


Digital Competences for Improving Digital Inclusion in E-Government Services: A Mixed-Methods Systematic Review Protocol

International Journal of Qualitative Methods
Volume 21: 1–9
© The Author(s) 2022
DOI: 10.1177/16094069211070935
journals.sagepub.com/home/ijq


Tamara Morte-Nadal¹  and Miguel Angel Esteban-Navarro¹ 

Abstract

The e-government requires citizens that have a certain level of digital skills. Contact restrictions caused by the COVID-19 pandemic has accelerated the digital transformation of Public Administration in most countries and has increased the social digital divide. Therefore, the training of citizens in digital competences is one of the main challenges of the knowledge society. This mixed-methods systematic review protocol aims to synthesize quantitative and qualitative findings about conditioning factors of digital inclusion, in a multidimensional perspective, related with the education, healthcare and welfare sectors and the political actions involved to improve the digital competences of citizenship for allowing and enhancing their interactions with these online public services. The protocol has been written following the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) guidelines. Nine databases including Web of Science, Scopus, Educational Resources Information Center Library and Information Science Abstracts (LISA), ProQuest, MEDLINE, PubMed, SocINDEX and Cairn.info will be searched for peer-reviewed empirical studies published from 2011 or later. Grey literature and citation chaining will be undertaken. Quantitative, qualitative and mixed-methods studies will be included. Data items will be extracted and coded in a standardized format. A convergent segregated approach to synthesis and integration will be used. The results will be of interest to educational policymakers who want to take into account citizens' digital skills in the design of online services and lifelong learning programs.

Keywords

digital skills, digital inclusion, lifelong learning, e-government, systematic review protocol, mixed-methods, PRISMA

Rationale

Electronic Government

Electronic government (e-government) is the use of electronic communications devices, computers and the internet to provide public services to citizens and other persons in a country or region. E-government is expected to improve public services and its social value is related to the ability in achieving better outcomes in areas like security, poverty, public health, employment or better educational achievements (Damascene & Andersson, 2019). E-government services can be categorized as either informational or transactional. According to Rana et al. (2017), informational services concern the delivery of government information through web pages, while transactional services involve two-way transactions between government

and citizens. E-government, as part of the transformation of public services, is becoming mandatory in many countries. Consequently, citizens are forced to interact with the government using these applications (Rodriguez-Hevia et al., 2020).

Weerakkody et al. (2017) identified four major factors determining the success of e-government initiatives; these are political factors, technological factors, organizational factors

¹Department of Journalism and Communication, University of Zaragoza, Spain

Corresponding Author:

Miguel Angel Esteban-Navarro, Department of Journalism and Communication, University of Zaragoza, C/ Pedro Cerbuna 12, Zaragoza 50009, Spain.
Email: mesteban@unizar.es



and social factors. The social factors are associated with training and educating the public on new technologies and breaching the gap in terms of ICT (information and communications technology) access and use with regard to gender, age, income and language (Kofi et al., 2017). Therefore, it can be stated that the achievement of e-government in a democratic society requires a precondition to be met: the digital inclusion of citizens.

Digital Inclusion and The Digital Divide

Digital inclusion means to bring the knowledge and use of ICT closer to those who do not already have it (Lopez & Castañeda, 2015): thus bridging the digital divide. The digital divide took on political and public policy overtones during the mid-1990s, as certain groups and policymakers claimed that some individuals were being left behind in the digital revolution. Since that time, a substantial part of the scholarly research about the digital divide has been devoted to identify the digital divide's component dimensions and the appropriate methods of measurement (Epstein et al., 2011). The digital divide, or 'digital inequality' with regard to ICT, has been defined in three different ways (Esteban-Navarro et al., 2020): inequality of opportunities in technological access and connectivity to devices and networks, internet included; illiteracy in computer skills to use technology among those who have access and are wired; and, more recently, lack of the necessary digital competences for doing things and creating with ICT in complex situations such as education, business and e-commerce. In the third level, the digital divide is present when the possession of digital skills and internet use do not lead to beneficial outcomes (Scheerder et al., 2017).

Digital Skills and Their Impact on E-government Adoption

The e-government and digital divide research are intrinsically intertwined as e-government policies can be both impeded by and exacerbate the digital divide (Rodriguez-Hevia et al., 2020). The most obvious cultural barrier to e-government in developing countries is the problem of social exclusion caused by the problem of unequal access to the internet (Hemant & Baboo, 2010; Dodel & Aguirre, 2018). However, in developed countries, whereas the effects of the access divide are diminishing, digital skills and competences are becoming the critical factor behind these disparities. Though many citizens have access to the internet, this does not automatically mean a high uptake of e-government use, as research shows that some e-government initiatives are not successful in attracting a large portion of citizens (Sundberg, 2019). There is a substantial percentage of the population that lacks the skills necessary to effectively interact with the government online and thus have become the minority groups (Yu et al., 2017). According to Ebbers et al. (2016), digital skills are essential components in the impact of the digital divide on e-government; even though they do not influence channel choice, they do influence how citizens appreciate online services. The findings of Rodriguez-Hevia et al. (2020)

show that skills divide is more relevant than access divide. Taejun et al. (2020) have also pointed the decisive impact of digital skills on the adoption of e-government online services.

Digital competence is the confident and critical use of ICT tools in the areas of work, employability, education, leisure, inclusion and participation in society, in accordance to the *Digital Competence Framework for Citizens*, also known as DigComp, developed by the Joint Research Centre of the European Commission as a tool to help policymakers to formulate policies and to plan education and training initiatives to improve digital competence of specific European target group (Vuorikari et al., 2016). The study of digital skills and competences is particularly remarkable in education (Fernández-Batanero et al., 2020; Pettersson, 2018; Spante et al., 2018; Svodoba et al., 2020; Sanchez-Caballe et al., 2020), communication (van Laar et al., 2017) and information literacy (Fernández-Ramos, 2016; Grabowsky & Weisbrod, 2020), but it has not yet received a similar attention from an e-government perspective.

Disparities in e-government take-up also have suggested the emergence of a new divide: an e-government divide (Zhao et al., 2014). Frohlich et al. (2020) showed that security, technology trust, ICT supporting infrastructure, usage experience, costs, awareness, skills for accessing e-government, language literacy, training, perceived ease of use, perceived usefulness, social influence, perceived empathy and compatibility are critical factors of e-government services adoption. Also, performance expectancy, social influence, culture and facilitating conditions can be significant in determining the willingness to use e-government services (Mensah, 2019). Scientists cannot fully evaluate usage behaviour of citizens by applying technology-oriented information system models. They need to shift the methodological scientific e-government discourse to a more user and service-oriented perspective (Wirtz & Tuna, 2017). Sociological studies have also been introduced to e-government research, with factors such as social inequality and poverty potentially being implicated in the digital divide and the e-government divide (Zhao et al., 2014). Vulnerable or low-income groups who are least likely to have access and skills for using the technology will inevitably be left behind. The paradox here is that those groups with whom government organizations deal with are often the most likely to be excluded (Hemant & Baboo, 2010). The extant literature provides evidence on the relationship between e-government adoption, demographics and socio-economic variables such as age, education, income, employment status, marital status or trust in government, but the results are not entirely conclusive (Rodriguez-Hevia et al., 2020).

The Role of Public Policies for Improving Digital Inclusion

Government, in its role as policy and decision-maker, can develop strategies to deal with issues of the digital divide and e-government development (Zhao et al., 2014). Hence, understanding the nature of the digital divide is crucial to take

proactive measures by public policies (Riggins & Dewan, 2005). Nevertheless, among global policymakers, the discourse surrounding ICTs and the digital divide is typically founded upon a fundamentally technocratic optimism. This means that technology is viewed as the ultimate developmental tool and that simply installing it will bridge the digital divide (Epstein et al., 2011). However, Ma and Zheng (2017) concluded that the supply of e-government functions did not automatically lead to citizen use: availability and functionality are not strongly related to use. It should be noted that e-government adoption studies often see digital public services as a generic phenomenon, ignoring the context and diversity of those services (Lindgren et al., 2019).

If we consider digital divide as a multidimensional concept (differences in access, use and exploitation of online services by citizens), the public policies should pay attention to how impacting the various factors of exclusion and inequality referenced by the literature, for example race/ethnicity, gender, age, income, skills, geography, cultural content, education, training... in each dimension of digital divide. Furthermore, the degree that the digital divide has on e-government development may not be the same as those affecting general internet use. E-government users may have different motivations and purposes from general internet users, and may need to possess more complex skill sets than general internet users (Belanger & Carter, 2009). It is necessary to identify, compare and differentiate general internet adoption effects and e-government specific divide effects because the factors influencing e-government usage among the entire population and among people who use the internet regularly are proved to be different (Niehaves et al., 2012).

Furthermore, new kinds of risk are emerging with the COVID-19 virus that can widen societal, educational and health inequalities (Khilnani et al., 2020). The COVID-19 pandemic has led to an inevitable surge in the use of digital technologies due to the social distancing norms and nationwide lockdowns (De et al., 2020). The pandemic has highlighted the digital vulnerability of many citizens in all three dimensions of digital divide: connectivity, use and exploitation; and it has also revealed the serious consequences of that vulnerability. In a situation with strict measures of social and physical distancing, people on the wrong side of the digital divide are completely left out of essential public services (Esteban-Navarro et al., 2020).

Challenge

The training of citizens in digital competences is one of the main challenges of lifelong learning in the knowledge society. This topic concerns various disciplines: Education, Communication, Informatics, Information Science and Politics. Educational, healthcare and social services have a significant impact on the welfare state and social inequality. Consequently, it is also relevant to identify in literature any enabling factor, barrier, or risk factor that influences the interactions of citizens with e-government services, in general, and of specific

social groups at risk of vulnerability. The analysis and assessment of associated political measures related to improving the digital competences of citizens are also significant for the design of public policies to promote e-government. Studies should focus on the same world regional or national unit, taking into account demographic, cultural, social and political differences, which have an evident effect on the development of electronic government and the relationship of various social groups with e-public services.

Sepulveda and Ramírez (2015) conducted a systematic review about digital inclusion, in general, to discover that the quantitative approach and the focus on demographic profiles are predominant. No systematic reviews or protocols on conditioning factors and public policies related to the acquisition of digital competence to interact with e-government services have been found in the Cochrane Database of Systematic Reviews, the JBI Database of Systematic Reviews and Implementation Reports, the Campbell Collaboration, and the International Prospective Register of Systematic Reviews (PROSPERO). However, digital inclusion is a complex and multidimensional phenomenon, so including different methodological approaches could offer a more comprehensive understanding and collate all the insights. Therefore, a mixed-methods systematic review will allow to the identification of quantitative and qualitative evidence about this area of interest in the same systematic review.

The aim of a systematic review is to collate and analyse all relevant information and evidence from primary research studies that fits pre-specified eligibility criteria to answer a specific research question (Moher et al., 2015). Systematic reviews are an established practice in social sciences because they show to academics significant and reliable research findings (what we know, what is not known and how can we know) in the subject studied, and they help to policymakers and practitioners to discover what works, how it works and what might do harm in practice (Gough et al., 2017). Systematic reviews with a focused question, a defined search strategy, inclusion and exclusion criteria and critical appraisal strategies are hard to do well; however, they are an important educational resource and reveal the maturity of a scientific field (Coverdale et al., 2017). A mixed-methods systematic review is a type of review focused on the analysis and integration of quantitative and qualitative evidence, which provides a more complete basis for decision-making (Stern et al., 2020).

The preparation of a protocol is an essential component of the systematic review process because it reduces arbitrary decision-making when extracting and using data from primary research (Moher et al., 2015). A systematic review protocol is a document that details the rational and planned methodological and analytical approach of the review prior to it being undertaken (Shamseer et al., 2015). The publication of the protocol increases the transparency, the clarity, and the traceability of the process in social sciences. It is also necessary to promote and implement valid evidence-based policy in education and welfare services.

Review Questions

The aims of this mixed-methods systematic review are to identify, analyse and synthesize quantitative and qualitative findings about i) conditioning factors of digital inclusion, in a multidimensional perspective, related with the education, healthcare and welfare sectors; and ii) the political actions involved to improve the digital competences of citizenship for allowing and enhancing their interactions with these online public services. This will allow us to develop a set of recommendations for the implementation of effective e-government policies.

The objectives are approached by addressing the following research questions:

1. What enabling factors are involved in the digital interaction between citizens and educational, social and healthcare online public services?
2. What risk factors or barriers are involved in the digital interaction between citizens and educational, social and healthcare online public services?
3. Which social groups are at higher risk of being digitally vulnerable? And what are their sociodemographic profile?
4. What measures and actions have been taken to improve digital competences of the citizens by e-government policies?

Inclusion Criteria

PECO (Population, Exposure, Comparator, Outcomes)

Exposition studies are more frequent in social science research than interventions, so a PECO statement is established to assess the association between exposures and outcomes. In fact, the general approach to phrasing PECO questions will depend on a number of factors, including a) the context; and b) what might be known about the effects of an exposure on an outcome at a given time. Because of the dependence on the research and decision-making context, clarifying these aspects for the purpose of developing a PECO is crucial (Morgan et al., 2018). The selected PECO appears below in Table 1.

Context. Systematic reviews on this matter should focus on coherent territorial units. In the case of the most developed world regions, such as the European Union, the first level of

the digital divide could be disregarded. Developing countries are currently more invested in improving their first digital divide. And in developed countries, the first level of the digital divide is mainly relevant in isolated areas of the rural world.

One of the main purposes of this protocol is to help practitioners in improving public policies revolving around digital inclusion. However, for a public policy to be effective, it should be based on a particular cultural, economic, and societal context. For example, the European Commission has developed a common digital strategy of e-government (European Commission, 2021a) and in 2017 published a Digital Competence Framework to monitor citizen's digital skills (European Commission, 2021b). Furthermore, the Digital Economy and Society Index (DESI) tracks and measures the digital performance of EU countries (European Commission, 2021c), and is a useful tool for policymakers. One of the indicators of the DESI is 'Digital Skills', which uses the DigComp framework.

Type of studies

We will select articles published in peer-reviewed journals because they are generally accepted as higher quality sources.

The focus will be on studies that are empirical in nature. This may include case studies, surveys, questionnaires, observation, interviews, observation, and focus groups. Mixed-methods studies will be included if we can extract easily the quantitative and qualitative data. Due to our PECO framework, it will be less likely to find randomized controlled trials (RCTs), case-control studies, quasi-experimental studies and cross-sectional studies. However, if we find them, they will be included in the review. Research that is focused on both the general population and significant sociodemographic groups will be included.

No language restrictions should be applied in worldwide studies. However, for regional studies, languages included must be the main ones in scientific communication (English, French, German and Spanish) and those relevant in the territory, such as Italian or Portuguese in the European Union.

The time period of systematic reviews should be carried out with reference to a significant milestone for the studied phenomenon and not based on convenience. For example, in the case of the European Union and digital competence, the publication in 2011 of 'Mapping Digital Competence: Towards a Conceptual Understanding' by the Joint Research Centre.

Table 1. Population, Exposure, Comparator, Outcomes Framework. Source: Own Elaboration.

Participants	People over 16 years old
Exposure	Any risk factors or barriers for digital exclusion to be identified
Comparator	Any enabling factors to be identified
Outcomes	<ul style="list-style-type: none"> • Risk factors or barriers which cause digital exclusion • Enabling factors which cause digital inclusion • Public measures or proposals to promote digital inclusion

Methods

In accordance with the actual trend to use validated guidelines for systematic reviews, the Preferred Reporting Items for Systematic review and Meta-Analysis Protocols (PRISMA-P) guidelines with the associated 17-item checklist has been used for the elaboration of the next protocol proposed (PRISMA-P 2015).

There are various methods for conducting systematic reviews, that have been developed in the last decade, especially in the area of Health Sciences, linked to evidence-based medicine and nursing. The method PRISMA, proposed by a group of experts who identified the minimum criteria for systematic reviews for high-quality scientific publications in 2009, with updates in 2015 and 2021: the PRISMA 2020 Statement (Page et al., 2021), was born in the field of medicine. The Campbell Collaboration (2020) also developed guidelines for systematic reviews in social sciences in 2014, updated in December 2020, which have been recommended for social interventions by the EPPI-Centre (Evidence for Policy and Practice Information and Co-ordinating Centre) of the University College London.

PRISMA is available to conduct reviews in all scientific areas, it is one of the most used methods, even in social sciences, and it is present and rising in a wide variety of journals and conferences. For example, Scopus database collects 510 documents with the term systematic review in title published in the area of Social Sciences in 2016, of which only 15 (2.94%) were performed with the PRISMA method, that increased to 1635 in 2020, of which 186 (11,37%) adopted PRISMA. Nevertheless, reviews based on Campbell method are published almost exclusively in *Campbell Systematic Reviews*.

The Joanna Briggs Collaboration, with more than 75 collaborating entities across 40 countries, established by the Institute of the University of Adelaide (Australia) in 1996, has also developed some evidence-based tools to improve healthcare practices and health outcomes: the most recent the JBI Manual for Evidence Synthesis, that endorses the PRISMA statement to guide systematic reviews (Aromataris and Munn, 2020). There is a chapter dedicated to mixed-methods systematic reviews on this manual, developed by the JBI Mixed Methods Review Methodology Group (Lizarondo et al., 2020). We decided to follow the recommendations of both Stern et al. (2020) and Lizarondo et al. (2020), and take a convergent segregated approach to the data, which involves a simultaneous and independent synthesis of quantitative and qualitative data that will generate quantitative and qualitative evidence.

Information Sources

The search action will be performed using Web of Science, Scopus, Educational Resources Information Center (ERIC), Library and Information Science Abstracts (LISA), ProQuest, MEDLINE, PubMed, SocINDEX and Cairn.info.

It would be convenient to include national databases of scientific literature of the selected region. Google Scholar will be used for finding grey literature. Citation chaining of all included studies will also be undertaken.

Search Strategy

The search strategy will consist of several key descriptors combined with Boolean search operators and will be based on our PECO statement (Supplemental Appendix A). Search strings will be adapted to each database according to their indexing methods. The terms will be searched into the title, abstract, and keywords fields. Searches number 11 and after will be performed to refine the previous search equations. In addition, the searches will be divided to classify the articles by the three services (education, health, and social services). See an example of a search string designed for use within Scopus in Supplemental Appendix B.

Study Records: Data Management, Screening and Selection Process

Automation tools won't be used. However, the reference management software Endnote will be used to merge the electronic search results and eliminate duplicates.

The screening and selection process will be carried out as follows. Firstly, one reviewer (T. Morte) will independently examine all titles and abstracts yielded by the search against the inclusion criteria to remove irrelevant results. 25% of the screened studies will be cross checked by the second reviewer (M. Esteban). The second reviewer (M. Esteban) will also be responsible for confirming a random sample of at least 25% of the excluded studies.

Secondly, both reviewers will retrieve and assess the full-text versions of all potentially relevant results to more accurately screen the finally chosen ones. See profile of authors in Supplemental Appendix C.

Any disagreement will be resolved through discussion. Exclusion and inclusion reasons will be documented. None of the review authors will be blind to the authors, institutions, or the journals responsible for the publication of the articles.

Data Items and Data Extraction Process

Data extraction will be carried out by one reviewer (T. Morte) with verification by the second reviewer (M. Esteban) in order to reduce bias and errors. The second review will confirm the extracted data of a random sample of at least 25%. Disagreements between reviewers regarding data extraction will be resolved by consensus.

Information for data extraction will include: year of publication, authors, author's location, title, journal name, area (general, education, healthcare or welfare services), funding sources, competing interests of study authors, the objectives, the method, the study type, sample size, sociodemographic

characteristics of the sample, country, risk factors or barriers which cause digital exclusion, enabling factors which cause digital inclusion, public measures to promote digital inclusion, result indicators results, the definition and operationalization of the risk factors, the definition and operationalization of the enabling factors and primary outcomes, proposals and recommendations to end the e-government divide. Coding of the studies will be done to ensure that all articles fulfil the selected criteria. An Excel table will be created to organize the data.

Outcomes and Prioritization

The primary outcome will be the enabling factors, the risk factors and the barriers that condition digital interaction between citizens and e-government services identified in the analysed studies. As far as possible, specific factors will be identified for each area of electronic government (education, healthcare and welfare sector) and by sociodemographic groups. Also, a secondary outcome will be the public measures or recommendations that the articles propose to promote digital inclusion. Furthermore, an additional outcome will be the identification of social groups that are at higher risk of being digitally vulnerable.

If it is relevant, the final part of the content analysis will consist of looking at how the variables (enabling factors, risk factors and barriers) were conceptualized and operationalized to not only list the skills, but to also provide them with a conceptual definition and operational component.

Risk of Bias Individual Studies

Review authors will aim to minimize the potential impact of reporting bias by ensuring the inclusion of the most important databases and resources to find relevant publications and by staying alert for duplication of data.

To minimize selection bias, it is advisable that the selected articles will be independently analysed by international academic experts in the emergent area of Educommunication, recognized since the seventies by the UNESCO, with origin in three different disciplines (Communication, Education and Psychopedagogy), in attention to the interdisciplinary nature of the research.

At least four educommunicators with research experience and diverse professional origins should participate in this process, to guarantee the diversity of perceptions and analysis. Educommunication is defined as the relationship between Education and Communication, since it perceives education as a communicative phenomenon and proposes a pedagogical methodology founded in the training in communicative competences, including digital ones, and an intensive and critical thinking use of media and all types of information sources. Therefore, Communication is considered a key factor in the learning process (Aparici, 2010).

Four groups of two reviewers each will be created randomly. The experts will be paired randomly. Each group will perform an analysis of 25% of the articles with the same standardized

format as the authors. Therefore, 100% of the articles will be assessed by our experts. Trustworthiness and methodological quality of studies will be assessed using the Mixed Methods Appraisal Tool (MMAT). It will be applied to seven screening questions to the articles, two common for all types and five according to the category of study design, with three possible answers (yes, no and can't tell), about research questions, data collection, rationale, integration of data, findings, interpretation of results and outputs (Hong et al, 2018).

Each group will also be responsible for confirming the exclusion of at least 10% of the previous excluded studies. The advisers may also propose the inclusion of articles that do not appear in the sample. Any discrepancies in the analysis will be resolved by consensus between the academic experts and the authors.

Data Synthesis

The systematic review will include quantitative and qualitative studies. Diversity in study populations, expositions, comparators, outcomes and design mean that conducting a meta-analysis will not be possible. Therefore, we will not perform a meta-analysis, as we consider that studies will not be sufficiently homogeneous.

A systematic narrative synthesis will be provided for the quantitative and the qualitative data. The narrative synthesis will analyse the relationships and findings both within and between the included studies. We will discuss the evidence of each study side-by-side, to generate new insights (Centre for Evaluation, 2021). In addition, the information will be presented in tables to summarize the characteristics and findings of the included studies.

We will take a convergent segregated approach, so we will synthesize independently the quantitative and qualitative data, and after that, we will integrate them. This evidence will be organized and integrated together to generate an overall analysis. According to Stern et al. (2020), this approach is convenient when the focus of the review is on different aspects or dimensions of a particular phenomenon.

For the narrative synthesis, we will follow the guidance on the conduct of narrative synthesis by Popay et al. (2006) according to the last three stages: developing a preliminary synthesis, exploring relationships in the data, and assessing the robustness of the synthesis product. However, we will omit the first stage (developing a theoretical model) as it only applies to interventions.

The conclusions will be based only on findings from the synthesis of the studies included. The conditioning factors involved will be identified and explained and the recommendations present in the literature will be summarized, but no proposals will be made.

Meta-Bias(es)

The advice of the four international experts in Educommunication indicated above will be sought to detect publication

bias. They will carry out a critical reading of the results of the systematic review, in order to detect and avoid possible biases from the use of studies with methodological deficiencies and the analysis performed by the review authors.

Confidence in Cumulative Evidence

The Educommunication experts will carry out a global assessment of the confidence of the evidences identified in the review, which will be used for the discussion of the results. The experts will apply their proven experience in the design and implementation of educommunication projects and resources. A Likert scale from 1 to 4 will be used, where 4 is the maximum confidence, based on the average score of five items in the articles or studies analysed: the soundness of the methodology used, the representativeness of the sample on the population studied, the diversity and timeliness of the technologies involved, if the intervention proposals have been applied and if key performance indicators are proposed to evaluate the result of the measures.

Conclusion

This mixed-methods systematic review protocol aims to synthesize findings and to give an overview of the current understanding of the conditioning factors that will improve digital inclusion of citizens through their interactions with e-government services related to the welfare state sector. The adoption of the PRISMA protocol to guide the systematic review will provide methodological soundness and will guarantee the transparency of the research process. All the items of the protocol have been applied.

The main limitation of this study results from the disregard of the first level of the digital divide and the search criteria, as data will be limited to peer-reviewed published work and a time period between 2010 and 2021 will be added. Furthermore, this systematic review will not extend to a meta-analysis. Despite these limitations, the proposed protocol adopts a well-established methodology based on the PRISMA method. Regarding ethical considerations, since all the data will be obtained from primary research studies and openly accessible sources, no formal ethical approval will be required.

This review has the potential to offer a valuable contribution to the e-government field since we intend to elucidate which digital competences are necessary for the citizens to use effectively the e-government services. Also, the results of this systematic review will outline the enabling factors, the risk factors and the barriers that are involved in the digital interaction between citizens and educational, social and health online public services. In addition, a secondary output will be to describe which social groups are at higher risk of being digitally vulnerable. The results of this study might be influenced by the social, economic, cultural and technological aspects of each country.

This research is relevant because digital gaps may aggravate the inequalities that exist in society. The COVID-19 pandemic has exacerbated the digital vulnerability of citizens since most countries and municipalities are forcing e-government and pushing more online services. The findings of this study will be of interest to policymakers who want to make more user-centric policies that take into account digital skills in the design of online services.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the Spanish Ministry of Universities under Grant FPU20/00469 through a predoctoral fellowship to T. Morte under supervision Dr. M. Esteban and the S29_20R GICID Research Group on Digital Communication and Information, research reference group of Aragon (Spain), BOA *n.* 62, dated 26/03/2020, Resolution of March 13, 2020: 8574–8655, funded by the European Social Fund for Regional Development (ERDF).

ORCID iDs

Tamara Morte-Nadal  <https://orcid.org/0000-0003-4459-9361>
Miguel Angel Esteban-Navarro  <https://orcid.org/0000-0001-6221-2824>

Supplemental Material

Supplemental material for this article is available online.

References

- Aparici, R. (2010). Introducción: La educomunicación más allá del 2.0. In R. Aparici(Coord) (Ed.), *Educomunicación: más allá del 2.0*. Gedisa Editorial.
- Aromataris, E., & Munn, Z. (Eds.) (2020). *JBIM Manual for Evidence Synthesis*. JBI. <https://doi.org/10.46658/JBIMES-20-01>
- Belanger, F., & Carter, L. (2009). The impact of the digital divide on e-government use. *Communications of the ACM*, 52(4), 132–135. <https://doi.org/10.1145/1498765.1498801>
- Centre for Evaluation. (2021). *Evidence synthesis*. <https://www.lshtm.ac.uk/research/centres/centre-evaluation/evidence-synthesis>
- Coverdale, J., Roberts, L. W., Beresin, E. V., Louie, A. K., Brenner, A. M., & Balon, R. (2017). Some potential “pitfalls” in the construction of educational systematic reviews. *Academic Psychiatry*, 41(2), 246–250. <https://doi.org/10.1007/s40596-017-0675-7>
- Damascene, J., & Andersson. (2019). The public value of e-government- a literature review. *Government Information Quarterly*, 36(2), 167–178. <https://doi.org/10.1016/j.giq.2019.01.001>
- De, R., Pandey, N., & Pal, A. (2020). Impact of digital surge during COVID-19 pandemic: A viewpoint on research and practice.

- International Journal of Information Management*, 55(1), 102171. <https://doi.org/10.1016/j.ijinfomgt.2020.102171>
- Dodel, M., & Aguirre, F. (2018). *Digital inequalities' impact on progressive stages of e-government development* [Conference session]. *Proceedings of the 11th international conference on theory and practice of electronic governance, galway, Ireland (ICEGOV'18)*, Galway, Ireland, 04 April 2018, ACM. <https://doi.org/10.1145/3209415.3209475>
- Ebbers, W.E., Jansen, M.G.M., & van Deursen, A. (2016). Impact of the digital divide on e-government: Expanding from channel choice to channel usage. *Government Information Quarterly*, 33(4), 685–692. <https://doi.org/10.1016/j.giq.2016.08.007>
- Epstein, D., Nisbet, E. C., & Gillespie, T. (2011). Who's responsible for the digital divide? Public perceptions and policy implications. *The Information Society*, 27(2), 92–104. <https://doi.org/10.1080/01972243.2011.548695>
- Esteban-Navarro, M.A., García-Madurga, M.A., Morte-Nadal, T., & Nogales-Bocio, A.I. (2020). The rural digital divide in the face of the covid-19 pandemic in Europe—recommendations from a scoping review. *Informatics*, 7(4), 1–18. <https://doi.org/10.3390/informatics7040054>
- European Commission (2021a). *E-Government action plan*. <https://digital-strategy.ec.europa.eu/en/policies/egovernment-action-plan>
- European Commission (2021b). *DigComp*. <https://ec.europa.eu/jrc/en/digcomp>
- European Commission (2021c). *The digital Economy and society Index (DESI)*. <https://digital-strategy.ec.europa.eu/en/policies/desi>
- Fernández-Batanero, J.M., Montenegro-Rueda, M., Fernández-Cerero, J., & García-Martínez, I. (2020). Digital competences for teacher professional development. Systematic review. *European Journal of Teacher Education*, 40(4), 1–20. <https://doi.org/10.1080/02619768.2020.1827389>
- Fernández-Ramos, A. (2016). Factores de éxito en tutoriales en línea de competencias informacionales. Revisión sistemática. *Revista Española de Documentación Científica*, 39(2), e126. <http://doi.org/10.3989/redc.2016.2.1291>
- Frohlich, K., Nieminen, M., & Pinomaa, A. (2020). Factors influencing the adoption of m-government: Perspectives from a Namibian marginalised community. In *International Conference on e-Infrastructure and e-Services for Developing Countries AFRICOMM 2019*. Springer. https://doi.org/10.1007/978-3-030-41593-8_17
- Gough, D., Oliver, S., & Thomas, J. (2017). Introducing systematic reviews. In: D. Gough, S. Oliver, & J. Thomas (Eds.), *An Introduction to Systematic Reviews*. Sage.
- Grabowsky, A., & Weisbrod, L. (2020). The effectiveness of library instruction for graduate/professional students: A systematic review and meta-analysis. *Evidence Based Library and Information Practice*, 15(2), 100–137. <https://doi.org/10.18438/ebliip29657>
- Hemant, C., & Baboo, N. (2010). Strategies to increase e-government take-up: Looking beneath statistics. *Global Journal of Management and Business Research*, 10(1), 104–114. <https://journalofbusiness.org/index.php/GJMBR/article/view/14>
- Hong, Q.N., Pluye, P., Fàbregues, S., Barlett, G., Boardman, F., Cargo, M., Dagenais, P., Gagnon, M.-P., Frances Griffiths, F., Nicolau, B., O' Cathain, A., Rousseau, M.-C., & Vedel, I. (2018). *Mixed methods appraisal tool (MMAT). Version 2018. User guide*. McGill University, Department of Family Medicine. http://mixedmethodsappraisaltoolpublic.pbworks.com/w/file/fetch/127916259/MMAT_2018_criteria-manual_2018-08-01_ENG.pdf
- Khilnani, A., Schulz, J., & Robinson, L. (2020). The COVID-19 pandemic: new concerns and connections between eHealth and digital inequalities. *Journal of Information, Communication and Ethics in Society*, 18(3), 393–403. <https://doi.org/10.1108/JICES-04-2020-0052>
- Kofi, M. I., Vera, P., & Jianing, M. (2017). Predictors of e-government services adoption: A case study of Russian students in China. *International Journal of Management and Fuzzy Systems*, 3(5), 67–74. <https://doi.org/10.11648/j.ijmfs.20170305.12>
- Kraus, S., Breier, M., & Dasí-Rodríguez, S. (2020). The art of crafting a systematic literature review in entrepreneurship research. *International Entrepreneurship and Management Journal*, 16(3), 1023–1042. <https://doi.org/10.1007/s11365-020-00635-4>
- Lindgren, I., Madsen, C.O., Hofmann, S., & Melin, U. (2019). Close encounters of the digital kind: A research agenda for the digitalization of public services. *Government Information Quarterly*, 36(3), 427–436. <https://doi.org/10.1016/j.giq.2019.03.002>
- Lizarondo, L., Stern, C., Carrier, J., Godfrey, C., Rieger, K., Salmund, S., Apostolo, J., Kirkpatrick, P., & Loveday, H. (2020). Chapter 8: Mixed methods systematic reviews. In: E. Aromataris, & Z. Munn (Eds.), *jbi manual for evidence synthesis*. JBI. <https://doi.org/10.46658/JBIMES-20-09>
- Lopez, J.J.S., & Castañeda, L.A.R. (2015, October 24–26). Digital inclusion and social perspective—Critical discussion based on a systematic review of the literature [Conference session]. *Proceedings of the 14th international conference*, Maynooth, Ireland, WWW/Internet 2015. <http://www.iadisportal.org/digital-library/mdownload/digital-inclusion-and-social-perspective-%C2%96-critical-discussion-based-on-a-systematic-review-of-the-literature>
- Ma, L., & Zheng, Y. (2017). Does e-government performance actually boost citizen use? Evidence from European countries. *Public Management Review*, 20(10), 1513–1532. <https://doi.org/10.1080/14719037.2017.1412117>
- Mensah, I. K. (2019). Predictors of electronic government services adoption: The African students' perspective in China. *International Journal of Public Administration*, 42(12), 997–1009. <https://doi.org/10.1080/01900692.2019.1572621>
- Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Shekelle, P., & Stewart, L.A., PRISMA-P Group. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews*, 4(1), 1–9. <https://doi.org/10.1186/2046-4053-4-1>
- Morgan, R. L., Whaley, P., Thayer, K. A., & Schünemann, H. J., et al. (2018). Identifying the PECO: A framework for formulating

- good questions to explore the association of environmental and other exposures with health outcomes. *Environment International*, 121(1), 1027–1031. <https://doi.org/10.1016/j.envint.2018.07.015>
- Niehaves, B., Gorbacheva, E., & Plattfaut, R. (2012). *The digital divide VS the e-government divide: Do socio-demographic variables (still) impact e-government use among onliners?* The 20th European Conference on information systems (ECIS'12). AISEL. <https://aisel.aisnet.org/ecis2012/199>
- Page, M.J., McKenzie, J.E., Bossuyt, P.M., Hoffmann, T.C., Mulrow, C.D., Shamseer, L., Tetzlaff, J.M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J.M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., McGuinness, L. A., & Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *Systematic Reviews*, 10(1), 1–9. <https://doi.org/10.1186/s13643-021-01626-4>
- Pettersson, F. (2018). On the issues of digital competence in educational contexts – a review of literature. *Education and Information Technologies*, 23(3), 1005–1021. <https://doi.org/10.1007/s10639-017-9649-3>
- Popay, J., Roberts, H., Sowden, A., Petticrew, M., Arai, L., Rodgers, M., Britten Roen, K., & Duffy, S. (2006). *Guidance on the conduct of narrative synthesis in systematic reviews. A product from the ESRC methods programme.* <https://cutt.ly/Tmi7xIV>
- Rana, N. P., Dwivedi, Y. K., Lal, B., Williams, M. D., & Clement, M. (2017). Citizens' adoption of an electronic government system: towards a unified view. *Information Systems Frontiers*, 19(3), 549–568. <https://doi.org/10.1007/s10796-015-9613-y>
- Riggins, F., & Dewan, S., (2005). The digital divide: Current and future research directions. *Journal of the Association for Information Systems*, 6(12), 298–337. <https://doi.org/10.17705/1jais.00074>
- Rodriguez-Hevia, L.F., Navio-Marco, J., & Ruiz-Gomez, L.M. (2020). Citizens' involvement in e-government in the European union: The rising importance of the digital skills. *Sustainability*, 12(17), 1–19. <https://doi.org/10.3390/su12176807>
- Sanchez-Caballe, A., Gisbert-Cervera, M., & Esteve-Mon, F. (2020). The digital competence of university students: A systematic literature review. *Aloma*, 38(1), 63–74. <https://doi.org/10.51698/aloma.2020.38.1.63-74>
- Scheerder, A., van Deursen, A., & van Dijk, J. (2017). Determinants of Internet skills, uses and outcomes. A systematic review of the second- and third-level digital divide. *Telematics and Informatics*, 34(8), 1607–1624. <https://doi.org/10.1016/j.tele.2017.07.007>
- Sepúlveda, J. J., & Ramirez, L. A. (2015). Digital inclusion and social perspective - Critical discussion based on a systematic review of the literature. In P R. L. Isaias (Ed.), *Proceedings of the 14th International Conference WWW/Internet (2015, October 24-26)* (pp. 209–212). IADIS, Maynooth, Greater Dublin, Ireland. <http://www.iadisportal.org/digital-library/digital-inclusion-and-social-perspective-%C2%96-critical-discussion-based-on-a-systematic-review-of-the-literature>
- Shamseer, L., Moher, D., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Shekelle, P., & Stewart, L.A., the PRISMA-P Group. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. *BMJ*, 349(g7647), 1–25. <https://doi.org/10.1136/bmj.g7647>
- Spante, M., Hashemi, S. S., Lundin, M., & Algers, A. (2018). Digital competence and digital literacy in higher education research: Systematic review of concept use. *Cogent Education*, 5(1), 1–21. <https://doi.org/10.1080/2331186X.2018.1519143>
- Stern, C., Lizarondo, L., Carrier, J., Godfrey, C., Rieger, K., Salmund, S., Apóstolo, J., Kirkpatrick, P., & Loveday, H. (2020). Methodological guidance for the conduct of mixed methods systematic reviews. *JBI Evidence Synthesis*, 18(10), 2108–2118. <https://doi.org/10.11124/JBISRIR-D-19-00169>
- Sundberg, L. (2019). Electronic government: Towards e-democracy or democracy at risk? *Safety Science*, 118, 22–32. <https://doi.org/10.1016/j.ssci.2019.04.030>
- Svoboda, P., Lorenzová, J., Jirkovská, B., Mynaříková, L., Vališová, A., & Pavel, A. (2020). Research of teachers' digital competences in an international context. In *The impact of the 4th industrial revolution on engineering education. icl 2019. advances in intelligent systems and computing*. Springer, https://doi.org/10.1007/978-3-030-40271-6_77
- Taejun, L., Byung-Kwan, L., & Seulki, L.G. (2020). The effects of information literacy on trust in government websites: Evidence from an online experiment. *International Journal of Information Management*, 52(1), 1–13. <https://doi.org/10.1016/j.ijinfomgt.2020.102098>
- The Campbell Collaboration (2020). *Campbell systematic reviews: Policies and guidelines*. Campbell Collaboration. <https://doi.org/10.4073/cpg.2016.1>
- Van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., & de Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in Human Behavior*, 72, 577–588. <https://doi.org/10.1016/j.chb.2017.03.010>
- Vuorikari, R., Punie, Y., Carretero-Gomez, S., & Van den Brande, G. (2016). *DigComp 2.0: The digital competence framework for citizens. Update phase 1: The conceptual reference model*. Publication Office of the European Union. <https://doi.org/10.2791/11517>
- Weerakkody, V., Irani, Z., Kapoor, K., Sivarajah, U., & Dwivedi, Y.K. (2017). Open data and its usability: an empirical view from the Citizen's perspective. *Information Systems Frontiers*, 19(2), 285–300. <https://doi.org/10.1007/s10796-016-9679-1>
- Wirtz, B., & Tuna, O. (2017). Determinants of citizen usage intentions in e-government: An empirical analysis. *Public Organization Review*, 17(3), 353–372. <https://doi.org/10.1007/s11115-015-0338-7>
- Yu, T., Lin, M., & Liao, Y. (2017). Understanding factors influencing information communication technology adoption behavior: The moderators of information literacy and digital skills. *Computers in Human Behavior*, 71, 196–208. <https://doi.org/10.1016/j.chb.2017.02.005>
- Zhao, F., Collier, A., & Deng, H. (2014). A multidimensional and integrative approach to study global digital divide and e-government development. *Information Technology & People*, 27(1), 38–62. <https://doi.org/10.1108/ITP-01-2013-0022>