This paper was presented at The ISPIM Innovation Conference – Innovating in Times of Crisis, 7-10 June 2020.
Event Proceedings: LUT Scientific and Expertise Publications: ISBN 978-952-335-466-1

Ready to innovate? A self-assessment tool for schools on the edge towards digital education

Gergana Vladova*

Weizenbaum-Institut, Hardenbergstraße 32, 10623 Berlin, Germany.
E-mail: gergana.vladova@wi.uni-potsdam.de

André Renz

Weizenbaum-Institut, Hardenbergstraße 32, 10623 Berlin, Germany.
E-mail: a.renz@udk-berlin.de

Alexander Heuts

Weizenbaum-Institut, Hardenbergstraße 32, 10623 Berlin, Germany.
E-mail alexander.heuts@hu-berlin.de
* Corresponding author

Abstract: The paper presents a self-assessment framework for schools with the aim of giving schools the opportunity to assess the degree of digitalisation of their institution and to derive measures for implementation. The self-evaluation also serves to identify potential for innovative learning strategies and to enter into active networking with other schools that are in the process of digital transformation. The framework is adaptive, modifiable and extendable during the digitalisation process. Even though new educational technologies have been in development for decades, they have not yet had the promised transformative effect on the education sector, as they did not become necessary until very recently. However, the need for digital educational tools and concepts became a reality overnight, driven by the COVID-19 crisis, which confronted schools with their own strengths and weaknesses, possibilities and limits within the strategic and operative context of their educational processes.

.

1 Introduction

In recent decades, innovation has increasingly been identified as a crucial factor for competitiveness in a globalized economy; it has a strong impact on markets and the ability of organizations to adapt to a changing environment (Damanpour and Gopalakrishnan, 1998; Hargadon and Sutton, 2000). In the literature, innovation is defined as the implementation of new or improved ideas, knowledge and practices (Kostoff, 2003; Mitchell, 2003). In the enterprise context, innovation-related topics have been researched intensively, and the general conditions for innovation have been continuously optimized. However, research on innovation in the public sector, including education, has only recently begun and has become increasingly important. Both the innovation of educational goals and methods and including the ability to innovate as an important learning objective for students have increasingly become the focus of theoretical and application-oriented research. Furthermore, digitalisation is an accelerator of demand for new skills, and a more comprehensive process of differentiation is taking place in education: the traditional methods of learning and teaching are increasingly being challenged. Educational innovations effectively improve learning outcomes and the quality of education, although changes in the educational system or in teaching methods can help adapt the educational process to individual students' needs. In its 2018 recommendations, the Council of the European Union (2018) identifies digital competence as one of the eight key competences for lifelong learning. Given that digital competence is one of the main objectives of digital education, teaching and acquiring these competences is important. According to the Council of the European Union (2018. P. 9), "digital competence involves the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society". The digital competence of both teachers and students is an important factor that is essential for a successful digital transformation of schools. It is necessary to fully benefit from the potential of digital media and to use this media in both pedagogical and didactical ways.

Even though new educational technologies have been in development for decades, they have not yet had the promised transformative effect on the education sector, as they did not become necessary until very recently. During the 2020 COVID-19 crisis, this need became a reality, so more and more educational institutions began shifting their activities to a virtual space. The current state of the technologies being used, the digital infrastructure, virtual teaching strategies, and the digital competence and experience of teachers is diverse. However, this is precisely the starting point for a potential innovation in the field of education. The use and spread of innovations are influenced by various factors. In the case of educational innovations, one of the most important factors is how well the innovation can be observed and tested. At the moment, there is no possibility of structured self-reflection and objective evaluation of the individual situation with regard to the digitalization of teaching in schools, so it is more difficult for schools to begin making innovative changes.

The purpose of our contribution is to present a developed self-assessment framework for schools. Our aim is to give schools the opportunity to assess the degree of digitalisation of their institution and to derive measures for improvement through this framework. The self-evaluation also serves to identify innovation potential and to enter into active networking with other schools that are in the process of digital transformation. The framework is adaptive, modifiable and extendable during the process of digitalisation.

In the context of this paper we will first present three results: 1) the design of the conceptual framework for the transition to digital schooling; 2) the self-assessment phases; 3) the design of the two most important elements of the first assessment phase. In addition, the paper outlines the next steps that are necessary to fully address this as well as the further phases of the self-assessment tool.

2 Introduction of the framework for digitalisation of schools

We regard the digitalisation of schools as an open innovation process (cf. Chesbrough, 2003) and use the stage-gate process model (Cooper, 1990) as a starting point to structure it in a formal way. We have adapted this model for our purpose and described schools on the basis of three stages: 1.) not digital, 2.) partially digital (employing hybrid learning), and 3.) fully digital (Fig. 1). Between each of these stages, there are decision gates during which a school revises its previous status and decides on the next step to move towards digitalisation. We use three arguments to justify this consideration: 1) The digitalisation process of schools can be seen as a process innovation that affects organisation, technology and people. 2) Schools can go through different phases and must make decisions between these phases. 3) The decisions and process are dependent on external actors that can influence the innovation process and either promote or hinder it.

We use the conceptional framework for Open Innovation Processes introduced by Braun et al. (2011) in order to describe the transformation process in schools with a focus on three relevant levels (see Fig 1):

The ***operative level*** forms the core of the digitalisation concept and takes the form of a stage-gate process model. Each stage presents a phase or subphase of the digitalisation process, and each gate represents a decision-making point regarding further action within a concrete project. On the operative level, the school has the aim to organize a smooth project flow and to take appropriate decisions regarding next steps.

The ***strategic level*** is an integrated part of the digitalisation concept. It includes all areas of activity that directly influence the digitalisation strategy of a school.

The ***framework conditions*** cover central influence and success factors that directly influence the digitalisation process. This raises e.g. the question of the creation of a suitable communication structure as well as the necessity to build up and promote appropriate change affine culture.

The school is furthermore embedded in a direct ecosystem with actors who can have a direct influence on decisions at both the operational and the strategic level. Another ecosystem also exerts influence: this includes actors such as politicians, EdTech providers, society, or technical changes that have occurred as a result of digitalisation. Figure 1 visualises this framework for the digitisation process in schools.

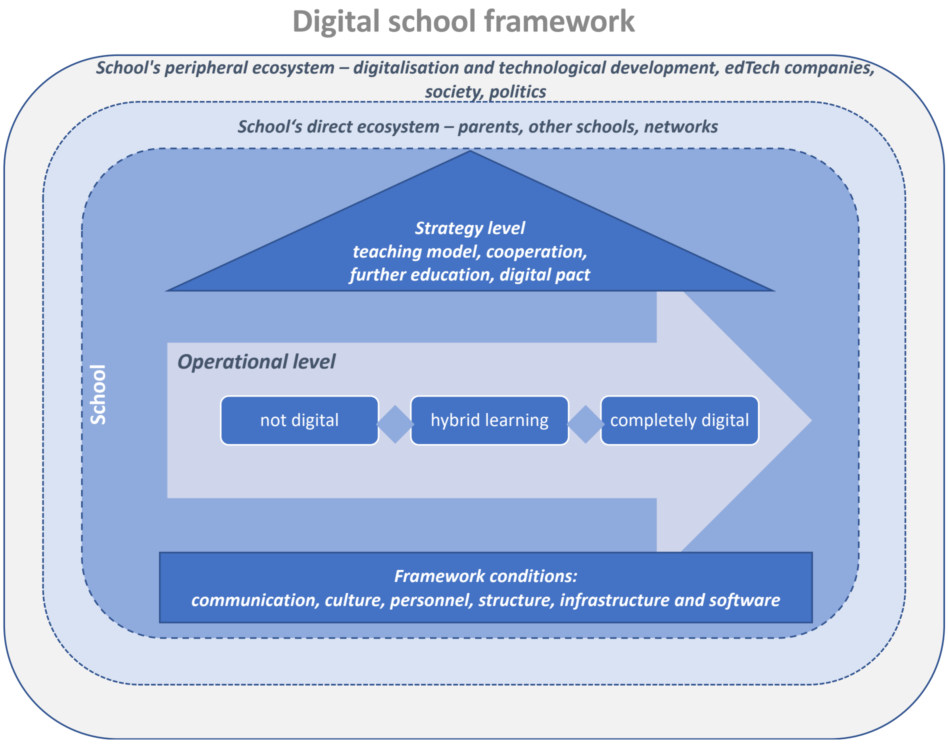

Figure 1 Conceptual framework for digitalisation processes in schools (adapted from Braun et al., 2011).

3 Self-assessment tool for schools

Due to the wide heterogeneity of digitalisation situations and individual situational conditions in schools, the self-assessment tool can assist schools by providing them with an evaluation methodology to guide them through the analysis process phases and enable them to make a comprehensible decision about digitisation. For this structured approach, we use the adapted approach of Vladova and Ullrich (2015) regarding the assessment of opportunities and risks of open innovation processes. The methodology is structured in four steps, which are described below as an example of the first stage of digitalisation (the first stage is “not digital”) (see Figure 2). These four steps can be followed for each of the digitalisation stages. The first two steps are those of intensive analysis (corresponding to the stage activities). The last two steps are assigned to a gate, which is where decisions are made, including whether the school can and should be digitalised and how to implement the digitalisation.

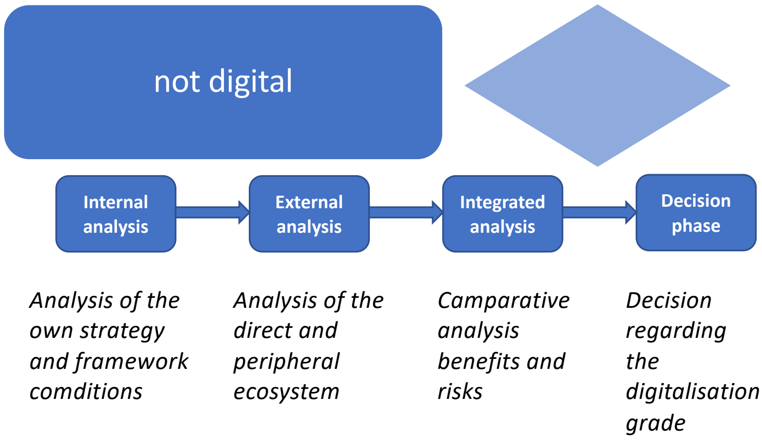

Figure 2 Self-assessment phases on the example of a first level of digitalisation. (The assessment phases can be applied in each of the three stages of the digitisation process. Here is an example from stage 1, "not digital.")

Phase 1: Internal analysis - Identification of digitalisation goal, actual and intended degree of digitalisation, and analysis of strengths and weaknesses

This first step of analysis concerns the view from inside the school's own four walls – the operative and strategical level (Fig. 1). At this point, schools need to focus on their current situation and how they can potentially cope with digitisation. The most important questions are 1.) Does the teachers in the school possess existing digital skills? and 2.) Is there the technical possibility to move towards digitalisation? This phase is the most important in the context of the COVID-19 crisis, as it determines how a school can meet technical challenges and remain capable of meeting educational goals. Phase one will be discussed in detail below.

Phase 2: External analysis - Identification of benefits and risks as well as assessment of their probability of occurrence

The second phase of analysis concerns both the direct and indirect ecosystem of the school (Fig. 1). The aim is to identify and take into account relevant external actors and influencing factors on the school's decision to digitise. This includes, for example, the families of the pupils and whether they accept digitisation or if they have the technical competency or resources to accept it. Furthermore, indirect ecosystem factors such as current political decisions, cooperation with EdTech companies, or technological developments will also influence the school's decision.

Phase 3: Integrated analysis - Comparison and interpretation of the results of internal and external analysis

In the third phase, integrated analysis, the school compares the achieved internal strengths and weaknesses with the external influences (positive and negative) and prepares a decision. It is of particular importance to find a balance between all influential factors when making the final decision to move towards digitisation or keep employing more traditional learning methods.

Phase 4: Decision phase

In this phase, the school receives recommendations regarding the level of digitisation and next steps.

During the COVID-19 crisis, the analysis of the internal conditions in the school (Phase 1) is especially necessary, as the school must meet the minimum necessary conditions to be able to organise and proceed the educational process under the given conditions. This analysis will be explained in detail below, using the example of school competences and technology.

4 Operationalisation of the first self-assessment phase

In order to analyse the operational and strategical level, we use the model of technological-pedagogical-content knowledge (TPACK). This model has established itself as a comprehensive framework in research and practice (Roussions & Jimoyiannis, 2019). The model provides a framework that supports the integration of digital technologies into pedagogical practice and programs for the preparation and professional development of teachers for the integration of ICT into pedagogical practice (Chai, Koh & Tsai, 2013; Jimoyiannis, 2010). The model combines three dimensions of knowledge, three hybrid forms and the context. The three dimensions of knowledge connect Content Knowledge (CK), which addresses specialist knowledge; Pedagogical Knowledge (PK), which refers to the understanding of teaching-learning processes, teaching methods and knowledge about learning styles or motivation of learners; and Technology Knowledge (TK), which describes the knowledge of dealing with technologies. "The constantly changing nature of technology results in this being a challenging dimension, making the disposition to continue to learn and adjust to new technologies important" (Bauer, 2014, p.14). Pedagogical Content Knowledge (PCK) is the knowledge of how to convey certain content to learners; Technological Content Knowledge (TCK) is the understanding of the interactions between technology and practice; Technological Pedagogical Knowledge (TPK) is the knowledge of the possibilities and limitations of a pedagogically motivated integration of technologies. The intersection of these different levels of knowledge is found in the Technological Pedagogical and Content Knowledge (TPACK), which is the intersection of all three fields of knowledge, with an interdependence on each field. If teachers succeed in this form of professionalization, the quality of didactic planning increases significantly (see ibid.) The starting point is the realization that there is neither the appropriate teaching method (PK) nor the appropriate technology (TK) for teaching a certain content (CK). Rather, the three dimensions of knowledge need to be brought together. In the model, the context is considered as the framing situational condition.

As mentioned, this framework is currently under development. Regarding the internal analysis, we will present the competences of the employees and technology as two important elements. These are relevant for two reasons—firstly, they are directly observable and measurable. Secondly, these results that can directly influence schools, and the schools can benefit from these direct recommendations.

Technology

Although technology and education have become increasingly connected over the last 20 years, there is no binding framework for schools in terms of how to use appropriate technology or what technical equipment is required for optimal learning. As a result, it is only partially possible to define suitable parameters for the self-assessment of schools in the process of digitalisation in the technology sector. To select the first parameters, we have oriented ourselves to recommendations for action and guidelines from individual federal states and state initiatives (e.g. Media Consulting NRW, Bertelsmann Foundation, Ministry of Education Rheinland-Pfalz, and the Ministry of State for Culture of Saxony). We distinguish between binding parameters (such as ensuring IT security) and freely-definable parameters (such as the use of software). Freely-definable parameters allow scope for design, which should be used according to the individual requirements and needs of the schools. Thus, digitisation does not necessarily have to lead to homogenization, but should also give room to heterogeneous learning. Considering these degrees of freedom, the most essential elements are briefly described below, including room conditions, staffing, hardware, software, infrastructure services and network infrastructure, IT security and cloud services or web-based solutions.

The self-evaluation allows schools to analyse each element in more detail to identify the extent to which the individual elements are available, well thought-out, implemented, mature, and ready for use in the classroom. For the first framework, we do not weigh and prioritise the mentioned elements. Rather, the individual elements should be weighted, prioritised, modified and expanded in the next step through the active involvement of the school leadership.

Generally, the **room conditions** should be checked during an initial self-assessment of the technological equipment. Does the school have permanent computer work rooms, or does alternative equipment have to be used (mobile devices, digital presentation technology such as beamers, screens, etc.)? Due to ever-changing living and learning conditions, alternative equipment variants are more modern and flexible and thus preferred.

Regarding **staffing**, it should be evaluated whether the school can rely on the expertise and support of EdTech agents, media consultants or competence teams. In addition to internal contact persons, it is also possible to enter into cooperation or framework agreements with external IT service providers or other consultants in order to be supported in the selection, installation, maintenance, expansion and use of technological equipment.

Hardware equipment can be differentiated into heterogeneous and homogeneous equipment. Bring your own device (BYOD) is understood as heterogeneous equipment, since all participants of a school are using their own hardware (Medienkompetenz Portal NRW, 2017). On the other hand, there is the choice of homogeneous equipment, whereby either the school purchases it as an organization, or teachers and students are instructed which hardware they must purchase to use in the school. Although BYOD relieves the school's burden of investment and maintenance costs, there are higher expenses in the area of technical integration, educational conception and IT security. Homogeneous equipment can facilitate didactic and technical integration into school operation, but the investment and maintenance costs must also be considered as a tradeoff.

In the case of **software,** standardization is desirable from the school management's point of view. In order to enable schools to set individual priorities, standardization can be prepared in the form of three blocks, as proposed by Breiter et al. (2015). The authors differentiate between basic image (operating systems, office products, Java etc.), basic installation of learning software (school-specific learning software) and individual installation (software licensed by the school).

Infrastructure services and network infrastructure: a school network must meet the requirements of modern computer networks. Depending on the scenario, the network should reflect the special features of the individual schools, allowing for different users with different access rights on different terminals (e.g. allowing instructors to access and edit all programs, while students have limited access to the learning platform). Various infrastructure services help to map the desired scenario. In order to use the digital network infrastructure in schools in a legally secure manner, it is essential to ensure that all pupils receive and sign usage agreements (in the case of underage pupils, these will also be signed by the parents). This legal basis is particularly necessary for the provision of Internet access.

IT security is becoming increasingly important in the self-evaluation of schools. In the future, the question of IT security, especially data security, will become more important, and is closely linked to the network security factor. This is especially relevant when solutions such as “Bring Your Own Device” (BYOD) become the focus of the infrastructure. The confidentiality, integrity and availability of data must be guaranteed to students. The following hazard groups must also be distinguished in schools: technical failure, organizational deficiencies, human error and intentional actions. IT security for schools can be divided into four areas: Software, IT infrastructure, data protection and Internet use.

The use of **cloud services or web-based solutions** is always accompanied by the question of data protection and data security. In general, it can be said that all services in which the data is hosted outside the country of use or sent to international servers are not compatible with data protection law. In each individual case, school administrators must determine whether the use is legally questionable from a data protection point of view.

The elements of the technological level that are listed here are not comprehensive; instead, they are intended to help develop an understanding of the technological level’s complexity. The deepening and broadening of individual elements depends largely on the extent to which a school has already been digitized. In the next step, further considerations can be included, such as whether the use of a learning management system (LMS), a learning experience platform (LEP) or a cloud solution is appropriate for a school.

Digital competence for teachers and learners

To teach students the basics of digitization, digital competences, or the use of digital media, as well as to access professional engagement or prepare lessons, teachers need a broad range of digital competences. To evaluate the digital competence of teachers, we use the European Framework for the Digital Competence of Educators (DigCompEdu) (cf. Redecker, 2017). This framework describes a total of 22 competences, which are divided into six competence areas. Thus, teachers need competences in the area of professional engagement, which includes organizational communication, professional collaboration, reflective practice, and digital continuous professional development (cf. Redecker, 2017, p. 19). Additionally, it is necessary to develop competences in the area of digital resources, which includes selecting digital resources, creating and modifying digital resources, and managing, protecting and sharing digital resources (cf. Redecker, 2017, p. 20). The competence area of teaching and learning covers specific competences for teaching and guidance as well as the support and enhancement of collaborative learning and self-regulated learning (cf. Redecker, 2017, p. 20 f.). To enhance assessment with digitalization, teachers need specific assessment strategies and competences in analyzing evidence and in feedback and planning (cf. Redecker, 2017, p. 21). Teachers' digital competence also includes the ability to empower learners through digital strategies. Thus, teachers need to use digital technologies for accessibility and inclusion, differentiation and personalization, and for actively engaging learners (cf. Redecker, 2017, p. 22). Teachers also need competences to facilitate learners' digital competence (cf. Redecker, 2017, p. 23), which is explained in the section on the digital competence of students.

To assess the current level of a teachers' digital competence, DigCompEdu provides a progression model, which teachers can use to identify their proficiency progression. Just like the Common European Framework of Reference for Languages (CEFR) (cf. Council of Europe, 2001), DigCompEdu also sets up 6 proficiency levels from A1 to C2. The first two levels are Newcomer (A1) and Explorer (A2). At this stage, teachers "assimilate new information and develop basic digital practices" (Redecker, 2017, p. 29). The two stages at the B level are Integrator (B1) and Expert (B2), where teachers "apply, further expand and reflect on their digital practices" (ibid.). At the C level, the stages are called Leader (C1) and Pioneer (C2). If a teacher has reached this level, he or she can "pass on their knowledge, critique existing practice and develop new practices" (ibid.). To assess the teachers' digital competence, DigCompEdu provides the self-assessment tool "DigCompEdu Check-In"[1].

Theoretically, teachers can develop their digital competence in different ways. In the best-case scenario, their digital competence is fostered during their teacher education. However, since this is often practically not the case when teachers are studying at a university, their digital competence must be developed in a different way. Because of the fact that technology is continually changing, developing, and improving, it is the case that even if a teacher that completed a rigorous education program that taught digital strategies and best practices might still need to learn new technologies, software and strategies. Teachers could also educate themselves at home and learn a lot of new skills autodidactically simply by trying things out themselves, using new digital tools on their own, and so on. They could also acquire digital skills through online training. However, since it cannot be expected that every teacher will develop digital competence during his or her own spare time, this possibility is not practical or optimal. In-service training adapted to teachers must be offered so that teachers can apply what they have learned in their classrooms. Furthermore, this is not a matter of single training sessions, but is a continuous need. It is particularly important to show teachers how to "use digital sources and resources for continuous professional development" (Redecker, 2017, p. 19), because technology (and subsequently, digital learning strategies) are continually developing. This creates a need for continual digital training.

Not only the digital competence of teachers is important for digital education, but also the digital competence of students. To be adequately prepared for life in the present and future and enabled to participate actively and responsibly in cultural, social, political,

[1] https://ec.europa.eu/eusurvey/runner/DigCompEdu-S-EN

professional and economic life, students need to be digitally competent. To describe the students' digital competence, we refer to the European Digital Competence Framework for Citizens (DigComp) (cf. Carretero et. al., 2017) as it is used as a basis for national competence frameworks on digital competence in many places. However, as it is intended for the competence of citizens, it is often slightly modified for national use to consider the differing educational contexts that may be evaluated. Regarding DigComp, students need competences across five different competence areas, which should be facilitated by teachers during compulsory education at school. The five areas include information and data literacy, communication and collaboration, digital content creation, safety and problem solving (cf. Carretero et. al., 2017. p. 21).

Conclusions and next steps

The COVID-19 crisis caused millions of schools around the world to rapidly innovate their educational processes in order to remain accessible to students and help students achieve required educational goals. This required changes in schools' regular operational activities, which depend first and foremost on the teachers' skills and on their concrete competences to convey the same educational content using new media. It also required technical solutions. Nevertheless, this response to COVID-19 is only the first step that must be taken in order to face the permanent changes that digitalisation will initiate. The situation, triggered by the crisis, necessitates urgent action in schools. However, the structures for appropriately adapting to improved digital platforms and pedagogy have not yet been permanently implemented and evaluated; that must happen in the future.

In this paper, we have presented for the first time a framework and a concept for the development of an assessment tool that helps schools make their digitalisation processes transparent and helps to evaluate and design the long-term process of digitalisation. The first internal analysis has already been discussed. The next steps of our application-oriented research will address the subsequent assessment phases and in particular, the weighting of influential variables in order to support schools in their self-assessment and decisions for or against further digitalisation of teaching. We are currently conducting empirical studies—surveys, interviews, and document analysis—with all relevant actors, e.g. teachers, parents, students, politics. The further development of the concept for self-assessment and technical implementation are the next steps we will follow.

References

Braun, A., Mueller, E., and Vladova, G. (2011). 'Open Innovation in Action – The Case of German Pharmaceutical SMEs,' in *R&D Management Conference – "R&D, Sustainability and Innovation, the need for new ideas, initiatives and alliances", Norrköping, Sweden.*

Breiter, A., Stolpmann, B.E., and Zeising, A. (2015). Szenarien lernförderlicher IT-Infrastrukturen in Schulen – Betriebskonzepte, Ressourcenbedarf und Handlungsempfehlungen, Bertelsmann Stiftung. Available at: https://www.bertelsmann-stiftung.de/fileadmin/files/BSt/Publikationen/Graue Publikationen/Studie_IB_IT_Infrastruktur_2015.pdf

Carretero, S., Vuorikari, R., and Punie, Y. (2017). *DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use*, EUR 28558 EN, doi:10.2760/38842.

Cooper, R. G. (1990). 'Stage-gate systems: a new tool for managing new products,' *Business Horizons*, *33*(3), pp. 44-54.

Chai, C. S., Koh, J. H. L., and Tsai, C. C. (2013). 'A review of technological pedagogical content knowledge,' *Education Technology and Society*, Vol. 16(2), 31-51.

Chesbrough, H. (2003). *Open Innovation. The New Imperative for Creating and Profiting from Technology*. Harvard Business Press.

Council of Europe (2001). *Common European Framework of Reference for Languages: Learning, Teaching, Assessment*. Cambridge: Cambridge University Press.

Council of the European Union (2018). *Council Recommendation of 22 May 2018 on key competences for lifelong learning (Text with EEA relevance)*. Official Journal of the European Union, C 189, 1-13

Damanpour, C. and Gopalakrishnan, S. (1998). 'Theories of organizational structure and innovation adoption: The role of environmental change', *Journal of Engineering and Technology Management*, 15(1), pp. 1-24.

Giering, B. and Obermöller, M. (2017). Lernförderliche IT-Ausstattung für Schulen – Orientierungshilfen für Schulträger und Schulen in NRW, Medienberatung NRW. Available at: https://www.medienberatung.schulministerium.nrw.de/Medienberatung-NRW/Publikationen/Orientierungshilfe_es_neu.pdf.

Hargadon, A. and Sutton, R. (2000). 'Building an innovation factory', *Harvard Business Review*, 78(3), pp. 157-66.

Jimoyiannis, A. (2010). 'Designing and implementing an integrated Technological Pedagogical Science Knowledge framework for science teacher's professional development,' *Computers & Education*, 55(3), pp. 1259-1269.

Kostoff, R.N. (2003), 'Stimulating innovation', in L. V. Shavinina (ed.), *The International Handbook on Innovation*, Pergamon. pp. 388-400.

Ministry of Education Rheinland-Pfalz (2020). Orientierungshilfe – Digitalinfrastruktur an Schulen. Available at: https://isb.rlp.de/fileadmin/user_upload/Foerderprogramme/DigitalPakt_Schule/Orientierungshilfe- Digitalinfrastruktur.pdf

Mitchell, J.M. (2003), *Emerging Futures: Innovation in Teaching and Learning in VET*. Melbourne: Australian National Training Authority (ANTA).

OECD (2016). *Innovating Education and Educating for Innovation: The Power of Digital Technologies and Skills.* OECD Publishing. [Online]. Available at: http://www.oecd.org/education/ceri/GEIS2016-Background-document.pdf.

Redecker, C. (2017). *European Framework for the Digital Competence of Educators: DigCompEdu*, EUR 28775 EN. Publications Office of the European Union, Luxembourg.

Roussions, D. and Jimoyiannis, A. (2019). 'Exploring primary education teachers' perceptions of their Technological Pedagogical and Content Knowledge,' *International Journal of Inspired Education, Science and Technology*, 1(1), pp. 4-19.

Staatsministerium für Kultus Freistaat Sachsen (2019). Orientierungshilfe zur grundlegenden Digitalinfrastruktur an Schulen 2019-2021, gemeinsame Orientierungshilfe des Sächsischen Staatsministeriums für Kultus, des Sächsischen Landkreistages und des Sächsische Städte- und Gemeindetages.

Vladova G. and Ullrich A. (2015). 'Decisions in Doubt – Weighing Pros and Cons of OI Projects.' In: Huizingh, K.R.E. et al. (eds.) Proceedings of 7th ISPIM Innovation Summit, Brisbane. Manchester: The International Society for Professional Innovation Management (ISPIM).