

CAPITULO 12

FOMENTAR LAS COMPETENCIAS DIGITALES DE TRABAJADORES DE MUNICIPIOS EUROPEOS

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1. INTRODUCTION

Digital competencies are essential competencies in modern society, and local government entities are a focus point for local development. The OECD (2020) pointed out three pillars for a digital talent and skills in the public sector, that are: a) the context for those working on digital government and the environment required to encourage digital transformation; b) the required skills to support digital government maturity, covering all public servants, in particular professionals and those in leadership roles; c) the practical steps and enabling activities required to establish and maintain a workforce that encompasses the skills to support digital government maturity. Also, the European Commission's Digital Strategy (2022) highlights the need for a digital culture and seamless digital landscape, which necessitates the fostering of digital competencies in governmental entities. Local government entities, which play a vital role in promoting community development and providing essential public services, can benefit from investing in digital competencies. Indeed, the local government need to keep up with technological advancements and provide high-quality public services to citizens, which are related to the use of digital technology. Research suggests that there is a continues need to reskill, namely, when it is related to digital environment. And the recognition and promotion on-the-job training opportunities and maximize informal learning opportunities (World Economic Forum, 2017).

The digital competencies are necessary for e-government development, effective public service delivery and community development (Fedotova et al., 2012; Gouveia, 2004; Janssen et al., 2012; OECD, 2020; Tinmaz et al., 2022). The local government entities can benefit from adopting e-autarchy, as suggested by Gouveia (2004). E-autarchy involves improving and rationalizing different processes, reducing paper use, and physical storage and saving time by using digital means. It can also lead to more efficient and effective public services. The efficacy and efficiency are provided by software's used to monitor the different processes, to establish the inputs, milestones, outputs and results, to provide data to analyse the costs and benefits, cross information between the strategy defined and its implementation, the communication between citizens and local government, e-citizens participation, among other issues. It reflects a reduction of time of work dedicated to certain tasks or response, increasing the transactions, connectivity and access to information (Gouveia, 2004). Through these reductions, the local governments also reduce their environmental impact and make their operations more sustainable. This is in line with the Digital Strategy's objective to sustain a green, secure, and resilient infrastructure.

Cities are adopting e-government and innovative technologies to raise their performance, and therefore provide better information and services, and engaging their citizens. However, it should be pay attention to the rural areas' specific needs, as well as certain segments of the society (e.g., elderly people) (Manoharan & Ingrams, 2018).

The changes to an e-autarchy or an e-local government, have risks, namely, the local governments become more vulnerable to cybersecurity attacks as they rely more on digital means. In the last year, with the Ukraine-Russia war, cyberattacks have risen to different public and private structures with a great impact on daily lives, companies work and finances/economic (Parliament, 2022). It is pointed that the main cybersecurity threats and incidences are concerned to malware (33%), inappropriate employee activity or network use (25%), managing access for approved remote users (25%), data encryption (23%), data loss (23%), and lost hardware (17%), with the external threats as more serious than internal threats (Caruson et al., 2012). Cybersecurity measures are necessary to protect local governments from cybersecurity threats. The security is one of the digital competencies defined in the Digital Competence Framework for Citizens (DigiComp 2.2) (Vuorikari et al., 2022).

This framework provides a useful tool for identifying digital competencies and developing training programs for workers, and it is also related to the Digital Education Action Plan 2021-2027 (European Commission, 2020), that include the digital competencies of public administration workers, leading to better public services.

Previous studies identified internal enablers for the e-government adoption, being the workforce a critical asset for it (Manoharan & Ingrams, 2018). Edelmann et al. (2023) reinforce that training programs can improve the digital competencies of public

administration workers. Fostering workers' digital competencies and proceeding to dematerialization can bring numerous benefits to local government entities. Firstly, it can improve the quality of public services provided by the municipalities, making them more efficient and effective. The workers digital competencies are associated with e-government development and better public services. So, investing in workers' digital competencies can lead to increased job satisfaction and retention rates. Nowadays, the workers that work within guidelines (of the task) but without boundaries, that have freedom of choice where, when, and how they want to work, provide higher job satisfaction. And, also receive training on new technologies and digital competencies are more likely to feel valued by their employers and have higher job satisfaction (Organization for Economic Cooperation and Development, 2020)). One of interesting competencies is leadership, and in this new era it is pointed the digital leadership such "the ability that individuals or organisations should have in the era of digital technology to lead others, teams or entire organisations to give full play to digital thinking by leveraging digital insight, digital decision-making, digital implementation and digital guidance to ensure that their goals are achieved" (Peng, 2022, p.216). If we consider the higher levels of decision, we can look for successful e-government managers who are willing to take logical risks by adopting new technologies, untried and underdevelopment, reallocating organizational resources in a different way and/or collaborating with civil society partners. Wang and Feeney (2016) suggest that in a less centralized decision-making the greater the likelihood of e-government innovation, since the concentration of authority can block organizational awareness and responsiveness to challenges and to the need to adapt. The e-government lead to changes in the working dynamics since the public managers and personal can work remotely, providing more work diversity, reducing personnel constrains, fostering the freedom to experiment new technologies.

And it is recognised the need to launch a campaign of digital literacy training in governmental departments (European Commission, 2022; Peng, 2021). Through a systematic analysis (Tinmaz et al., 2022) verified that the findings of the systematic literature review are, to a large extent, in line with the existing framework used in the European Union. It is clear the relevance provided by the European Union to digital transition. There are several policy instruments and programs that include guidelines to it. Another example is the ERASMUS+ program which include specific objectives related to digital transition, and which cofund the present work.

Knowing these issues related to local government, digital competencies and education processes, the cities applied to ERASMUS KA2 funds, to develop the present work, which aims to analyse and develop the municipal workers digital competencies. The present work is a first step of the work, where we aim to make the initial evaluation and comparison of digital competencies considering the city, gender, age group, work in the municipality age.

2. METHODS

To reach our objectives we developed a digital competencies self-assessment questionnaire in English that was translated by each project team members for their entities. Any doubt related to the items or factors were explained by the principal researcher. The final version of the questionnaire contains 78 questions, that evaluate the five digital competencies (Communication & Collaboration, Information & Data Literacy, Digital Content Creation, Safety, Problem Solving), gather sociodemographic data and also qualitative data regarding the workers opinion about measures to take place to improve digital competencies and dematerialization.

The questionnaire was applied to the municipality workers of three European cities, (Vila Nova de Poiares– Portugal (MP), Liepāja – Latvia (ML), Mielec – Poland (MM), mainly those that use personal computers or digital means daily. So, we define different clusters according to – municipality, gender, age group (<35years, 35 to 54 years, >55years) and age of working in the municipality (<10 years, 10 to 19 years, >19 years). The definition of 10 years for age of working is due to the consideration that only after that period that the person can be considered an expert in the process.

Each municipality is responsible for the self-evaluation process and the General Data Protection Regulation (RGPD), and the ethical principles to collect and treat the data. The organisational participation in the ERASMUS KA2 project was provided by the city council mayor, which reflect this initial self-evaluation of the workers.

For the data analysis we used the JASP 0.16.4.0 and proceed to a descriptive analysis and an ANCOVA to compare the municipality worker's self-assessed digital competencies (Communication & Collaboration - CC, Information & Data Literacy - IDL, Digital Content Creation - DCC, Safety - S and Problem Solving - PS). A t-test was performed to verify the differences between gender (male vs female).

3. RESULTS

From the descriptive analysis we verified that participate in the study 32 persons from MP, 110 from ML and 137 from MM. 71 respondents are males and 208 females, moreover, 50% of the respondents (n=139) have under 35 years old, 17% are placed between 35 to 54, and 33% are over 55 years old. These percentages are also reflected in the Age of Working in the Municipality clusters, with under 10 years (50%), between 10 and 19 years (17%) and over 20 years (33%). A descriptive analysis of the self-assessment scores for the five digital competencies is presented on table 1, by municipality, age group, working age group and gender.

Table 1 Descriptive analysis of self-assessed digital competencies according to Municipality, Age group, Age Working and Gender

Competencies		CC	IDL	DCC	S	PS
		M±SD	M±SD	M±SD	M±SD	M±SD
Municipalities	MVNP	3.77±.35	3.83±.46	3.60±.59	3.57±.49	3.76±.38
	ML	3.45±.51	3.52±.53	3.14±.70	3.23±.52	3.41±.58
	MM	3.41±.55	3.31±.66	3.57±.49	3.23±.60	3.39±.63
Age group	<35y	3.71±.34	3.78±.36	3.52±.40	3.55±.38	3.69±.38
	35-54y	3.49±.47	3.48±.53	3.21±.60	3.28±.52	3.44±.59
	>54y	3.14±.68	3.00±.81	2.75±.81	3.28±.52	3.17±.70
Age Working	<10y	3.60±.39	3.60±.48	3.36±.53	3.41±.47	3.54±.51
	10-20y	3.50±.44	3.62±.43	3.23±.56	3.23±.44	3.49±.52
	>20	3.25±.65	3.14±.74	2.90±.77	3.04±.67	3.25±.71
Gender	Male	3.53±.55	3.37±.67	3.22±.70	3.31±.62	3.44±.64
	Female	3.45±.51	3.48±.59	3.18±.64	3.26±.54	3.44±.58

Through the ANCOVA analysis (Table 2) it was observed that are differences between entities (table 1) regarding CC ($F=11.408$, $p<.001$), DCC ($F=7.450$, $p<.001$), S ($F=5.106$, $p<.05$) and PS ($F=5.382$, $p<.05$) and no differences regarding IDL ($F=2.887$; $p=.057$). On CC we verified differences between the 3 municipalities, with MP having the higher levels and MM having the lower ones. Relatively to DCC, S and PS the MP workers present higher levels than the ones from the other municipalities.

Regarding to age group there are differences on IDL ($F=275.000$, $p<.001$), CC ($F=275.000$, $p<.001$), DCC ($F=275.000$, $p<.001$), S ($F=275.000$, $p<.001$), PS ($F=275.000$, $p<.001$) all with differences between the 3 ages groups. Of highlighting the values of IDL and DCC of the >54 years old group, respectively, $3.00±.81$ and $2.75±.81$.

The analysis related to age working revealed differences between all the 3 age working groups defined. The group with over 20 years of working experience had a lower value related to digital content creation ($2.90±.77$) and security ($3.04±.67$).

It was not observed differences between males and females in the five digital competencies under study, and the values are on average. Nevertheless, the data show that being satisfactory it should be worked to get higher levels.

Table 2 Self-assessed digital competencies comparison between Municipalities, Age Group, Age Working Group and Gender

Competencies	Cities	Age Groups	AgeWorking	Gender
Communication & Collaboration	F=11.408, p<.001	F=275.000, p<.001	F=6.808, p<.001	F=1.300, p=.255
Information & Data Literacy	F=2.887; p=.057	F=275.000, p<.001	F=14.201, p<.001	F=1.856, p=.174
Digital Content Creation	F=7.450, p<.001	F=275.000, p<.001	F=15.023, p<.001	F=0.221, p=.648
Safety	F=5.106, p<.05	F=275.000, p<.001	F=12.977, p<.001	F=0.434, p=.510
Problem Solving	F=5.382, p<.05	F=275.000, p<.001	F=6.808, p<.001	F=9,760x10 ⁻⁷ , p=.999

4. DISCUSSION

Its is interesting to see the gap difference between males vs females working in the municipalities in functions that usually use digital means. It should be interesting to explore the organisational differences of functions according to gender (e.g., administrative vs operational).

Other result is the high number of respondents from the first age group (<35 years), which can reflect a higher predisposition to use digital means and participate in organisational or scientific studies. The age groups and age working groups reveal similar results, through which we can consider that the participants with less than 35 years old have less than 10 years in the municipality, and the respondents over 35 to 54 years old have more than 10 years but less than 20 years in the municipality, and the last group is also related. This can point out that the recruitment process looks for new blood to the organisations instead to consider experient personnel, among other recruitment criteria.

Relatively to the age group results, this was already expected since the younger ones are born on a digital era, and that have contact with information and communication technologies during formal education process. Moreover, it gets easier, accessible and cheaper the use of technological equipment and digital means. Also, The possible connection between the age group and age working group reinforces the discussion related to promotion of digital competencies of older people, given priority to groups with ages over 35 years old.

According to Detlor and Finn (2002) there is a higher availability to use the local e-government by higher socioeconomic status individuals and younger ones. We consider that this is not only applied to external users but also internal ones since the data show us the age factors related to self-assessed digital competencies in the different municipalities. This is, on different cultural settings, providing a transnational image. As Gouveia (2004) point out, to implement an e-government, there should be a good understanding of the processes, services, organisation principles and aims, cultural issues, among others aspects. It is expected that older workers have a better understand of the organisation context, and therefore can contribute for its improvement. However, the results lead us to suggest that this is not happening, probably by a lack of critical thinking to improve those, achieving a continuous flow of development related to e-governance and digital means use or there are constrains related to management and leadership that don't allow the workers development.

In some way, it seems contradictor that older people, with longer experience in municipality functions have fewer digital competencies than the youngsters. It is expected that during the working years that will be provide training processes, through modules or training in functions. Nowadays is recommended that the workers to adapt to these new technologies need a continuous learning through a different process verified on the education model system. Indeed, it is pointed that "Learning methods across all formats and timeframes, including adult-focused reskilling and upskilling, need to be adapted to foster curiosity, creativity, imagination, build confidence in continued learning, and inspire a desire for continued growth and development." (World Economic Forum, 2017, p. 4). The educational and training process throughout a lifetime learning trajectory should be flexible and with a learner-centred approach, so that we can empower learners and provide foundational and experiential learning with higher impact on the person and, consequently, organisational development (Organization for Economic Cooperation and Development, 2017, 2020).

There are several organisational context variables that can be influencing the self-assessed digital competencies. For example, the MP belongs to the AIRC - Central Region Informatics Association since 1982, having a strait collaboration with that municipality association, namely, on software development and implementation. Also, the president in 2017 declare that all documents should be treated and signed through digital means. Indeed, from our data analysis it was observed that in MP there are a significant number of workers that have and use the digital signature when compared to the other municipalities.

Is interesting the lack of gender differences in self-assessed digital competencies, which may reflect that women and men when performing identic tasks can present or develop the same competencies, and therefore functional equality.

The present work was developed to make an initial evaluation so that we can provide recommendations for the training in the municipalities. In this case, the MP has higher levels of self-assessed digital competencies, but they can improve some competencies, namely, S and DCC. In the case of the other 2 municipalities, it was recommended that ML and MM must prioritize the DCC, and then S in second, differing in the 3rd training module, with PS for ML and CC for MM. It is expected that from this analysis tailored training programs and learning packages will be developed to improve workers' digital competencies.

The Security issue, namely, fostering the workers digital competencies, should be a main concerning of the municipalities leadership, since “cyberattacks are designed to be silent warriors whose mission is not necessarily to destroy a system, but to quietly siphon-off critical information” (Caruson et al., 2012, p. 19). And with continuous increase of sensitive data (e.g., personnel data, financial data) the risk is increased. Caruson et al. (2012) referrer that non-IT officials also tend to underestimate the likelihood of major internal threats in spite of warnings that changes made by budgetary cut offs, namely, during deep recessions increase the odds of malicious internal breaches. However, even with those warnings and the published recommendations, reports and science related to cybersecurity, there still exist a lack of awareness that influence budgetary shortfalls and, consequently, make it more difficult to better educate local officials or workers or to purchase new software and equipment.

On daily work at local government it is necessary to produce digital content to improve and integrate information and content into an existing body of knowledge at the same understanding how copyright and licences are to be applied, to know how to give understandable instructions for a computer system (Vuorikari et al., 2022). The information flow inside a local government is more complex with the higher number of legal and organisational competencies, number of workers and citizens served. Through the establishment of *front-office* that by onside allow the fulfilment of quality standards and to provide the contact with the citizen to resolve issues related to knowledge (e.g., unknowing norms, regulations, laws, processes of the citizen interest). The implementation of a *back-office* is related to operational aspects is not so dependent of the human relation or knowledge (Gouveia, 2004). It is common to get access to e-forms and clarify issues related to each form on the *front-office*. A municipality is rich on data, one more example of that is the case of Geographical

Information System, that can use digital data, and to be consulted InSite or remotely. Other issue is the institutional communication and marketing. These different working areas reveal the importance for its workers develop their digital content creation skills. Of course, it should be payed attention to each worker function so the educational can have more operational benefits. There are workers that need to know how to create new e-forms, threat them and send to the respective responsible or person through digital means, work geographical data – evaluating, approving, sharing, create digital photos, videos, online messages and communication, reports of accidents or risks associated to geographical data, strategic planning and evaluation, financial management – e-contracts, public procedures, among lots of other processes that are the municipalities daily base work.

The establishment of a local e-government demands a high investment, namely, financial one. Since the money is a scarce resource, it should be carefully defined the implementation cycle of a *local e-government*, through Planning, Financing, Execution, Evaluation, Development. This cycle should have a continues revision. Moreover, this process involves, commitment, responsibility and accountability, transparency, strategic alignment, and of course, operational and financial management (Gouveia, 2004).

5. CONCLUSIONS

The present work achieved its objectives of analysing and comparing the digital competencies of municipal workers from three European cities, being the initial phase of an ERASMUS KA2 project. It provided that there is a clear difference between the Portuguese city regarding the other two cities, in the different digital competencies. Nevertheless, there is margin to evolve the digital competencies to higher levels. Even the municipality of Poiares present the lower values in the Safety digital competency, which raises concerns related to digital transition for e-local governments. This digital competency can be consider the more concerning for the good function of an e-government and the services connected to it, since the lack of it raise the vulnerability to be hostage of hackers, virus and other threats.

The results also reinforce the idea of older people having fewer digital competencies and being the high-priority target group to foster digital competencies, independently of gender and working years in the municipality. Which leaded us to suggest that the former educational and training provide by the municipality missed the main aim, that is to foster the digital competencies, and therefore, the education and training provided in the future should not follow the traditional system.

The study present has limitation of being a self-assessment questionnaire instead of a real evaluation of the digital competencies. Usually, the perception and reality of self is quite weak,

and people judge them self-better, tending to be overconfident in their skill and expertise, through rosy judgments of them self's that are not true (Carter & Dunning, 2008). So, this type of digital competencies self-assessment should be complemented to other evaluations that can provide more specific that. Is our intention to develop an intervention in the municipalities and observe the effects of it, providing a comparison between municipalities and before and after digital competencies training.

Further studies should pay attention to other systemic issues, namely, organisation digital activity norms and orientations, and leadership position to foster digital transformation and competencies. Looking for factors and determinants of success, that help to reduce IT failures, identify mismatch between e-government courses and training and what practitioners need at the workplace (Manoharan & Ingrams, 2018).

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