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ORIGINAL RESEARCH PAPER

INFLUENCE OF SOCIODEMOGRAPHIC FACTORS ON CROATIAN SECONDARY SCHOOL TEACHERS' READINESS FOR DIGITAL TRANSFORMATION

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ABSTRACT

The findings of the research preceding this article clearly point to the conclusion that two prerequisites need to be met in order to successfully start the process of digital transformation of educational institutions. Firstly, without a targeted supply of up-to-date ICT equipment, most of the elements described both in TAM and other models can be extraneous and potentially lacking in significant effects. Before considering any individual characteristics that are usually the focus of TAM, availability of the ICT infrastructure should be the basis for the encouragement of the actors to overcome their personal limitations. Secondly, in line with copious scientific findings which suggest that access to ICT is in itself an important determinant of technology adoption, it is mandatory to test the individual readiness for the digital transformation, taking into account the factors of enthusiasm and fear. Tests should provide an individualized, custom-made approach for each staff member as a key stakeholder of transformative effort. Since data sets and ensuing factors provided by the initial research were not yet tested for sociodemographic differences among respondents, this article is the step forward. Taking into account the key factor of digital enthusiasm and relating it to sociodemographic categories, results point to a clear a) negative relationship between enthusiasm and seniority and b) positive relationship between seniority and familiarity with digital transformation strategy. Teachers with longer work experience seem to be more familiar with digital transformation characteristics and goals, but that does not make them significantly more enthusiastic about the process. On the other hand, regardless of being less familiar with the digital transformation, teachers with less work experience are more enthusiastic about digital transformation. It seems that seniority and familiarity reduce enthusiasm, while lower amiliarity and shorter exposure to the institutional logics increases it.

Keywords: digital transformation, education, digital enthusiasm, sociodemographic, institutional logics

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1. Introduction

The rapid growth of digital technologies, gadgets and solutions has often been the focus of various researchers trying to gain insight into the impact of technology on daily life for several decades. In education, a number of papers have examined the changes that the introduction of digital technologies in the classroom has on students, teachers, learning outcomes and technology adoption, among others. Although "education has not been at the front-line of digitalisation," (OECD, 2020, p. 5), information and communications technology (ICT) infrastructure is present in many schools (OECD 2019a, p. 179[1]) and majority of education systems in developed countries have welcomed digital technologies, but the pace and scope of digital transformational change in education systems is not in line with other industries (A.M. McCarthy et al., 2023.). A warning that "without substantial change, the gap between what education systems provide and what societies demand is likely to widen further" (Schleicher, 2018, p. 203) must be addressed seriously. Influence of digital technology, artificial intelligence and social networks such as TikTok on social structure (Cardenal, 2019; Cervi, 2021) is evident in every walk of life (Güttel et al., 2024). While European Commission (2018) plans for a skilled, well-trained workforce with future-skills by 2030, it should also keep in mind the need to develop a "well-educated citizenry" (Chen et al., 2018, p. 6). As pointed out by A.M. McCarthy et al.: "The necessity to meet current challenges and deliver equitable solutions in education regardless of socio-economic constraints, requires reimagining 21st century education systems" (McCarthy et al., 2023, p. 2). In that sense, adoption of digital technologies among teachers remains essential and this paper intent is to further examine what factors could be fundamental in preparing the classrooms for a digital era.

This study advances theory on teachers' readiness for digital transformation by foregrounding sociodemographic heterogeneity (e.g., age, career stage, subject area, school context) as a systematic source of variance rather than background noise. Treating readiness as multidimensional – combining dispositions toward change, perceived instructional competence with technology, and perceptions of enabling school conditions – the study helps reconcile mixed findings in prior literature and clarifies when and for whom readiness is likely to be higher or lower. By providing evidence from Croatia, the study also strengthens the comparative knowledge base, testing commonly used readiness frameworks in a context that is underrepresented in international research.

Findings can guide decision-makers toward targeted professional learning (e.g., coaching and mentoring for late-career teachers; micro-credentials and collaborative design sprints for early-career staff; discipline-specific clinics for STEM vs. humanities). They further support equity-minded resource allocation, prioritizing infrastructure, release time, and instructional coaching in schools or locales where readiness gaps are most pronounced. At the system level, readiness profiles can inform change management – identifying internal champions, structuring peer-support networks, and sequencing roll-outs in phases – while establishing monitoring routines (brief pulse surveys linked to participation and classroom use indicators) to sustain improvement over time.

2. Theoretical background

Although some researches follow such understanding (Hagberg et al., 2016; Hess et al., 2016; Parviainen et al., 2017), digital transformation is not to be confused with digit(al)ization (Kraus et al., 2021.). Digit(al)ization refers to conversion of an analog signal into digital form such as the conversion of text, image, sound, or the three-dimensional form of an object into a digital form, usually a binary code (Hrvatska enciklopedija, 2024). On the other hand, (digital) transformation is not just another change. While every transformation is a change, not every change is transformative. Transformation is a complete change in the appearance or character of something or someone (Cambridge dictionary), which makes it comparable to a paradigm shift as defined by Kuhn (1970). A paradigm governs the research efforts of scientific communities (English, 2001) and it is by this criterion that a field is most clearly identified as science. One of the fundamental claims of Kuhn's argumentation is that the typical development pattern of mature science is marked by successive transitions from one paradigm to another, through a process of revolution. When a paradigm shift occurs, "the scientist's world is qualitatively transformed [and] quantitatively enriched with fundamental factual or theoretical novelties" (Kuhn, 1970, p. 7)

According to Kuhn, scientific revolution is a non-cumulative developmental event in which the older paradigm is completely or partially replaced by an incompatible new one. The new paradigm cannot continue or build on the previous one, but can only change it, because "the normal scientific tradition that results from a scientific revolution is not only incompatible, but actually incommensurable with the one that existed before" (Kuhn, p. 103). Repercusions of transformative efforts, including ones resulting from digital paradigm shift, are clear: previous, old system will inevitabely be replaced by a new one. Having that in mind, Martin defines the digital transformation as "the use of information and communication technology, not when trivial automation is performed, but in the case where fundamentally new capabilities are created in business, public government, and in the lives of people and society (Martin, 2008, p. 130)".

The findings of the research (Kirinić et al., 2023) preceding this article clearly point to the conclusion that two prerequisites need to be met in order to successfully start the process of digital transformation of educational institutions. Firstly, without a targeted supply of up-to-date ICT equipment, most of the elements described both in TAM and other models can be extraneous and potentially lacking in significant effects. Before considering any individual characteristics that are usually the focus of TAM, availability of the ICT infrastructure should be the basis for the encouragement of the actors to overcome their personal limitations. Secondly, in line with copious scientific findings which suggest that access to ICT is in itself an important determinant of technology adoption, it is mandatory to test the individual readiness for the digital transformation, taking into account the factors of enthusiasm and fear. Tests should provide an individualized, custom-made approach for each staff member as a key stakeholder of transformative effort.

As presented in (Kirinić et al., 2023), several authors have shown that age plays a role in teachers' technology acceptance (O'Bannon & Thomas, 2014; Scherer et al., 2015), which is consistent with other similar findings at a general level (Hauk et al. 2018). Other researchers (Gefen & Straub, 1997; Almerich et al., 2016; Cai, Fan & Du, 2017; Lucas et al., 2021;) showed that factors such as gender, frequency of computer use at home, education level and access to a computer equiped classrooms were most important for teachers' readiness to adopt technology. But, several papers questioned those results showing that age and/or gender are not predictors of technology acceptance and that claims as such could not be not conclusive (e.g. Daniali et al., 2022; Scherer, & Teo, 2019). Therefore, this paper aim is to check for any effects that socio-demographish may play within the six factors extracted from the analisys shown in (Kirinić et al., 2023). Those factors are: (1) Digital enthusiasm; (2) Digital sources; (3) Fear of technology; (4) Encouragement of the use of technology and the equipped schools; (5) Promoting identity through digital sources and (6) Familiarity with the European digital transformation strategy.

2. Methodology

Since data sets and ensuing factors provided by the initial research were not yet tested for sociodemographic differences among respondents, this article is the necessary step forward. The initial survey (Kirinić et al., 2023) focused on 167 secondary schools in Croatia, with 185 teachers finalising the questionnaire, based on similar previous surveys in Croatia and around the world (Fernández-Cruz et al, 2016; Perifanou et al., 2021). Questions addressed (i) sociodemographics, (ii) attitudes about digital transformation and the application of digital technologies, (iii) professional development of teachers, and (iv) information on the use of digital sources.The Kaiser–Meyer–Olkin (KMO) test showed the value of 0.722, which meant that the collected dataset could be used for targeted factor analysis.

The exploratory factor analysis (EFA) was conducted and the extracted six factors were checked for internal consistency and reliability via Cronbach's alpha test. Factor with the highest load, which explained 23.2% of the total variance was Digital enthusiasm.

As a mandatory continuation of the research, in this paper focus was placed on sociodemographic, personal characteristics of respondents (Lucas et al., 2020) and their connection to extracted factors. In order to determine which personal factors benefit and/or hinder the successull implementation of digital transformation in education and with the goal of modeling the linear relationship between the explanatory (independent) variables and response (dependent) variables, a multiple linear (multiple) regression was performed, with the the dependent variable being seniority in teaching.

3. Results

First regression put the dependent variable *seniority in teaching* in relation to relevant units from the questionnaire. The following table shows that the significance of the model is p>0.05, which means that the observed model is not statistically significant.

Table 1.
Regression analysis with regard to the dependent variable of seniority in

	B	*T*	*p*	Model excerpt
I am familiar with the determinants of the European digital transformation strategy	,090	1,103	,271	adjusted R^2 = 0,028 F (8,175) = 1,649 p = 0,114
The digital transformation of education is an extremely positive change in education	-,074	-,711	,478	
The key elements of the European Digital Transformation Strategy are incorporated into the subject curricula of secondary school education in the Republic of Croatia	,190	2,314	,022	
Digital transformation of education is of crucial importance for improving the quality of the teaching process	-,133	-1,371	,172	
The school where I work is fully technically equipped for the use of digital tools in the teaching process (computers and other equipment, speed and stability of the Internet connection...)	,016	,173	,863	
The school where I work strongly encourages the implementation of digital transformation of the teaching process	-,087	-,869	,386	
After the coronavirus pandemic, I will further intensify the use of digital tools in the teaching process	-,036	-,398	,691	
Digital competences (knowledge of information and communication technology) have become a prerequisite for the successful realization of the goal of modern education	-,004	-,049	,961	

Legend: β = value of the standardized regression coefficient; t = t-test value; p = significance level; adjusted R^2 = adjusted total contribution to explained variance; F = total F-ratio value;

The second regression put the dependent variable *seniority in teaching* in relation to the abovementioned extracted factors.

Table 2.
Regression factors

	B	*T*	*P*	Model excerpt
Digital enthusiasm	-,164	-2,061	**,041**	R^2 = 0,099 F (6,177) = 3,246 p = **0,005**
Digital sources	-,068	-,807	,421	
Fear of technology	,075	1,025	,307	
Encouragement of the use of technology and the equipped schools	,007	,087	,931	
Promoting identity through digital sources	-,156	-1,942	,054	
Familiarity with the European digital transformation strategy	,242	3,056	**,003**	

Legend: β = value of the standardized regression coefficient; t = t-test value; p = significance level; adjusted R^2 = adjusted total contribution to explained variance; F = total F-ratio value;

The prediction model explains 9.9% of the criterion variance. Teachers with more work experience have a lower response value for the factor digital enthusiasm (β=-0.164, p<0.05), but a higher value for the factor familiarity with the strategy (β=0.246, p<0.05) and the model is statistically significant (p<0.05).

Figure 1.
The prediction model variance (digital enthusiasm)

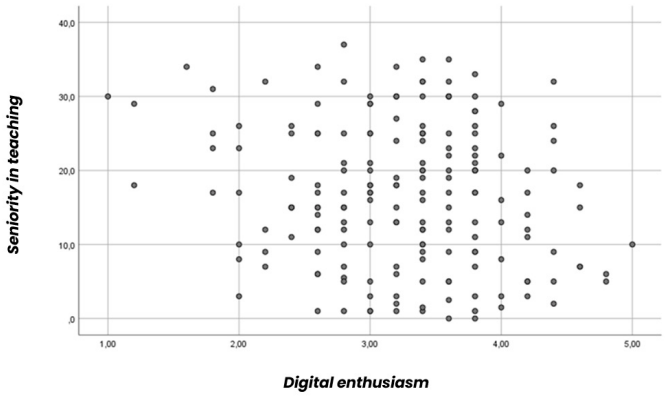
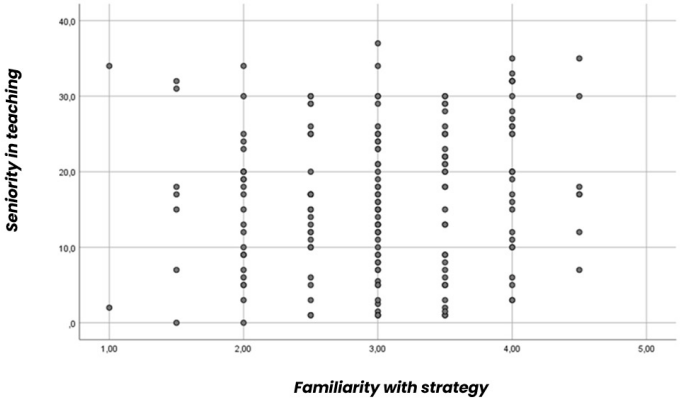


Figure 2.
The prediction model variance (familiarity with the strategy)



4. Discussion

This study investigated how sociodemographic characteristics of Croatian secondary-school teachers relate to their readiness for digital transformation. The results point to a nuanced profile of readiness in which enthusiasm for digital innovation and familiarity with system strategy do not move in lockstep across career stages.

First, greater seniority is associated with lower digital enthusiasm. A plausible explanation is that experienced teachers have established pedagogical routines and face higher opportunity costs when changing tools and practices, which can temper affective readiness for further digital change. Second, greater seniority is associated with higher familiarity with the European digital transformation strategy. This pattern likely reflects accumulated institutional responsibilities – such as committee work, mentoring, or coordination roles – that increase exposure to policy documents and system-level planning.

Although the predictive power of the model is modest, the statistically significant coefficients indicate that sociodemographic factors do play a role, alongside organizational conditions (e.g., infrastructure, time, leadership signals), professional learning opportunities, and peer norms. Readiness should therefore be understood as multidimensional: differentiating between enthusiasm for change and strategic familiarity helps explain mixed findings in the literature and cautions against one-size-fits-all narratives.

Practical implications follow from these patterns. For late-career teachers, change efforts may benefit from classroom-embedded coaching, streamlined workflows, and opportunities to adapt tools to established pedagogical repertoires – reducing perceived disruption. For early-career teachers, who tend to be more enthusiastic but less exposed to system strategy, interventions that connect innovative practices with formal strategic aims and quality assurance processes can align energy with direction. Across groups, brief tracking of enthusiasm and strategy familiarity can guide targeted professional learning and resource allocation.

Limitations include the cross-sectional design and a restricted set of predictors, which constrain causal inference and leave unobserved school-level factors outside the model. Future work could incorporate multilevel designs and longitudinal data to examine how readiness profiles evolve as policies and technologies diffuse through schools.

5. Conclusion

As can be seen from the research results, the only socio-demographic factor that has an impact on the six factors of digital transformation presented in Kirinić et al. (2023) is duration of the teachers' working experience, in such a way that longer working experience reduces digital enthusiasm but improves knowledge of strategic documents and decisions. The explanation for this finding could be that teachers with many years of experience have already been part of a number of reform attempts and another one focusing on digitalization would not excite them as much as their younger colleagues.

Teachers with less professional experience were younger, and digital technologies are something they can identify with and with which they have significantly more experience. We think it is important to point out that the long professional experience in the education system could be a reason for the decrease in enthusiasm for the same reasons as mentioned above. Another possible interpretation could be that the technology itself is not as important to learning and learning outcomes as it may seem, so teachers with experience in the classroom may consider other factors to be more important. This is an aspect that still needs to be thoroughly investigated.

Familiarity with the European digital transformation strategy is also a factor that depends on the working experience and could also be explained by the experience of the multiple attempts of systematic reforms endured of surveyed teachers during their working career. Same as above, further research is needed to explain such a difference.

In the sense of theoretical contribution, the article (i) positions sociodemographic differences (age, career stage, subject, context) as systematic drivers of teachers' digital-readiness rather than statistical noise, (ii) conceptualizes readiness as multicomponent – orientation to change, tech-pedagogical efficacy, and perceived enabling conditions – clarifying when and for whom readiness is higher or lower and (iii) broadens comparative validity by testing common frameworks in Croatia, an underrepresented setting.

As for practical contributions, the article (i)enables targeted professional learning (e.g., coaching for late-career teachers; micro-credentials/design sprints for early-career; subject-specific clinics), (ii) guides equity-oriented resourcing – prioritizing infrastructure, release time, and coaching where readiness gaps are largest, (iii) informs change management via readiness profiles: identify champions, structure peer networks, phase rollouts, and run brief pulse surveys tied to classroom uptake.

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