e-Schools, 2018) for the purpose of planning how to continue the digital transformation of educational institutions in Croatia.

By framing EI’s digital transformation by two selected digital transformation frameworks we gained a good perspective of how to approach the transformation process itself. Both frameworks show the linkage of strategy and operational processes as well as the importance of resource capability assessment in form of employee skills and motivation to carry out the digital transformation.

References

- Begičević Ređep, N. Balaban, I., Žugec, B. Klačmer Čalopa, M. & Divjak, B. (2017). Framework for Digitally Mature Schools, *Proceedings of the European Distance and E- Learning Network 2017 Annual Conference* (pp. 360-371). Volungeviciene, Airina; Szűcs, András – Jönköping (Eds.), European Distance and E- Learning Network, Sweden.
- Business Model Canvas. Retrieved on April 28, 2018 from: strategyzer.com/canvas/business-model-canvas
- Digital Transformation: History, Present, and Future Trends. Retrieved April 28, 2018. from: auriga.com/blog/digital-transformation-history-presentand-future-trends/
- Digitrans method framework, Retrieved August 22, 2018. from www.interreg-danube.eu/approved-projects/digitrans/section/digitrans-method-framework
- e-Schools, Retrieved April 28, 2018. from: www.e-skole.hr/en/e-schools/project-description/
- Osterwalder, A., Pigneur, Y., Bernarda, G. & Smith, A. (2014). *Value proposition design*, Hoboken, New Jersey: John Wiley & Sons
- Research and Innovation for ICT in education. Retrieved on August 21, 2018 from: ec.europa.eu/digital-single-market/en/research-and-innovation-ict-education

The digital transformation compass recognizes the significance of organizational factors like leading and cultural influencers. Business model canvas framework emphasizes the customer centricity dimension as a leading determinant of setting goals related to key products and services.

None of two compared frameworks require components of infrastructure or technology related to digital transformation. This also confirms our understanding and interpretation of digital transformation paradigm that it is not all about technology, but it is being inspired by business needs firstly and then supported by appropriate technologies secondly.

6 Conclusion

Digital transformation as a paradigm of changing the way organizations run their business is often misunderstood and mistakenly considered as only another informatization initiative or a buzzword. Our short insights about publications related to DT methodologies indicate increasing interest of researchers for the topic and its subject area analysis shows that DT is more than just another technology initiative. Digital society as context in which educational institutions are providing public services is challenging, so EIs need to change and adapt themselves.

In order to support EIs in this transformation process, we investigated methodological frameworks and took two well- known frameworks in order to frame the digital transformation process of EIs within them. This has led us to confirming our presumption that the leading issue in digital transformation are not digital technologies, but challenges of digital societies that urge organizations to set their goals with the emphasis on business needs and customer expectations which then can be supported by new technologies.

- Schallmo, D., Williams, C.A. & Boardman, L. (2017). Digital transformation of business models — best practice, enablers, and roadmap. *International Journal of Innovation Management* 21(8), pp. 17. doi: 10.1142/S136391961740014X
- Tomčić Furjan, M. & Kuhar, P. (2018) Comparative analysis of digital transformation frameworks. In prof. dr. sc. Vladimir Rosić (ur.). *Radovi 7. međunarodne znanstveno-stručne konferencije: Liderstvo kroz partnerstvo*. Visoka poslovna škola PAR, Rijeka.
- Westerman, G., Bonnet, D. & McAfee, A. (2014). *Leading Digital – turning technology into business transformation*. USA: Harvard business review press.
- World economic forum - Realizing Human Potential in the Fourth Industrial Revolution, An Agenda for Leaders to Shape the Future of Education, Gender and Work, Retrieved August 22, 2018. from: www3.weforum.org/docs/WEF_EGW_Whitepaper.pdf.